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WATER RESOURCES



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Approved for Consultants:



S Johnson
Deputy Study Leader

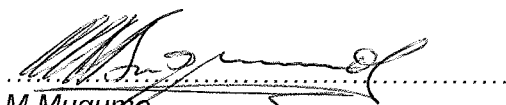


A Pepperell
Study Leader

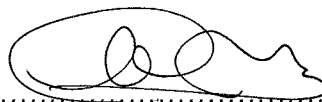
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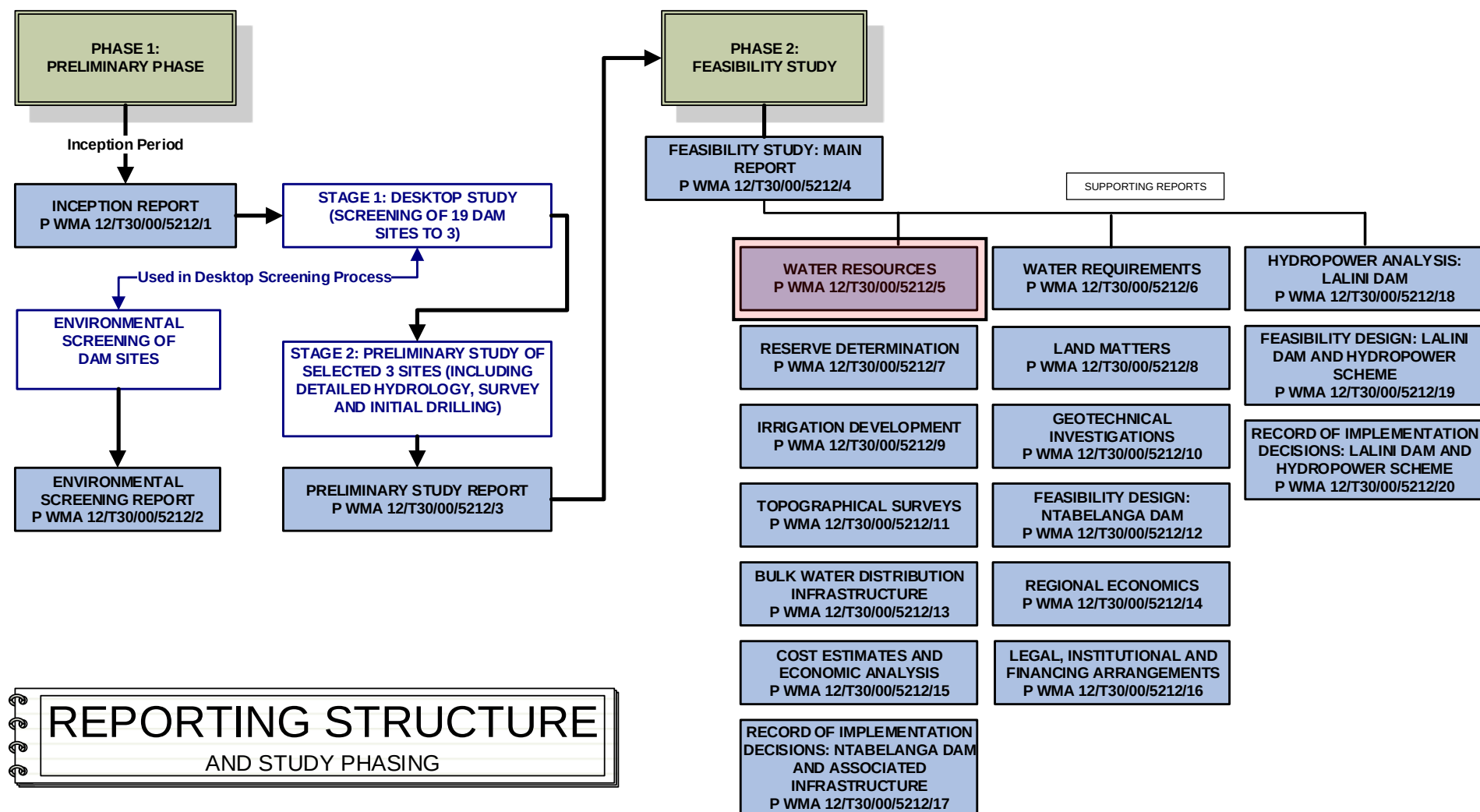
M Mugum
Chief Engineer: Options Analysis (South)



L S Mabuda
Chief Director: Integrated Water Resource Planning

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Prepared for: Directorate – Options Analysis

Prepared by: Jeffares & Green (Pty) Ltd, P O Box 794, Hilton, 3245

Tel: 033 343 6700, Fax: 033 343 6701

Contact: Mr A Pepperell

Email: pepperella@jgi.co.za

Note on Departmental Name Change:

In 2014, the Department of Water Affairs changed its name to the Department of Water and Sanitation, which happened during the course of this study. In some cases this was after some of the study reports had been finalized. The reader should therefore kindly note that references to the Department of Water Affairs and the Department of Water and Sanitation herein should be considered to be one and the same.

Note on Spelling of Laleni:

The settlement named Laleni on maps issued by the Surveyor General is locally known as Lalini and both names therefore refer to the same settlement.

EXECUTIVE SUMMARY

INTRODUCTION

The Mzimvubu River catchment in the Eastern Cape of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country which is still largely unutilised, is considered by the Eastern Cape Provincial Government as offering one of the best opportunities in the Province to achieve such development. In 2007, a special-purpose vehicle (SPV) called the Accelerated and Shared Growth Initiative for South Africa – Eastern Cape (Pty) Ltd (ASGISA-EC) was formed in terms of the Companies Act to initiate planning and to facilitate and drive the Mzimvubu River Water Resources Development.

As a result of this the Department of Water and Sanitation (DWA) commissioned the Mzimvubu Water Project with the overarching aim of developing water resources schemes (dams) that can be multi-purpose reservoirs in order to provide benefits to the surrounding communities and to provide a stimulus for the regional economy, in terms of irrigation, domestic water supply and the potential for hydropower generation amongst others.

The study commenced in January 2012 and was completed by October 2014 in three stages as follows:

- *Inception;*
- *Phase 1 – Preliminary Study; and*
- *Phase 2 – Feasibility Study.*

The purpose of this study was to make use of that information previously collected, to update and add to this information, and to undertake more focussed and detailed investigations and feasibility level analyses on the dam site options that have then been identified as being the most promising and cost beneficial.

A Water Resources Assessment was undertaken when comparing three dam development options in Phase 1 of the study and subsequently reviewed and updated once a single preferred development option had been selected. This review and update were undertaken during Phase 2 of the study. This report is structured in a similar manner to the phased approach and is split into the Phase 1 and Phase 2 water resource assessments. This report constitutes the Water Resources Study (P WMA 12/T30/00/5212/5) of the suite of reports generated under the Mzimvubu Water Project.

PHASE 1

The water resources assessment in Phase 1 undertook to investigate three preferred dam sites and, ultimately, to provide input into the selection of the final site for detailed analyses. The three preferred dam sites were the proposed Ntabelanga, Somabadi and Thabeng dams on the Tsitsa and Kinira Rivers, respectively.

The proposed Ntabelanga Dam is located on the Tsitsa River within the quaternary catchment T35E and has a contributing catchment area of 1 967 km². The proposed Thabeng Dam is located on the Kinira River and straddles three quaternary catchments, namely T33C, T33D and T33E and has a contributing catchment area of 2 135 km². The proposed Somabadi Dam, which is also located on the Kinira River, is located within the quaternary catchment T33E and has a contributing catchment area of 2 380 km².

The yield modelling exercise required various inputs in order to accurately represent each system. These inputs included rainfall, evaporation, simulated and stochastic stream flows, Environmental Water Requirement (EWR) allocations, sedimentation volume allocations and dam basin characteristics (obtained from a LiDAR survey, cf. Report No. P WMA 12/T30/00/5212/11). The EWR requirements were determined through a Rapid Reserve Determination of each site (cf. Report no. P WMA 12/T30/00/5212/7). The results from the Rapid Reserve Determination, undertaken as a component of the study, were used in the yield modelling of the three dams and were as follows:

- Somabadi Dam - Class C EWR, equating to a 29.08% of the MAR;
- Thabeng Dam - Class C EWR, equating to a 29.08% of the MAR; and
- Ntabelanga Dam - Class D EWR, equating to a 15.90% of the MAR.

The sedimentation for the three dam sites was determined using the Rooseboom method (1992), which was used to determine the conceptual 50-year sediment volume (V_{50}) that needs to be allocated into the total dam storage capacity. Due to the extremely high sediment loads in the rivers and the large-scale erosion within the catchment, the 95% non-exceedance V_{100} values were adopted, rather than the V_{50} value as is the norm, for each dam. The following summarises the V_{100} sediment volumes adopted for each dam:

- Somabadi Dam - 42.80 million m^3 ;
- Thabeng Dam - 38.44 million m^3 ; and
- Ntabelanga Dam - 29.30 million m^3 .

Monthly rainfall files were created for each quaternary catchment within the Kinira and Tsitsa River catchments. This was used as input into the rainfall-runoff modelling and the yield modelling exercises. The mean annual quaternary catchment rainfall ranged from just below 720 mm to marginally under 1 000 mm in the Kinira River catchment and from slightly lower than 800 mm to marginally under 1 100 mm in the Tsitsa River catchment.

The rainfall-runoff modelling was undertaken using the WRS2000 model. The quaternary catchments were simulated using calibrated catchment parameters that represent the climatic and physiographic conditions. The models for both catchments were calibrated against available gauged stream flow data. The Kinira River catchment system was calibrated against recorded data from stream flow gauges T3H002 (1949 to 2009) located at the outlet of quaternary catchment T33C and T3H007 (1984 to 2009) located at the outlet of quaternary catchment T33G.

The Tsitsa River catchment system was calibrated against recorded data from stream flow gauges T3H009 (1964 to 2009) located at the outlet of quaternary catchment T35C and T3H006 (1983 to 2003) located at the outlet of quaternary catchment T35K. The calibrations were considered sufficient for use in this phase of the study. The mean annual quaternary catchment runoff for the Kinira River catchment ranged from 50.59 million m^3 in T33C (area of 368.1 km^2) to 145.68 million m^3 in T33F (area of 438.7 km^2). The mean annual quaternary catchment runoff for the Tsitsa River catchment ranged from 42.45 million m^3 in T35F (area of 359.6 km^2) to 110.29 million m^3 in T35H (area of 521.0 km^2).

Both river systems, including all three dam sites, were simulated using the Water Resources Yield Model – Information Management System (WRYM-IMS) in order to quantify the sustainable yield of each dam site for a variety of proposed dam volumes. A range of dam volumes were simulated at each site (typically five scenarios ranging from 0.10 MAR to 1.50 MAR), each accounting for existing water uses, sedimentation and EWR allowances. These simulations presented a range of yields at various assurances of supply.

The results highlighted that the Ntabelanga Dam was the superior or better dam site from a water resources perspective, not only for the provision of raw water to meet potable water required and irrigation requirements, but also to potentially generate hydropower within the Tsitsa River system. This was confirmed in the economic analysis of the three options (cf. Report no. P WMA 12/T30/00/5212/3). Hence, a more detailed water resources assessment was undertaken on the Ntabelanga Dam, with a higher level assessment being undertaken of the hydropower generation potential of the Tsitsa River at Lalini (Tsitsa Falls).

PHASE 2

The same methodology adopted for Phase 1 was followed in Phase 2, with two changes:

1. Some of the input information was updated, namely:
 - a. Rainfall;
 - b. Land use;
 - c. Sedimentation; and
 - d. EWR.
2. Hydropower scenarios were included through the addition of a second dam at Lalini (Tsitsa Falls).

New monthly rainfall files were created for each quaternary catchment within the Tsitsa River catchment. The change came about due to the inclusion of additional rainfall gauges of shorter duration. These additional short gauged records were used in the patching process of the longer gauges used in Phase 1 and to increase the variability between the final quaternary catchment rainfall files. The Phase 2 assessment resulted in a more realistic rainfall distribution across the catchment due to the increase in variability between the individual rain gauge sites. The results from the rainfall analysis given in Table 1 were used in the rainfall-runoff and yield modelling exercises (as presented in the table below), which had a positive impact by increasing the available stream flow across the catchment due to an overall increase in rainfall depth.

Table 1: Mean Annual Precipitation of the Tsitsa Quaternary Catchments

Quaternary Catchment	Phase 2 MAP (mm)	WR2005 MAP (mm)
T35A	927.9	912.0
T35B	867.5	915.0
T35C	974.2	1 008.0
T35D	816.6	818.0
T35E	941.1	918.0
T35F	907.5	860.0
T35G	705.7	759.0
T35H	935.7	845.0
T35J	985.6	924.0
T35K	828.7	783.0
T35L	657.6	764.0

The land use inputs from Phase 1, i.e. commercial forestry, irrigation and invasive alien plants (IAPs) were updated due to the recent availability of a biodiversity study undertaken in the Ntabelanga Dam catchment, up to and including quaternary catchment T35E. Commercial forestry area increased from 334.0 to 380.3 km² and IAPs' area increased from 37.5 to 41.0 km² from Phase 1 to Phase 2.

The sedimentation allowance was updated in Phase 2, from using the Rooseboom (1992) method to using the updated version of the same method, developed by the WRC (2010). This method was also used to determine the incremental sedimentation allowance for the proposed Lalini Dam, below Ntabelanga Dam. The new values selected for the Ntabelanga and Lalini dams were the V_{50} values of 35.7 and 32.1 million m^3 , respectively.

The EWR for the Ntabelanga Dam in Phase 2 was determined through an Intermediate Reserve Determination (cf. Report no. P WMA 12/T30/00/5212/7), which determined the river reach associated with the Ntabelanga Dam to be an ecological Class C, allocating 87.25 million m^3 (20.4% of the MAR) as an annual average. Refer to Report no. P WMA 12/T30/00/5212/7 for more detail.

The updated inputs were used in the rainfall-runoff modelling based on the same configuration as in the Phase 1 study. Through a process of calibrating the poor quality stream flow data and using the new rainfall and land use inputs, better calibrations were achieved using WRSM2000. These simulated natural stream flow results were accepted and used in the stochastic and yield analyses.

The simulated natural mean annual stream flow was modelled to be 428.49 million m^3/a at the Ntabelanga Dam site, with the present day mean annual runoff (MAR_{PD}) at the same site being slightly lower at 415.0 million m^3/a . This proportionally low reduction in MAR highlighted the relatively small development level within the catchment, thus, indicating the potential for water resource development.

The yield modelling of the Ntabelanga Dam for raw water abstraction (59.86 million m^3/a for potable water and irrigation requirements, based on the high requirement scenario) used the same system configuration as in Phase 1, with the updated input information. In spite of an increase in sedimentation volume, EWR allowance and stream flow reducing land use, the yield of the system increased from Phase 1. This increase was as a result of the higher simulated natural stream flow values. Similarly to Phase 1, a range of dam volumes were assessed from 0.10 MAR to 1.50 MAR.

The Ntabelanga Dam can supply the year 2050 water requirement scenario of 60.2 million m^3/a at a 98% assurance of supply from a relatively small impoundment of 60.0 million m^3 (≈ 0.15 MAR). Any increase in impoundment volume above 60.0 million m^3 has a large impact on increasing the yield due to the large proportional increase in live storage once the dead storage allocation has been overcome. The high requirements scenario from the Ntabelanga Dam accounts for the provision of the following water uses:

- Class C EWR from Ntabelanga Dam;
- Raw water supply for end-user potable water use; and
- Irrigation potential (cf. Report no. P WMA 12/T30/00/5212/9).

INITIAL HYDROPOWER ANALYSIS

A series of hydropower scenarios were initially undertaken for varying dam sizes and combinations at the Ntabelanga and Lalini Dam sites.

Four scenarios were undertaken for a “maximum” Ntabelanga Dam volume (489.7 million m^3 – 1.18 MAR_{PD}) with a water requirement scenario of 60 million m^3/a , run conjunctively with various Lalini Dam sizes (82.8, 165.6, 414.0 and 621.0 million m^3).

An additional four scenarios were undertaken for a “minimum” Ntabelanga Dam volume (60.0 million m^3 – 0.15 MAR), again with a water requirement of 60 million m^3/a , run conjunctively with various Lalini Dam sizes (207.0, 414.0, 621.0 and 828.0 million m^3).

All eight scenarios aimed to determine the average/base load hydropower generation capability of the combined system at Lalini Dam.

The conclusion of this initial hydropower analysis indicated that between 25 and 30 MW of hydropower could be generated on average, and that the optimum configuration was with the Ntabelanga Dam at its maximum feasible capacity of 489.7 million m³ or 1.18 MAR_{PD}, and with the Lalini Dam at a minimum capacity of 207.0 million m³ or 0.18 MAR_{PD}.

This initial analysis is described in Report Nos. P WMA 12/T30/00/5212/12 and 15.

FURTHER INVESTIGATIONS UNDERTAKEN

The basis of this approach was that the generating of hydropower could be used to cross-subsidize the significant energy costs required for pumping water for the irrigation and domestic water supply schemes proposed to be supplied from the Ntabelanga Dam. The agricultural water requirements proposed for the Tsolo area would require lifting the water more than 150 m, which would normally render such a scheme non-viable in terms of the pumping cost component of water supplied, unless hydropower is developed to reduce the net unit cost of water.

A more detailed hydropower analysis was therefore undertaken to assess the output potential of the Lalini Dam hydropower scheme when used conjunctively with the Ntabelanga Dam. This analysis used the detailed hydrology developed for the catchment and the naturalised and historical flow series that was developed therefrom.

In order to facilitate this analysis detailed investigations were undertaken of the Lalini Dam components of the scheme, inter alia:

- *detailed topographical survey and positioning of the proposed Lalini Dam,*
- *geotechnical investigations of the dam site, sources of construction materials, and tunnel alignments,*
- *detailed elevation-head-efficiency relationship for the hydropower plant and configuration proposed at the Lalini Dam, and*
- *hydropower modelling simulation of the Lalini hydropower plant and two mini-hydropower plants at Ntabelanga and Lalini dams for the conjunctive scheme.*

A reserve determination needed to be completed for the Lalini Dam and hydropower plant sites as the hydropower releases may have a significant impact upon the riverine ecology downstream of the proposed dam site and hydropower tunnel exit point. This was undertaken as a part of the independent EIA contract and results are given in that suite of reports.

This included the undertaking of a rapid determination of the EWR of the Tsitsa River downstream of the Tsitsa Falls, which indicated an ecological class of B/C. This EWR value and its recommended rules of operation were included into a new hydropower simulation model to improve the accuracy of estimation the potential hydropower outputs of the scheme.

The process and results of the improved hydropower potential assessment and the feasibility design of the Lalini Dam and its hydropower scheme are described in Report Nos. P WMA 12/T30/00/5212/18 and 19.

DETAILED HYDROPOWER GENERATION: RESULTS

The detailed hydropower assessment of the conjunctive use of the Ntabelanga and Lalini Dams on the Tsitsa River system, was undertaken using detailed hydrology produced in the earlier analyses stage of this feasibility study, as well as new and highly accurate topographical survey data for the Lalini dam basin.

The analysis was undertaken using the previously recommended Ntabelanga Dam capacity of 489.7 million m³, or 1.18 MAR_{PD}, and for a range of Lalini Dam capacities from 0.10 MAR_{PD} to 0.75 MAR_{PD}.

The optimum Lalini Dam size selection was based on several factors, such as the cost benefits, as well as social and environmental impacts.

The main objective of the hydropower generation assessment was to determine the average amount of energy that can be produced per year from each dam capacity option assuming that the environmental, domestic and agricultural water requirements are met first.

Two base case options were investigated for the main Lalini HEP, namely

- installed capacity 50 MW, and
- installed capacity 37.5 MW

In addition to the main Lalini HEP, two smaller plants were also included in the modelling, each just downstream of the dam walls, and utilising the EWR flows to generate additional hydropower.

The results from the hydropower modelling analyses for a range of Lalini Dam storage volumes are presented in the following figures.

The energy figures thus produced were incorporated into the economic and financial models undertaken to determine the best conjunctive use solution.

These analyses are described in the Feasibility Design of the Lalini Dam and Hydropower Scheme Report No. P WMA 12/T30/00/5212/19, and in the Cost Estimates and Economic Analysis Report No. P WMA 12/T30/00/5212/15.

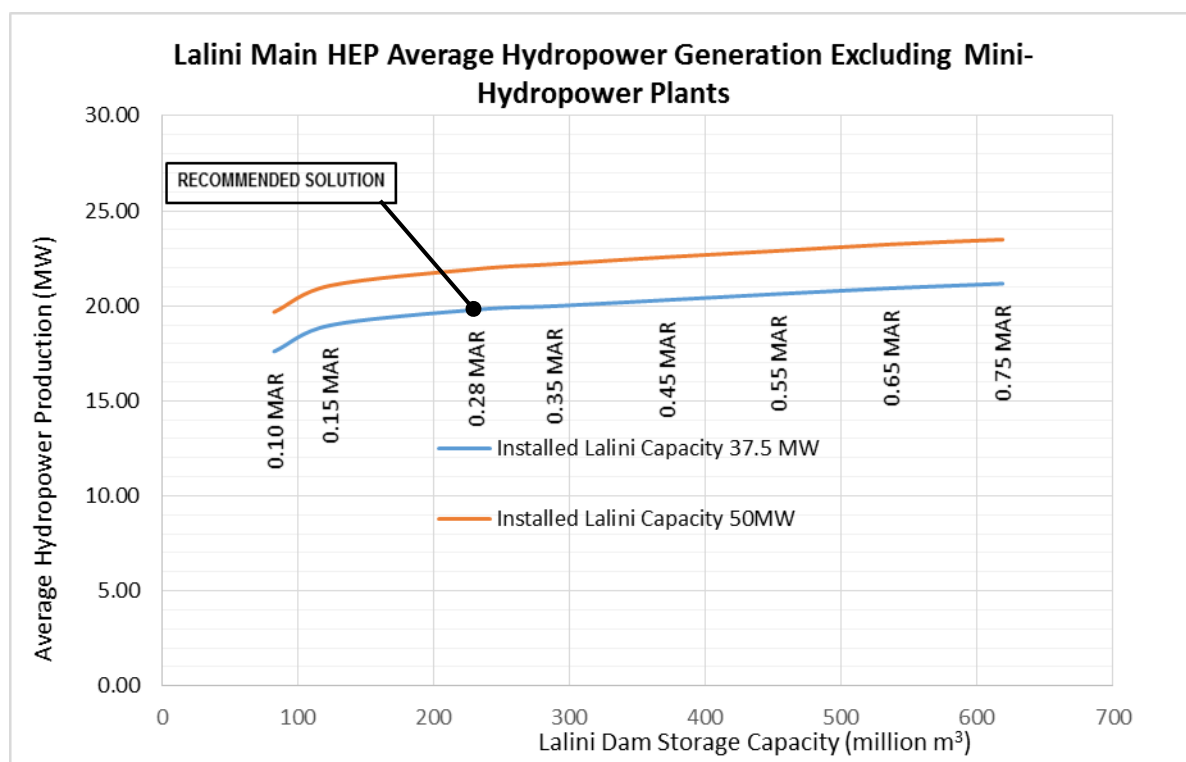


Figure 1: Hydropower Output: Lalini Main HEP

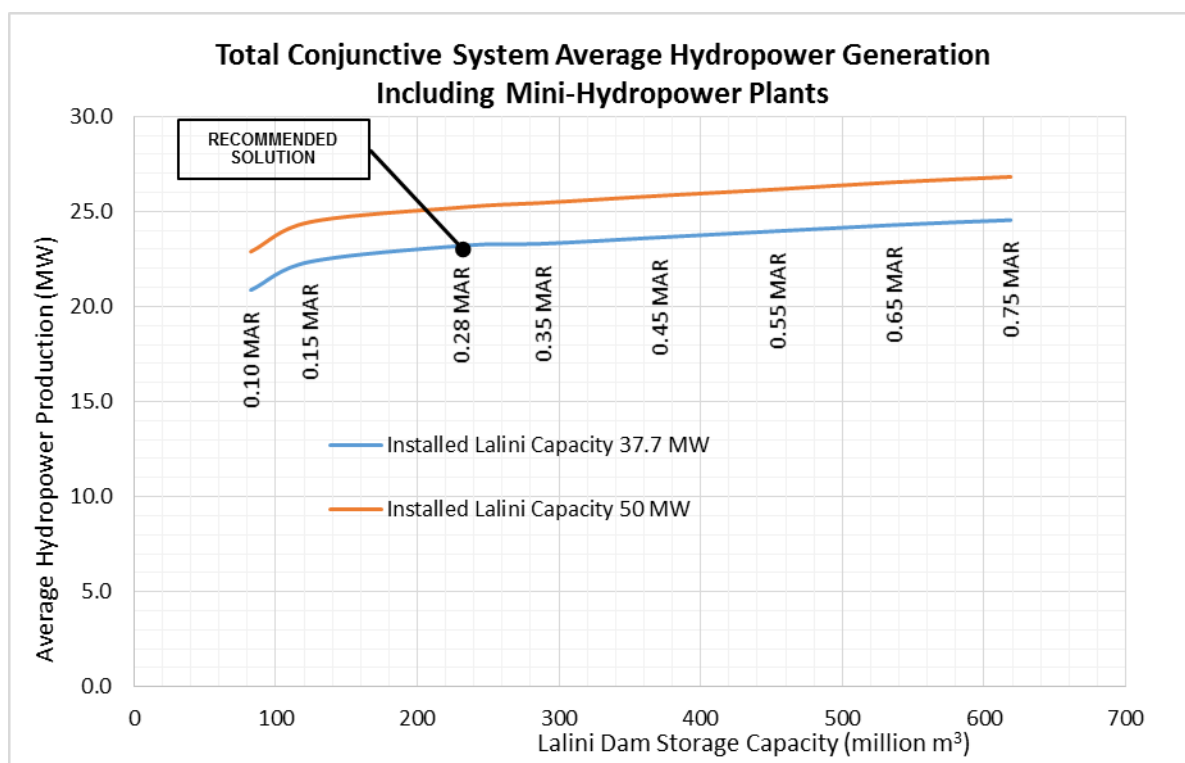


Figure 2: Hydropower Output: Including Mini-HEPs

CONCLUSIONS AND RECOMMENDATIONS

CHOICE OF PREFERRED DAM SITE

- The Ntabelanga Dam was determined to have the best yield per unit volume of water stored, due to the lower stream flow CV, a lower required sedimentation allowance and a lower EWR requirement when compared to the Somabadi and Thabeng dams.
- An economic viability and financial sustainability analysis resulted in the selection of the Ntabelanga Dam as the preferred option (cf. Report no. P WMA 12/T30/00/5212/3).
- The selection of this as the preferred dam also had the unique advantage of being able to be operated conjunctively with the potential hydropower scheme downstream of the Ntabelanga Dam at the Lalini Dam, located just above the Tsitsa Falls.

WATER RESOURCES ASSESSMENT CONCLUSIONS

- The Ntabelanga Dam can supply the projected 2050 potable and irrigation water requirement of 60.2 million m³/a at a 98% assurance of supply from a relatively small impoundment of 60.0 million m³ (≈ 0.15 MAR).
- Any increase in impoundment volume above 60.0 million m³ has a significant impact on increasing the yield due to the large proportional increase in live storage once the dead storage allocation has been overcome.
- The water requirement projections for the Ntabelanga Dam accounts for the provision of the following water uses:
 - Class C EWR from Ntabelanga Dam, based on the Intermediate Reserve Determination undertaken as a part of the greater Mzimvubu Water Project (cf. Report no. P WMA 12/T30/00/5212/7);
 - Raw water supply for end user potable water (cf. Reports no. P WMA 12/T30/00/5212/6 and no. P WMA 12/T30/00/5212/13); and
 - Irrigation potential (cf. Report no. P WMA 12/T30/00/5212/9).

- The EWR for the Ntabelanga Dam was determined through an Intermediate Reserve Determination (cf. Report no. P WMA 12/T30/00/5212/7), which determined the river reach associated with the Ntabelanga Dam to be an ecological Class C, allocating 87.25 million m^3 (20.4 % MAR) as an annual average. In spite of the limited development identified within the catchment, an ecological Class C was still determined as the reserve requirement, due to the high sedimentation rates in the system, which limits biotic proliferation within the riparian areas (mainly due to the impacts of sedimentation on the biota's required habitat). Refer to Report no. P WMA 12/T30/00/5212/7 for more detail.
- Sedimentation volumes over 50 years were accounted for based on an assessment of the Ntabelanga Dam catchment using the WRC (2010) methodology. The sedimentation V50 values used in this study were 35.704 million m^3 .
- The simulated natural mean annual stream flow was modelled to be 428.49 million m^3/a at the Ntabelanga Dam site, with the present day mean annual runoff at the same site being slightly lower at 415.0 million m^3/a . This proportionally low reduction in MAR highlights the relatively small development within the catchment. Thus, indicating the potential for water resource development.
- A gross storage volume of 60.0 million m^3 is the recommended impoundment if only the high scenario domestic and irrigation requirements are to be supplied.

HYDROPOWER GENERATION CONCLUSIONS

- The Ntabelanga Dam was simulated to supply the potable and irrigation water requirement scenario value, rounded to approximately 60 million m^3/a , which was met 100% of the time in all of the hydropower scenarios. For the purposes of its conjunctive usage with the Lalini Dam and hydropower scheme, the capacity used for the Ntabelanga Dam was 489.7 million m^3 , or 1.18 MAR_{PD}.
- The EWR for the Lalini Dam was determined following a reserve determination process undertaken as a part of the EIA study, which considered that the river reach below the Tsitsa Falls to be an ecological Class B/C due to the potentially sensitive and unique environment downstream of the Tsitsa Falls, and allocating 287 million m^3 (33% MAR) as an annual average.
- Sedimentation volumes over 50 years were accounted for based on an assessment of the incremental contributing catchment of the Lalini Dam, below the Ntabelanga Dam. The incremental sedimentation V50 value used in this study was 31.185 million m^3 , which resulted in a total allowance of 66.889 million m^3 in both dams.
- The simulated natural mean annual stream flow at the Lalini Dam site was modelled to be 868.63 million m^3/a , with the present day mean annual runoff at the same site being slightly lower at 828.0 million m^3/a . This proportionally low reduction in MAR highlights the relatively little development within the catchment.
- The average hydropower generation potential at the Lalini Dam and the two small hydropower plants ranges from 23 to 27 MW, depending on the combination of dam storage volumes simulated between the Ntabelanga and Lalini dams. There are only limited gains in hydropower output above a Lalini Dam storage volume equivalent to some 0.28 MAR_{PD}.
- The Tsitsa River system can be utilised for a multi-purpose use due to the high water resources availability in the catchment (i.e. the Ntabelanga Dam and the Lalini Dam). The consumptive uses could sustainably include, inter alia:
 - Potable water supply;
 - Irrigation; and
 - Hydropower.
- The full analysis of the scenarios assessed in this study includes an economic and financial analysis, which will include determination of the cost benefits of the hydropower component, as described in Report No. P WMA 12/T30/00/5212/15 and 16.

RECOMMENDED DESIGN FLOOD AND SAFETY EVALUATION FLOOD HYDROLOGY

The DWS reviewed and commented on submitted flood memoranda and the agreed RDF and SEF have been used in determining the spillway, freeboard and other safety aspects of each dam.

These design flood memoranda are included as Appendices to each of the Dam Feasibility Design reports – Nos. P WMA 12/T30/00/5212/12, and P WMA 12/T30/00/5212/19.

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LIST OF ACRONYMS AND ABBREVIATIONS

ASGISA-EC	Accelerated and Shared Growth Initiative for South Africa – Eastern Cape
CAPEX	Capital Expenditure
CFRD	Concrete-faced rockfill dam
CMA	Catchment Management Agency
CTC	Cost to Company
CV	Coefficient of Variability
DAFF	Department of Agriculture, Forestry and Fisheries
DBSA	Development Bank of Southern Africa
DEA	Department of Environment Affairs
DM	District Municipality
DME	Department of Minerals and Energy
DoE	Department of Energy
DRDAR	Department of Rural Development and Agrarian Reform
DRDLR	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Eastern Cape
ECRD	Earth core rockfill dam
EF	Earthfill (dam)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPWP	Expanded Public Works Programme
ESIA	Environmental and Social Impact Assessment
EWR	Environmental Water Requirements
FSL	Full Supply Level
GERCC	Grout enriched RCC
GN	Government Notices
GW	Gigawatt
GWh/a	Gigawatt hour per annum
IAPs	Invasive Alien Plants
IB	Irrigation Board
IFC	International Finance Corporation
IPP	Independent Power Producer
IRR	Internal Rate of Return
IVRCC	Internally vibrated RCC
ISO	International Standards Organisation
kW	Kilowatt
LM	Local Municipality
ℓ/s	Litres per second

MAR _{NAT}	Mean Annual Runoff (Naturalised Flows)
MAR _{PD}	Mean Annual Runoff (Present Day Flows)
MEC	Member of the Executive Council
MIG	Municipal Infrastructure Grant
million m ³	Million cubic metres
MW	Megawatt
NEMA	National Environmental Management Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NOCL	Non-overspill crest level
NWA	National Water Act
NWPR	National Water Policy Review
NWRMS	National Water Resources Management Strategy
O&M	Operations and Maintenance
OPEX	Operational Expenditure
PICC	Presidential Infrastructure Co-Ordinating Committee
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PSC	Project Steering Committee
PSP	Professional Services Provider
RBIG	Regional Bulk Infrastructure Grant
RCC	Roller-compacted concrete
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RWI	Regional Water Institution
RWU	Regional Water Utilities
SEZ	Special Economic Zone
SIP	Strategic Integrated Project
SMC	Study Management Committee
SPV	Special Purpose Vehicle
TCTA	Trans Caledon Tunnel Authority
ToR	Terms of Reference
UOS	Use of System
URV	Unit Reference Value
WEF	Water Energy Food
WRYM	Water Resources Yield Model
WSA	Water Services Authority
WSP	Water Services Provider
WTE	Water Trade Entity
WUA	Water User Association

LIST OF UNITS

Description	Standard unit
Elevation	m a.s.l.
Height	m
Distance	m, km
Dimension	mm, m
Area	m ² , ha or km ²
Volume (storage)	m ³
Yield, Mean Annual Runoff	m ³ /a
Rotational speed	rpm
Head of Water	m
Pressure	Pa
Diameter	mm or m
Temperature	°C

Description	Standard unit
Velocity, speed	m/s, km/hr
Discharge	m ³ /s
Mass	kg, tonne
Force, weight	N
Gradient (V:H)	%
Slope (H:V) or (V:H)	1:5 (H:V) <u>or</u> 5:1 (V:H)
Volt	V
Power	W
Energy used	kWh
Acceleration	m/s ²
Density	kg/m ³
Frequency	Hz

1. BACKGROUND AND INTRODUCTION

The Mzimvubu River catchment in the Eastern Cape of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country which is still largely unutilised, is considered by the Eastern Cape Provincial Government as offering one of the best opportunities in the Province to achieve such development. In 2007, a special-purpose vehicle (SPV) called ASGISA-Eastern Cape (Pty) Ltd (ASGISA-EC) was formed in terms of the Companies Act to initiate planning and to facilitate and drive the Mzimvubu River Water Resources Development.

The five pillars on which the Eastern Cape Provincial Government and ASGISA-EC proposed to model the Mzimvubu River Water Resources Development are:

- Afforestation;
- Irrigation;
- Hydropower;
- Water transfer; and
- Tourism.

As a result of this the Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project with the overarching aim of developing water resources schemes (dams) that can be multi-purpose reservoirs in order to provide benefits to the surrounding communities and to provide a stimulus for the regional economy, in terms of irrigation, forestry, domestic water supply and the potential for hydropower generation amongst others.

The Mzimvubu River and its associated catchment area are considered to have significant water resources potential, which is due to the large volume of water generated from the catchment area on an annual basis. These water resources are largely underutilised due to a lack of development within the catchment. Associated with the lack in development are communities of people considered to be amongst the poorest in South Africa. It is for this reason that the Eastern Cape Provincial Government and National Government have identified the Mzimvubu River catchment area as requiring accelerated social and economic upliftment. It is envisaged that by harnessing the available water resources in the catchment area (through the construction of a dam), social and economic upliftment will follow.

The Department of Water Affairs (DWA) undertook a water resource study of the Mzimvubu River catchment in 2009, in which nineteen (19) possible dam sites were investigated at pre-feasibility level (BKS, 2009). In January of 2012, Jeffares & Green (Pty) Ltd (J&G) were appointed by DWA to undertake a detailed feasibility study for possible dam sites in the Mzimvubu River catchment. In this second study, the nineteen possible dam sites identified in the 2009 pre-feasibility study were ranked according to their potential to supply water for, amongst other things, hydropower generation, domestic water supply, irrigation for agricultural land and job creation. From the nineteen dam sites ranked, the site selection was narrowed down to three sites for further investigation (cf. Report No P WMA 12/T30/00/5212/3). These three sites were analysed at a more detailed level including geotechnical site walkovers (to assess founding conditions and material availability without physical drilling), environmental screening and assessment of water requirements.

Hydrological investigations of the three preferred potential dam sites selected from the initial nineteen dam sites were undertaken during Phase 1 of the project to enable a comparison of the water resource characteristics and potential at each site. This included the calibration of the rainfall-runoff relationship, and assessing the water supply potential (yield) of the proposed dams. The three preferred dam sites were the proposed Ntabelanga Dam on the Tsitsa River and the Somabadi and Thabeng dams on the Kinira River. The results of the water resource assessment and system yield analysis are summarised in this report, along with a short description of the study area, analysis methodology and data sets applied.

This information was then used to further narrow the dam selection to the preferred site and dam size. This is discussed further in the Preliminary Report No P WMA 12/T30/00/5212/3.

Upon identification of the single preferred development option a revision of the hydrology undertaken in Phase 1 was undertaken focussing on that option (i.e. Phase 2 of the Study). This report is structured in a similar manner to the phased approach of the technical analysis. The study area is described in the following section for all three dam sites, after which the report is split into the Phase 1 and Phase 2 water resource assessments.

2. STUDY AREA

The Mzimvubu River Catchment, which is the study area, is situated in the Eastern Cape (EC) Province of South Africa which consists of six District Municipalities (DM) and two Metropolitan Municipalities (Buffalo City and Nelson Mandela Bay). These include Cacadu DM in the west across to the Alfred Nzo DM in the east with the two Metropolitan Areas being located around the two major centres of the province, East London and Port Elizabeth, both of which border the Indian Ocean.

The Mzimvubu River Catchment traverses three DMs, namely the Joe Gcabi DM in the north west, the OR Tambo DM in the south and the Alfred Nzo DM in the east and north east. A locality map of the catchment area and its position in relation to the DMs in the area is provided in Figure 2-1 overleaf. The three dam sites that were selected for further investigation are the proposed:

- Ntabelanga Dam located on the Tsitsa River within the quaternary catchment T35E;
- Thabeng Dam located on the Kinira River and straddling the quaternary catchments T33C, T33D and T33E; and
- Somabadi Dam, which is also located on the Kinira River, within the quaternary catchment T33E.

The proposed Somabadi and Thabeng dams are located approximately 120 km north of Umthatha in the Eastern Cape on the Kinira River and the proposed Ntabelanga Dam is located approximately 55 km north of Umthatha on the Tsitsa River, as illustrated in Figure 2-1. The catchment areas contributing to the Somabadi, Thabeng and Ntabelanga Dams are approximately 2 380 km², 2 135 km² and 1 967 km² respectively (cf. Table 2-1 for the contributing quaternary catchment areas, which are depicted in Figure 2-2). The catchment area contributing to the proposed Somabadi and Thabeng dams in the tertiary catchment T33 is largely undeveloped, with less than 1% of the contributing catchment area currently under commercial forestry. The catchment area contributing to the Ntabelanga Dam in the Tertiary catchment T35 is somewhat more developed with approximately 10% of the catchment area under commercial forestry. In order to assess that runoff contributing to these catchments, additional quaternary catchments were modelled in order to allow for calibration at stream flow gauging sites (cf. Sections 3.2 and 4.2).

Table 2-1: Contributing Catchment Areas for the Study Area

Kinira River Catchment		Tsitsa River Catchment	
Quaternary Catchment	Catchment Area (km ²)	Quaternary Catchment	Catchment Area (km ²)
T33A	674.4	T35A	476.5
T33B	603.8	T35B	396.8
T33C	368.1	T35C	307.0
T33D	462.0	T35D	348.9
T33E	268.0	T35E	493.5
T33F	438.7	T35F	359.6
T33G	504.6	T35G	576.2
TOTAL	3 319.6	T35H	521.0
		T35J	189.0
		T35K	627.1
		T35L	339.5
		TOTAL	4 635.1

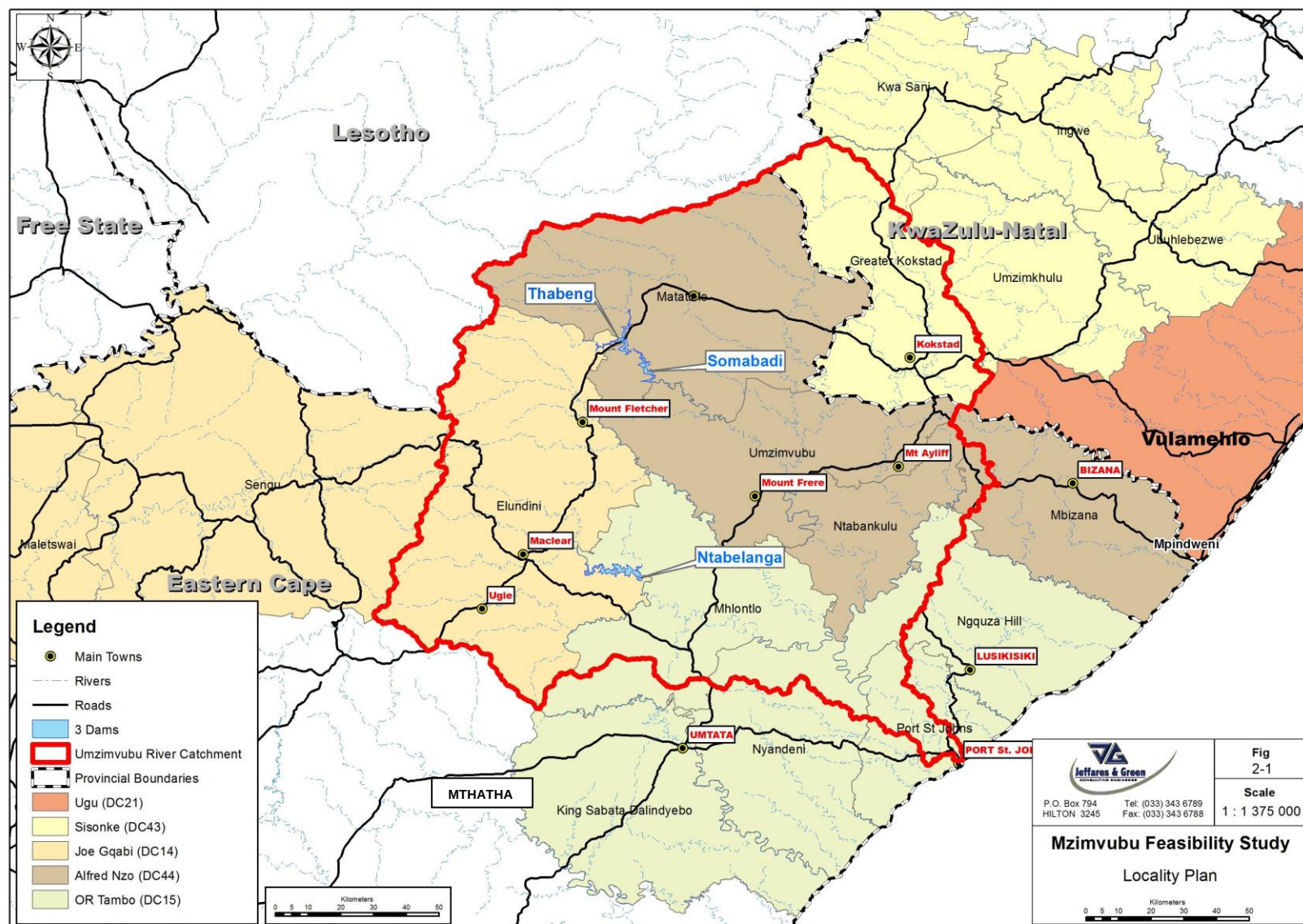


Figure 2-1: Locality Map of the Mzimvubu River Catchment Area

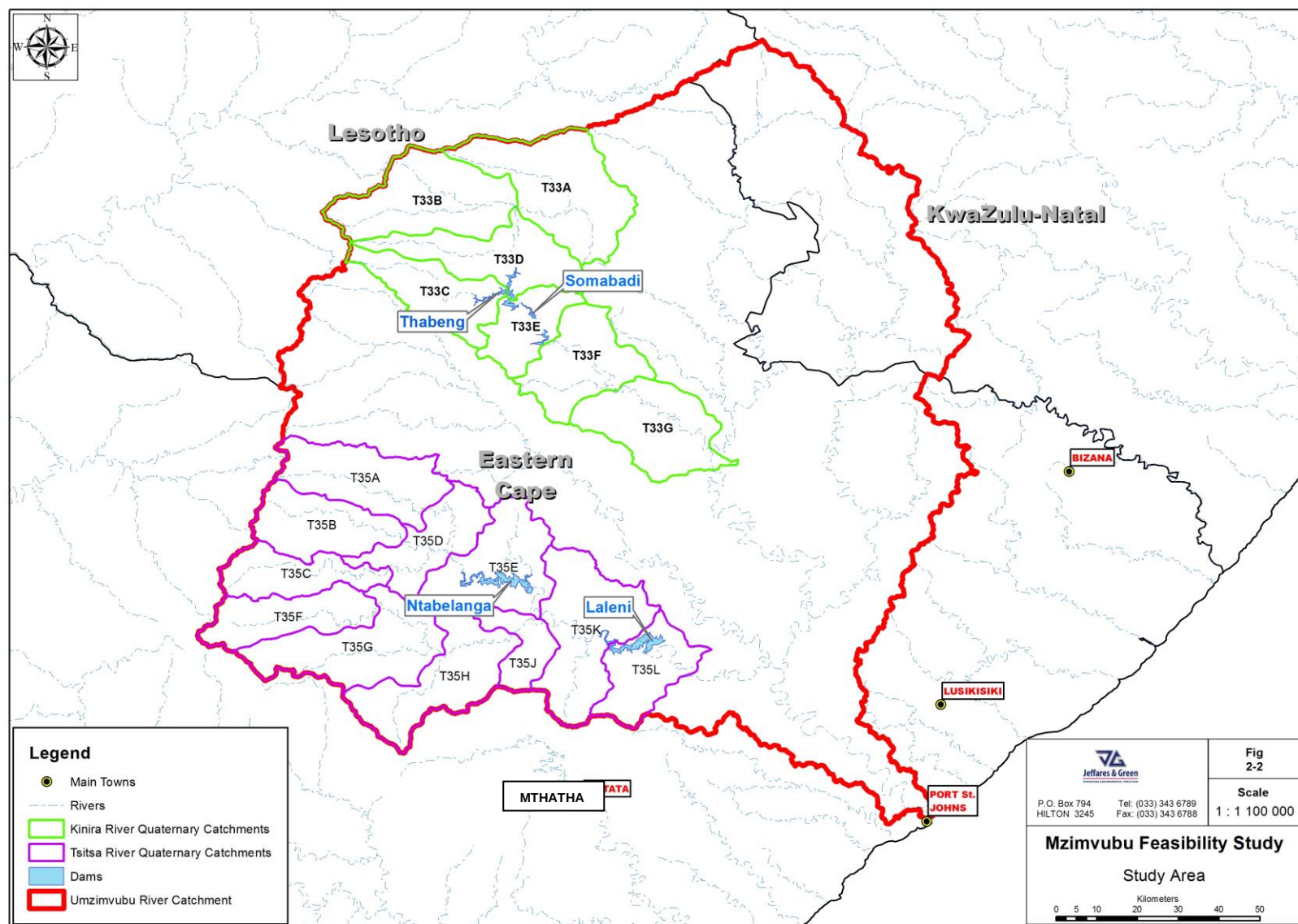


Figure 2-2: Study Area for the Mzimvubu Feasibility Study - Selected Three Dams

3. GROUNDWATER POTENTIAL – A REVIEW OF THE MZIMVUBU CATCHMENT

A comprehensive desktop review was undertaken by Africa Geo-Environmental Services (Pty) Ltd (AGES) as a component of the DWA pre-feasibility study. Several sources of data were used to determine the potential for groundwater as a supply source. Some of the more pertinent data sources included:

- Eastern Cape GRIP Programme (hydrocensus);
- 1:500 000 DWA Geological Maps; and
- National Groundwater Database;

The 1:500 000 DWA hydrogeological maps were used to describe the groundwater potential and character of the study area based on the geological formations underlying the catchment. Areas underlain by the Tarkastad sub-group are described as predominantly argillaceous while the Katberg and Molteno formations are described as argillaceous and arenaceous in approximately equal proportions. All lithologies underlying the study area are described as having groundwater occurring intergranular and in fracture zones, with predominantly fractured aquifers to be found associated with the small section of Natal Group sedimentary rocks near the Mzimvubu River mouth. Groundwater potential assessments and aquifer types occurring within the study area are dependent on the type of dolerite intrusion associated with the specific site, as well as considering the geological formation present (DWA, 2010). The expected median of the borehole yield class in the Natal Group sedimentary rocks could be described as 0.5 l/s to 2 l/s, although occasional higher yielding boreholes may be expected in ideally sited locations. Median borehole yields in Quaternary alluvium deposits in the Cedarville and Matatiele region, are known to be between 2 l/s and 5 l/s (DWA, 2010). DWA (2010) described the following groundwater occurrences associated with the study area:

- Aquifers associated with doleritic intrusion;
- Aquifers associated with fracturing unrelated to doleritic intrusion; and
- Intergranular aquifers.

For the bulk of the study area groundwater occurs in dual porosity aquifers, comprising large, but infrequent principle transmissive fractures with relatively low storage capacity, and secondary but numerous microfissures with high storativity but lower transmissivity. The upper and lower zones are hydraulically linked and the microfissures are usually concentrated towards the surface (typically first 30 m), resulting in a higher storage capacity than the deeper lying rocks. The deeper fractures often have a high transmissivity but lower storativity when compared to the shallow zone fractures.

The study area is characterised by a range of groundwater levels varying across the area. The values vary from very close to the surface (1 to 2 m) to approximately 50 m below surface. There was insufficient groundwater quality data to assess the potential for water supply based on expected water classes. General descriptions of the area provided on the 1:500 000 hydrogeological maps describe the groundwater as a Calcium Magnesium Bicarbonate water with sodium enrichment, which is most prevalent in the Burgersdorp formation in the study area.

This can be used to conclude that there is active groundwater circulation with sodium and chloride enrichment occurring through ionic exchange in the groundwater flow paths (DWA, 2010). Groundwater conductivities (EC) are expected to generally range between 70 and 300 mS/m in the study area, while higher EC values (higher than 1 000 mS/m) have been noted in faulted Dwyka and Natal Group sandstone and also possibly alluvium associated with the Mzimvubu River near the river mouth at Port St Johns (DWA, 2010).

The findings from the review highlighted that there was a low to moderate water supply potential distributed across the Mzimvubu Catchment that could possibly meet the individual water requirements of selected towns or irrigation schemes. However, this type of supply scheme would involve multiple abstraction sites spread across vast geographical areas. In consultation with the stakeholders during the project steering committee meetings, the water services authorities in the area stipulated that they would prefer one single surface water source rather than multiple groundwater sources.

The main concerns regarding multiple groundwater sources were:

- Maintaining a scheme with multiple abstraction sites spread across a vast spatial area has practical limitations regarding manpower and logistics when considering the operations and maintenance of the infrastructure;
- Operations and maintenance costs associated with a widespread, multi-abstraction scheme;
- The reliability of groundwater is not always as good as a large-scale surface water supply option, i.e. during the dry years, groundwater schemes can often experience shortages and, thus, restrictions could be imposed before they would be necessary in a large single-source scheme; and
- Management of groundwater resources is critical in order to ensure the sustainability of the resource. This cannot always be monitored comprehensively in a widely dispersed supply scheme as would be required in this case, thus, the resource is open to misuse, which could have negative impacts for water supply and for the aquifer.

Based on the above, and after discussions with the PSC and DWA, it was decided that there was still a role to be played by groundwater in supplying some of the communities within the study area, and that where such groundwater schemes are considered to be operating reliably and supplying potable water of adequate quantity and quality, then such schemes should be integrated into the overall bulk water supply planning and implementation for the area. Given that the planning for the bulk water distribution systems for this study has primarily been based upon a surface water-sourced system, it is recommended that the detailed design and implementation of the bulk water system takes into account such viable existing groundwater-based schemes.

4. PRELIMINARY WATER RESOURCE ASSESSMENT

The water resources study was implemented in two phases. The first phase, which is presented in this section, undertook a moderately detailed study to assess the water resource potential of the three selected dam sites (i.e. Ntabelanga, Somabadi and Thabeng).

4.1 Catchment Characteristics

4.1.1 Rainfall

Rainfall data are required as a primary input to the hydrological analyses and were used in the rainfall-runoff modelling process (cf. Section 4.2), as well as for the modelling of rainfall onto the exposed surface area of dams in the yield analyses (cf. Section 4.6). The Mean Annual Precipitation (MAP) for the catchment contributing to the Somabadi and Thabeng dams is approximately 795 mm, and the MAP for the catchment area contributing to the Ntabelanga Dam is approximately 845 mm.

a) Screening of Available Data

Monthly gauged rainfall data were obtained from the South African Weather Service (SAWS) with the assistance of the Cradock Regional Office of the Department of Water Affairs, Eastern Cape (Ferreira, 2012), as well as from the Daily Rainfall Extraction Utility (Lynch, 2003). There are 23 rainfall gauges located in the vicinity of the Kinira Catchment (quaternary catchments T33A to T33G) and 44 rainfall gauges in the vicinity of the Tsitsa Catchment (quaternary catchments T35A to T35L).

Of the 67 gauges, however, only 12 gauges for the Kinira River catchment and 10 gauges from the Tsitsa River catchment were ultimately selected for application in the Phase 1 hydrological analysis of the catchments contributing to the three dam sites, for a combination of the following purposes:

- Developing a representative quaternary catchment rainfall data set for application in the later rainfall-runoff and yield modelling processes;
- as a source of data for patching missing or unreliable data values in other gauges; and
- to develop quaternary catchment MAP values.

A summary of the available rainfall gauge data for the Kinira and the Tsitsa River catchments is provided in Tables 4-1 and 4-2, respectively (cf. Figures A1-1 and A2-1 in Appendix A1 and A2, respectively). Note that the table also shows gauges that were not used in the hydrological analysis, generally because the gauges provided short periods of record and/or contained little or no reliable data.

b) In-filling of Missing or Unreliable Data

Gauged rainfall data generally require significant processing before they can be used in the hydrological analysis in order to infill (or “patch”) values that are missing from the data set. For each of the selected gauges missing data values were patched using the CLASSR and PATCHR suite of software. The data sets were also assessed for the purpose of finding “outlier” values using PATCHR. An outlier is defined as a data value which is presented as being reliable, but which appears to be either very high or very low (often zero) and does not correspond with values of other gauges in the vicinity.

Table 4-1: Summary of Available Rainfall Gauge Data - Kinira Catchment

SAWS Number	Station Name	Start	End	Total Years	% Missing	Comment	Source	Patching	MAP	Quat Rainfall
0178881 W	Mnt Fletcher (Mun)	01-03-1900	01-08-2012	112	5.3	Good, long data (1892-1924 & 1937-2001)	DWA	Yes		
0179344 W	Colwane (Bos)	01-11-1926	01-06-2002	76	2.4	Good, long data	DWA	Yes	Yes	Yes
0179353 W	Etwa (Bos)	01-10-1926	30-09-2010	84	1.9	Good, long data	DWA	Yes		
0179501 W	Cancele	01-10-1937	01-08-2012	75	6.5	Good, long data	DWA	Yes	Yes	
0179523 W	Rockford	01-10-1916	30-09-1930	14	1.8	Short, early data	Daily Rainfall Utility			
0179528 W	Glen Hope	01-01-1919	31-12-1936	17	0.9	Short, early data	Daily Rainfall Utility			
0179663 W	Strathroy	01-01-1941	31-12-1959	18	1.3	Short, mid data	Daily Rainfall Utility			
0179713 W	Amanzamnyama (Bos)	01-01-1920	01-08-2012	92	4.6	Good, long data	DWA	Yes	Yes	Yes
0179790 W	Tshatsheni (Bos)	01-09-1923	01-11-1993	70	5.9	Good, long data	DWA	Yes	Yes	Yes
0179864 W	Mnt Frere (Mun)	01-07-1919	01-07-2000	81	3.4	Good, long data (1920-1946 & 1960-2000)	DWA	Yes	Yes	
0206440 W	Ongeluksnek	01-01-1986	31-12-1994	8	8.3	Poor data, < 10 continuous years data	Daily Rainfall Utility			
0206530 W	Ongeluksnek (Pol)	01-10-1968	30-09-1985	17	7.4	Short, mid/late data (1968-1985)	Daily Rainfall Utility			
0206588 W	Sinclair	01-07-1949	01-01-1979	30	1.4	Good, moderate data, strategic position	DWA	Yes	Yes	
0206738 W	Avondale (Pol)	01-10-1967	01-10-2007	40	7.9	Good, moderate data, strategic position	DWA	Yes	Yes	
0206772 W	Paballong	01-01-1950	31-12-1959	9	4.2	Poor data, < 10 continuous years data	Daily Rainfall Utility			
0207108 W	Ade	01-06-1942	01-02-1972	30	1.1	Moderate data	DWA			
0207178 W	Kenegha Drift	01-01-1921	31-12-1929	8	14.8	Poor data, < 10 continuous years data	Daily Rainfall Utility			
0207198 W	Roamers Rest	01-01-1972	31-12-1976	4	20	Poor data, < 10 continuous years data	Daily Rainfall Utility			
0207288 W	Erith	01-01-1931	31-12-1950	19	5.8	Short, good early/mid data	Daily Rainfall Utility			

SAWS Number	Station Name	Start	End	Total Years	% Missing	Comment	Source	Patching	MAP	Quat Rainfall
0207337 P	Qachas Nek	01-03-1900	01-01-1980	80	19.5	Good, long data	DWA	Yes		
0207402 W	Mount Plaisir	01-11-1949	01-09-1978	29	3.7	Good, moderate data, strategic position	DWA	Yes	Yes	
0207531 W	Matatiele (Mun)	01-12-1903	01-12-2012	109	2.1	Good, long Data	DWA	Yes	Yes	Yes
0207654 W	Entremonts	01-01-1913	31-12-1952	39	13.7	Short, moderate early/mid data	Daily Rainfall Utility			

Table 4-2: Summary of Available Rainfall Gauge Data - Tsitsa Catchment

SAWS Number	Station Name	Start	End	Total Years	% Missing	Comment	Source	Patching	MAP	Quat Rainfall
0151214 W	Oakhurst	1925-01-01	1930-01-01	5	7	Poor data, < 10 years data	Daily Rainfall Utility			
0151338 W	Rockwater	1946-01-01	1952-01-01	6	25	Poor data, < 10 years data	Daily Rainfall Utility			
0151402 W	Ugie	1963-01-01	2001-01-01	38	14	Short, moderate late data (1963-2001)	Daily Rainfall Utility			
0151461 W	Kincardine	1928-01-01	1930-01-01	2	0	Poor data, < 10 years data	Daily Rainfall Utility			
0151463 A	Ugie	1980-01-01	1990-01-01	10	6	Short, good late data (1980-1980)	Daily Rainfall Utility			
0151549 W	Strathavon	1930-01-01	1934-01-01	4	35	Poor data, < 10 years data	Daily Rainfall Utility			
0151582 W	Pomona	1927-01-01	1939-01-01	12	16	Poor data, < 10 years data	Daily Rainfall Utility			
0151604AW	Maclear (Sar)	1945-01-01	1956-04-01	11	14	Poor data, < 10 years data	Daily Rainfall Utility			
0151604BW	Maclear (Mun)	1906-01-01	1944-01-01	38	12	Short, moderate early data (1907-1944)	Daily Rainfall Utility			
0151604 W	Maclear (Mag)	1902-01-01	2010-01-01	108	15	Good/moderate, long Data (1897-1993)	DWA	Yes	Yes	Yes
0151608 W	Ben Dambh	1934-01-01	1937-01-01	3	31	Poor data, < 10 years data	Daily Rainfall Utility			
0151623 W	Hopefield	1924-01-01	1978-01-01	54	26	Good, long Data (1923-1978)	DWA	Yes	Yes	
0152172 W	Ceka (Bos)	1956-01-01	1999-01-01	43	11	Moderate, long data (1955-1999)	DWA			
0152190 W	Ntywenka (Bos)	1925-01-01	2010-01-01	85	22	Good, long Data (1923-2001)	DWA	Yes	Yes	Yes

SAWS Number	Station Name	Start	End	Total Years	% Missing	Comment	Source	Patching	MAP	Quat Rainfall
0152252 W	Somerville	1891/01/01	1931-01-01	40	12	Poor data, < 10 years data, not relevant	Daily Rainfall Utility			
0152259 W	Bele (Bos)	1932-01-01	1999-01-01	67	24	Good, long Data (1928-2001)	DWA	Yes	Yes	Yes
0152446 W	Nquadu	1925-01-01	1969-01-01	44	3	Good, moderate Data (1925-1969), strategic position	Daily Rainfall Utility			
0152468 W	Tsolo	1925-01-01	1998-01-01	73	24	Good, long Data (1929-1997)	DWA	Yes	Yes	
0152475 W	Nqadu Heights (Bos)	1921-01-01	2010-01-01	89	31	Good, long Data (1920-2001)	DWA	Yes	Yes	Yes
0152640 W	Qumbu (Mag)	1903-01-01	1998-01-01	95	17	Good/moderate, long Data (1917-1922&1952-1998)	DWA	Yes	Yes	
0152792 W	Bencuti (Bos)	1926-01-01	1997-01-01	71	22	Good, long Data (1923-1999)	DWA	Yes	Yes	Yes
0178288 W	Glen Peschel	1979-01-01	1987-01-01	8	14	Poor data, < 10 years data, not relevant	Daily Rainfall Utility			
0178300 W	Woodcliffe	1891/01/01	1911-01-01	20	23	Poor data, < 10 years data, not relevant	Daily Rainfall Utility			
0178320 W	Cransmoor	1947-01-01	1961-01-01	14	7	Good, moderate Data (1948-1961), strategic position	Daily Rainfall Utility			
0178321 W	Kilmeny	1928-01-01	1947-01-01	19	2	Good, moderate Data (1928-1947), strategic position	Daily Rainfall Utility			
0178349 W	Antelope Park	1961-01-01	1979-01-01	18	11	Good, moderate Data (1962-1979), strategic position	Daily Rainfall Utility			
0178377 W	Temple Horne	1939-01-01	1950-01-01	11	10	Poor data, < 10 years data, not relevant	Daily Rainfall Utility			
0178378 W	Elands Heights	1909-01-01	1939-01-01	30	45	Good, early Data (1914-1940), strategic position	DWA	Yes	Yes	
0178564 W	New Lynndale	1934-01-01	1953-01-01	19	9	Good, mid Data (1934-1953)	Daily Rainfall Utility			
0178689 A	Sheeprun	1962-01-01	1973-01-01	11	0	Good, mid Data (1962-1973)	Daily Rainfall Utility			
0178689 W	Stockenstrom	1964-01-01	1996-01-01	32	3	Good, mid/late Data (1963-1997)	DWA			
0178807 W	Kromhoek	1939-01-01	1966-01-01	27	18	Good, mid Data (1938-1966), strategic position	DWA	Yes	Yes	

These data values are also considered to be unreliable and, when they are found, are flagged and patched similarly to other missing data values. The statistical characteristics of the selected gauges, subsequent to the patching process, are shown in Tables 4-3 and 4-4 for the Kinira and Tsitsa catchments, respectively.

Table 4-3: Patched Monthly Rainfall Data (Kinira)

No.	SAWS No.	Name	Period of record (hydrological years)		Length of record (years)	Annual statistics		
			Start	End		MAP ⁽¹⁾ (mm)	SD ⁽²⁾ (mm)	CV ⁽³⁾
1	0179344 W	Colwane (BOS)	1926	2000	75	1 120.2	225.4	0.20
2	0179713 W	Amanzamnyama (BOS)	1920	2009	90	1 105.1	190.2	0.17
3	0179790 W	Tshatsheni (BOS)	1923	1992	70	878.4	228.2	0.26
4	0207531 W	Matatiale (MUN)	1920	2009	90	684.3	128.9	0.19

Notes: (1) Mean annual precipitation.
(2) Standard deviation, calculated as the square root of the variance.
(3) Coefficient of variance, calculated as SD / MAP.

Table 4-4: Patched Monthly Rainfall Data (Tsitsa)

No.	SAWS No.	Name	Period of record (hydrological years)		Length of record (years)	Annual statistics		
			Start	End		MAP ⁽¹⁾ (mm)	SD ⁽²⁾ (mm)	CV ⁽³⁾
1	0151604 W	Maclear	1920	2009	90	793.4	178.4	0.22
2	0152190 W	Ntywenka Plantation	1923	2009	87	1 084.9	197.4	0.18
3	0152259 W	Bele Plantation	1928	2009	82	883.8	178.2	0.20
4	0152475 W	Nqadu Heights Plantation	1920	2009	90	1 203.0	230.5	0.19
5	0152482W	Cengcane (BOS)	1920	2009	90	961.9	192.2	0.20
6	0152792 W	Bencutti Plantation	1923	1997	75	823.7	185.7	0.23

Notes: (1) Mean annual precipitation.
(2) Standard deviation, calculated as the square root of the variance.
(3) Coefficient of variance, calculated as SD / MAP.

c) Quaternary Catchment Mean Annual Precipitation

The gauges identified for use in the MAP calculations in Tables 4-1 and 4-2 were used to obtain the quaternary catchment MAP's. The MAP of each suitable patched gauge was spatially plotted against the quaternary catchments in each main catchment. These MAP values were used in a Thiessen Polygon analysis to determine the weighted MAP of each quaternary catchment (Figures A1-2 and A2-2 in Appendices A1 and A2, respectively).

Table 4-5: Main Annual Precipitation - Kinira Quaternary Catchments

Quaternary Catchment	Phase 1 MAP (mm)	WR2005 MAP (mm)
T33A	768.7	757.0
T33B	779.4	801.0
T33C	782.5	768.0
T33D	718.0	736.0
T33E	927.2	748.0
T33F	986.3	829.0
T33G	892.8	835.0

Table 4-6: Mean Annual Precipitation - Tsitsa Quaternary Catchments

Quaternary Catchment	Phase 1 MAP (mm)	WR2005 MAP (mm)
T35A	803.4	912.0
T35B	804.0	915.0
T35C	817.3	1 008.0
T35D	801.9	818.0
T35E	1 007.8	918.0
T35F	825.1	860.0
T35G	806.8	759.0
T35H	985.3	845.0
T35J	1 070.6	924.0
T35K	775.8	783.0
T35L	845.2	764.0
T35M	876.9	861.0

It was noted that the estimated MAP values of the quaternary catchments, using the rainfall stations as indicated above, are significantly different in some cases to those from the Water Resources of South Africa, 2005 study (WRC, 2009), hereafter referred to as WR2005. These differences are thought to be as a result of the two studies using different combinations of gauges and having different record lengths.

d) Representative Quaternary Catchment Rainfall Data

A dataset representing the monthly rainfall over each quaternary catchment was generated by combining the characteristics of selected gauges for each of the three dams.

The resulting monthly rainfall data set covers a period of 90 years from 1920 to 2009 (hydrological years). The rainfall files and corresponding statistical characteristics are presented and summarised in Appendices A1 (Kinira River catchment) and A2 (Tsitsa River catchment).

Finally, the stationarity of each dataset was also tested using a single mass-plot, which is also shown in Appendices A1 (Kinira River catchment) and A2 (Tsitsa River catchment). Based on these results, the representative catchment rainfall data for the Kinira and Tsitsa catchments were considered to be acceptable in Phase 1.

Additional analysis of catchment rainfall including incorporation of gauges with a short record length was undertaken during Phase 2 of this study, which is detailed in Section 5.1.1 of this report.

4.1.2 Evaporation

While rainfall and stream flow data are generally modelled as monthly time-series, which incorporate the variability of the data on a month-to-month basis, this is not the case with evaporation data. The latter is known to not vary significantly from one year to the next (e.g. evaporation in one October-month, is similar to evaporation in the next October-month). Therefore, it is generally considered to be acceptable to model evaporation data simply by applying 12 average monthly evaporation values over the standard hydrological year, from October to September, for the particular area in question.

The evaporation data used in this study for the Kinira River was obtained from evaporation zone 29A, and for the Tsitsa River from evaporation zone 29B as per WR2005. Catchment evapo-transpiration is calculated in the enhanced Water Resources Simulation Model 2000 (WRSM2000) as part of the rainfall-runoff simulation process by applying 12 monthly S-pan-to-catchment evapo-transpiration conversion factors.

Evaporation losses from the exposed surface area of water bodies are calculated by applying 12 monthly S-pan-to-lake evaporation conversion factors. The evaporation rates for the Kinira River and Tsitsa River catchments are presented in Tables 4-7 and 4-8, respectively. The S-pan-to-lake evaporation conversion factors and S-pan-catchment evapo-transpiration conversion factors used to calculate evaporation for both catchments are provided in Table 4-9.

Table 4-7: Evaporation Data - Kinira Catchment

Quaternary Catchment	Variable	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
T35A	Evaporation (mm)	139	151	162	156	129	119	87	68	58	65	94	117
T35B	Evaporation (mm)	144	156	168	162	134	123	90	71	60	67	97	122
T35C	Evaporation (mm)	144	156	168	162	134	123	90	71	60	67	97	122
T35D	Evaporation (mm)	139	151	162	156	129	119	87	68	58	65	94	117
T35E	Evaporation (mm)	139	151	162	156	129	119	87	68	58	65	94	117
T35F	Evaporation (mm)	139	151	162	156	129	119	87	68	58	65	94	117
T35G	Evaporation (mm)	139	151	162	156	129	119	87	68	58	65	94	117

Table 4-8: Evaporation Data - Tsitsa Catchment

Quaternary Catchment	Variable	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
T35A	Evaporation (mm)	140	151	176	176	142	125	95	66	53	62	90	117
T35B	Evaporation (mm)	140	151	176	176	142	125	95	66	53	62	90	117
T35C	Evaporation (mm)	140	151	176	176	142	125	95	66	53	62	90	117
T35D	Evaporation (mm)	135	146	170	170	137	121	92	64	51	59	87	113
T35E	Evaporation (mm)	135	146	170	170	137	121	92	64	51	59	87	113
T35F	Evaporation (mm)	140	151	176	176	142	125	95	66	53	62	90	117
T35G	Evaporation (mm)	140	151	176	176	142	125	95	66	53	62	90	117
T35H	Evaporation (mm)	135	146	170	170	137	121	92	64	51	59	87	113
T35J	Evaporation (mm)	140	151	176	176	142	125	95	66	53	62	90	117
T35K	Evaporation (mm)	130	140	163	164	132	116	88	62	49	57	84	109

Quaternary Catchment	Variable	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
T35L	Evaporation (mm)	125	135	157	157	127	112	85	59	47	55	81	105

Table 4-9: Evaporation Conversion Factors (WRC, 1994)

Variable	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
S-pan-to-lake	0.81	0.82	0.83	0.84	0.88	0.88	0.88	0.87	0.85	0.83	0.81	0.81
S-pan-catchment	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.80	0.80	0.80

4.1.3 Stream Flow

Gauged stream flow data is an important input into the rainfall-runoff modelling component of a water resources study. The gauged stream flow records are used to calibrate the rainfall-runoff model to increase the accuracy of the simulations and, ultimately, create naturalised, or simulated natural, time-series. The stream flow gauges used in this study are as follows:

- T3H002 (1949 to 2012) located at the outlet of quaternary catchment T33C on the Kinira River;
- T3H007 (1984 to 2012) located at the outlet of quaternary catchment T33G on the Kinira River;
- T3H009 (1964 to 2012) located at the outlet of quaternary catchment T35C on the Tsitsa River; and
- T3H006 (1983 to 2003) located at the outlet quaternary catchment T35K on the Tsitsa River.

The positions of the stream flow gauges relative to the two catchments and the three proposed dam sites are provided in Figure 4-1. Table 4-10 presents the historical statistics of the stream flow at each gauge. The unpatched stream flow records are provided in Appendix B.

Table 4-10: Raw Gauged Stream Flow Statistics

No.	Gauge	Quat	Catchment	Period of record (hydrological years)		Length of record (years)	Annual statistics			
				Start	End		MAR ⁽¹⁾ Million m ³	SD ⁽²⁾ Million m ³	CV ⁽³⁾	% DWA ⁽⁴⁾ Flagged
1	T3H002	T33C	Kinira	1964	2009	46	286.77	190.22	0.66	17.93
2	T3H007	T33G	Kinira	1964	2003	40	609.85	546.54	0.90	24.17
3	T3H006	T35K	Tsitsa	1983	2003	21	806.86	516.62	0.64	10.71
4	T3H009	T35C	Tsitsa	1964	2009	46	98.83	47.71	0.48	3.99

- Notes: (1) Mean annual runoff.
 (2) Standard deviation, calculated as the square root of the variance.
 (3) Coefficient of variance, calculated as SD / MAP.
 (4) Flagged by DWA – HYDRSTRA in the RAW Observed Stream Flow data file.

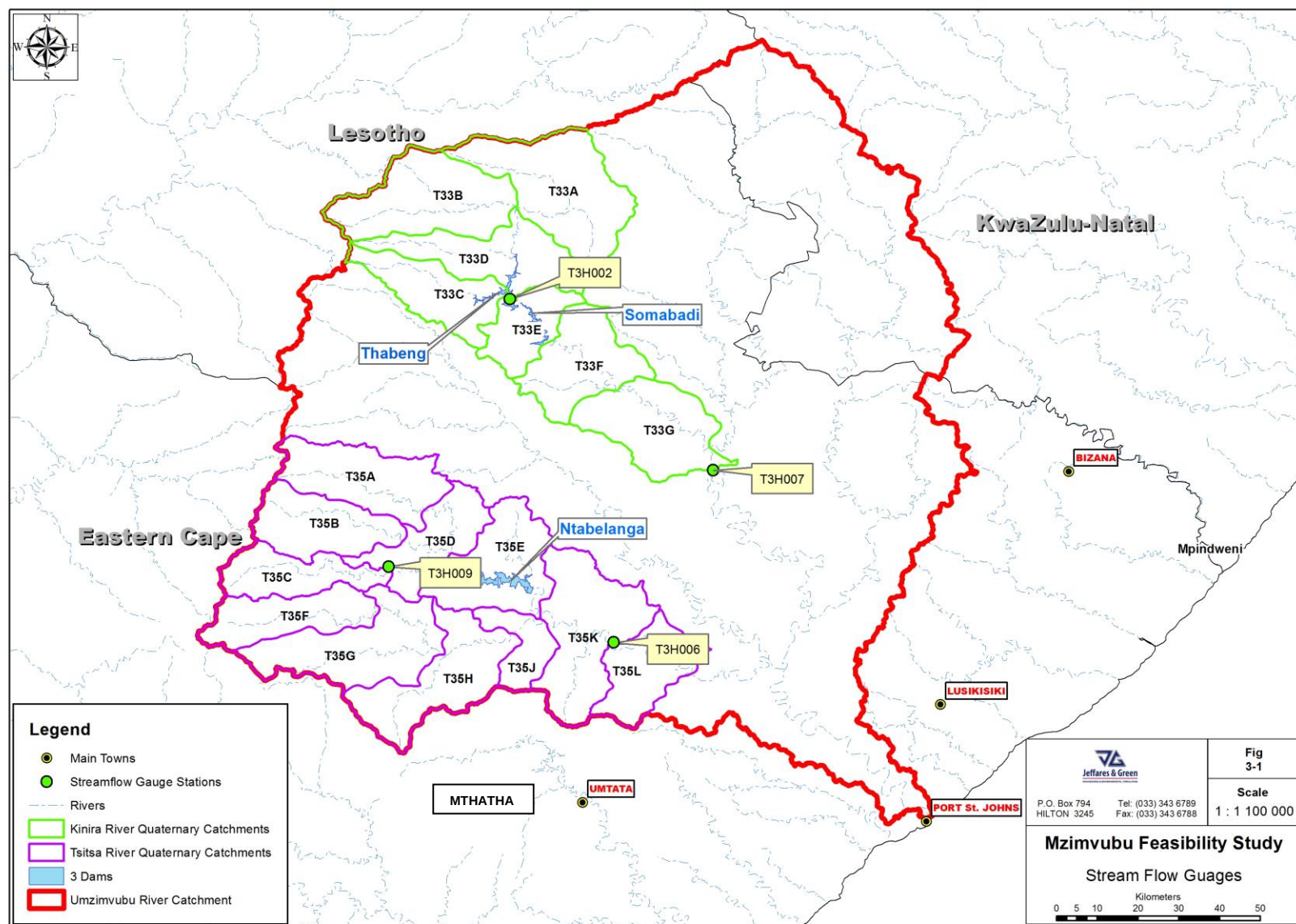


Figure 4-1: Stream Flow Gauges

4.1.4 Land Use

Land use can have a significant impact on stream flow simulations and it is for this reason that land use and changes in the land use over the simulation period need to be accounted for. The land use types that require investigation include commercial forestry, alien vegetation and irrigated crops. In this study, land use is not anticipated to have a significant impact on the catchment stream flows due to the relatively low impacted area when compared to the total catchment area.

a) Commercial Forestry

Commercial afforestation has been classified as a stream flow reduction activity due to the fact that this land use type reduces base flow in rivers. In order to determine the distribution of afforestation in each of the contributing quaternary catchments, a number of databases and institutions with information on coverage's of commercial forestry were interrogated (cf. Table 4-11).

These included the following:

- DAFF;
- The Eastern Cape Private Plantations database;
- Private Managed Plantations database;
- National Land-Cover Database 2000 (NLC, 2000);
- National Land-Cover Database 2009 (NLC, 2009);
- The WR2005 Study (WRC, 2009);
- The DWA Water Authorisation and Registration Management System (WARMS); and
- All commercial forestry areas in the Tsitsa River catchment were digitised as part of this study using the latest (2012) Google Earth satellite imagery.

It was found that very little correlation existed between most of the databases and coverage's assessed. This was especially apparent in the WR2005 study, which notably overestimated the area under commercial forestry in the Tsitsa River catchment, when compared to the other sources of information assessed.

These discrepancies may be as a result of different development levels (i.e. the year for which the information was generated), which will be accounted for in the final selection of commercial forestry area. Some correlation did, however, exist between the WARMS database and the areas that were digitised using Google Earth satellite imagery.

It was therefore decided that information obtained from the WARMS database would be used in the rainfall-runoff simulations in the Phase 1 study. The commercial forestry was simulated in the WRSM2000 model using the Smoothed Gush/Pitman curves assuming 50% optimal growth. The proportional species split was accounted for in WRSM2000 based on the values presented in Table 4-12. The commercial forestry areas adopted per quaternary catchment obtained from the WARMS database are provided in Table 4-13.

Table 4-11: Commercial Forestry Area Comparison

Quaternary Catchment	WR2005	Forestry	EC Private Plantations	Private Managed Plantations	NLC 2000	NLC 2009	Google Earth	WARMS
T33A	0.00							0.00
T33B	0.00							0.00
T33C	0.00							2.57
T33D	0.00		0.06		0.06			2.38
T33E	0.00							1.79
T33F	4.90	4.30	1.53		1.53	1.10		2.43
T33G	1.50	0.46	1.24		1.25	0.96		3.91
T35A	72.80		23.30		23.30	17.51	34.40	39.43
T35B	33.10		11.46		11.46	9.97	30.20	24.65
T35C	93.70		39.77		40.28	44.91	65.60	55.78
T35D	30.30		11.45		11.45	8.48	16.60	17.84
T35E	46.80	6.78	9.24		9.35	7.63	6.60	10.52
T35F	157.80		47.31		49.63	56.00	100.50	92.57
T35G	89.00		34.48		34.48	34.45	55.70	62.78
T35H	29.20		2.65	0.17	2.65	0.51	0.39	0.51
T35J	19.00	13.70	6.47	2.09	6.47	3.87	10.49	12.10
T35K	32.30	2.05	23.00	18.18	24.38	24.66	23.74	17.85

Table 4-12: Commercial Forestry Species Composition

	Quaternary Catchment	Eucalyptus	Pine	Unknown	Wattle	Total
Kinira River Catchment	T33A					0.00
	T33B					0.00
	T33C	2.44			0.14	2.57
	T33D	2.38				2.38
	T33E	1.79				1.79
	T33F		4.85			4.85
	T33G	0.04		3.87		3.91
Tsitsa River Catchment	T35A	3.88	7.76	27.70	0.10	39.43
	T35B	10.44	3.82	10.39		24.65
	T35C	33.72	4.78	17.28		55.78
	T35D	0.53	16.90	0.41		17.84
	T35E	8.77	1.01	0.31	0.43	10.52
	T35F	50.57	16.17	25.81	0.02	92.57
	T35G	11.23	2.12	48.96	0.47	62.78
	T35H	0.51				0.51
	T35J	1.32	10.78			12.10
	T35K	5.06	11.87	0.92		17.85
	T35L_1					0.00
	T35L_2	5.06			1.13	6.19

Table 4-13: Afforested Areas (WARMS Database)

	Quaternary Catchment	Afforested Area (km ²)
Kinira River Catchment	T33A	0.00
	T33B	0.00
	T33C	2.57
	T33D	2.38
	T33E	1.79
	T33F	2.43
	T33G	3.91
	Total	13.08
Tsitsa River Catchment	T35A	39.43
	T35B	24.65
	T35C	55.78
	T35D	17.84
	T35E	10.52
	T35F	92.57
	T35G	62.78
	T35H	0.51
	T35J	12.10
	T35K	17.85
	T35L	0.00
	Total	334.03

b) Invasive Alien Plants

Various databases and coverages were considered when determining the area of invasive alien plants (IAPs) per quaternary catchment. These included the following:

- WR2005 study (WRC, 2009);
- National Invasive Alien Plant Survey (Kotze et. al., 2010); and
- Google Earth Satellite imagery.

It was found that the study conducted by Kotze *et. al.*, 2010 was not sufficiently detailed in the contributing catchment areas for this study and, thus, results from this study were not used. Significant differences existed between the area of IAPs used for the WR2005 study compared to those areas digitised using Google Earth satellite imagery. The areas used in the WR2005 study were derived from WARMS and, as such, the results obtained from the digitised invasive alien vegetation undertaken as a part of this study were considered to be more reliable.

Note that IAPs were digitised only in the riparian zone of streams and rivers. It was decided that areas of alien vegetation digitised from Google Earth satellite imagery would be adopted in this study. However, it is important to note that these areas have not been field validated. The resultant areas of alien vegetation per quaternary catchment are presented in Table 4-14. The IAPs were simulated assuming 50 % optimal growth and an ages of 20 years. The proportional split between tall trees, medium trees and shrubs was accounted for in WRSM2000 based on the values presented in Table 4-14.

Table 4-14: IAP Areas

	Quaternary Catchment	Alien Vegetation Area (km ²)	% Area Riparian	% Tall Trees	% Area Medium Trees	% Area Shrubs
Kinira River Catchment	T33A	10.4	98.00	100.00	0.00	0.00
	T33B	19.4	98.00	100.00	0.00	0.00
	T33C	13.4	98.00	50.00	50.00	0.00
	T33D	15.1	98.00	50.00	50.00	0.00
	T33E	9.4	98.00	50.00	50.00	0.00
	T33F	41.3	98.00	50.00	50.00	0.00
	T33G	34.6	98.00	50.00	50.00	0.00
	Total	143.6				
Tsitsa River Catchment	T35A	5.8	0.05	50.00	50.00	0.00
	T35B	1.2	98.00	50.00	50.00	0.00
	T35C	0.6	98.00	50.00	50.00	0.00
	T35D	3.1	97.00	50.00	50.00	0.00
	T35E	10.1	98.00	50.00	50.00	0.00
	T35F	0.5	98.00	50.00	50.00	0.00
	T35G	3.0	98.00	50.00	50.00	0.00
	T35H	3.6	98.00	50.00	50.00	0.00
	T35J	1.6	98.00	50.00	50.00	0.00
	T35K	2.2	98.00	50.00	50.00	0.00
	T35L	0.0	98.00	50.00	50.00	0.00
	Total	31.7				

c) Irrigation of Crops

WR2005 (WRC, 2009), WARMS and SANBI (2000) were assessed to determine the irrigated area. After a comparison of the three data sources, it was found that SANBI (2000) and WARMS were comparable, with WR2005 being found to underestimate the irrigation area in most cases. Hence, the area under irrigation for each respective Quaternary Catchment was determined using the WARMS database.

The irrigation requirements are based on results derived from WRSM2000 simulations using the WQT Irrigation Block sub-model to simulate composite crops (to account for the variation of crops within each quaternary catchment), with the crop factors presented in **Table 4-15**. The irrigation simulations within WRSM2000 assumed an irrigation efficiency of 85% and evaporation based on A-pan values. Return flows were modelled with a Net Return Flow Factor of 0.020. The total irrigated area within each quaternary catchment is presented in **Table 4-16**.

Table 4-15: Composite Crop Factors

Crop	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Composite	0.74	0.81	0.85	0.90	0.92	0.93	0.91	0.88	0.82	0.78	0.74	0.72

Table 4-16: WARMS Registered Areas of Irrigation

	Quaternary Catchment	Irrigated Area (km ²)
Kinira River Catchment	T33A	0.26
	T33B	0.00
	T33C	0.00
	T33D	0.02
	T33E	0.00
	T33F	0.00
	T33G	0.00
	Total	0.28
Tsitsa River Catchment	T35A	0.40
	T35B	2.03
	T35C	0.00
	T35D	1.02
	T35E	0.00
	T35F	0.09
	T35G	16.56
	T35H	0.10
	T35J	0.00
	T35K	0.00
	T35L	0.00
	Total	20.20

d) Farm Dams

The characteristics of existing farm dams within the greater Kinira and Tsitsa River systems were determined using the DWS managed Dam Safety Register as well as by digitising dams identified using satellite imagery in Google Earth. For each of the dams identified, a contributing catchment area and approximate dam storage capacity were determined. The resultant sum of all dam surface areas, dam capacities and contributing catchment areas for each contributing Quaternary Catchment were calculated, as presented in Table 4-17. The contributing catchment area for each dam was measured using ARCMAP 9.3 GIS software. The basin characteristics for the dams identified with no information, i.e. those digitised from Google Earth imagery, were determined based on a typical area-capacity relationship for the catchments in question derived using a regional regression of information for registered dams (Figure 4-2). The capacity of each dam was calculated and accumulated with the known farm dam volumes to obtain a farm dam capacity (referred to as a “Dummy Dam” in the modelling component) for each quaternary catchment. The same methodology was applied for the surface area of the Dummy Dams. It is important to note that, for comparative purposes, Dummy Dams were not included in the WR2005 model configuration, which may lead to different stream flow results.

Table 4-17: Farm Dams per Quaternary Catchment

	Quaternary Catchment	Combined Dam Areas (km ²)	Combined Dam Volumes (million m ³)	Combined Catchment Area (km ²)
Kinira River Catchment	T33A	0.371	1.014	28.27
	T33B	0.000	0.000	0.00
	T33C	0.000	0.000	0.00
	T33D	0.000	0.000	0.00
	T33E	0.000	0.000	0.00
	T33F	0.000	0.000	0.00
	T33G	0.264	0.892	22.02
Tsitsa River Catchment	T35A	0.054	0.325	12.71
	T35B	0.058	0.350	15.30
	T35C	0.060	0.360	4.25
	T35D	0.386	1.027	52.84
	T35E	0.060	0.365	4.14
	T35F	0.743	1.261	22.23
	T35G	1.353	1.476	100.27
	T35H	0.190	0.775	19.14
	T35J	0.000	0.000	0.00
	T35K	0.362	1.005	18.03

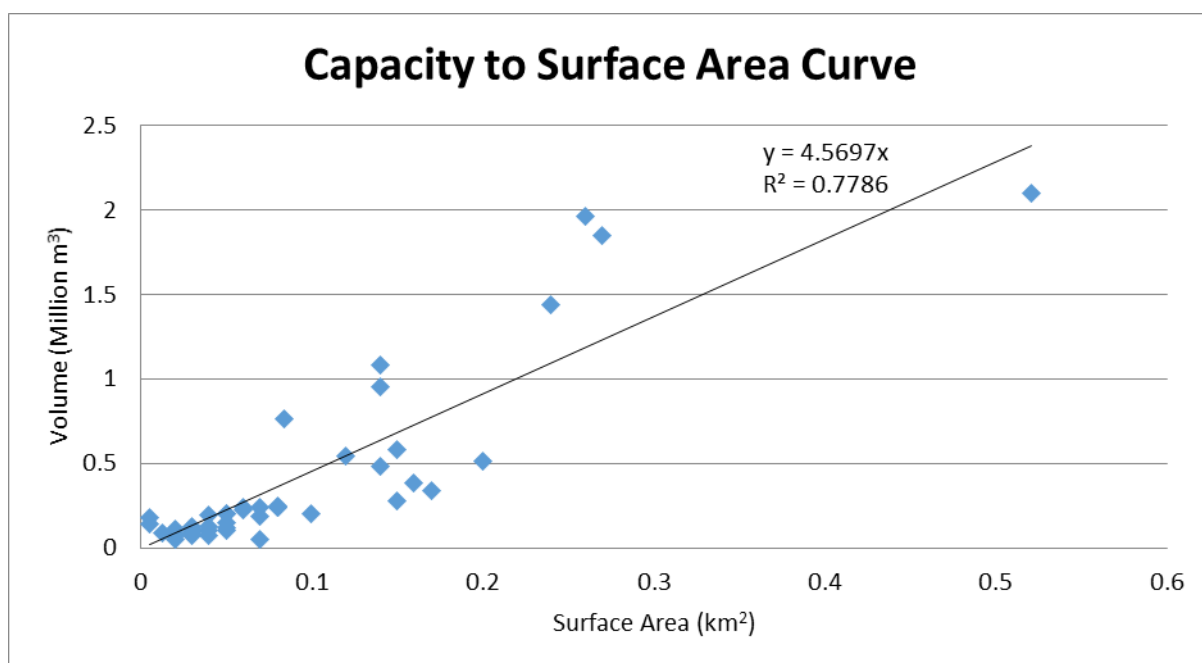


Figure 4-2: Dam Characteristics Regression

e) Sediment Transport

Calculation of the sediment yield transported through the catchment and deposited at the outlet is important when investigating a storage structure. The sediment deposited in a dam will decrease its live storage, and, hence, its lifespan, by decreasing the volume of water it can hold. It is necessary to take this into consideration during the sizing of the storage structure.

To determine the amount of sediment that will be deposited annually, the empirical Rooseboom Method of calculating sediment deposition in each dam was undertaken. This method is based on a Water Research Commission (WRC) project to produce a sediment yield map for Southern Africa. This was undertaken by Rooseboom *et. al.* (1992) and is now the standard for sediment yield estimation for storage structures. Rooseboom (1992) derived equations that describe sediment transport by the carrying capacity of the runoff from the catchment. This led to regional parameters and a simplified method for sediment yield determination without having to gauge the site.

Using the methodology outlined on pages 5.3 and 5.12 of Rooseboom *et. al.* (1992) and Figure 5.4 on page 5.6 of Rooseboom *et.al.* (1992), the sediment yield was determined for the dam sites. This was then converted to the sediment consolidation volume for 50 years (V_{50}) for different percentiles of non-exceedance. After considering the sediment loads and erosion potential in each of the three catchments, it was decided that for the Phase 1 assessments, the V_{50} value would be adopted using the calculated V_{100} value at the 95% assurance of non-exceedance.

This is due to the extremely high erosion potential in the area and is similar to the sediment yield results identified by the DWA (2010) study. Table 4-18 presents a summary of the selected V_{50} sedimentation allowance volumes (storage allocation to accommodation 50 years of sedimentation into the dam without impacting upon the yield of the impoundment). Tables C-1, C-2 and C-3 in Appendix C present the sedimentation calculations using the Rooseboom (1992) method. These sedimentation volumes were used as dead storage volumes when calculating the yields of the potential dams.

Table 4-18: Sedimentation V50 Values

Dam Site	Sedimentation V_{50} (million m^3)
Somabadi	42.80
Thabeng	38.44
Ntabelanga	29.30

4.2 Rainfall-Runoff Modelling

The occurrence of stream flows at a particular point in a river can be monitored, over time, using a variety of flow measuring and data logging equipment. The resulting data set of historical stream flows provides the primary means of assessing the magnitude and characteristics of runoff generated within the catchment area located upstream of the point in question. In this case, the historical stream flows were not of a great quality with many missing values (e.g. overtopping of the gauge) and a low confidence in some of the readings due to siltation of the gauging weirs. However, the observed stream flow records were used to calibrate simulated stream flow time-series generated in the rainfall-runoff modelling exercise as no other data was available for calibration in these catchments. The resultant stream flow time series were used in further reservoir simulation analyses to assess the catchment's available water resources.

4.2.1 Rainfall-runoff Model Calibration

Rainfall-runoff modelling represents a process whereby the runoff response of the Kinira and Tsitsa River catchments was simulated based on the monthly time-series of representative catchment rainfall data (cf. Section 4.1.1) and observed stream flows (cf. Section 4.1.3). For this purpose, WRSM2000 was used.

The generation of stream flows with WRSM2000 is controlled by a number of physical catchment parameters. The values adopted for each parameter differs from one catchment to another and may be obtained in a variety of ways, including:

- By means of a process referred to as “calibration”, which involves the iterative adjustment of parameter values in order to achieve a situation where the stream flows generated by the model mimic, as closely as possible, observed stream flows;
- From regionalised catchment studies, such as the WR2005 (WRC, 2009); and
- From estimates based on the physical characteristics of a catchment such as the climate, soil characteristics, vegetation and topography.

In order to determine the physical catchment parameters for the Kinira and Tsitsa River Systems, quaternary catchments T33A to T33G (Kinira River system) and quaternary catchments T35A to T35L (Tsitsa River system) were simulated using the WRSM2000 model (cf. Appendix B1 and B2 for the WRSM2000 System Diagrams for each river system). The stream flow simulations were calibrated against the stream flow gauges described in Section 4.1.3.

The results from the calibration process are summarised below, including the calibrated values of the WRSM2000 calibration parameters for the Kinira and Tsitsa catchments in Tables B1-18 and B2-39, respectively (Appendices B1 and B2). In addition, a comparison of the statistical characteristics of the observed and simulated stream flows are presented for each of the four gauge sites in Tables 4-19 to 4-22. Further to the stream flow statistics, WRSM2000 plots of various statistics were visually assessed to improve the statistical calibration (Appendix B1 for the Kinira and B2 for the Tsitsa).

Table 4-19: Simulated and Gauge T2H002 (Kinira) Observed Stream Flows

Index	Units	Observed	Simulated
Mean Annual Runoff (M A R)	Million m ³	268.07	261.40
Standard Deviation of Annual Flows (S)	Million m ³	197.22	172.57
Mean of Logs of Annual Flows	Million m ³	2.12	2.33
Std. Dev. of Logs of Annual Flows	-	1.05	0.30
Index of Seasonal Variability	PERCENT	36.99	39.08

Table 4-20: Simulated and Gauge T2H007 (Kinira) Observed Stream Flows

Index	Units	Observed	Simulated
Mean Annual Runoff (M A R)	Million m ³	790.76	630.40
Standard Deviation of Annual Flows (S)	Million m ³	502.67	401.60
Mean of Logs of Annual Flows	Million m ³	2.82	2.73
Std. Dev. of Logs of Annual Flows	-	0.28	0.27
Index of Seasonal Variability	PERCENT	37.96	38.18

Table 4-21: Simulated and Gauge T2H006 (Tsitsa) Observed Stream Flows

Index	Units	Observed	Simulated
Mean Annual Runoff (M A R)	Million m ³	806.82	782.42
Standard Deviation of Annual Flows (S)	Million m ³	516.80	351.33
Mean of Logs of Annual Flows	Million m ³	2.82	2.83
Std. Dev. of Logs of Annual Flows	-	0.29	0.28
Index of Seasonal Variability	PERCENT	38.84	33.04

Table 4-22: Simulated and Gauge T2H009 (Tsitsa) Observed Stream Flows

Index	Units	Observed	Simulated
Mean Annual Runoff (M A R)	Million m ³	97.70	87.87
Standard Deviation of Annual Flows (S)	Million m ³	47.80	29.79
Mean of Logs of Annual Flows	Million m ³	1.93	1.92
Std. Dev. of Logs of Annual Flows	-	0.24	0.16
Index of Seasonal Variability	PERCENT	37.34	25.00

The calibration results are generally poor, particularly with regard to standard deviations (simulated too low) and seasonal distributions. This can probably be attributed largely to the fact that the WRSM2000 model was calibrated against poor quality observed stream flow data sets.

Due to the high proportion of flagged values in the observed stream flow datasets, it was decided to use simulated natural flows for the stochastic and yield analyses, rather than using naturalised or extended observed flows.

The stationarity of the simulated natural stream flow datasets was tested using a single mass-plot, which are shown in Appendix B1 and B2 (Kinira and Tsitsa systems, respectively). Based on these results, the simulated stream flows for the Kinira and Tsitsa River catchments that contribute to the three dams were considered to be acceptable for use in the stochastic and yield analyses of the Phase 1 assessment and acceptable for comparative purposes.

4.2.2 Rainfall-runoff Modelling Results

The results of these simulations produced the monthly natural simulated stream flow time-series for both the Kinira and Tsitsa Rivers, as presented in Appendix B1 and B2, (in units of million m³), respectively. In addition, Appendix B presents the time-series of historical modelled irrigation requirements and impacts of commercial forestry over the 90-year simulated period 1920 to 2009 (hydrological years) for each respective system. These time-series files for irrigation and commercial forestry are presented at a constant development scenario of 2009. A summary of the results for each quaternary catchment is presented in Table 4-23, with a summary of the accumulated simulated natural stream flow at each dam site provided in Table 4-24.

Table 4-23: Natural Simulated Stream Flow Time-Series

River System	Quaternary Catchment	Catchment Area (km ²)	Period of record (hydrological years)		Length of record (years)	Annual statistic		
			Start	End		MAR ⁽¹⁾ (million m ³ /a)	SD ⁽²⁾ (million m ³ /a)	CV ⁽³⁾
Kinira River Catchment	T33A	674.4	1920	2009	90	97.51	53.69	0.55
	T33B	603.8	1920	2009	90	82.43	47.68	0.58
	T33C	368.1	1920	2009	90	50.59	29.33	0.58
	T33D	462.0	1920	2009	90	51.47	31.40	0.61
	T33E	268.0	1920	2009	90	78.72	29.63	0.38
	T33F	438.7	1920	2009	90	145.68	53.97	0.37
	T33G	504.6	1920	2009	90	135.49	54.55	0.40
	Total	3 319.6	1920	2009	90	641.89		
Tsitsa River Catchment	T35A	476.5	1920	2009	90	52.23	31.57	0.60
	T35B	396.8	1920	2009	90	43.76	26.56	0.61
	T35C	307.0	1920	2009	90	96.70	31.93	0.33
	T35D	348.9	1920	2009	90	40.60	23.96	0.59
	T35E	493.5	1920	2009	90	106.62	53.04	0.50
	T35F	359.6	1920	2009	90	42.45	25.38	0.60
	T35G	576.2	1920	2009	90	69.85	41.33	0.59
	T35H	521.0	1920	2009	90	110.29	55.90	0.51
	T35J	189.0	1920	2009	90	52.25	23.76	0.45
	T35K	627.1	1920	2009	90	69.08	42.60	0.62
	T35L	339.5	1920	2009	90	54.71	30.37	0.56
	Total	4 635.1	1920	2009	90	738.54		

Notes: (1) Mean annual runoff.
(2) Standard deviation, calculated as the square root of the variance.
(3) Coefficient of variance, calculated as SD / MAP.

The accumulated mean natural simulated stream flow at the outlet of quaternary catchment T33G (Kinira River) is approximately 47% larger than the same naturalised stream flow of 437.54 million m³/annum presented in W2005 (WRC, 2009). This increase can be attributed to the difference in rainfall, i.e. higher average rainfall values across the Kinira River catchment in this study than in WR2005 (WRC, 2009), and due to the difference in land use, namely the changes in commercial forestry and irrigated area.

Conversely, accumulated mean natural simulated stream flow at the outlet of quaternary catchment T35L (Tsitsa River) is approximately 95% of the same naturalised stream flow of 775.04 million m³/annum presented in W2005 (WRC, 2009). This change can be attributed to the difference in rainfall and land use between the two studies.

Table 4-24: Mean Annual Runoff for the Three Dam Sites

Dam Site	MAR ⁽¹⁾
Thabeng	290.00
Somabadi	361.00
Ntabelanga	327.00

Notes: (1) Mean annual runoff.

4.3 Stochastic Stream Flow Analysis

The time-series of historical stream flows for a particular catchment may be used in reservoir simulation analyses to assess the catchment's available water resources. However, the results obtained from analysing a single historical sequence is often misleading and provides little information on the reliability of the resource since it depends, to a large extent, on the period of record analysed and the severity of dry periods that this sequence happens to contain.

In order to address the above shortcoming, analyses are undertaken based, not only on the historical stream flow sequence, but also on a number of alternative stream flow sequences, each of which is generated synthetically based on the inherent characteristics of the historical stream flow sequence. Once the analysis of these sequences, which are referred to as stochastic stream flow sequences, has been completed, the results are interpreted further to derive the assurance of supply associated with the resource.

Stochastic stream flow sequences are generated by applying statistical distribution models. The selection of these models is based on a number of complex analyses, the purpose of which is to determine the inherent statistical characteristics of the historical stream flow sequence for the catchment in question.

The statistical analysis of stream flows was undertaken for all quaternary catchments in the Kinira and Tsitsa River systems using the *Stochastic Model of South Africa* (STOMSA), which incorporates Mark 7.1 of the ANNUAL and CROSSYR programs. The analysis was based on the simulated monthly natural stream flow data time-series adopted for the respective catchments, which covers a 90-year period from 1920 to 2009 (hydrological years) as discussed in Section 4.2.

Both visual inspection and various statistically-based checking procedures were used to test the stochastic stream flow sequences produced. For this purpose, Mark 7.1 of the SDFPrep program was applied and examples of the results are shown in Appendix D1 and D2, for the Kinira and Tsitsa River systems, respectively. The results of these statistically based plots were considered to be acceptable and, thus, the results were adopted for use in the yield modelling component of the study.

4.4 Reservoir Characteristics

The reservoir characteristics are used in yield modelling to assess several aspects of the impounded water, viz.:

- Evaporative losses from the dam water surface;
- Rainfall on to the dam water surface;
- Physical abstraction limitations of the dam, such as the water level dropping below Minimum Operating Level (MOL); and
- To assess when the dam is spilling.

A LiDAR survey (Light Detection and Ranging, or Laser Imaging Detection and Ranging) was undertaken for the storage basins of each of the three proposed dams and used to generate accurate reservoir characteristics (Report No. P WMA 12/T30/00/5212/3). The results are presented in Tables 4-25, 4-26 and 4-27 for the Somabadi, Thabeng and Ntabelanga dams, respectively, and also depicted in Figures 4-3 to 4-5. Also, the main basin characteristics available are related to the selected dam design and operations of the dam.

These included:

- A selected full supply level (FSL), depending on the selected storage size of the dam for the scenario in question (cf. Section 4.6);
- total volume at FSL;
- surface area at FSL; and
- live volume which was calculated by subtracting the projected sediment volume from the total volume. For modelling purposes, this was defined based on a corresponding MOL.

Table 4-25: Storage Basin Characteristics for Somabadi Dam

Water Level (m.a.s.l) ⁽¹⁾	Total Volume (million m ³)	Surface Area (km ²)
1340.00	445.48	18.51
1322.00	196.45	10.42
1320.00	168.78	9.52
1315.00	122.73	7.69
1310.00	87.83	6.28
1307.00	70.20	5.47
1304.00	55.08	4.61
1302.00	46.45	4.04
1300.00	38.92	3.51
1298.00	32.42	2.98
1296.00	26.98	2.49
1293.00	20.37	1.94
1290.00	15.19	1.51
1280.00	5.29	0.59
1259.07	0.00	0.00

Notes: (1) Metres above sea level.

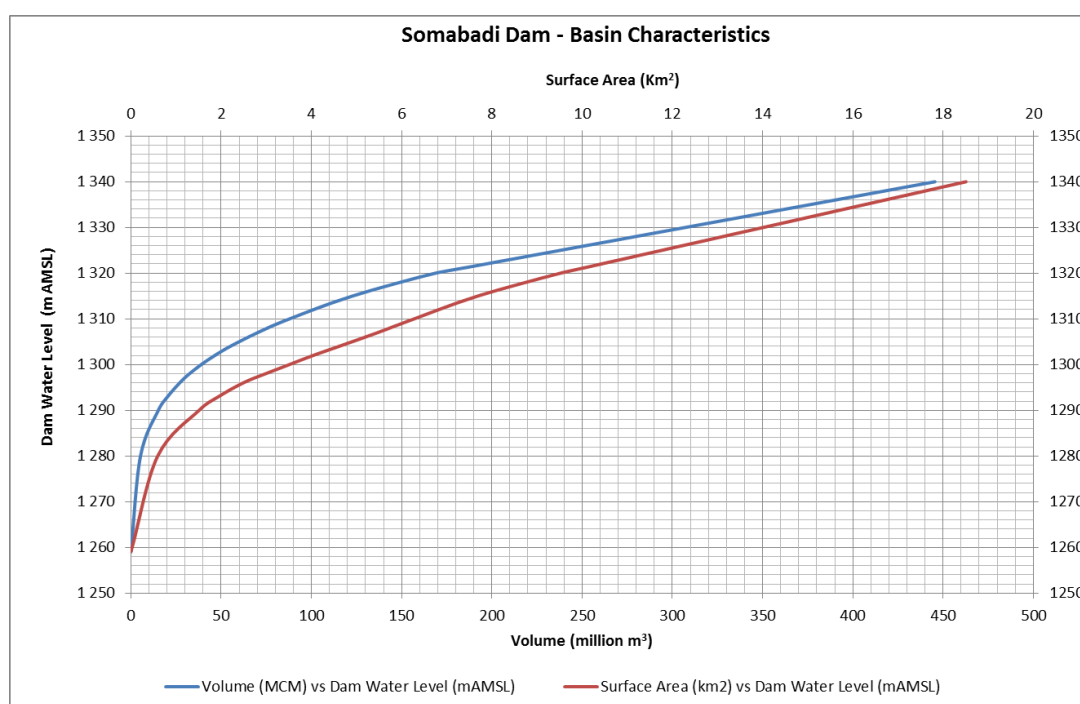


Figure 4-3: Storage Basin Characteristics for Somabadi Dam

Table 4-26: Storage Basin Characteristics for Thabeng Dam

Water Level (m.a.s.l) ⁽¹⁾	Accumulated Volume (million m ³)	Surface Area (km ²)
1401.00	516.60	23.66
1383.00	212.66	12.64
1379.00	151.41	10.39
1375.00	112.99	8.83
1372.00	88.20	7.70
1369.00	66.70	6.62
1366.00	48.61	5.44
1363.00	34.05	4.26
1360.00	22.86	3.21
1356.00	12.71	1.81
1353.00	8.13	1.27
1350.00	4.95	0.86
1345.00	1.86	0.42
1340.00	0.41	0.16
1334.12	0.00	0.00

Notes: (1) Metres above sea level.

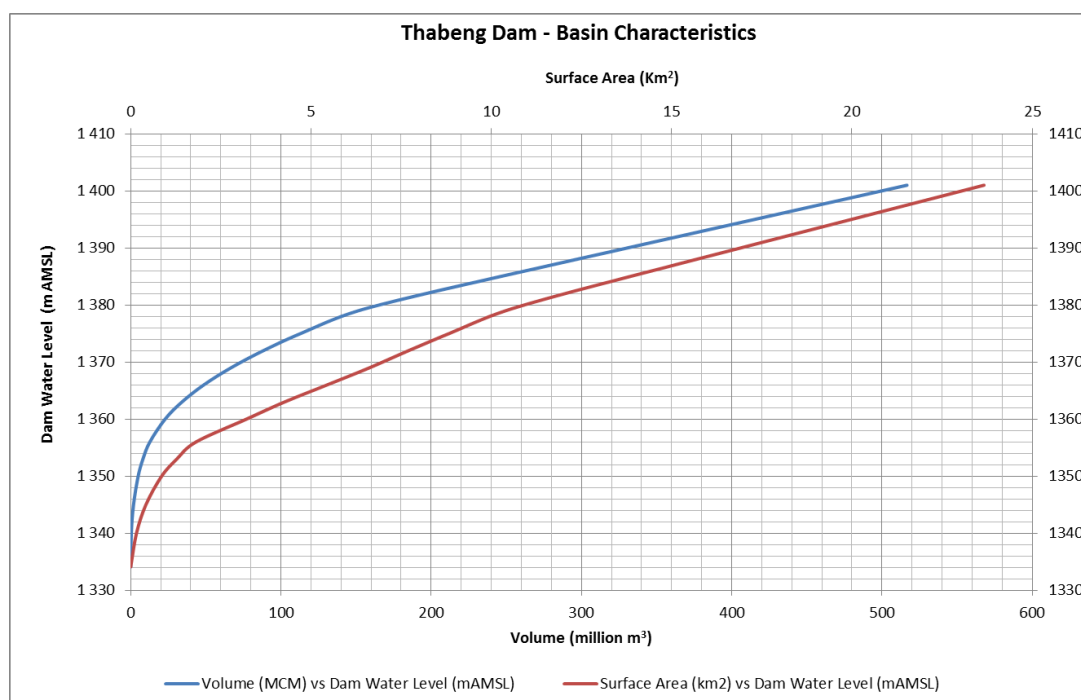


Figure 4-4: Storage Basin Characteristics for Thabeng Dam

Table 4-27: Storage Basin Characteristics for Ntabelanga Dam

Water Level (m.a.s.l) ⁽¹⁾	Accumulated Volume (million m ³)	Area (km ²)
959.90	796.80	49.00
938.90	285.56	22.03
934.90	197.58	17.31
931.90	150.58	14.20
929.90	124.31	12.01
926.40	87.49	9.04
924.40	71.04	7.53
922.40	57.18	6.36
919.90	43.13	5.04
915.90	26.12	3.47
911.90	14.57	2.28
907.90	7.56	1.29
903.90	3.78	0.69
899.90	1.64	0.41
886.66	0.00	0.00

Notes: (1) Metres above sea level.

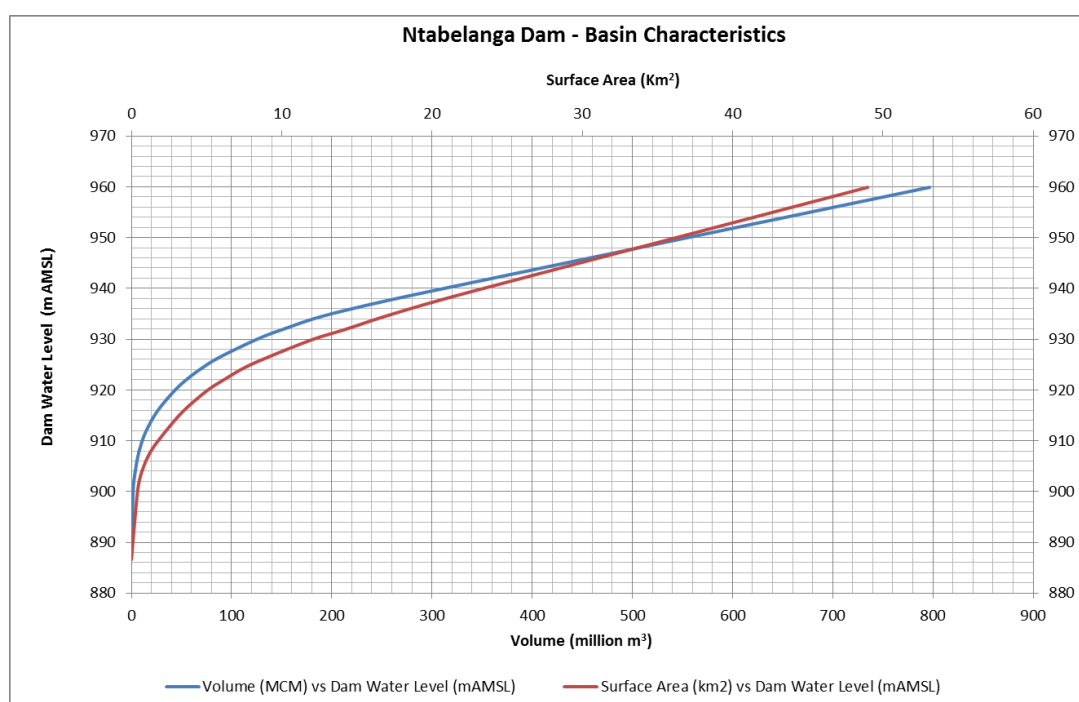


Figure 4-5: Storage Basin Characteristics for Ntabelanga Dam

4.5 Environmental Water Requirements

Environmental Water Requirements (EWR) are important to downstream ecosystems and are related to the characteristics and timing of natural stream flows.

For the purpose of assessing the impact of making EWR releases on the yield available from the proposed dams, Rapid Reserve Determinations were undertaken for each of the three sites as a part of this study (cf. Report no. P WMA 12/T30/00/5212/7), with a summary of the results presented in Table 4-28. Note that once the final dam site has been selected at the end of Phase 1, an Intermediate Reserve Determination will be undertaken in Phase 2.

Table 4-28: Rapid Reserve Determination Results

Dam Site	Rapid EWR Class	Annual Average EWR Allowance (million m ³ /a)	Total Flows (% MAR)
Somabadi	C	104.98	29.08
Thabeng	C	84.33	29.08
Ntabelanga	D	52.82	15.90

The present ecological state of the Kinira and Tsitsa Rivers are classed as a C or a D, which could be considered low in undeveloped catchments. The low classes, especially the Class D of the Tsitsa River, is predominantly due to the very high sediment loads in the river, which limit habitat availability for the aquatic biota associated with an EWR study (i.e. macro-invertebrates and fish).

4.6 Yield Assessment

The purpose of the yield analysis of the three dams was to assess the water resource capability (or “yield”) of the dams under a variety of situations. The yield analysis was undertaken using the Water Resources Yield Model (WRYM), which was developed by the Department of Water Affairs (DWA). Analyses are undertaken based on a monthly time-step and for constant development levels, i.e. the system configuration and modelled demands remain unchanged over the simulation period.

Yield results presented in this report are based on two distinct types of analyses. The first is a historical yield analysis and the second is a long-term stochastic yield analyses.

4.6.1 Historical Yield Analysis

The historical yield analysis was undertaken by analysing the dam over a period of 90 years, from 1920 to 2009 (hydrological years), based on the available historical hydro-meteorological data developed in the hydrological analysis (as described in Section 4.1). The most important result from such an analysis is the Historical Firm Yield (HFY) of the dam for the scenario under consideration. The HFY is a first order indication of yield available from the dam based on the historical flow records.

4.6.2 Stochastic Yield Analysis

The long-term stochastic yield analyses were undertaken using 201 90-year stochastically generated stream flow sequences. The results of a long-term stochastic yield analysis were then used to derive Yield Reliability Characteristics (YRC) curves for the dams. This curve provides a graphical representation of the relationships between yield and reliability of supply.

4.6.3 Starting Storage

In line with common practice when undertaking long-term yield analyses, the dam was assumed to be full at the start of the analysis period.

4.6.4 Description of Yield Scenarios

A series of yield scenarios were undertaken for each dam site. All of these scenarios followed the same trend, with a range of impoundment volumes (i.e. 0.10, 0.25, 0.50, 1.00 and greater than 1.00 MAR dam sizes) assessed to determine the present water resource potential. A 2009 development level (classed as current) was adopted in the yield modelling exercise for all three dam options, including a static EWR allowance as per the results of the Rapid Reserve Determination for each specific site (cf. Section 4.5). No future development scenarios were assessed as the aim of the water resource potential created by the proposed impoundments was to provide water for potential potable water supply, irrigation and hydropower. Hence, the net yield of the dam could be used to assess any aspects of these demands that could be achieved (cf. Report no. P WMA 12/T30/00/5212/6 for the water requirements assessment).

4.7 Water Resource Potential Results

The WRYM network diagrams are depicted in Figures E-1 and E-3 for the Kinira and Tsitsa River systems, respectively (Appendices E1 – E3).

The yield results for the scenarios described in Section 4.6.4 are presented in Tables 4-29 to 4-31, with the corresponding YRC curves in Figures E1-2 to E2-6, of Appendix E1, Figures E2-2 to E2-6 of Appendix E2, and Figures E3-2 to E3-6 of Appendix E3 for the Somabadi, Thabeng and Ntabelanga dam sites, respectively.

The results presented in Table 4-29 show that the current HFY of Somabadi Dam ranges from 8.38 million m³/a to 161.60 million m³/a when the storage capacity of the dam is increased from 0.10 MAR to 1.23 MAR (1.23 MAR was the maximum simulated volume due to the limitations in the survey data available). It is also important to note that the yield of the various dam sizes is larger at the 98% assurance of supply than the HFY.

At 0.10 MAR, the live storage is only 4.28 million m³, with a loss of the majority of the storage volume over the proposed 50-year lifespan of the dam due to sediment deposition (i.e. V_{50}). Once the dam storage is increased beyond the 0.10 MAR capacity, large increases in yield are observed at all assurances of supply, which is due to the rapid increase in live storage. However, the yield curve does start to flatten towards the larger dam sizes, i.e. 1.00 MAR and 1.23 MAR (Figure 4-6).

The results presented in Table 4-30 show that the current HFY of Thabeng Dam ranges from 7.15 million m³/a to 133.90 million m³/a when the storage capacity of the dam is increased from 0.10 MAR to 1.50 MAR. These results are lower than those obtained from Somabadi, which is to be expected due to the smaller contributing catchment area. In a similar manner to Somabadi, the yield of the various Thabeng Dam sizes is larger at the 98% assurance of supply than the HFY.

At 0.10 MAR, the live storage is only 5.06 million m³, with a loss of the majority of the storage volume over the proposed 50-year lifespan of the dam due to sediment deposition (i.e. V_{50}). Once the dam storage is increased beyond the 0.10 MAR capacity, large increases in yield are observed at all assurances of supply, which is due to the rapid increase in live storage. However, the yield curve does start to flatten towards the larger dam sizes, i.e. 1.00 MAR and 1.50 MAR (Figure 4-7).

The results presented in Table 4-31 show that the current HFY of Ntabelanga Dam ranges from 23.30 million m³/a to 186.45 million m³/a when the storage capacity of the dam is increased from 0.10 MAR to 1.50 MAR. These results are higher than those obtained from Somabadi and Thabeng, as a result of the significantly lower sedimentation rates, a lower stream flow CV and a lower EWR requirement.

In a similar manner to Thabeng and Somabadi, the yield of the various Ntabelanga Dam sizes is larger at the 98% assurance of supply than the HFY. At 0.10 MAR, the live storage is only 2.93 million m³ more than the volume allowed for sediment deposition over 50 years (i.e. V₅₀). Once the dam storage is increased beyond the 0.10 MAR capacity, large increases in yield are observed at all assurances of supply, which is due to the rapid increase in live storage. However, the yield curve does start to flatten towards the larger dam sizes, i.e. 1.00 MAR and 1.50 MAR (Figure 4-8).

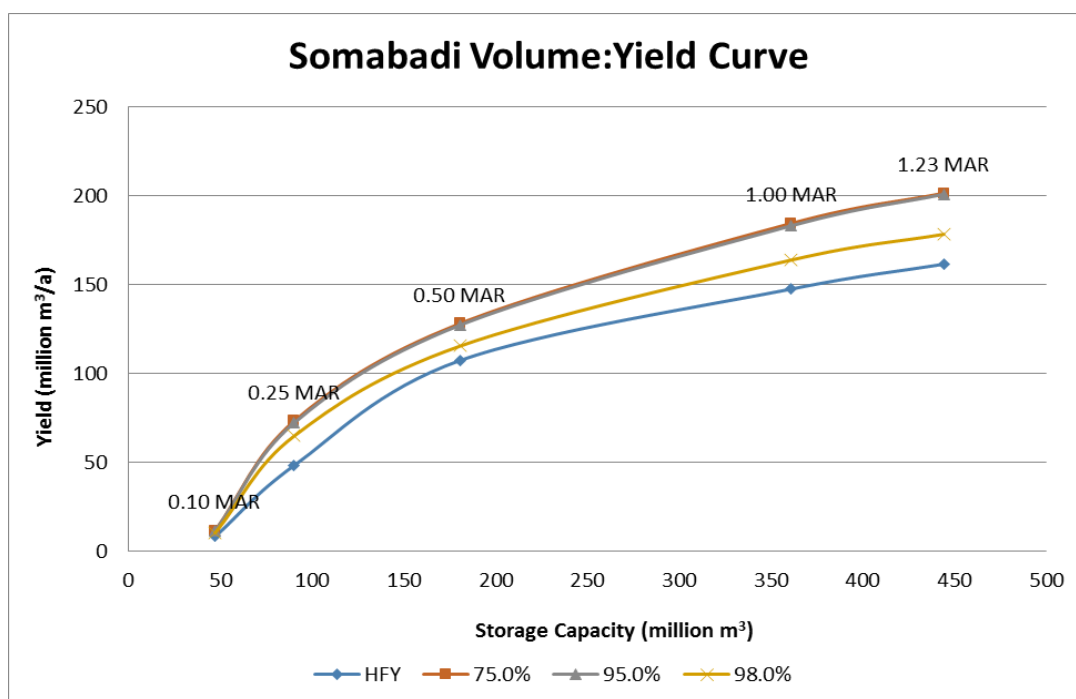


Figure 4-6: Yield vs. Volume Curve - Somabadi Dam

Table 4-29: Yield Results for the Somabadi Dam

Scenario		Reservoir					EWR			HFY (million m³/a)	Yield (million m³/a) at RI, annual assurance		
No.	Description	FSL (m.a.s.l)	MOL (m.a.s.l)	Gross storage capacity (million m³)	Live storage capacity (million m³)	Area (km²)	Class	Req.					
								(million m³/a)	(%MAR)		1:4 75%	1:20 95%	1:50 98%
01	Current + 0.10 MAR + C Class EWR	1302.1	1301.0	47.08	4.28	4.08	C	105.0	29.1%	8.4	11.6	11.5	10.4
02	Current + 0.25 MAR + C Class EWR	1310.4	1301.0	90.25	47.45	6.38	C	105.0	29.1%	48.4	73.4	72.4	65.0
03	Current + 0.50 MAR + C Class EWR	1320.9	1301.0	180.50	137.70	9.90	C	105.0	29.1%	107.4	128.2	127.3	115.5
04	Current + 1.00 MAR + C Class EWR	1333.9	1301.0	361.00	318.20	15.76	C	105.0	29.1%	147.6	184.5	183.2	163.9
05	Current + 1.23 MAR + C Class EWR	1339.6	1301.0	444.03	401.23	18.34	C	105.0	29.1%	161.6	201.5	200.9	178.4

Table 4-30: Yield Results for the Thabeng Dam

Scenario		Reservoir					EWR			HFY (million m³/a)	Yield (million m³/a) at RI, annual assurance		
No.	Description	FSL (m.a.s.l)	MOL (m.a.s.l)	Gross storage capacity (million m³)	Live storage capacity (million m³)	Area (km²)	Class	Req.			1:4 75%	1:20 95%	1:50 98%
								(million m³/a)	(%MAR)				
01	Current + 0.15 MAR + C Class EWR	1364.9	1363.9	43.50	5.06	5.02	C	84.3	29.1%	7.2	9.3	9.0	8.2
02	Current + 0.25 MAR + C Class EWR	1369.8	1363.9	72.50	34.06	6.91	C	84.3	29.1%	30.4	48.0	47.4	41.4
03	Current + 0.50 MAR + C Class EWR	1378.3	1363.9	145.00	106.56	10.13	C	84.3	29.1%	76.5	92.3	90.9	80.8
04	Current + 1.00 MAR + C Class EWR	1387.6	1363.9	290.00	251.56	15.46	C	84.3	29.1%	108.6	141.1	139.2	121.0
05	Current + 1.50 MAR + C Class EWR	1396.2	1363.9	435.00	396.56	20.70	C	84.3	29.1%	133.9	168.0	166.5	143.2

Table 4-31: Yield Results for the Ntabelanga Dam

Scenario		Reservoir					EWR			HFY (million m³/a)	Yield (million m³/a) at RI, annual assurance		
No.	Description	FSL (m.a.s.l)	MOL (m.a.s.l)	Gross storage capacity (million m³)	Live storage capacity (million m³)	Area (km²)	Class	Req.			1:4 75%	1:20 95%	1:50 98%
								(million m³/a)	(%MAR)				
01	Current + 0.10 MAR + D Class EWR	917.3	916.7	32.23	2.93	4.03	D	52.82	15.9%	23.3	29.2	29.0	26.8
02	Current + 0.25 MAR + D Class EWR	925.7	916.7	81.75	52.45	8.51	D	52.82	15.9%	65.9	93.0	91.5	77.1
03	Current + 0.50 MAR + D Class EWR	932.7	916.7	163.50	134.20	15.05	D	52.82	15.9%	114.0	140.5	138.5	123.0
04	Current + 1.00 MAR + D Class EWR	940.6	916.7	327.00	297.70	24.21	D	52.82	15.9%	157.6	201.0	192.9	171.7
05	Current + 1.50 MAR + D Class EWR	947.3	916.7	490.50	461.20	32.84	D	52.82	15.9%	186.5	221.1	218.2	198.8

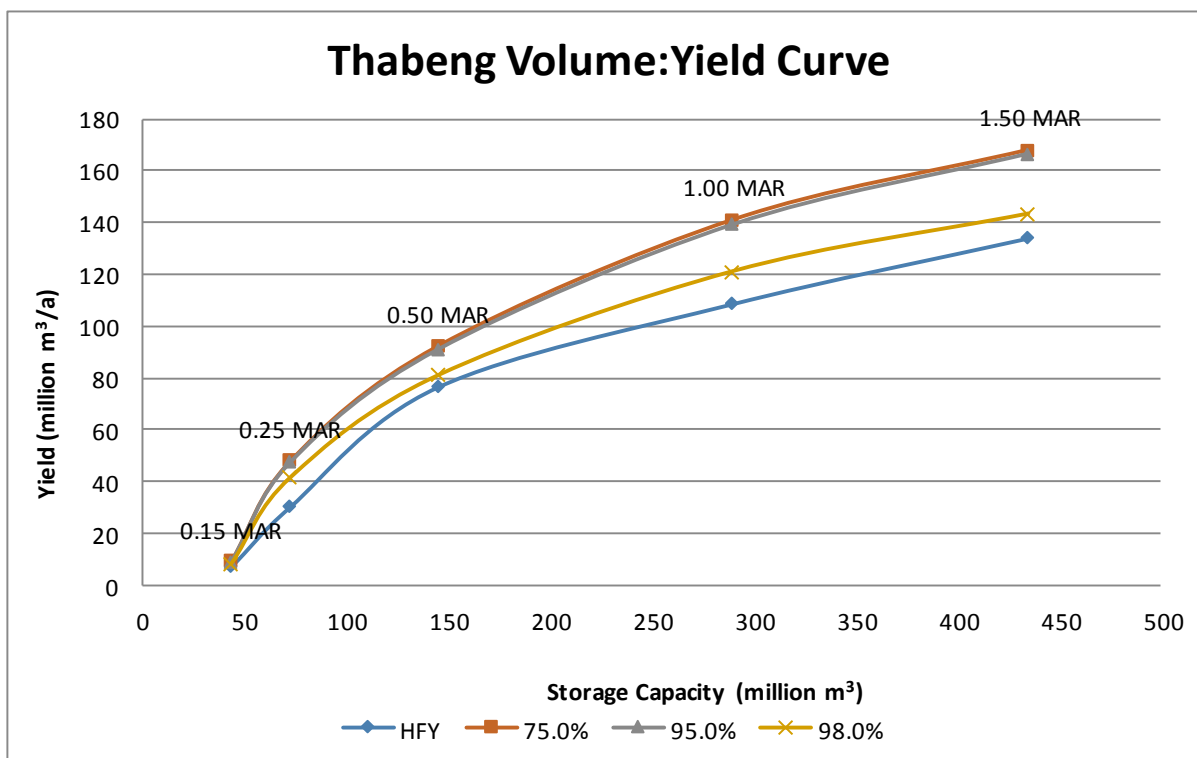


Figure 4-7: Yield vs. Volume Curve - Thabeng Dam

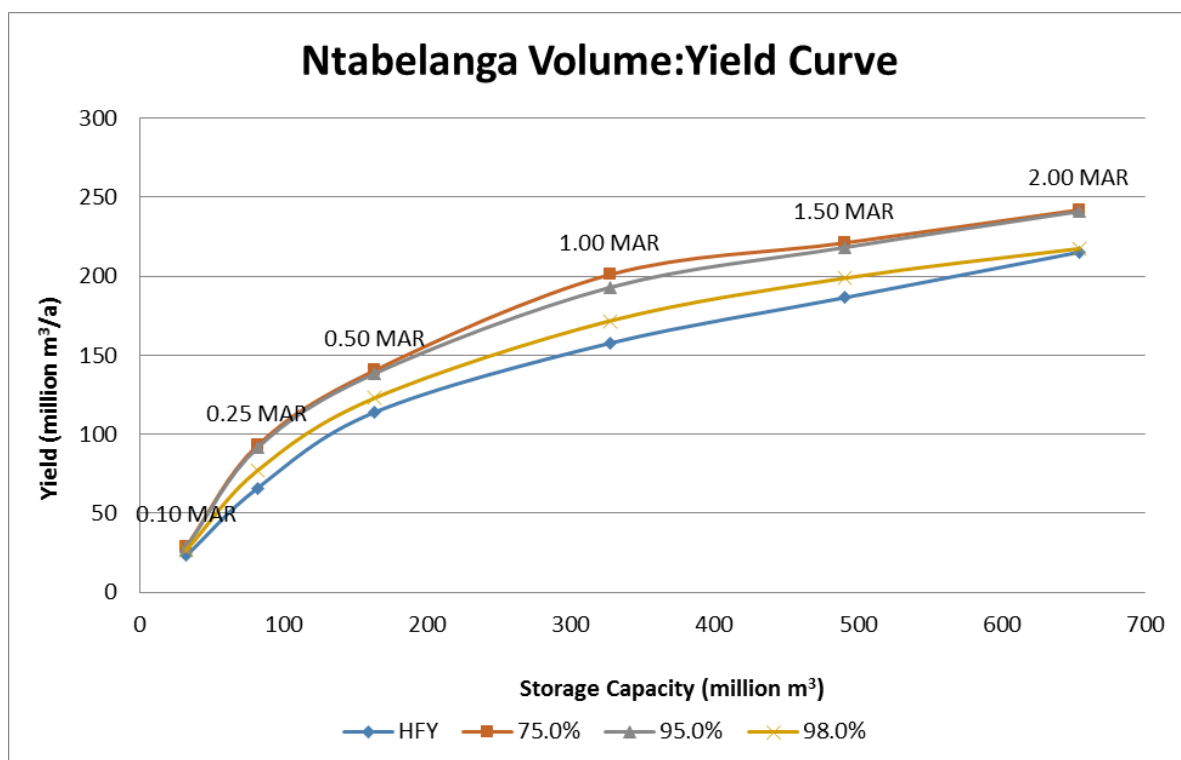


Figure 4-8: Yield vs. Volume Curve - Ntabelanga Dam

4.8 Interpretation of the Water Resources Results

The yields of the proposed dams can be used for either domestic water supply, irrigation or hydropower generation, or a combination of these in a multi-purpose scheme. Current and future water requirements for domestic water users were revisited in Phase 2 of the study, and this is described in Report P WMA 12/T30/00/5212/6. Irrigation potential and associated water requirements were identified and are discussed in detail in P WMA 12/T30/00/5212/9.

These future water requirements that could be supplied from the three potential dam sites are summarised below in Table 4-32. Two demand scenarios were accounted for, namely a BASE case whereby “expected” demands have been estimated, and a HIGH case, whereby growth scenarios have been used that represent the “upper end of possible demand”. The high demand scenario was used in the yield modelling scenarios. Note that the water requirements that could be potentially supplied from Ntabelanga are different to those that could be supplied by either Thabeng or Somabadi Dams.

The yields of larger dam size options are significantly higher than the identified potential future water demands of any one use in the catchment. This shows the potential for a multi-purpose dam and the possibility of hydropower generation, which was explored further in Phase 2 of this study. Dam sizes of 32.23 million m³ (0.10 MAR) or bigger for Ntabelanga, and 58.00 million m³ (0.20 MAR) or 54.15 million m³ (0.15 MAR) for Thabeng or Somabadi, respectively, should be considered further to meet the projected multi-purpose demands (excluding hydropower) based on the Phase 1 analysis (both hydrology and water requirement information).

A larger impoundment would present the possibility for hydropower generation, which may be beneficial from a unit cost of stored water and from an economic viability perspective. This was assessed and discussed in detail in The Preliminary Study Report P WMA 12/T30/00/5212/3.

Further consideration was given to the possibility of using a second impoundment downstream of one of the proposed dam sites at a strategic point in order to enhance the possibility of meaningful hydropower generation. This proved only to be possible below the Ntabelanga Dam on the Tsitsa River and is also discussed further in the Preliminary Study Report P WMA 12/T30/00/5212/3.

Table 4-32: Raw Water Requirements to Year 2050

Dams	Total Potable Water Requirements		Total Irrigation Water Requirements Incl 20% Losses		Total Water Requirements	
	Base	High	Base	High	Base	High
	Million m ³ /a		Million m ³ /a		Million m ³ /a	
Ntabelanga	5.71	10.91	2.12	11.06	7.83	21.97
Thabeng	4.73	14.38	4.46	9.24	9.19	23.62
Somabadi	4.13	13.35	4.46	8.12	8.59	21.47

4.9 Conclusions and Recommendations

Following the analysis to compare the three shortlist dam sites, the Ntabelanga Dam was determined to have the best yield per unit volume of water stored due to the lower stream flow coefficient of variability (CV), a lower sedimentation allowance and a lower EWR requirement. Therefore from a purely water resource perspective this would be the recommended development for further investigation.

However, in a study of this nature where a multi-purpose dam serving a large supply area is being investigated, there are several other factors to be considered such as economic development, job creation and food security within this area, which has some of the highest levels of poverty in South Africa. In order to determine the optimal dam site considering all aspects (e.g. water supply, economic analysis and implementation), a URV analysis was undertaken (cf. Report P WMA 12/T30/00/5212/3) and this also confirmed that the Ntabelanga Dam Site was the preferred option.

In addition, the overall outcome of this phase of the study was that a conjunctive use scheme should also be considered.

This option involves the possible development of the Lalini Dam site downstream of the Ntabelanga Dam site on the Tsitsa River, just above Tsitsa Falls.

It was recommended that a review of the Phase 1 methodology be undertaken for the Tsitsa catchment during Phase 2 in order to optimise, wherever possible, the hydrology and to incorporate hydropower analysis in the further analysis of the conjunctive use scheme that was to be investigated.

It was also decided that the next phase of analysis would also need to incorporate the agreed EWR requirements, as developed after the Intermediate Reserve Determination was concluded for the preferred site, as well as the final results of the water requirements investigation (irrigation and domestic water supply) undertaken during the second phase of the study.

5. DETAILED WATER RESOURCE ASSESSMENT OF NTABELANGA

The findings from Phase 1 of the Mzimvubu Water Project identified the Ntabelanga Dam as the preferred site (cf. Report P WMA 12/T30/00/5212/3). It was further identified that a conjunctive use scheme should be investigated to generate hydropower potential if a second impoundment was constructed at the Lalini Dam site, which would make use of the head created by the Tsitsa Falls (cf. Report P WMA 12/T30/00/5212/3).

This next phase of the water resource assessment followed the above requirements and took cognisance of comments and suggestions made during the expert review of the first phase studies.

5.1 Catchment Characteristics

5.1.1 Rainfall

Following the recommendations of the expert review panel, it was decided that additional rainfall analysis would be undertaken for the Tsitsa catchment. In Phase 1, for comparative purposes, several rainfall stations with a short record length were left out of the analysis. However, with the aim of increasing the spatial variability and representation of the rainfall across the catchment, some of these stations were brought back into the analysis.

The same rainfall analysis process was followed as outlined in Section 4.1.1, but for the inclusion of these additional gauges.

a) Screening of Available Data

As per the Phase 1 study, monthly gauged rainfall data were obtained from the South African Weather Service (SAWS) with the assistance of the Cradock Regional Office of the Department of Water Affairs, Eastern Cape (Ferreira, 2012), as well as from the Daily Rainfall Extraction Utility (Lynch, 2003). There are 44 rainfall gauges in the vicinity of the Tsitsa Catchment (quaternary catchments T35A to T35L).

Of the total, 33 gauges from the Tsitsa River catchment were ultimately selected for application in the Phase 2 hydrological analysis for a combination, of the following purposes:

- Developing a representative quaternary catchment rainfall data set for application in the later rainfall-runoff and yield modelling processes;
- As a source of data for patching missing or unreliable data values in other gauges; and
- To develop quaternary catchment MAP values.

A summary in this regard is provided in Table 5-1 (cf. Figure A3-1 in Appendix A3, respectively). Note that the table also shows gauges that were not used in the hydrological analysis, generally because the gauges provided short periods of record and contained little or no reliable data.

b) In-filling of Missing or Unreliable Data

The same process outlined in Section 4.1.1 *b)* was followed in this phase. The statistical characteristics of the selected gauges, subsequent to the patching process, are shown in Table 5-2 for the Tsitsa River catchment. Stationarity of each patched gauge was checked and, where applicable, gauges were split if a discontinuity was observed (cf. Table 5-1).

Table 5-1: Available Rainfall Gauge Data (Tsitsa)

#	SAWS No.	Name	Location		Altitude m.a.s.l ⁽¹⁾	Used in earlier studies		Period used in this study				Stats (for period used, patched)			Application			Comment
			Lat. (°S)	Long. (°E)		WR2005	BKS, 2009	Start	End	Length	Patched	MAP ⁽²⁾ (mm)	SD ⁽³⁾ (mm)	CV ⁽⁴⁾	Patch	MAP	Catchm.	
1	0151019W	Xuka Drift	31.32	28.02	1417	Nb	Nb	1953	1972	20	-	-	-	-	N	N	N	Poor mid-period record, non-stationary, geographically distant.
2	0151050W	Gheeltvrede	31.33	28.03	1417	Nb	Nb	1972	1975	4	-	-	-	-	N	N	N	Poor data quality, geographically distant.
3	0151053W	Glen Garry	31.38	28.07	1535	Nb	Nb	1934	1934	1	-	-	-	-	N	N	N	Insufficient data.
4	0151080W	Ronan	31.33	28.07	1432	Nb	Nb	1931	1952	22	4.2%	754.8	169.8	0.22	Y	N	Y	Good early-mid-period data, non-stationary data with discontinuity at 1944, split for use.
5	0151112W	Water furrow	31.37	28.07	1463	Nb	Nb	1936	1940	5	-	-	-	-	N	N	N	Poor data quality, short record.
6	0151214W	Oakhurst	31.08	28.17	1382	Nb	Nb	1925	1930	6	10.0%	1014.9	143.8	0.14	Y	N	Y	Short early-period data, strategic position in T35C.
7	0151231W	Gubenva	31.35	28.18	1288	Nb	Nb	1968	1986	19	7.1%	729.1	208.8	0.29	N	N	N	Moderate mid-period data, non-stationarity, geographically distant.
8	0151290W	The Home	31.35	28.18	1288	Nb	Nb	1932	1954	23	8.0%	675.0	168.2	0.25	N	N	N	Moderate mid-period data, non-stationarity, geographically distant.
9	0151338W	Rockwater	31.15	28.22	1385	Nb	Nb	1946	1951	6	13.9%	1150.1	248.1	0.22	Y	N	Y	Short mid-period data, strategic position in T35F.
10	0151351W	Gubenva (Pol)	31.35	28.20	1241	Nb	Nb	1950	1998	49	0.0%	783.3	176.1	0.22	Y	Y	Y	Good mid to late-period data. Discontinuity between 1984 & 1988, gauge split.
11	0151402W	Ugie	31.20	28.23	1322	Nb	Nb	1963	2009	47	20.0%	862.0	244.2	0.28	Y	Y	Y	Good late-period data, strategic position in T35F/G, non-stationary with discontinuity at 1985 (Split).
12	0151461W	Kincardine	31.20	28.27	1294	Nb	Nb	1928	1929	2	-	-	-	-	N	N	N	Insufficient data.
13	0151463A	Ugie	31.22	28.27	1287	Nb	Nb	1980	1989	10	2.5%	936.7	192.8	0.21	Y	N	Y	Short moderate late-period data, non-stationary, strategic position.
14	0151549W	Strathaven	31.17	28.32	1297	Nb	Nb	1930	1933	4	-	-	-	-	N	N	N	Insufficient data.
15	0151582W	Pomona	31.25	28.27	1311	Nb	Nb	1927	1939	13	14.6%	777.0	200.8	0.26	Y	N	Y	Good early-period data, strategic position.
16	0151604W	Mackear (Mag)	31.07	28.35	1263	Yes	Yes	1920	2009	90	15.0%	793.4	178.4	0.22	Y	Y	Y	Good, long data. Non-stationary with discontinuity at 1984, gauge split for use.
17	0151608W	Ben Bamth	31.17	28.35	1238	Nb	Nb	1934	1936	3	-	-	-	-	N	N	N	Insufficient data.
18	0151623W	Hopefield	31.40	28.33	1336	Yes	Yes	1923	1976	54	4.8%	636.0	156.7	0.25	Y	Y	Y	Good, long mid-period data, strategic position in T35H.
19	0152054W	Kvelamatolo	31.40	28.53	1565	Yes	Yes	1958	2009	52	6.4%	1308.6	228.1	0.17	Y	Y	Y	Moderate mid to late-period data.
20	0152172W	Ceka Plantation	31.35	28.62	1015	Nb	Nb	1954	1998	45	11.0%	1288.5	244.4	0.19	Y	Y	Y	Moderate mid to late-period data.
21	0152190W	Niywenka (Bos)	31.17	28.62	1435	Yes	Yes	1923	2010	87	22.0%	1082.8	196.2	0.18	Y	Y	Y	Good long data.
22	0152252W	Somerville	31.20	28.65	938	Nb	Nb	1900	1913	14	-	-	-	-	N	N	N	Irrelevant period of record.
23	0152259W	Bele (Bos)	31.37	28.60	927	Yes	Yes	1920	2009	90	8.9%	883.8	178.2	0.20	Y	Y	Y	Good long record, non-stationary data with discontinuity at 1967, gauge split for use.
24	0152446W	Nqadu	31.43	28.75	908	Nb	Nb	1924	1961	38	3.3%	971.6	156.1	0.16	Y	Y	Y	Good long record. Non-stationary record, discontinuity at 1941, split for use.
25	0152468W	Tsolo	31.30	28.77	896	Yes	Yes	1928	1996	69	8.8%	571.0	152.7	0.27	Y	Y	Y	Good long record.
26	0152475W	Nqadu Heights (Bos)	31.42	28.77	1128	Yes	Yes	1920	2009	90	7.7%	1203.0	230.5	0.19	Y	Y	Y	Good long record, non-stationary data with discontinuity at 1947, gauge split for use.
27	0152482W	Cengane	31.02	28.77	1262	Yes	Yes	1920	2009	90	6.5%	961.9	192.2	0.20	Y	Y	Y	Good long record.
28	0152640W	Qumbu (Mag)	31.17	28.87	991	Yes	Yes	1951	1996	46	4.3%	656.7	143.4	0.22	Y	Y	Y	Good mid to late-period data.
29	0152767W	Lotana	31.28	28.93	799	Nb	Nb	1923	1932	10	7.5%	521.6	95.3	0.18	Y	N	Y	Short early-period data, strategic position.
30	0152792W	Benutti	31.20	28.92	995	Yes	Yes	1926	2000	75	2.5%	825.7	183.4	0.22	Y	Y	Y	Good long record.

#	SAWS No.	Name	Location		Altitude m.a.s.l ⁽¹⁾	Used in earlier studies WR2005	BKS, 2009	Period used in this study				Stats (for period used, patched)			Application			Comment
			Lat. (°S)	Long. (°E)				Start	End	Length	Patched	MAP ⁽²⁾ (mm)	SD ⁽³⁾ (mm)	CV ⁽⁴⁾	Patch	MAP	Catchm.	
		Plantation																
31	0178288W	Glen Peschel	30.82	28.18	1911	Nb	Nb	1979	1986	8	12.5%	930.9	183.0	0.20	Y	N	Y	Short late-period record, strategic position in T35A.
32	0178300W	Woodcliffe	31.00	28.18	1368	Nb	Nb	1900	1911	12	-	-	-	-	N	N	N	Irrelevant period of record.
33	0178320W	Oansmoor	30.83	28.20	1788	Nb	Nb	1947	1960	14	1.8%	1049.1	193.6	0.18	Y	N	Y	Short mid-period record, strategic position in T35A.
34	0178321W	Kilmeny	30.87	28.23	1716	Nb	Nb	1927	1946	20	4.2%	1013.7	206.8	0.20	Y	N	Y	Short early-period record, strategic position in T35A.
35	0178349W	Antelope Park	30.82	28.20	1783	Nb	Nb	1961	1978	18	16.7%	975.1	178.5	0.18	Y	N	Y	Short mid-period record, strategic position in T35A.
36	0178377W	Temple Home	30.78	28.22	1901	Nb	Nb	1939	1949	11	0.0%	807.1	172.3	0.21	Y	N	Y	Short early-period record, strategic position in T35A.
37	0178378W	Elands Heights	30.80	28.23	1930	Yes	Yes	1920	1938	19	22.8%	966.4	135.5	0.14	Y	N	Y	Short early-period record, strategic position in T35A.
38	0178564W	New Lymdale	30.92	28.37	1320	Nb	Nb	1933	1952	20	10.0%	900.4	158.7	0.18	Y	N	Y	Short early-period record, non-stationary with discontinuity at 1943 (Split), strategic position in T35A.
39	0178585W	Bloegomhof	30.75	28.33	1546	Yes	Yes	1934	1976	43	2.9%	685.0	183.0	0.27	Y	Y	Y	Moderate record, geographically distant, strategic position north of T35A.
40	0178615W	Devillebos	30.75	28.32	1765	Yes	Yes	1925	1971	47	5.4%	806.7	155.2	0.19	Y	Y	Y	Moderate record, geographically distant, strategic position north of T35A.
41	0178689A	Sheeprun	30.98	28.38	1444	Yes	Yes	1962	1972	11	0.0%	800.9	132.4	0.17	Y	N	Y	Short mid-period record, strategic position north of T35A, B&D.
42	0178689W	Stokenstrom	30.98	28.38	1444	Yes	Yes	1962	1995	34	1.0%	808.6	168.0	0.21	Y	Y	Y	Moderate mid-period record, strategic position north of T35A, B&D.
43	0178807W	Kromhoek	30.98	28.48	1263	Yes	Yes	1937	1966	30	5.3%	731.2	136.1	0.19	Y	Y	Y	Good mid-period record.
44	0179353W	Elwa (Bos)	30.88	28.68	1296	Yes	Yes	1926	1999	74	6.5%	947.7	200.1	0.21	Y	Y	Y	Good long record, non-stationary data with discontinuity at 1976, gauge split for use.

Notes: (1) Metres above mean sea level.
(2) Mean annual precipitation.
(3) Standard deviation, calculated as the square root of the variance.
(4) Coefficient of variance, calculated as SD / MAP.

Table 5-2: Characteristics of Patched Monthly Rainfall Gauge Data

#	SAWS No.	Name	Stats (for period used, patched)			Application		
			Start	End	Length	MAP ⁽¹⁾ (mm)	SD ⁽²⁾ (mm)	CV ⁽³⁾
1 ⁽⁴⁾	0151080 W	Ronan	1931	1942	12	811.3	174.6	0.22
2 ⁽⁴⁾	0151080 W	Ronan	1943	1952	10	687.0	143.6	0.21
3	0151214 W	Oakhurst	1925	1930	6	1014.9	143.8	0.14
4	0151338 W	Rockwater	1946	1951	6	1150.1	248.1	0.22
5	0151351 W	Gubenxa (Pol)	1950	1984	35	756.3	154.4	0.20
6 ⁽⁴⁾	0151402 W	Ugie	1963	1985	23	779.5	177.9	0.23
7 ⁽⁴⁾	0151402 W	Ugie	1986	2009	24	941.0	275.0	0.29
8	0151463 A	Ugie	1980	1989	10	936.7	192.8	0.21
9	0151582 W	Pomona	1927	1939	13	777.0	200.8	0.26
10 ⁽⁴⁾	0151604 W	Maclear (Mag)	1920	1983	64	737.2	156.4	0.21
11 ⁽⁴⁾	0151604 W	Maclear (Mag)	1984	2009	26	931.6	154.1	0.17
12	0151623 W	Hopefield	1923	1976	54	636.0	156.7	0.25
13	0152054 W	Kwelamatolo	1958	2009	52	1308.6	228.1	0.17
14	0152172 W	Ceka Plantation	1954	1998	45	1288.5	244.4	0.19
15	0152190 W	Ntywenka (Bos)	1923	2010	86	1082.8	196.2	0.18
16	0152259 W	Bele (Bos)	1920	2009	90	879.9	172.9	0.20
17 ⁽⁴⁾	0152446 W	Nquadu	1924	1941	18	982.9	122.2	0.12
18 ⁽⁴⁾	0152446 W	Nquadu	1941	1961	20	961.5	183.9	0.19
19	0152468 W	Tsolo	1928	1996	69	571.0	152.7	0.27
20	0152475 W	Nqadu Heights (Bos)	1920	2009	90	1203.0	230.5	0.19
21	0152482 W	Cengane	1920	2009	90	961.9	192.2	0.20
22	0152640 W	Qumbu (Mag)	1920	1983	46	656.7	143.4	0.22
23	0152767 W	Lotana	1923	1932	10	521.6	95.3	0.18
24	0152792 W	Bencutti Plantation	1926	2000	75	821.9	182.8	0.22
25	0178288 W	Glen Peschel	1979	1986	8	930.9	183.0	0.20
26	0178320 W	Cransmoor	1947	1960	14	1049.1	193.6	0.19
27	0178321 W	Kilmeny	1927	1946	20	1013.7	206.8	0.20
28	0178349 W	Antelope Park	1961	1978	18	923.3	183.5	0.20
29	0178377 W	Temple Horne	1939	1949	11	807.1	142.8	0.18
30	0178378 W	Elands Heights	1920	1938	19	966.4	135.5	0.14
31 ⁽⁴⁾	0178564 W	New Lynndale	1933	1943	11	951.4	155.5	0.16
32 ⁽⁴⁾	0178564 W	New Lynndale	1944	1952	9	838.0	147.2	0.18
33	0178585 W	Bloegomhof	1934	1976	43	685.0	183.0	0.27
34	0178615 W	Devillebos	1925	1971	47	806.7	155.23	0.19
35	0178689 A	Sheeprun	1962	1972	11	800.9	132.4	0.17
36	0178689 W	Stockenstrom	1962	1995	34	808.6	168.0	0.21
37	0178807 W	Kromhoek	1937	1966	30	731.2	136.1	0.19
38 ⁽⁴⁾	0179353 W	Etwa (Bos)	1926	1975	50	976.0	190.6	0.20
39 ⁽⁴⁾	0179353 W	Etwa (Bos)	1976	1999	24	888.8	210.6	0.24

Notes: (1) Mean annual precipitation. (2) Standard deviation, calculated as the square root of the variance.
(3) Coefficient of variance, calculated as SD / MAP. (4) Gauge record split due to discontinuity

c) Quaternary Catchment Mean Annual Precipitation

The gauges identified for use in the MAP calculations in Tables 5-1 were used to obtain the quaternary catchment MAPs. The MAP of each suitable patched gauge (Figure A3-1 in Appendix A3) was spatially plotted against the quaternary catchment centroid points. These MAP values were used in an Inverse Distance Weighting (IDW) exercise, rather than a Thiessen Polygon analysis, to determine the weighted MAP of each quaternary catchment (cf. Table 5-3). IDW was preferred to Thiessen Polygons after an analysis of the results in Phase 2 highlighted that IDW provided more realistic answers.

Table 5-3: Mean Annual Precipitation (Tsitsa)

Quaternary Catchment	Phase 2 MAP (mm)	WR2005 MAP (mm)
T35A	927.9	912.0
T35B	867.5	915.0
T35C	974.2	1 008.0
T35D	816.6	818.0
T35E	941.1	918.0
T35F	907.5	860.0
T35G	705.7	759.0
T35H	935.7	845.0
T35J	985.6	924.0
T35K	828.7	783.0
T35L	657.6	764.0

It was interesting to note that the estimated MAP values of the quaternary catchments in Phase 2 are considerably closer than they were in Phase 1 and relatively similar (in most cases) to the Water Resources of South Africa, 2005 study (WRC, 2009). The differences can be as a result of the two studies using different combinations of gauges and having different record lengths.

d) Representative Quaternary Catchment Rainfall Data

A dataset representing the monthly rainfall over each quaternary catchment was generated by combining the characteristics of selected gauges for each quaternary catchment. Cognisance was taken of not using too many of the same gauges for the different catchments as this would smooth the spatial variability across the greater contributing catchment area.

The resulting monthly rainfall data set covers a period of 90 years from 1920 to 2009 (hydrological years). The rainfall files and corresponding statistical characteristics are presented and summarised in Appendices A3.

Finally, the stationarity of each dataset was also tested using a single mass-plot, which is also shown in Appendices A3. Based on these results, the representative catchment rainfall data for the Tsitsa catchments were considered to be acceptable in Phase 2.

5.1.2 Evaporation

The same evaporation data was used as presented in Phase 1, cf. Section 4.1.2.

5.1.3 Stream Flow

The same observed stream flow data was used as presented in Phase 2, cf. Section 4.1.3.

5.1.4 Land Use

The land use inputs were updated in the Phase 2 study as a result of additional information becoming available, namely:

- Assessment of Ecological Infrastructure for Three Potential Dams in the Mzimvubu Catchment Area (Zunckel and Tau, 2013).

This study was undertaken through the National Grasslands Biodiversity Programme (NGBP) currently being implemented through the South African National Biodiversity Institute (SANBI). SANBI recognised the significant role that the concept of Payment for Ecosystem Services can play in incentivising the sustainable management of grasslands. More specifically the relationship between the sustainable management of high altitude grasslands and their ability to deliver strategically important catchment services has been recognised. Through this study, an updated land-cover GIS coverage for the Ntabelanga Catchment was obtained. This new information was integrated with the land-use information used in the Phase 1 study.

a) Commercial Forestry

The commercial forestry inputs were updated in the Phase 2 study and a number of databases and institutions with information on coverage's of commercial forestry were investigated, including the Zunckel and Tau (2013) results (cf. Table 5-4).

The new land-use information (Zunckel and Tau, 2013) differed from the Phase 1 findings, often having higher commercial forestry areas. The results from the Zunckel and Tau (2013) study were available in GIS shapefile format for comparison against the J&G Google Earth delineations. Some correlation did exist between the Zunckel and Tau (2013) results and the areas that were digitised using Google Earth satellite imagery (only up to T25E as the Zunckel and Tau 2013 study only went as far down the catchment as the proposed Ntabelanga Dam).

It was therefore decided that information obtained from a combination of the Zunckel and Tau results (2013), the Google Earth satellite imagery delineations undertaken as a part of this study and the WARMS database would be used in the rainfall-runoff simulations in the Phase 2 study, after a review of all three inputs to obtain the most realistic 2009 development level results. As with the Phase 1 study, the commercial forestry was simulated in the WRSM2000 model using the Smoothed Gush/Pitman curves assuming 50% optimal growth. The proportional species split was accounted for in WRSM2000 based on the values presented in Table 5-4. The commercial forestry areas adopted per quaternary catchment obtained from the WARMS database are provided in Table 5-5.

b) Alien Invasive Plants (AIPs)

In a similar manner to the commercial forestry assessment in Phase 2, new information from Zunckel and Tau (2013) was available for use. This information was incorporated into the findings from Phase 1 (cf. Section 4.1.4 *b*)). The GIS shape file coverages of the Zunckel and Tau (2013) for AIPs were available for comparison against the Google Earth coverages delineated by J&G in Phase 1 of this study (only up to T25E as the Zunckel and Tau 2013 study only went as far down the catchment as the proposed Ntabelanga Dam). A review of both inputs was undertaken to obtain the most realistic 2009 development level results, which are presented in Table 5-6.

It is important to note that these areas have had little to no field validation. The AIPs were simulated assuming 50% optimal growth and an age of 20 years. The proportional split between tall trees, medium trees and shrubs was accounted for in WRSM2000 based on the values presented in Table 5-7.

Table 5-4: Commercial Forestry Area Comparison

Quaternary Catchment	WR2005	Forestry	EC Private Plantations	Private Managed Plantations	NLC 2000	NLC 2009	Google Earth	Zunckel and Tau (2013)	WARMS
T35A	72.80		23.30		23.30	17.51	34.40	72.5	39.43
T35B	33.10		11.46		11.46	9.97	30.20	46.7	24.65
T35C	93.70		39.77		40.28	44.91	65.60	86.3	55.78
T35D	30.30		11.45		11.45	8.48	16.60	25.2	17.84
T35E	46.80	6.78	9.24		9.35	7.63	6.60	3.2	10.52
T35F	157.80		47.31		49.63	56.00	100.50		92.57
T35G	89.00		34.48		34.48	34.45	55.70		62.78
T35H	29.20		2.65	0.17	2.65	0.51	0.39		0.51
T35J	19.00	13.70	6.47	2.09	6.47	3.87	10.49		12.10
T35K	32.30	2.05	23.00	18.18	24.38	24.66	23.74		17.85

Table 5-5: Commercial Forestry Species Composition

	Quaternary Catchment	Afforested Area (km ²)	Eucalyptus	Pine	Unknown	Wattle
Tsitsa River Catchment	T35A	62.50	6.14	12.30	43.91	0.15
	T35B	30.20	12.79	4.68	12.73	0.00
	T35C	72.16	43.62	6.18	22.36	0.00
	T35D	21.39	0.63	20.27	0.49	0.00
	T35E	3.20	2.67	0.31	0.09	0.13
	T35F	100.50	54.90	17.56	28.02	0.02
	T35G	55.70	9.96	1.88	43.44	0.42
	T35H	0.39	0.39	0.00	0.00	0.00
	T35J	10.49	1.14	9.35	0.00	0.00
	T35K	23.74	6.73	15.78	1.23	0.00
	T35L_1	0.00	0.00	0.00	0.00	0.00
	Total	380.27				

c) Irrigation of crops

The irrigation areas are the same as those presented in Table 4-14 (cf. Section 3.1.4 c)).

d) Farm dams

The same farm dam information was used as is presented in the Phase 1 study (cf. Section 4.1.4 d)).

e) Sediment Transport

To determine the volume of sediment that will be deposited annually, the empirical Rooseboom Method of calculating sediment deposition in each dam was undertaken in Phase 1. This method is based on a 1992 Water Research Commission (WRC) project to produce a sediment yield map for Southern Africa. Recently, an update of the 1992 study has been undertaken by the WRC (2010), with this revised methodology being used in the Phase 2 sedimentation estimations.

Table 5-6: AIP Areas

	Quaternary Catchment	Alien Vegetation Area (km ²)	% Area Riparian	% Tall Trees	% Area Medium Trees	% Area Shrubs
Tsitsa River Catchment	T35A	5.8	0.05	50.00	50.00	0.00
	T35B	1.2	98.00	50.00	50.00	0.00
	T35C	0.6	98.00	50.00	50.00	0.00
	T35D	12.5	97.00	50.00	50.00	0.00
	T35E	10.0	98.00	50.00	50.00	0.00
	T35F	0.5	98.00	50.00	50.00	0.00
	T35G	3.0	98.00	50.00	50.00	0.00
	T35H	3.6	98.00	50.00	50.00	0.00
	T35J	1.6	98.00	50.00	50.00	0.00
	T35K	2.2	98.00	50.00	50.00	0.00
	T35L	5.8	98.00	50.00	50.00	0.00
	Total	41.0				

It is important to note that, as a result of the inclusion of hydropower at the Lalini Dam in the Phase 2 study, sedimentation volumes were calculated for both dam sites, with the Lalini Dam sedimentation being calculated on the incremental catchment area downstream of the Ntabelanga Dam, as the Ntabelanga Dam is assumed to trap all sediment from its contributing catchment.

Using the updated WRC (2010) methodology outlined in the report, the sediment yield was determined for the dam sites. This was then converted to the sediment consolidation volume (based on a 50-year bulk sediment density of 1.35 t/m³) for 50 years (V_{50}) for different percentiles of non-exceedance. After considering the sediment loads and erosion potential in the catchment, it was decided that for the Phase 2 assessments, the V_{50} value would be adopted using the 80% assurance of non-exceedance.

This is due to the extremely high erosion potential in the catchment and is similar to the sediment yield results identified by the DWA (2010) study undertaken by BKS. Tables 5-8 and 5-9 and Figure 5-1 presents a summary of the selected V_{50} sedimentation allowance volumes for the Ntabelanga Dam catchment and incremental Lalini Dam catchment (the selected value is highlighted in green in each table).

The V_{50} sediment volume for Ntabelanga Dam has increased from 29.3 million m³ in Phase 1 to 35.7 million m³ in Phase 2. This change has been brought about by the updating of the 1992 Rooseboom method to the latest version provided by the WRC (2010). Tables C-4 and C-5 in Appendix C present the sedimentation calculations using the WRC (2010) method. These sedimentation volumes were used as dead storage volumes when calculating the yields of the potential dams.

Table 5-7: Sedimentation V_{50} Values for the Ntabelanga Dam Site

WRC Method	Confidence Band	Factor	Sediment Load (t/a)	Sediment Yield (t/km ² /a)	50 Year Sediment Yield (t/km ²)	V_{50} (million m ³)
Empirical	50%	1.05	947 943	494	24 700	18.296
Empirical	80%	2.05	947 943	964	48 200	35.704
Empirical	90%	2.75	947 943	1 293	64 650	47.889
Empirical	95%	3.65	947 943	1 716	85 800	63.556

Table 5-8: Incremental Catchment Sedimentation V_{50} Values (Lalini)

WRC Method	Confidence Band	Factor	Sediment Load (t/a)	Sediment Yield (t/km ² /a)	50 Year Sediment Yield (t/km ²)	V_{50} (million m ³)
Empirical	50%	0.95	1 012 999	400	20 000	14.815
Empirical	80%	2.00	1 012 999	842	42 100	31.185
Empirical	90%	2.70	1 012 999	1 137	56 850	42.111
Empirical	95%	3.50	1 012 999	1 474	73 700	54.593

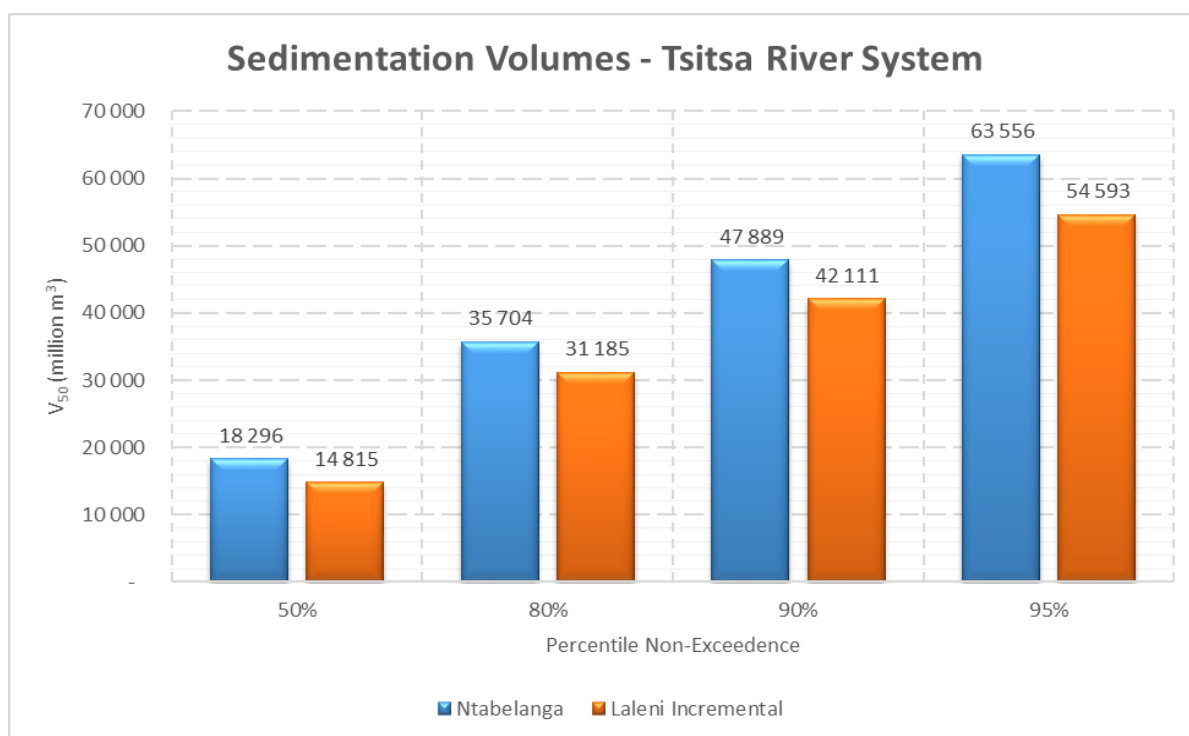


Figure 5-1: Comparison of Sediment Yields in the Tsitsa River

5.2 Rainfall-Runoff Modelling

The same methodology as presented in Phase 1 was used for the Phase 2 study. The WRSM2000 system was configured in the same manner (cf. Appendix B2), however, any inputs updated during Phase 2 (as described in the preceding section) were included in the revised simulations (cf. Appendix B3).

5.2.1 Rainfall-runoff Model Calibration

Rainfall-runoff modelling represents a process whereby the runoff response of the Tsitsa River catchment was simulated based on the monthly time-series of representative catchment rainfall data (cf. Section 5.1.1) and observed stream flows (cf. Section 5.1.3). For this purpose, the enhanced WRSM2000 was used.

In order to determine the physical catchment parameters for the Tsitsa River System, quaternary catchments T35A to T35L were simulated using WRSM2000 model (cf. Appendix B2 for the WRSM2000 System Diagram). The stream flow simulations were calibrated against the stream flow gauges described in Section 4.1.3. However, the gauges were patched as a part of the calibration process. The results from the calibration process are summarised below, including the calibrated values of the WRSM2000 calibration parameters for the Tsitsa catchment in tables presented in Appendix B3.

In addition, a comparison of the statistical characteristics of the observed and simulated stream flows are presented for each of the two gauge sites in Tables 5-10 and 5-11. Further to the stream flow statistics, WRSM2000 plots of various statistics were visually assessed to improve the statistical calibration (Appendix B3).

Table 5-9: Gauge T2H006 Observed Flows (Patched)

Index	Units	Observed	Simulated
Mean Annual Runoff (M A R)	Million m ³	884.78	853.45
Standard Deviation of Annual Flows (S)	Million m ³	487.81	363.78
Mean of Logs of Annual Flows	Million m ³	2.8762	2.8772
Std. Dev. of Logs of Annual Flows	-	0.2680	0.2474
Index of Seasonal Variability	PERCENT	36.15	33.51

Table 5-10: Gauge T3G009 Observed Flows (Patched)

Index	Units	Observed	Simulated
Mean Annual Runoff (M A R)	Million m ³	100.79	97.49
Standard Deviation of Annual Flows (S)	Million m ³	46.92	38.92
Mean of Logs of Annual Flows	Million m ³	1.9484	1.9478
Std. Dev. of Logs of Annual Flows	-	0.2383	0.2072
Index of Seasonal Variability	PERCENT	37.30	37.37

The calibration results are generally good, particularly with regard to the mean, log and seasonal values. However, the standard deviation calibration for stream flow gauge T3H006 is not as close as originally hoped. This can be attributed largely to the fact that the WRSM2000 model was calibrated against poor quality stream flow data set, as the gauging weir is often silted up. The updated monthly rainfall data and land use inputs have facilitated a better calibration to the gauged stream flow data, especially once the gauged data was patched during the rainfall-runoff modelling exercise. This has increased the confidence in the resultant simulated stream flow files.

Due to the high proportion of flagged values in the observed stream flow datasets, it was decided to use simulated natural flows for the stochastic and yield analyses, rather than using naturalised or extended observed flows. The stationarity of the simulated natural stream flow datasets was tested using a single mass-plot and a cumulative difference about the mean plot, which are shown in Appendix B3.

Based on these results, the simulated stream flows for the Tsitsa River catchment that contributes to the dams (Ntabelanga and Lalini) were considered to be acceptable for use in the stochastic and yield analyses of the Phase 2 assessment.

5.2.2 Rainfall-runoff Modelling Results

The results of these simulations produced the monthly natural simulated stream flow time-series for the Tsitsa River to below the proposed Lalini Dam site, as presented in Appendix B3 (in units of million m³). In addition, Appendix B3 presents the time-series of historical modelled irrigation requirements and impacts of commercial forestry over the 90-year simulated period 1920 to 2009 (hydrological years) for each respective system. These time-series files for irrigation and commercial forestry are presented at a constant development scenario of 2009. A summary of the results for each quaternary catchment is presented in Table 5-11, with a summary of the accumulated simulated natural stream flow at each dam site provided in Table 5-12.

The accumulated mean natural simulated stream flow at the outlet of quaternary catchment T35L (Tsitsa River) is approximately 114% of the same naturalised stream flow of 775.04 million m³/annum presented in WR2005 (WRC, 2009). In addition, the accumulated mean natural simulated stream flow at the outlet of quaternary catchment T35L (Tsitsa River) is approximately 95% of the same naturalised stream flow of 926.90 million m³/annum presented in WR90 (Water Research Commission (WRC), 1994). The comparison was undertaken for both WR2005 and WR90 due to potential inaccuracies in the WR2005 results, such as the exclusion of farm dams in the rainfall-runoff modelling in certain catchments and discrepancies in the land use values.

The results from this study are between those obtained from the two Water Research Commission studies (i.e. WR90 and WR2005), with the changes being as a result of the difference in rainfall and land use (including the development level of the study). The findings from the comparison serve as an adequate validation of the Phase 2 results, which were, thus, considered suitable for use in the stochastic and yield analyses.

Table 5-11: Natural Simulated Stream Flow Time-Series

River System	Quaternary Catchment	Catchment Area (km ²)	Period of record (hydrological years)		Length of record (years)	Annual statistic		
			Start	End		MAR ⁽¹⁾ (million m ³ /a)	SD ⁽²⁾ (million m ³ /a)	CV ⁽³⁾
Tsitsa River Catchment	T35A	476.5	1920	2009	90	98.71	48.08	0.49
	T35B	396.8	1920	2009	90	70.44	32.28	0.46
	T35C	307.0	1920	2009	90	109.60	41.08	0.37
	T35D	348.9	1920	2009	90	55.25	26.80	0.49
	T35E	493.5	1920	2009	90	105.58	55.54	0.53
	T35F	359.6	1920	2009	90	73.49	37.37	0.51
	T35G	576.2	1920	2009	90	70.47	40.31	0.57
	T35H	521.0	1920	2009	90	115.00	54.07	0.47
	T35J	189.0	1920	2009	90	46.83	22.45	0.48
	T35K	627.1	1920	2009	90	110.71	62.83	0.57
	T35L	339.5	1920	2009	90	27.10	19.34	0.71
	Total	4 635.1	1920	2009	90	883.18		

Notes: (1) Mean annual runoff. (2) Standard deviation, calculated as the square root of the variance.
(3) Coefficient of variance, calculated as SD / MAP.

Table 5-12: Simulated Natural Mean Annual Runoff (Ntabelanga & Lalini)

Dam Site	MAR ⁽¹⁾ (million m ³ /a)
Ntabelanga	428.49
Lalini	868.63

Notes: (1) Mean annual runoff.

The present day MAR for the Ntabelanga and Lalini Dams are approximately 415 and 828 million m³ per annum, respectively, which highlights the relatively low level of development in the Tsitsa River catchment (as the present day MARs are only marginally smaller, less than 10%, than the simulated natural MARs).

5.2.3 Stochastic Stream Flow Analysis

The same methodology was undertaken as presented in Phase 1 (cf. Section 4.3). Examples of the results are shown in Appendix D3. The results of these statistically-based plots were considered to be acceptable and, thus, the results were adopted for use in the yield modelling component of the study.

5.3 Basin Characteristics

The same detailed Ntabelanga basin characteristics were used in the Phase 2 study (cf. Section 4.4). A conjunctive use scheme including hydropower generation at the Lalini Dam site was not included in the original scope of works and, hence, no detailed survey was undertaken of the Lalini Dam basin. In order to undertake the yield and hydropower analyses, basin characteristics of the Lalini Dam were derived from 20 m contour data available on the 1:50 000 map sheets from the Surveyor General (cf. Table 5-13 and Figure 5-2).

Table 5-13: Storage Basin Characteristics for Lalini Dam

Water Level (m masl) ⁽¹⁾	Accumulated Volume (million m ³)	Surface Area (km ²)
800.0	1105.15	35.41
790.0	804.43	28.73
780.0	533.78	22.55
770.0	342.07	17.39
760.0	195.47	12.47
750.0	101.49	8.06
740.0	41.35	4.16
730.0	15.04	1.76
720.0	0.00	0.00

Notes: (1) Metres above mean sea level.

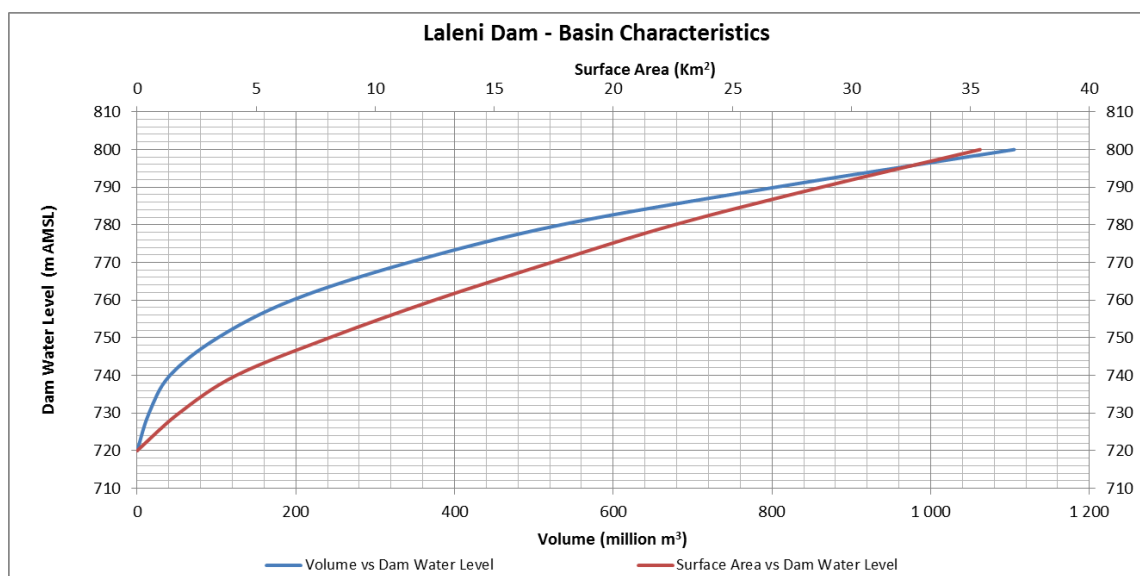


Figure 5-2: Storage Basin Characteristics for Lalini Dam

5.4 Environmental Water Requirements

Following on from Phase 1 (cf. Section 4.5), an Intermediate Reserve Determination was undertaken on the Tsitsa River for the Ntabelanga Dam in Phase 2, which changed the EWR results to what is presented in Table 5-15 (cf. Report no. P WMA 12/T30/00/5212/7 for full details). This change is as a result of the inclusion of additional results identified during the additional sampling trips completed as part of the intermediate level study. Further, the findings from the Intermediate Reserve Determination were used to extrapolate EWR values for the Lalini Dam site.

Table 5-14: Intermediate Reserve Determination Results (Ntabelanga & Lalini)

Dam Site	EWR Class	Annual Average EWR Allowance (million m ³ /a)	Total Flows (% MAR)
Ntabelanga	C	87.25	20.36
Lalini	B	298.84	34.40

The outcomes of the Intermediate Reserve Determination were that the present ecological state of the Tsitsa River has improved from a Class D in the Rapid assessment (Phase 1) to a Class C. This change has increased the EWR requirements by approximately 35 million m³/annum. The ecological Class C could still be considered low for an undeveloped catchment. However, this is predominantly due to the very high sediment loads in the river, which limit habitat availability for the aquatic biota associated with an EWR study (i.e. macro-invertebrates and fish).

The Lalini Dam site EWR was simulated at an ecological Class B due to the potentially sensitive and unique nature of the environment below the Tsitsa Falls, which will be impacted should the Lalini Dam hydropower scheme be implemented.

This estimation is only at a Desktop Level, in spite of the additional knowledge gained from the Intermediate Reserve Determination of the Tsitsa River higher up the system at the Ntabelanga Dam and, as such, will need to have a more detailed reserve determination study undertaken if the Lalini Dam is to be considered further.

5.5 Yield Assessment

The same yield assessment process was followed as outlined in Section 4.6. The yield assessments of the Ntabelanga Dam utilised the same system configuration as were used in Phase 1, presented in Figure E-3 in Appendix E-3. However, for the hydropower assessments, including the Lalini Dam, a slightly different configuration was used in order to assess the hydropower generation capabilities at Lalini Dam site.

The new water requirement from the Ntabelanga Dam is approximately 60.2 million m³/a (cf. Reports no. P WMA 12/T30/00/5212/6, no. P WMA 12/T30/00/5212/9 and no. P WMA 12/T30/00/5212/13), consisting of 32.4 million m³/a for raw water requirements to meet potable water projections and 27.8 million m³/a for irrigation water supply requirements. This requirement was applied to the Ntabelanga Dam as a specified requirement during the hydropower scenarios to ensure that the requirement could be met before hydropower releases were allowed.

5.5.1 Description of Yield Scenarios

A series of yield scenarios were undertaken for the dam site following the same trend as in the Phase 1 study, with a range of impoundment volumes (i.e. 0.10, 0.25, 0.50, 1.00, 1.18 and 1.80 MAR dam sizes) assessed to determine the present water resource potential. A 2009 development level (classed a current) was adopted in the yield modelling exercise for all scenarios, including a static EWR allowance as per the results of the Rapid Reserve Determination for each specific site (cf. Report no. P WMA 12/T30/00/5212/7). No future development scenarios were assessed as the aim of water resource potential created by the proposed impoundments was to provide water for potential potable water supply, irrigation and hydropower. Hence, the net yield of the dam could be used to assess any aspects of these demands that could be achieved (cf. Report no. P WMA 12/T30/00/5212/6 for the water requirements assessment). A final scenario was undertaken to determine the gross storage volume required to meet the agricultural and domestic water requirements.

5.6 Finalised Water Resource Potential Results

The yield results for the scenarios described in Section 5.6.1 are presented in Table 5-16, with the corresponding YRC's in Figures E2-1 to E2-6, of Appendix E4, for the Ntabelanga dam site only (i.e. no hydropower allowances).

The results presented in Table 5-16 show that the current HFY of the Ntabelanga Dam ranges from 10.8 million m³/a to 265.0 million m³/a when the storage capacity of the dam is increased from 41.5 million m³ (0.10 MAR) to 747.0 million m³ (1.80 MAR). These results differ from those in Phase 1 due to the changes in simulated natural stream flow, EWR and sedimentation allowance. In a similar manner to the Phase 1 results, the yield of the various Ntabelanga Dam sizes is larger at the 99% assurance of supply than the HFY. At 0.10 MAR, the live storage is only 5.80 million m³, with the majority of the storage volume over the proposed 50-year lifespan of the dam due to sediment deposition (i.e. V₅₀, which meets the DWS standards for dam design).

Once the dam storage is increased beyond the 0.10 MAR capacity, large increases in yield are observed at all assurances of supply, which is due to the rapid increase in live storage. However, the yield curve does start to flatten towards the larger dam sizes, i.e. 1.00 MAR and 1.18 MAR (Figure 5-3).

What is also evident is the small incremental increase in yield between the 95% and 75% assurance of supply. This small incremental increase in yield between the 75% and 95% assurance of supply is as a result of the low development levels in the catchments coupled with the high water resource availability, which provides the majority of the available water at a higher assurance.

5.7 Interpretation of the Final Yield Results

The yields of the proposed Ntabelanga Dam can be used for either domestic water supply, irrigation or hydropower generation, or a combination of these in a multi-purpose scheme. Current and future water requirements for domestic water users is covered in Report P WMA 12/T30/00/5212/6 and Report P WMA 12/T30/00/5212/13. Irrigation potential and associated water requirements are identified and discussed in detail in P WMA 12/T30/00/5212/9. These future water requirements (as of Phase 2) that could be supplied from the potential dam site are estimated to be approximately 60.2 million m³/a.

Table 5-16 presents results that show 83.0 million m³ of gross storage is too large for the high requirement scenario and can meet more than the required combined water requirement of 60.2 million m³/a. However, the results presented in Table 5-16 show that 41.5 million m³ of gross storage at Ntabelanga Dam is insufficient to meet the required high requirement scenario.

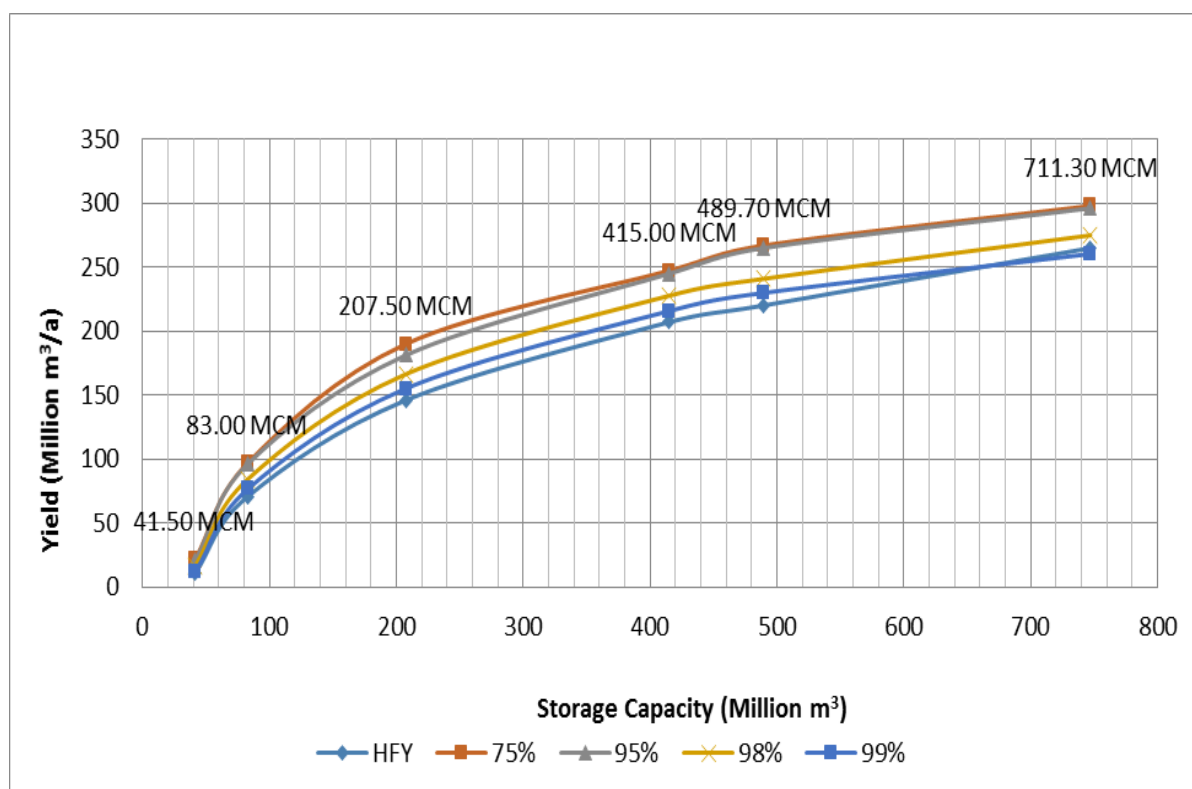


Figure 5-3: Final Yield vs. Volume Curve (Ntabelanga Dam)

Hence, a final scenario was undertaken to quantify what gross storage volume was needed to meet the 60.2 million m³ requirement. The results from this scenario show that a 60 million m³ (0.145 MAR, or ≈0.15 MAR) dam could meet the requirement with little excess supply available. As indicated above, the 60.2 million m³/a demand is comprised of both domestic water supply and irrigation water supply.

These two requirements are supplied at different levels of assurance of supply. In this case, the potable water was assessed at the 98% assurance of supply and the irrigation supply was assessed at 80% assurance of supply. The Yield Reliability Curve (YRC) for a gross Ntabelanga Dam storage of 60.0 million m³ (≈ 0.15 MAR) is presented in Figure 5-4. The results of this scenario show that 55.5 million m³/a can be supplied at a 98% assurance of supply, with an additional 7.2 million m³/a at 80 % assurance of supply (interpolated between the 75% and 95% assurance values).

The yields of larger dam size options are significantly higher than the identified potential future water requirement of any one user in the catchment. This showed the potential for a multi-purpose dam and the possibility of hydropower generation.

Further, it was considered that a larger impoundment for hydropower could also be of benefit and prove to be more economically viable when considering two dams operating conjunctively on the Tsitsa River.

Scenarios were therefore investigated whereby the Ntabelanga Dam and the Lalini Dam were operated conjunctively, with a larger Ntabelanga Dam providing flow regulation downstream to a Lalini Dam and hydropower scheme in order to maximize the hydropower potential of this combined system.

5.8 Hydropower Assessment

It was decided at the end of Phase 1 to focus on a conjunctive use scheme that was to include the Lalini Dam downstream of the initially proposed Ntabelanga Dam. The Lalini Dam would be used solely for hydropower generation and would improve the financial viability of the scheme as a whole through the provision of an additional income stream.

The proposed infrastructure configuration to generate hydropower is the development of a storage structure at the identified Lalini Dam site and an approximately seven kilometres long tunnel to transfer water to a hydroelectric plant at some 330 m lower elevation before discharging back into the Tsitsa River downstream of the Tsitsa Falls.

This potential conjunctive hydropower scheme overview is illustrated in Figure 5-5.

This initial hydropower assessment of the Lalini Dam, including the simulation of the Ntabelanga Dam as a balancing dam upstream, required a slightly different WRYM model configuration, when compared to the domestic and irrigation supply only configuration, in order to assess the hydropower generation capabilities at Lalini (cf. Appendix E-4).

The water requirement from the Ntabelanga Dam (for domestic water supply and irrigation) remained at approximately 60 million m³/a (cf. Reports no. P WMA 12/T30/00/5212/6 and no. P WMA 12/T30/00/5212/13). This demand was applied to the Ntabelanga Dam as a specified demand during the hydropower scenarios to ensure that this supply requirement could be met before any hydropower releases were allowed.

5.8.1 Initial Hydropower Modelling

These initial hydropower assessments were conducted with the WRYM, which is a monthly time-step model developed for Southern African conditions. The WRYM simulates hydropower on a monthly basis, which is equivalent to “continuous” hydro-power generation (but based upon an average for the month). This is equivalent to base load/average power generation.

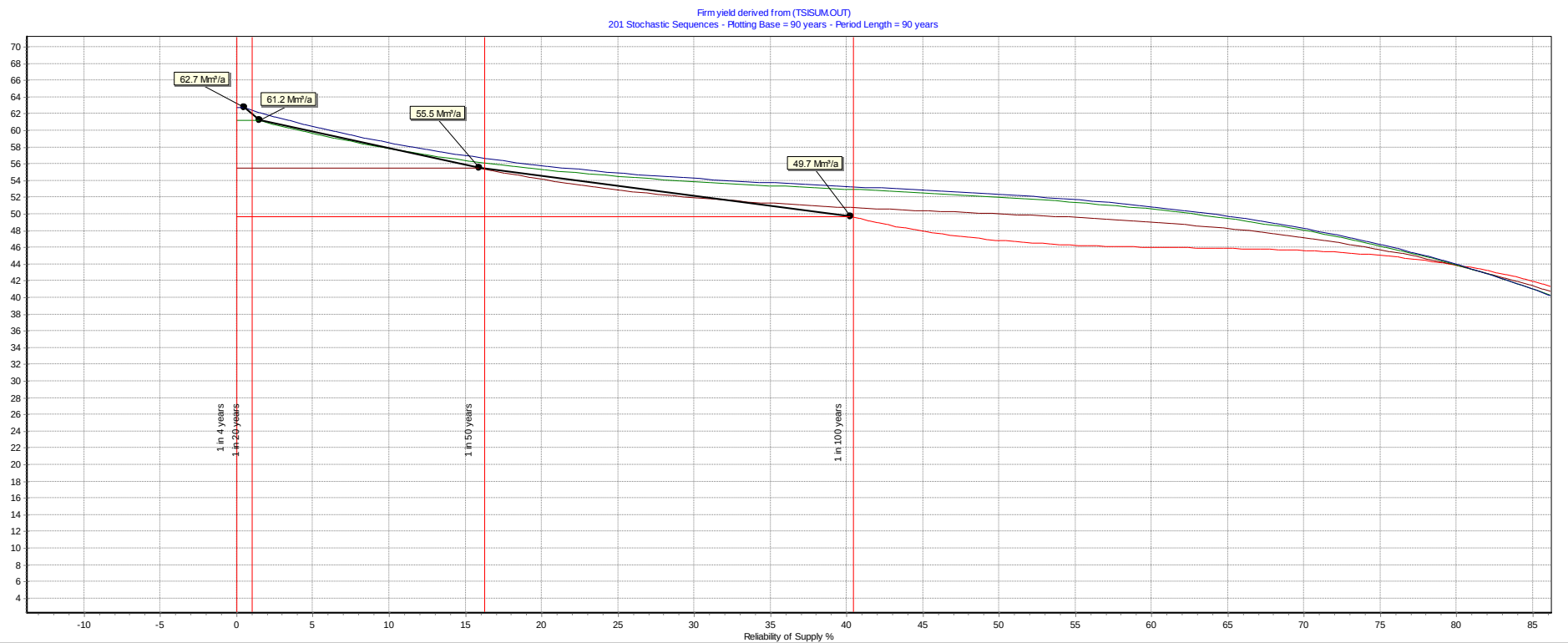


Figure 5-4: Yield Reliability Curve for a 60.0 Million m³ Gross Storage Ntabelanga Dam

Table 5-15: Final Yield Results for the Ntabelanga Dam

Scenario		Ntabelanga Reservoir					EWR			HFY (Million m³/a)	Yield (Million m³/a) at RI, annual assurance			
No.	Description	FSL (m.a.s.l)	MOL (m.a.s.l)	Tot Cap (Million m³)	Live Cap (Million m³)	Area (km²)	Class	Req.			1:4 75%	1:20 95%	1:50 98%	1:100 99%
								(Million m³/a)	(%MAR)					
01	Present Day + 0.10MAR + C Class EWR	919.5	918.2	41.50	5.80	4.35	C	87.25	20.4%	10.8	22.0	21.1	16.7	12.0
02	Present Day + 0.145MAR + C Class EWR	922.8	918.2	60.00	24.30	6.59	C	87.25	20.4%	45.1	62.7	61.2	55.5	49.7
03	Present Day + 0.20MAR + C Class EWR	925.9	918.2	83.00	47.30	8.63	C	87.25	20.4%	71.0	97.2	96.4	84.5	76.8
04	Present Day + 0.50MAR + C Class EWR	935.4	918.2	207.50	171.80	17.84	C	87.25	20.4%	146.2	190.1	181.3	166.5	155.3
05	Present Day + 1.00MAR + C Class EWR	944.2	918.2	415.00	379.30	24.21	C	87.25	20.4%	207.1	247.3	245.0	227.7	215.8
06	Present Day + 1.18MAR + C Class EWR	947.3	918.2	489.70	454.00	32.84	C	87.25	20.4%	220.2	267.0	265.0	241.0	230.0
07	Current + 1.80MAR + C Class EWR	957.9	918.2	747.00	711.30	46.37	C	87.25	20.4%	265.0	298.0	296.1	275.0	260.4

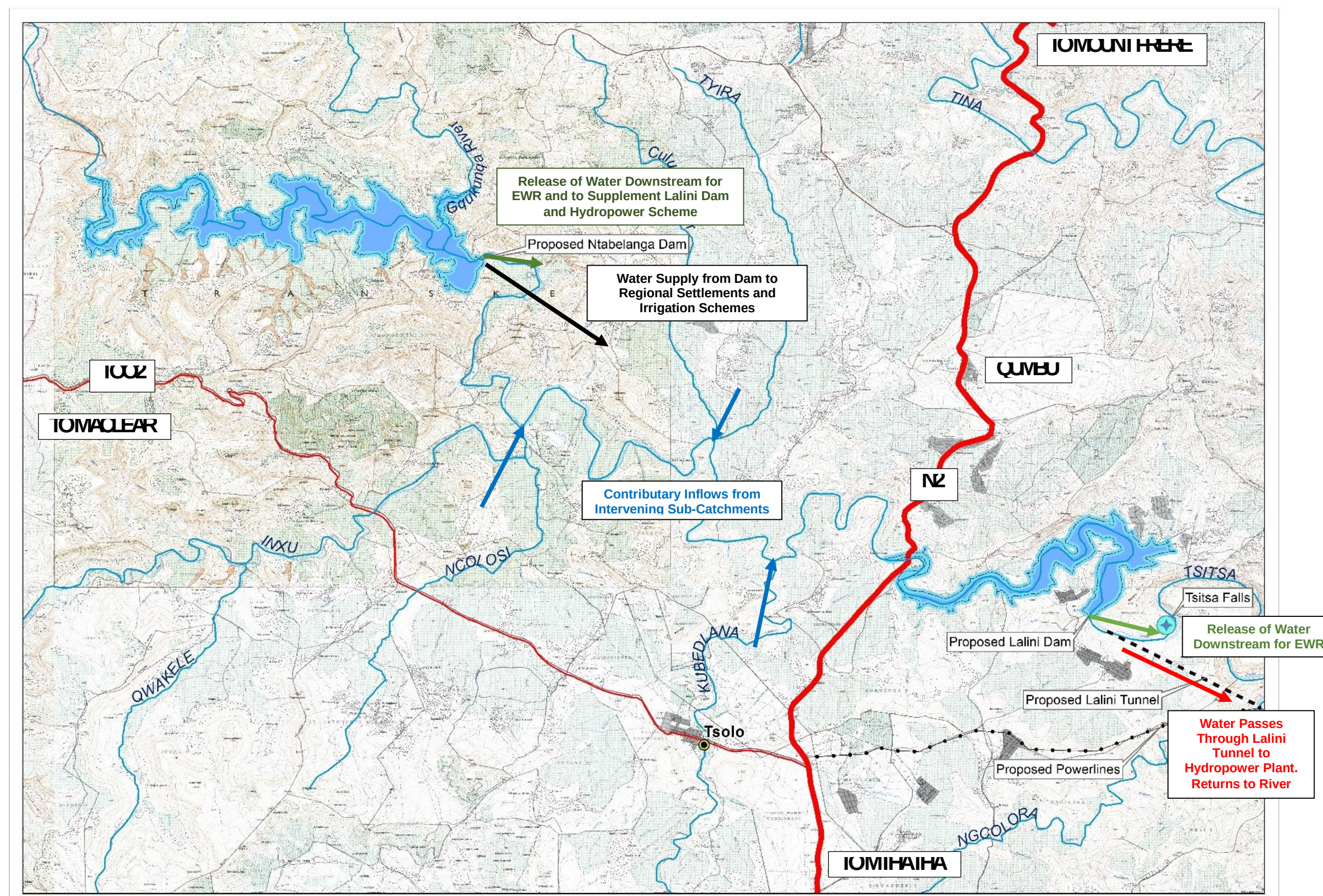


Figure 5-5: Layout of Potential Conjunctive Hydropower Scheme

Peaking power can be estimated by applying a load factor to the continuous generation results, but this was not done at this stage of the study, and was a part of the detailed investigations carried out under the .

The assurance of supply of the power that can be generated is largely dependent on two variables:

- The target draft that is placed on the dam, i.e. how much energy is aimed for; and
- how the assurance of supply is measured, i.e. monthly, annually etc.

Hydropower potential was calculated at each site (Ntabelanga and Lalini Dams) for a single assurance to assist with the optimising of the system design.

The WRYM simulated water levels in the dam upstream of the Lalini hydropower plant. The required hydropower information input into the WRYM is as follows:

- Installed power plant capacity;
- head losses;
- tailwater level;
- elevation-head-efficiency relationship; and
- monthly target energy production.

A generic elevation-head-efficiency relationship was adopted to account for typical turbine efficiency and range.

Design head was assumed to be 85% of the maximum head, and minimum head was assumed to be 60% of the design head (amounts to a minimum drawdown of about 50%). To draw a reservoir down beyond the 50% of the design head increases the inefficiency of the power generation.

Having stated that, the design head is very high in relation to the impounded water levels due to the additional head created by the proposed tunnel arrangement, which would drop the water approximately 350 m, with the tail water level at 410 m amsl. Peak efficiency at design head was assumed to be 91% and head loss was calculated to be five metres.

The hydrological record used for the simulations was a 90-year record from 1920 to 2009 (cf. Section 5.2). Hence, the results are based on the historical record as no stochastic simulations could be undertaken.

Table 5-16: Generic Elevation-Head-Efficiency Relationship

Efficiency Factor	Efficiency	Net Head Factor
0.904	0.823	0.650
0.935	0.851	0.725
0.962	0.875	0.800
0.982	0.894	0.875
0.995	0.905	0.950
1.000	0.910	1.000
0.998	0.908	1.025
0.990	0.901	1.100
0.977	0.889	1.175
0.957	0.871	1.250

The target power production was changed iteratively to determine the power production at different assurance levels. The target power demand applies when the dams are being drawn down. When the dams are spilling the power production increases to the capacity of the plant to make use of spills. The results are provided in Table 5-17. Power production assurance was calculated using monthly percentiles (ranking the monthly production values of the simulation record).

5.8.2 *Description of the Initial Hydropower Scenarios*

A series of hydropower scenarios were undertaken for varying dam sizes and combinations at the Ntabelanga and Lalini Dam sites.

Four scenarios were undertaken for a “maximum” Ntabelanga Dam volume (489.7 million m³ – 1.18 MAR_{PD}) with a water requirement scenario of 60 million m³/a, run conjunctively with various Lalini Dam sizes (82.8, 165.6, 414.0 and 621.0 million m³).

An additional four scenarios were undertaken for a “minimum” Ntabelanga Dam volume (60.0 million m³ – 0.15 MAR), again with a water requirement of 60 million m³/a, run conjunctively with various Lalini Dam sizes (207.0, 414.0, 621.0 and 828.0 million m³).

All eight scenarios aimed to determine the average/base load hydropower generation capability of the combined system at Lalini Dam.

The conclusion of this initial hydropower analysis indicated that between 25 and 30 MW of hydropower could be generated on average, and that the optimum configuration was with the Ntabelanga Dam at its maximum feasible capacity of 489.7 million m³ or 1.18 MAR_{PD}, and with the Lalini Dam at a minimum capacity of 207.0 million m³ or 0.18 MAR_{PD}.

This initial analysis is described in Report Nos. P WMA 12/T30/00/5212/12 and 15.

5.8.3 *Further Investigations Undertaken*

The basis of this approach was that the generating of hydropower could be used to cross-subsidize the significant energy costs required for pumping water for the irrigation and domestic water supply schemes proposed to be supplied from the Ntabelanga Dam. The agricultural water requirements proposed for the Tsolo area would require lifting the water more than 150 m, which would normally render such a scheme non-viable in terms of the pumping cost component of water supplied, unless hydropower is developed to reduce the net unit cost of water.

A more detailed hydropower analysis was therefore undertaken to assess the output potential of the Lalini Dam hydropower scheme when used conjunctively with the Ntabelanga Dam. This analysis used the detailed hydrology developed for the catchment and the naturalised and historical flow series that was developed therefrom.

In order to facilitate this analysis detailed investigations were undertaken of the Lalini Dam components of the scheme, inter alia:

- detailed topographical survey and positioning of the proposed Lalini Dam,
- geotechnical investigations of the dam site, sources of construction materials, and tunnel alignments,
- detailed elevation-head-efficiency relationship for the hydropower plant and configuration proposed at the Lalini Dam, and
- hydropower modelling simulation of the Lalini hydropower plant and two mini-hydropower plants at Ntabelanga and Lalini dams for the conjunctive scheme.

A reserve determination needed to be completed for the Lalini Dam and hydropower plant sites as the hydropower releases may have a significant impact upon the riverine ecology downstream of the proposed dam site and hydropower tunnel exit point. This was undertaken as a part of the independent EIA contract and results are given in that suite of reports.

This included the undertaking of a rapid determination of the EWR of the Tsitsa River downstream of the Tsitsa Falls, which indicated an ecological class of B/C. This EWR value and its recommended rules of operation were included into a new hydropower simulation model to improve the accuracy of estimation the potential hydropower outputs of the scheme.

The process and results of the improved hydropower potential assessment and the feasibility design of the Lalini Dam and its hydropower scheme are described in Report Nos. P WMA 12/T30/00/5212/18 and 19.

5.9 Hydropower Generation: Results

The detailed hydropower assessment of the conjunctive use of the Ntabelanga and Lalini Dams on the Tsitsa River system, was undertaken using detailed hydrology produced in the earlier analyses stage of this feasibility study, as well as new and highly accurate topographical survey data for the Lalini dam basin.

The analysis was undertaken using the previously recommended Ntabelanga Dam capacity of 489.7 million m³, or 1.18 MAR_{PD}, and for a range of Lalini Dam capacities from 0.10 MAR_{PD} to 0.75 MAR_{PD}.

The optimum Lalini Dam size selection was based on several factors, such as the cost benefits, as well as social and environmental impacts.

The main objective of the hydropower generation assessment was to determine the average amount of energy that can be produced per year from each dam capacity option assuming that the environmental, domestic and agricultural water requirements are met first.

5.9.1 Results

Two base case options were investigated for the main Lalini HEP, namely

- i) installed capacity 50 MW, and
- ii) installed capacity 37.5 MW

In addition to the main Lalini HEP, two smaller plants were also included in the modelling, each just downstream of the dam walls, and utilising the EWR flows to generate additional hydropower.

The results from the hydropower modelling analyses for a range of Lalini Dam storage volumes are presented in Figures 5-6 and 5-7, and Tables 5-17 and 5-18.

The energy figures thus produced were incorporated into the economic and financial models undertaken to determine the best conjunctive use solution.

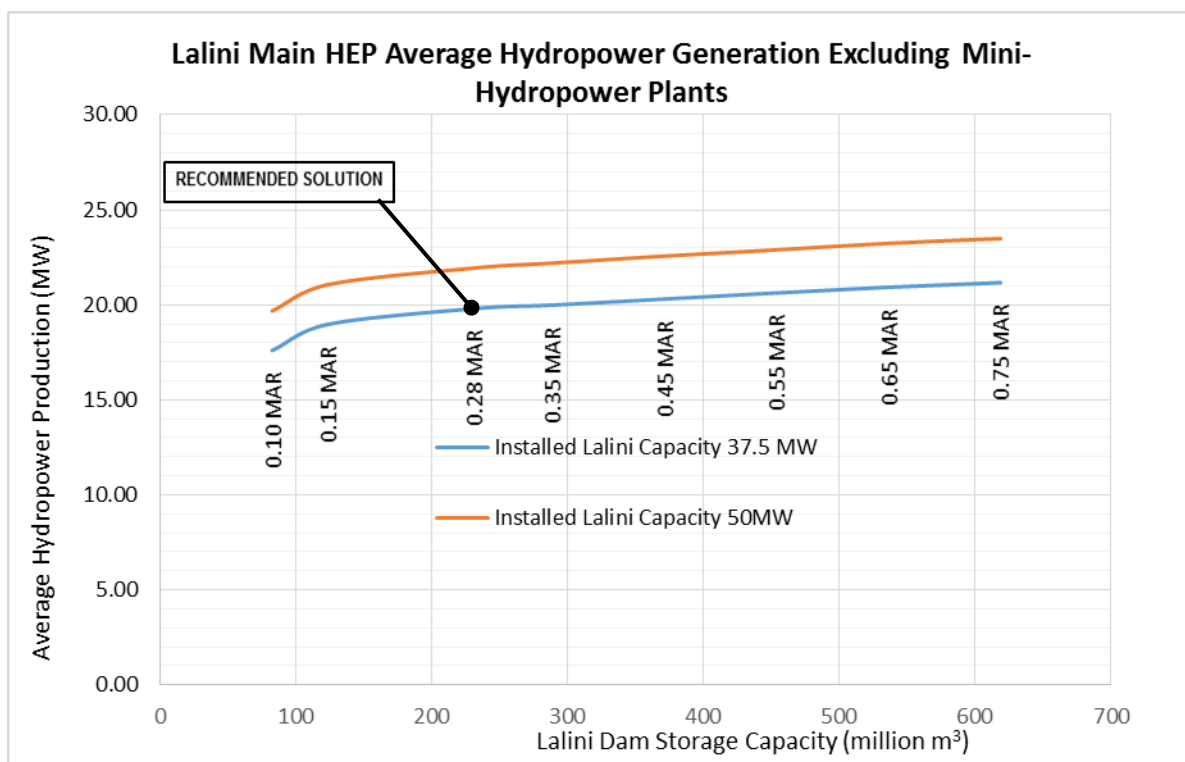


Figure 5-6: Hydropower Output: Lalini Main HEP

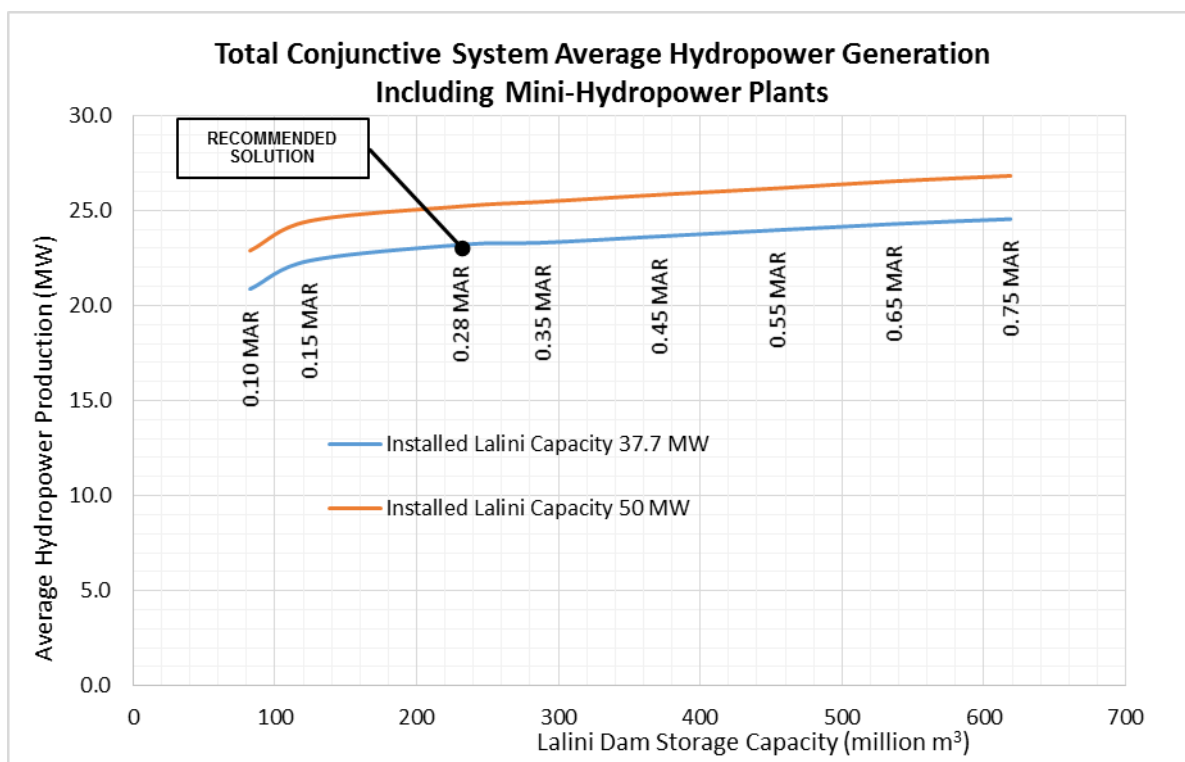


Figure 5-7: Hydropower Output: Including Mini-HEPs

Note: Recommended solution would produce an average of 23.17 MW.

Table 5-17: Hydropower Generation Results: 37.5MW Installed

Scenario		Lalini Dam Statistics					Lalini Dam EWR			Ntabelanga Mini-HEP Maximum Installed Capacity	Ntabelanga Mini-HEP Ave. Annual Power Output	Lalini Main HEP Installed Capacity	Lalini Main HEP Ave. Annual Power Output	Lalini Mini-HEP Maximum Installed Capacity	Lalini Mini-HEP Ave. Annual Power Output
No.	Description	FSL	MOL	Gross storage capacity	Live storage capacity	*Area	Class	Requirements		HydroPower	HydroPower	HydroPower	HydroPower	HydroPower	HydroPower
		mas.l	mas.l	million m³	million m³	km²		million m³/a	% MAR	MW	MW	MW	MW	MW	MW
01	1.18 MAR Ntabelanga + 0.10 MAR Lalini	751.8	745.2	82.5	40.3	7.61	BC	287.1	33.05	5	1.67	37.5	17.60	5	1.60
02	1.18 MAR Ntabelanga + 0.15 MAR Lalini	756.5	745.2	123.8	81.6	9.85	BC	287.1	33.05	5	1.66	37.5	18.98	5	1.71
03	1.18 MAR Ntabelanga + 0.28 MAR Lalini	765.5	745.2	231.0	188.8	14.02	BC	287.1	33.05	5	1.57	37.5	19.77	5	1.83
04	1.18 MAR Ntabelanga + 0.35 MAR Lalini	769.4	745.2	288.8	246.6	15.80	BC	287.1	33.05	5	1.45	37.5	19.99	5	1.87
05	1.18 MAR Ntabelanga + 0.45 MAR Lalini	774.2	745.2	371.3	329.1	18.18	BC	287.1	33.05	5	1.40	37.5	20.31	5	1.93
06	1.18 MAR Ntabelanga + 0.55 MAR Lalini	778.4	745.2	453.8	411.6	20.67	BC	287.1	33.05	5	1.35	37.5	20.63	5	1.99
07	1.18 MAR Ntabelanga + 0.65 MAR Lalini	782.3	745.2	536.3	494.1	22.65	BC	287.1	33.05	5	1.31	37.5	20.93	5	2.05
08	1.18 MAR Ntabelanga + 0.75 MAR Lalini	785.8	745.2	618.75	576.56	24.5	BC	287.1	33.05	5	1.28	37.5	21.17	5	2.10

* Surface area at Full Supply Level

Recommended Scheme

Table 5-18: Hydropower Generation Results: 50MW Installed

Scenario		Lalini Dam Statistics					Lalini Dam EWR			Ntabelanga Mini-HEP Maximum Installed Capacity	Ntabelanga Mini-HEP Ave. Annual Power Output	Lalini Main HEP Installed Capacity	Lalini Main HEP Ave. Annual Power Output	Lalini Mini-HEP Maximum Installed Capacity	Lalini Mini-HEP Ave. Annual Power Output
No.	Description	FSL	MOL	Gross storage capacity	Live storage capacity	*Area	Class	Requirements		HydroPower	HydroPower	HydroPower	HydroPower	HydroPower	HydroPower
		mas.l	mas.l	million m ³	million m ³	km ²		million m ³ /a	% MAR	MW	MW	MW	MW	MW	MW
01	1.18 MAR Ntabelanga + 0.10 MAR Lalini	751.8	745.2	82.5	40.3	7.61	BC	287.1	33.05	5	1.65	50	19.68	5	1.56
02	1.18 MAR Ntabelanga + 0.15 MAR Lalini	756.5	745.2	123.8	81.6	9.85	BC	287.1	33.05	5	1.71	50	21.07	5	1.66
03	1.18 MAR Ntabelanga + 0.28 MAR Lalini	765.5	745.2	231.0	188.8	14.02	BC	287.1	33.05	5	1.54	50	21.94	5	1.74
04	1.18 MAR Ntabelanga + 0.35 MAR Lalini	769.4	745.2	288.8	246.6	15.80	BC	287.1	33.05	5	1.47	50	22.20	5	1.79
05	1.18 MAR Ntabelanga + 0.45 MAR Lalini	774.2	745.2	371.3	329.1	18.18	BC	287.1	33.05	5	1.41	50	22.57	5	1.85
06	1.18 MAR Ntabelanga + 0.55 MAR Lalini	778.4	745.2	453.8	411.6	20.67	BC	287.1	33.05	5	1.37	50	22.90	5	1.90
07	1.18 MAR Ntabelanga + 0.65 MAR Lalini	782.3	745.2	536.3	494.1	22.65	BC	287.1	33.05	5	1.35	50	23.24	5	1.95
08	1.18 MAR Ntabelanga + 0.75 MAR Lalini	785.8	745.2	618.75	576.56	24.5	BC	287.1	33.05	5	1.34	50	23.49	5	1.99

* Surface area at Full Supply Level

5.10 Flood Hydrology for Dam Safety Design Purposes

Design flood hydrology was assessed for both Ntabelanga and Lalini Dam sites and recommended design flood (RDF) and safety evaluation flood (SEF) values were developed and recommendations sent via a design memorandum to the Hydrology Section of the Department of Water and Sanitation (DWS).

The DWS reviewed and commented on both memoranda and the agreed RDF and SEF have been used in determining the spillway, freeboard and other safety aspects of each dam. These design flood memoranda are included as Appendices to each of the Dam Feasibility Design reports – Nos. P WMA 12/T30/00/5212/12, and P WMA 12/T30/00/5212/19.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Choice of Preferred Dam Site

- The Ntabelanga Dam was determined to have the best yield per unit volume of water stored, due to the lower stream flow CV, a lower required sedimentation allowance and a lower EWR requirement when compared to the Somabadi and Thabeng dams.
- An economic viability and financial sustainability analysis resulted in the selection of the Ntabelanga Dam as the preferred option (cf. Report no. P WMA 12/T30/00/5212/3).
- The selection of this as the preferred dam also had the unique advantage of being able to be operated conjunctively with the potential hydropower scheme downstream of the Ntabelanga Dam at the Lalini Dam, located just above the Tsitsa Falls.

6.2 Water Resources Assessment Conclusions

- The Ntabelanga Dam can supply the high water requirement scenario of approximately 59.86 million m³/a at a 98% assurance of supply from a relatively small impoundment of 60.0 million m³ ($\approx$ 0.15 MAR).
- Any increase in impoundment volume above 60.0 million m³ has a large impact on increasing the yield due to the large proportional increase in live storage once the dead storage allocation has been overcome.
- The high water requirement scenarios from the Ntabelanga Dam accounts for the provision of the following water uses:
 - Class C EWR from Ntabelanga Dam, based on the Intermediate Reserve Determination undertaken as a part of the greater Mzimvubu Water Project (cf. Report no. P WMA 12/T30/00/5212/7);
 - Raw water supply for end user potable water (cf. Reports no. P WMA 12/T30/00/5212/6 and no. P WMA 12/T30/00/5212/13); and
 - Irrigation potential (cf. Report no. P WMA 12/T30/00/5212/9).
- The EWR for the Ntabelanga Dam was determined through an Intermediate Reserve Determination (cf. Report no. P WMA 12/T30/00/5212/7), which determined the river reach associated with the Ntabelanga Dam to be an ecological Class C, allocating 87.25 million m³ (20.4 % MAR) as an annual average. In spite of the limited development identified within the catchment, an ecological Class C was still determined as the reserve requirement, due to the high sedimentation rates in the system, which limits biotic proliferation within the riparian areas (mainly due to the impacts of sedimentation on the biota's required habitat). Refer to Report no. P WMA 12/T30/00/5212/7 for more detail.
- Sedimentation volumes over 50 years were accounted for based on an assessment of the Ntabelanga Dam catchment using the WRC (2010) methodology. The sedimentation V₅₀ values used in this study were 35.704 million m³.
- The simulated natural mean annual stream flow was modelled to be 428.49 million m³/a at the Ntabelanga Dam site, with the present day mean annual runoff at the same site being slightly lower at 415.0 million m³/a. This proportionally low reduction in MAR highlights the relatively small development within the catchment. Thus, indicating the potential for water resource development.
- A gross storage volume of 60.0 million m³ is the recommended impoundment if only the high scenario domestic and irrigation requirements are to be supplied.

6.3 Hydropower Generation Conclusions

- The Ntabelanga Dam was simulated to supply the potable and irrigation water requirement scenario value, rounded up to approximately 60 million m³/a, which was met 100% of the time in all of the hydropower scenarios. For the purposes of its conjunctive usage with the Lalini Dam and hydropower scheme, the capacity used for the Ntabelanga Dam was 489.7 million m³, or 1.18 MAR_{PD}.
- The EWR for the Lalini Dam was determined following a reserve determination process undertaken as a part of the EIA study, which considered that the river reach below the Tsitsa Falls to be an ecological Class B/C due to the potentially sensitive and unique environment downstream of the Tsitsa Falls, and allocating 287 million m³ (33% MAR) as an annual average.
- Sedimentation volumes over 50 years were accounted for based on an assessment of the incremental contributing catchment of the Lalini Dam, below the Ntabelanga Dam. The incremental sedimentation V₅₀ value used in this study was 31.185 million m³, which resulted in a total allowance of 66.889 million m³ in both dams.
- The simulated natural mean annual stream flow at the Lalini Dam site was modelled to be 868.63 million m³/a, with the present day mean annual runoff at the same site being slightly lower at 828.0 million m³/a. This proportionally low reduction in MAR highlights the relatively little development within the catchment.
- The average hydropower generation potential at the Lalini Dam and the two small hydropower plants ranges from 23 to 27 MW, depending on the combination of dam storage volumes simulated between the Ntabelanga and Lalini dams. There are only limited gains in hydropower output above a Lalini Dam storage volume equivalent to some 0.28 MAR_{PD}.
- The Tsitsa River system can be utilised for a multi-purpose use due to the high water resources availability in the catchment (i.e. the Ntabelanga Dam and the Lalini Dam). The consumptive uses could sustainably include, *inter alia*:
 - Potable water supply;
 - Irrigation; and
 - Hydropower.
- The full analysis of the scenarios assessed in this study includes an economic and financial analysis, which will include determination of the cost benefits of the hydropower component, as described in Report No. P WMA 12/T30/00/5212/15 and 16.

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P WMA 12/T30/00/5212/5

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT

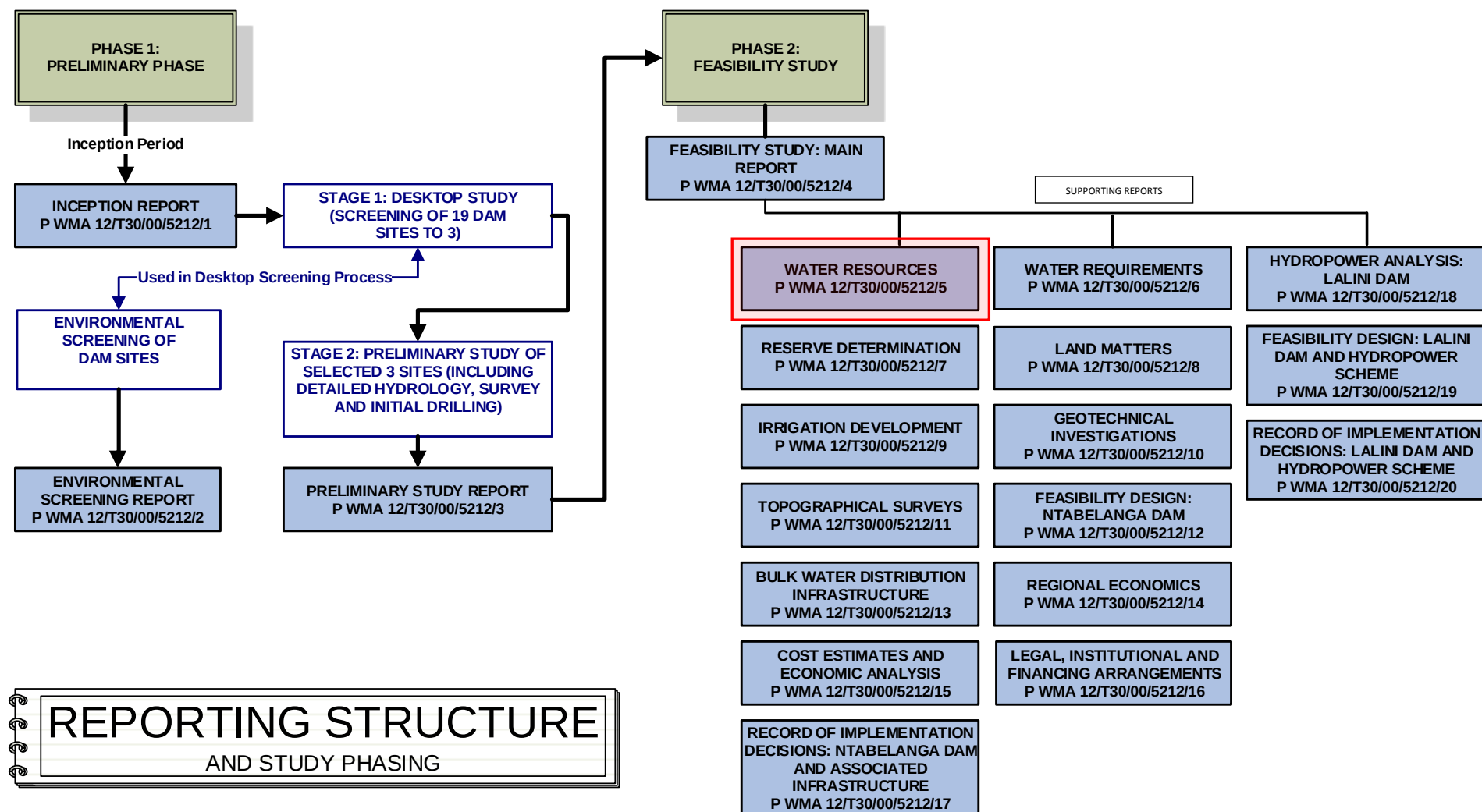
WATER RESOURCES APPENDIX A



OCTOBER 2014

LIST OF REPORTS

REPORT TITLE	DWS REPORT NUMBER
Inception Report	P WMA 12/T30/00/5212/1
Environmental Screening	P WMA 12/T30/00/5212/2
Preliminary Study	P WMA 12/T30/00/5212/3
Feasibility Study: Main Report	P WMA 12/T30/00/5212/4
Volume 1: Report	
Volume 2: Book of Drawings	
FEASIBILITY STUDY: SUPPORTING REPORTS:	
Water Resources	P WMA 12/T30/00/5212/5
Water Requirements	P WMA 12/T30/00/5212/6
Reserve Determination	P WMA 12/T30/00/5212/7
Volume 1: River	
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Volume 1: Ntabelanga, Somabadi and Thabeng Dam Sites: Report	
Volume 2: Ntabelanga, Somabadi and Thabeng Dam Sites: Appendices	
Volume 3: Lalini Dam and Hydropower Scheme: Report	
Volume 4: Lalini Dam and Hydropower Scheme: Appendices	
Topographical Surveys	P WMA 12/T30/00/5212/11
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Bulk Water Distribution Infrastructure	P WMA 12/T30/00/5212/13
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Feasibility Design: Lalini Dam and Hydropower Scheme	P WMA 12/T30/00/5212/19
Record of Implementation Decisions: Lalini Dam and Hydropower Scheme	P WMA 12/T30/00/5212/20



REFERENCE

This report is to be referred to in bibliographies as:

*Department of Water and Sanitation - **Feasibility Study for the Mzimvubu Water Project: Water Resources – Appendix A***

DWS Report No: P WMA 12/T30/00/5212/5

Prepared for: Directorate – Options Analysis

Prepared by: Jeffares & Green (Pty) Ltd, P O Box 794, Hilton, 3245

Tel: 033 343 6700, Fax: 033 343 6701

Contact: Mr A Pepperell

Email: pepperella@jgi.co.za

Note on Departmental Name Change:

In 2014, the Department of Water Affairs changed its name to the Department of Water and Sanitation, which happened during the course of this study. In some cases this was after some of the study reports had been finalized. The reader should therefore kindly note that references to the Department of Water Affairs and the Department of Water and Sanitation herein should be considered to be one and the same.

Note on Spelling of Lalení:

The settlement named Lalení on maps issued by the Surveyor General is locally known as Lalini and both names therefore refer to the same settlement.

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APPENDIX A

RAINFALL INFORMATION AND ANALYSIS

APPENDIX A1

MONTHLY RAINFALL INFORMATION KINIRA RIVER SYSTEM

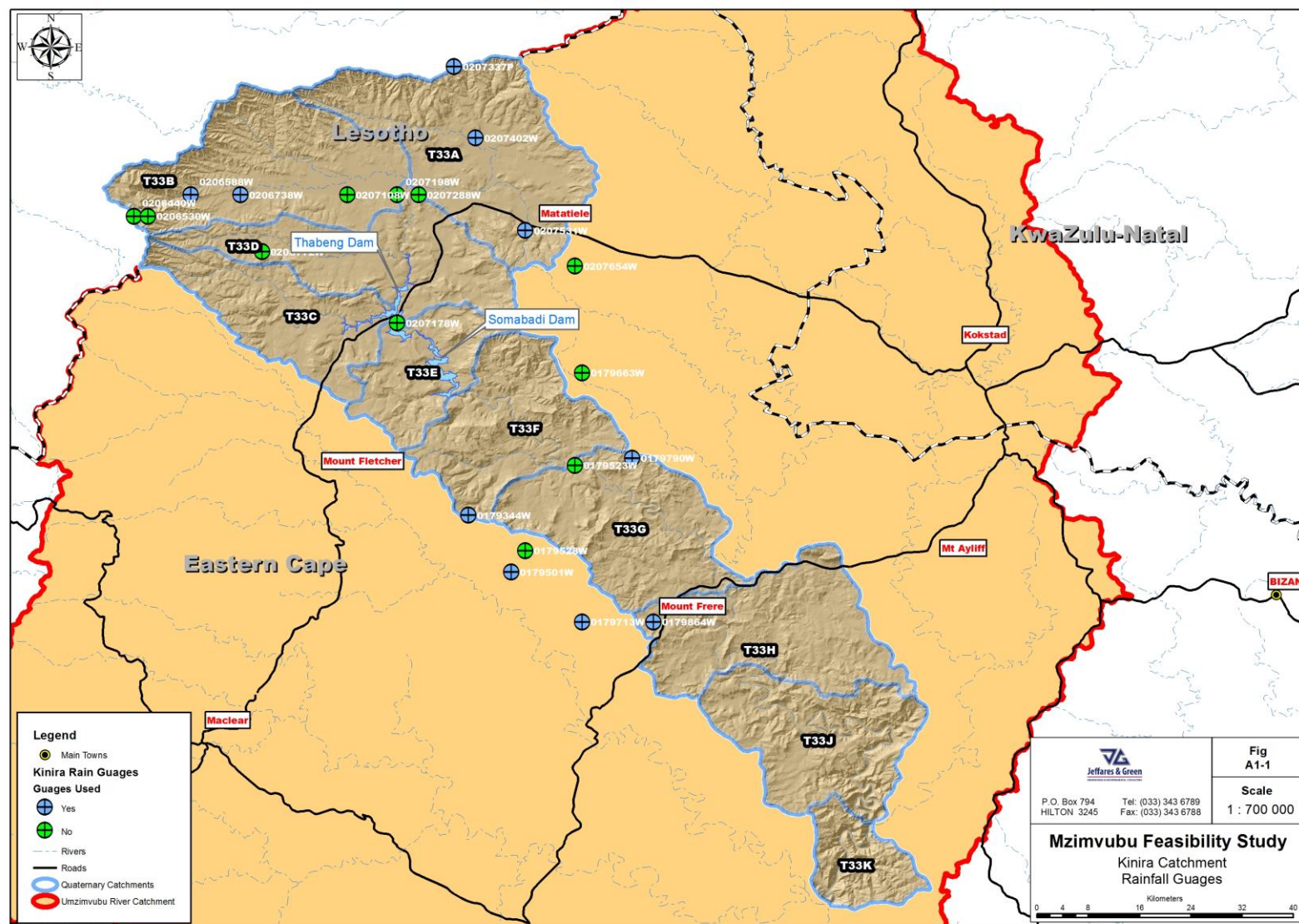


Figure A1- 1 Map of Rain Gauges Used in Phase 1 for the Kinira River System

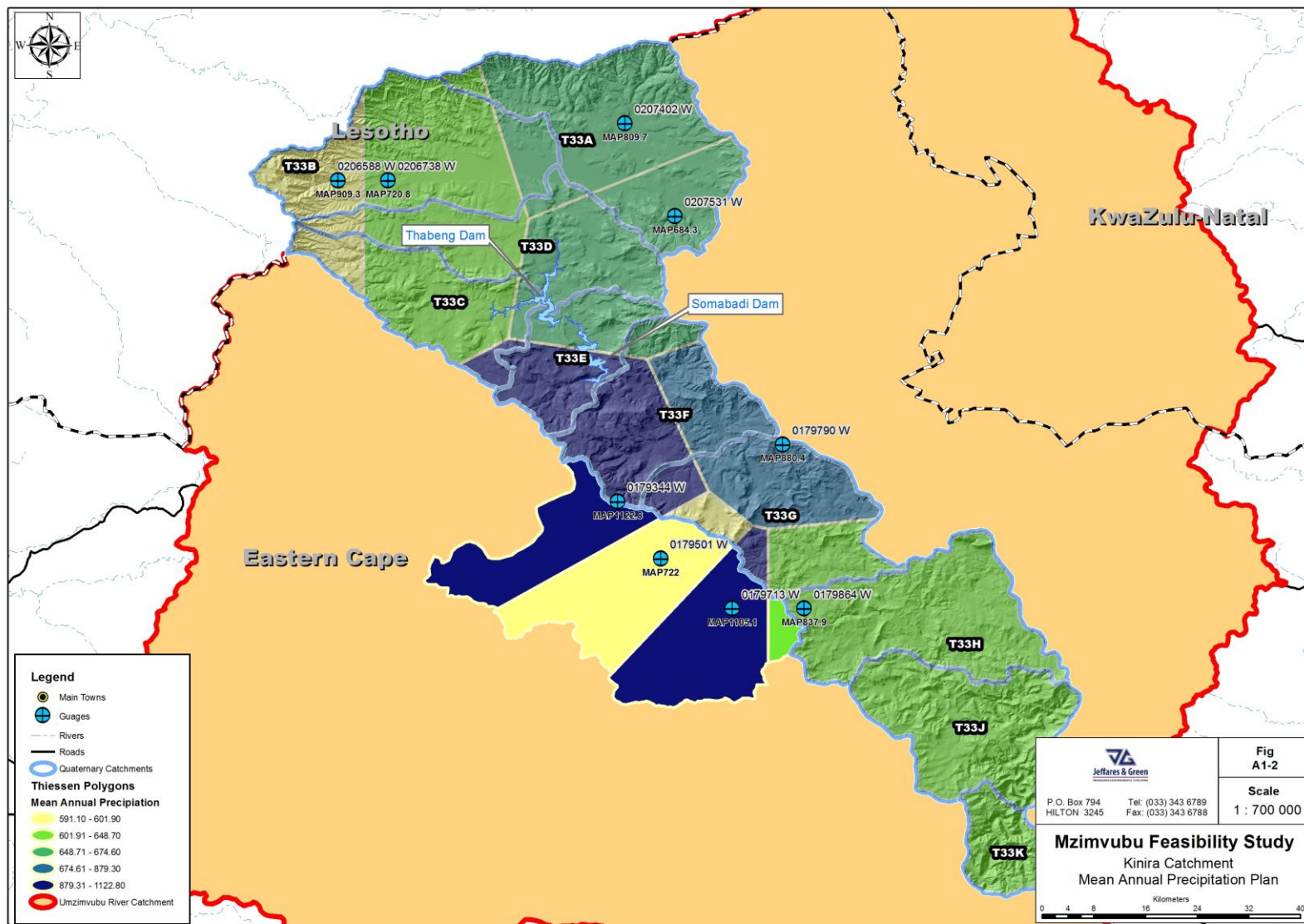


Figure A1- 2 Map of Thiessen polygons Used in Phase 1 for the Kinira River System

Table A1- 1 Quaternary Catchment T33A - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	53.5	69.0	101.8	68.6	98.0	97.3	55.0	15.8	18.2	18.4	0.9	45.9
1921	54.8	167.8	121.6	77.2	68.4	46.9	5.0	79.7	47.8	1.5	61.5	6.6
1922	50.2	150.9	55.6	149.4	182.7	84.4	7.9	4.9	12.5	93.6	5.9	10.8
1923	22.0	49.1	92.0	119.2	135.9	86.5	6.4	16.6	6.4	0.6	15.9	43.5
1924	47.4	91.0	159.4	63.7	125.7	217.5	70.4	13.1	0.9	2.0	0.0	34.6
1925	39.4	106.5	70.7	157.7	69.8	155.9	27.7	22.1	32.4	0.6	19.0	50.7
1926	79.9	94.8	144.3	77.2	125.9	225.4	30.3	15.1	0.6	19.0	14.7	19.4
1927	88.7	36.5	165.7	203.4	75.9	72.6	6.2	8.8	2.5	1.6	46.5	6.0
1928	60.1	76.4	103.5	85.1	98.8	171.9	5.0	25.0	50.1	39.6	9.8	87.9
1929	73.7	98.0	148.7	128.0	74.9	81.0	62.2	6.7	13.3	11.5	59.2	29.9
1930	60.2	28.7	92.3	186.6	120.2	128.6	65.4	1.2	0.9	78.3	1.2	3.9
1931	70.1	57.8	80.0	93.8	198.6	67.8	23.2	29.3	7.6	24.3	2.4	52.1
1932	50.1	95.7	140.2	45.8	79.3	87.5	46.4	1.7	1.5	10.6	7.5	16.6
1933	21.5	212.4	237.6	226.1	119.5	109.6	23.1	14.6	4.2	28.8	5.0	9.3
1934	95.1	107.9	170.0	100.8	73.2	99.7	63.7	47.7	35.3	2.6	64.4	6.8
1935	35.2	44.5	19.7	108.5	176.7	77.3	21.6	111.7	2.4	19.3	0.1	11.5
1936	76.1	213.1	71.1	125.1	201.8	122.4	5.3	1.3	0.3	4.6	1.0	23.6
1937	43.3	45.3	130.4	130.9	134.5	49.1	98.1	3.9	23.3	23.6	30.1	17.4
1938	61.2	53.8	130.3	151.4	182.8	61.5	19.3	32.6	7.6	22.9	21.3	121.6
1939	66.4	86.7	106.9	111.3	159.6	106.5	42.5	114.9	9.8	0.2	6.8	47.9
1940	94.6	81.8	122.5	152.6	117.0	66.0	53.8	0.4	5.7	9.7	11.8	12.5
1941	50.3	51.7	37.4	164.6	195.3	118.1	130.3	21.2	0.0	0.1	25.9	24.0
1942	88.1	108.2	230.8	108.3	62.0	106.4	77.4	37.3	19.0	28.5	131.0	43.1
1943	98.9	153.3	199.9	72.0	105.3	98.7	9.6	18.9	49.1	7.9	1.1	107.0
1944	74.8	55.7	15.8	105.3	188.4	172.3	15.0	9.5	1.8	0.7	1.5	20.8
1945	58.7	27.5	71.1	66.3	111.8	110.1	56.2	34.1	1.0	6.9	2.5	10.7
1946	58.5	116.8	116.3	127.2	126.9	102.0	57.7	0.2	44.3	4.6	2.2	42.9
1947	48.5	128.3	147.1	166.8	124.2	137.0	29.3	3.3	0.3	1.1	0.9	6.4
1948	51.4	44.7	87.8	156.1	102.0	130.9	45.1	13.2	0.0	7.1	4.7	26.0
1949	32.2	64.8	118.7	83.3	125.5	182.3	40.2	26.1	2.2	18.9	102.0	12.7
1950	54.8	51.1	173.6	98.9	122.5	57.7	30.9	3.9	2.0	3.1	38.2	50.5
1951	95.3	17.5	52.1	166.9	200.7	75.4	52.7	13.0	15.1	11.1	5.6	45.9
1952	41.4	97.1	141.9	86.7	76.1	58.6	65.4	3.8	1.2	0.1	14.7	63.6
1953	71.0	82.2	110.1	95.8	116.1	102.4	32.7	83.4	20.7	5.6	2.5	52.1
1954	91.5	75.7	96.8	241.7	166.0	92.3	47.8	13.9	27.5	1.3	0.0	30.7
1955	65.7	108.3	89.6	116.2	156.6	126.3	23.3	24.0	8.4	1.6	5.5	28.1
1956	36.3	124.3	220.9	196.5	144.4	113.6	38.6	7.4	4.3	11.2	38.7	112.3
1957	104.2	76.4	121.4	146.8	87.4	74.7	63.2	19.5	0.9	2.9	1.3	12.2
1958	32.6	134.6	182.2	82.0	104.7	72.1	80.7	137.0	0.0	29.8	12.2	33.2
1959	39.6	104.8	103.2	81.4	78.3	43.3	75.3	19.0	5.3	1.5	25.1	47.9
1960	49.6	140.4	166.9	92.3	105.3	122.9	98.9	15.1	1.6	0.9	17.1	22.7
1961	15.4	113.0	136.9	110.3	130.1	129.7	26.4	13.3	0.0	0.0	10.4	12.8
1962	56.4	117.5	126.4	248.6	148.8	131.7	34.0	3.3	0.7	53.8	0.0	1.3
1963	84.4	115.8	125.8	155.1	75.8	135.2	71.7	1.3	80.1	4.3	6.8	41.2
1964	117.2	31.0	112.9	126.9	65.5	17.3	43.3	1.6	88.5	48.7	56.8	22.3

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	72.0	96.2	39.6	207.1	114.9	20.3	28.8	53.0	4.2	0.0	38.0	33.1
1966	38.6	57.3	101.7	117.6	189.4	178.1	85.4	17.2	38.2	25.8	3.1	0.8
1967	40.0	71.9	82.3	66.6	74.8	103.7	65.0	7.6	1.7	4.0	21.5	41.9
1968	39.6	55.0	80.2	68.7	86.0	163.8	40.1	36.5	1.7	4.7	6.9	23.2
1969	103.0	46.5	119.8	92.8	113.5	44.7	11.2	22.6	22.1	0.7	56.4	45.8
1970	94.3	63.1	95.9	158.7	118.8	62.7	42.4	38.6	4.2	37.4	30.8	9.6
1971	102.8	57.3	86.8	139.8	169.1	118.0	34.0	16.9	7.1	1.2	1.4	31.0
1972	49.2	127.9	44.1	85.3	185.3	56.8	39.4	7.0	0.0	23.2	27.1	40.0
1973	46.5	127.7	104.5	199.2	175.5	148.8	40.9	48.2	16.5	8.9	10.0	11.0
1974	36.9	133.4	142.4	106.5	75.6	123.0	40.0	0.9	0.1	4.6	10.5	105.6
1975	15.2	96.2	227.9	235.6	169.9	290.3	32.8	46.6	1.5	9.8	1.7	72.0
1976	136.8	48.9	54.5	115.0	127.6	123.9	36.1	0.3	0.0	15.0	14.0	45.8
1977	83.6	79.0	98.2	142.2	92.3	164.0	97.4	4.9	4.7	1.1	12.0	40.1
1978	66.9	53.9	173.6	90.0	91.9	63.5	26.8	8.9	0.0	56.9	27.9	20.7
1979	52.6	47.7	103.8	112.6	112.9	77.7	14.0	13.7	0.0	3.0	2.9	73.7
1980	34.6	102.0	58.7	132.0	134.5	68.2	34.6	20.1	10.5	1.4	45.7	37.9
1981	41.2	98.9	118.1	89.5	47.8	165.6	67.9	1.5	18.6	5.1	8.6	61.5
1982	53.5	86.7	56.6	68.9	32.5	75.3	47.6	9.8	3.7	5.2	6.0	20.2
1983	66.1	105.8	143.9	155.7	61.8	107.6	41.0	14.7	16.2	16.3	8.9	23.8
1984	94.5	94.7	48.5	149.6	206.6	28.0	13.8	2.1	0.0	0.8	0.0	9.2
1985	134.2	135.5	144.8	217.6	122.5	85.6	35.2	1.3	13.9	1.9	50.6	44.2
1986	95.8	120.8	80.9	117.2	85.5	118.9	24.7	2.3	29.0	2.0	78.4	219.7
1987	109.4	78.7	94.0	111.0	172.3	119.5	45.9	24.9	14.0	26.5	21.0	31.1
1988	64.3	98.7	158.1	87.5	179.0	73.5	69.4	39.7	9.3	15.5	1.0	1.7
1989	40.5	201.4	148.0	139.1	33.7	145.6	52.4	10.6	22.8	3.3	43.3	19.5
1990	42.1	33.2	122.1	124.6	119.2	65.9	3.1	6.5	5.7	0.7	0.5	62.4
1991	140.5	71.5	114.1	61.0	146.9	47.6	45.8	1.0	0.8	0.0	15.4	33.3
1992	28.7	40.7	47.6	90.3	93.9	82.8	38.8	2.6	0.0	0.0	22.8	25.9
1993	127.7	72.6	161.9	107.2	123.9	117.1	19.1	6.3	2.6	31.7	16.6	1.9
1994	38.1	21.3	84.2	137.3	71.8	141.6	44.6	27.7	39.8	0.9	0.1	24.5
1995	55.3	82.5	184.1	209.3	189.8	87.7	39.8	3.9	2.9	40.9	5.9	16.3
1996	69.4	143.3	136.1	170.0	58.0	138.3	82.4	21.9	89.6	21.4	15.3	28.6
1997	54.8	84.9	39.1	124.2	204.7	110.2	26.6	39.9	1.2	4.4	22.5	18.0
1998	45.9	103.6	123.1	109.1	156.4	117.8	21.2	9.1	2.8	2.9	0.6	12.1
1999	74.0	90.7	173.4	196.4	140.6	130.0	66.7	51.4	4.0	1.5	2.7	65.5
2000	57.5	98.0	119.1	145.0	107.7	107.9	49.2	9.7	5.4	7.9	17.4	37.9
2001	99.8	141.5	132.3	114.9	43.8	183.9	28.8	43.7	23.6	45.7	43.9	35.1
2002	17.4	35.3	118.4	106.7	64.7	84.9	26.3	16.4	12.4	5.3	12.5	42.1
2003	31.0	59.0	76.2	142.2	78.7	98.4	16.7	6.3	2.2	66.2	16.5	67.7
2004	68.6	125.6	169.8	133.8	119.1	79.8	49.4	15.8	0.0	6.4	16.9	11.3
2005	65.2	81.0	49.3	147.0	149.0	74.6	50.5	26.0	11.1	0.0	85.4	75.2
2006	136.6	109.8	160.9	138.4	55.3	95.9	64.3	6.3	29.9	1.1	10.9	13.1
2007	86.5	71.8	71.5	114.1	104.6	119.5	74.4	11.4	35.0	0.0	6.7	30.8
2008	33.5	86.0	113.6	127.8	119.2	73.7	40.3	20.6	20.0	1.5	34.8	13.9
2009	143.9	82.3	57.1	175.4	160.1	57.4	35.3	5.7	27.2	3.8	2.7	7.9

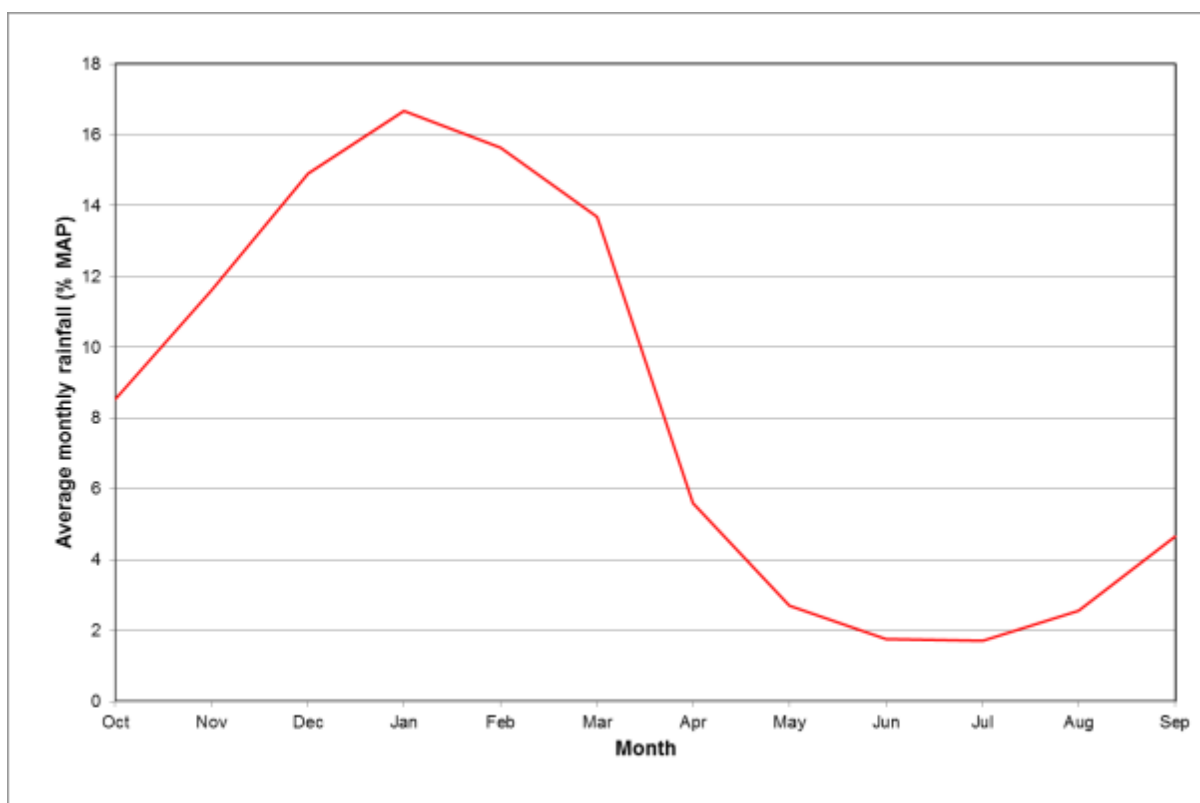


Figure A1- 3 Monthly Rainfall Distribution of Quaternary Catchment T33A

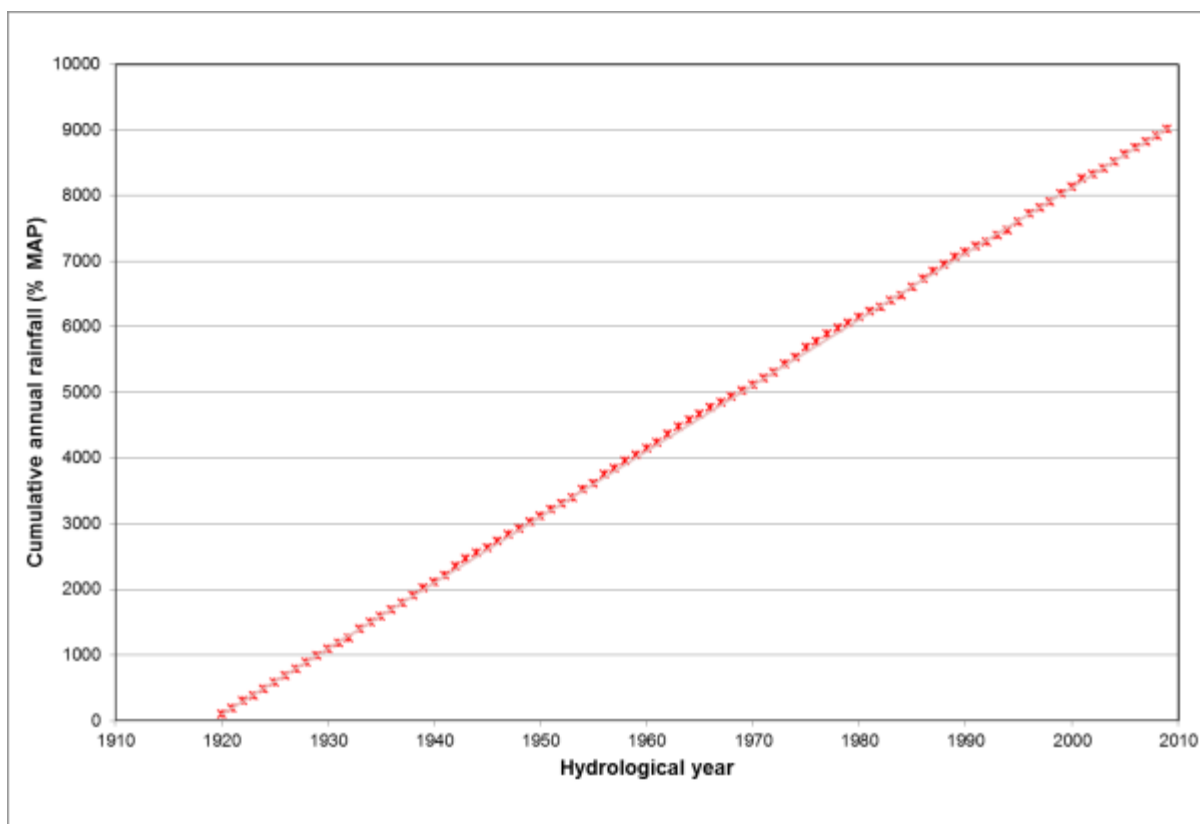


Figure A1- 4 Cumulative Annual Rainfall in Quaternary Catchment T33A

Table A1- 2 Quaternary Catchment T33B - Monthly Rainfall File in Milimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	60.7	69.1	103.5	80.1	93.8	113.2	61.2	17.5	13.2	13.6	1.3	44.4
1921	59.8	172.4	121.5	75.0	64.5	47.2	5.6	85.0	45.0	2.4	57.1	9.8
1922	55.4	154.9	56.0	157.4	186.6	99.4	9.1	6.1	10.8	107.5	8.0	13.3
1923	24.1	49.8	94.2	114.3	120.8	84.0	9.7	18.3	5.9	0.9	18.7	40.9
1924	54.4	99.0	171.2	67.9	116.1	213.2	74.4	14.5	0.9	2.8	0.0	36.4
1925	40.1	109.0	73.7	134.4	76.6	158.7	27.4	19.0	38.1	1.0	14.4	61.8
1926	72.4	86.8	134.3	84.4	106.9	237.1	30.1	13.9	0.9	18.0	16.7	19.3
1927	84.7	37.8	164.0	198.3	90.0	69.7	9.3	13.1	3.7	2.6	46.3	9.0
1928	61.0	78.1	106.7	75.8	92.2	173.6	6.9	25.4	53.2	38.0	11.6	84.4
1929	81.9	100.0	152.5	124.4	61.6	85.9	60.9	8.5	13.0	12.9	60.1	34.8
1930	64.2	30.4	94.3	204.6	126.4	137.1	62.6	1.8	1.2	85.5	1.9	5.8
1931	72.5	59.9	89.1	94.4	189.0	71.6	27.6	30.4	7.9	25.9	3.2	59.0
1932	55.2	109.2	145.6	42.0	76.3	94.7	41.2	1.4	1.3	9.5	7.8	21.1
1933	23.7	209.1	211.9	235.3	124.0	114.2	24.5	13.2	5.7	33.5	4.7	9.9
1934	92.7	109.9	158.7	95.0	72.4	95.1	79.5	49.7	35.5	2.2	61.9	9.0
1935	36.4	47.6	22.0	103.6	174.7	84.8	20.5	98.3	3.6	20.5	0.1	17.2
1936	84.8	221.1	69.6	122.0	219.1	113.3	4.9	2.1	0.5	4.0	1.4	30.3
1937	51.6	46.1	129.5	141.8	137.3	54.7	96.0	6.1	25.9	25.5	28.4	17.9
1938	65.5	60.3	135.3	152.0	208.5	64.6	26.0	35.0	10.2	28.9	21.2	137.5
1939	71.9	98.5	105.4	106.0	179.2	106.3	44.8	108.8	8.5	0.4	5.5	47.0
1940	87.4	87.2	135.9	146.6	114.5	69.4	57.3	0.7	6.9	9.2	12.3	15.1
1941	53.3	54.3	41.6	151.0	203.4	117.9	114.2	23.1	0.0	0.1	31.0	27.7
1942	94.5	111.8	218.6	113.1	60.8	119.1	83.8	33.7	21.6	25.1	119.7	48.1
1943	100.0	145.0	191.5	83.9	112.2	97.3	11.2	15.9	47.5	9.9	1.7	119.1
1944	73.1	52.3	16.1	111.6	183.5	161.9	17.4	9.9	2.8	1.1	2.2	17.7
1945	69.5	28.6	76.5	96.1	109.3	114.4	56.1	32.3	1.6	8.8	3.8	12.8
1946	58.3	118.5	113.2	136.6	123.3	101.6	58.4	0.2	46.3	6.9	3.3	43.0
1947	50.0	141.6	142.9	162.6	131.6	132.8	32.7	4.6	0.5	1.6	1.3	8.8
1948	60.2	48.7	82.7	135.7	109.3	116.4	42.8	13.5	0.0	8.3	7.0	28.7
1949	35.8	63.5	112.0	91.7	129.0	174.7	42.2	31.7	2.6	20.7	92.7	15.8
1950	61.9	52.8	170.0	111.9	130.1	59.9	27.8	5.3	2.0	2.8	41.1	54.9
1951	103.8	17.1	53.2	144.9	183.3	81.7	55.6	14.0	14.5	11.2	5.3	46.9
1952	46.9	97.3	143.0	90.6	82.2	74.3	71.5	3.1	1.8	0.1	16.6	72.0
1953	71.9	84.2	117.8	105.7	108.8	113.4	34.2	81.5	21.7	5.4	2.4	51.6
1954	95.3	83.3	96.9	260.8	169.3	100.0	46.6	17.6	27.7	1.4	0.0	34.6
1955	72.0	111.5	85.0	106.0	155.3	139.9	25.9	26.1	10.1	1.1	5.4	31.8
1956	42.9	132.0	231.3	186.8	124.3	123.8	45.9	7.4	4.6	12.8	40.8	103.3
1957	102.4	73.7	120.8	157.9	92.6	77.1	70.1	18.5	1.3	4.3	1.0	15.5
1958	35.3	134.1	172.2	90.9	109.1	73.8	74.2	141.2	0.0	28.0	14.4	38.4
1959	42.6	100.5	107.6	80.9	81.4	46.3	75.9	14.4	4.2	2.2	24.3	51.2
1960	48.5	129.4	168.9	85.7	105.9	111.5	97.8	13.2	1.1	1.4	15.1	23.4
1961	19.2	114.0	139.9	107.9	131.6	130.2	24.2	12.9	0.0	0.0	15.7	12.5
1962	61.6	120.5	125.3	235.7	129.6	154.7	35.9	5.2	1.2	53.5	0.0	0.9
1963	101.9	123.0	117.3	155.4	67.0	128.5	73.3	1.7	96.1	5.3	7.6	45.0
1964	113.7	32.5	118.8	118.1	76.4	19.1	39.4	2.1	93.1	46.8	54.3	25.9

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	81.7	103.5	44.1	185.9	113.8	20.6	27.0	59.9	5.2	0.0	38.7	37.4
1966	39.4	58.4	99.9	110.9	194.6	175.8	89.5	19.0	42.7	25.8	4.6	1.3
1967	49.3	80.8	80.0	72.1	91.6	96.6	63.7	5.9	1.6	3.8	23.5	40.0
1968	46.0	69.7	72.6	66.2	89.7	164.5	40.4	39.6	2.5	6.3	5.6	26.5
1969	102.7	56.0	125.4	100.3	117.6	42.7	11.0	25.8	25.0	1.1	58.8	45.8
1970	101.3	63.1	99.2	164.1	117.1	64.2	46.9	43.1	5.3	39.5	33.8	13.6
1971	114.1	62.1	86.7	136.4	162.3	110.9	30.8	15.5	9.1	1.1	1.6	28.6
1972	51.5	136.9	48.5	94.3	184.2	67.0	44.9	7.0	0.0	20.2	27.7	36.5
1973	55.0	122.7	103.5	216.4	170.8	155.9	47.7	46.8	15.4	8.5	8.3	8.6
1974	34.6	130.3	147.2	117.0	73.2	108.0	40.5	1.2	0.1	5.1	7.9	106.0
1975	15.9	96.1	241.8	237.4	176.0	279.7	35.9	47.1	2.4	10.1	2.7	71.5
1976	136.0	52.8	53.4	118.3	120.6	112.2	36.4	0.5	0.0	15.7	18.0	55.5
1977	83.7	85.5	95.7	149.2	91.3	146.3	101.0	5.3	3.6	1.5	12.7	38.9
1978	66.2	54.1	159.1	82.5	87.5	67.1	28.6	8.3	0.0	57.9	25.7	23.9
1979	56.3	50.6	96.6	106.6	111.3	79.7	14.9	13.3	0.0	4.2	2.9	79.9
1980	37.8	108.0	66.1	134.7	139.0	73.1	30.5	23.0	9.8	1.8	46.9	39.7
1981	45.6	96.9	122.6	89.3	57.6	167.5	62.2	2.3	21.2	8.1	8.5	59.8
1982	61.1	86.0	55.5	65.6	36.2	72.1	42.6	9.9	3.2	4.9	5.0	19.3
1983	66.1	107.0	142.3	155.6	64.9	113.6	46.1	14.2	15.4	17.3	9.8	20.9
1984	95.1	99.7	52.7	162.6	217.0	24.6	20.9	1.8	0.0	0.5	0.0	9.7
1985	128.8	142.1	146.9	204.9	121.5	92.1	31.5	1.9	12.2	2.9	44.9	48.6
1986	103.9	113.6	75.9	117.6	77.0	114.8	25.2	2.2	26.1	2.2	73.4	200.2
1987	112.8	80.9	85.3	104.2	159.9	123.2	47.9	26.6	14.7	23.5	21.7	30.5
1988	65.8	102.2	157.3	99.4	180.9	68.5	72.9	37.9	7.9	14.2	0.7	1.2
1989	50.0	191.7	137.3	134.6	36.9	135.2	48.4	12.5	18.1	2.8	39.8	21.4
1990	47.2	30.6	116.1	110.4	106.2	57.4	3.7	8.7	4.8	0.5	0.7	69.4
1991	129.8	69.5	116.0	59.0	138.2	46.0	41.7	1.6	1.0	0.0	14.6	36.5
1992	27.8	35.6	38.7	83.8	85.9	76.6	38.8	2.0	0.0	0.0	21.8	33.6
1993	118.6	73.1	168.3	109.4	134.0	106.8	16.8	6.9	3.9	31.3	21.3	2.3
1994	42.0	22.3	92.5	124.8	89.7	153.6	48.3	24.1	44.7	1.2	0.1	25.4
1995	55.5	83.7	195.4	208.3	192.5	88.8	36.8	4.3	4.3	42.0	5.1	16.7
1996	67.3	149.5	134.8	179.0	58.0	124.9	75.0	23.5	92.9	23.6	16.7	36.1
1997	59.1	80.5	40.5	130.0	208.8	119.5	32.4	42.0	1.2	6.7	24.8	20.4
1998	49.0	108.9	145.3	112.0	145.1	118.3	24.0	7.2	3.6	3.4	0.9	14.8
1999	79.6	92.1	173.0	211.3	146.6	134.5	66.5	52.5	4.0	1.0	4.0	63.2
2000	57.1	100.5	125.5	137.7	107.8	108.1	52.1	8.3	5.1	8.1	16.3	35.0
2001	99.5	142.9	152.7	113.4	50.3	176.7	23.7	42.6	20.5	48.6	51.5	29.6
2002	17.7	44.6	118.4	107.6	61.5	82.0	17.7	16.7	18.2	7.9	10.0	52.9
2003	29.2	56.3	84.8	148.6	75.8	101.6	17.9	8.2	3.1	59.9	16.5	77.6
2004	60.0	109.6	166.8	133.0	117.3	85.1	41.6	16.2	0.0	6.1	18.2	16.3
2005	69.4	96.6	43.0	141.9	145.1	81.7	53.3	30.0	11.7	0.0	83.5	77.4
2006	148.5	109.3	128.3	145.0	56.3	93.5	62.4	4.6	32.5	1.6	11.9	12.5
2007	99.7	79.7	75.1	108.4	104.5	130.1	84.5	10.1	38.0	0.0	8.8	29.0
2008	43.0	82.1	107.0	134.8	128.7	76.7	38.0	28.2	16.2	2.2	36.6	18.9
2009	136.2	83.1	67.7	176.8	131.6	57.6	32.8	5.6	26.6	5.4	4.0	11.4

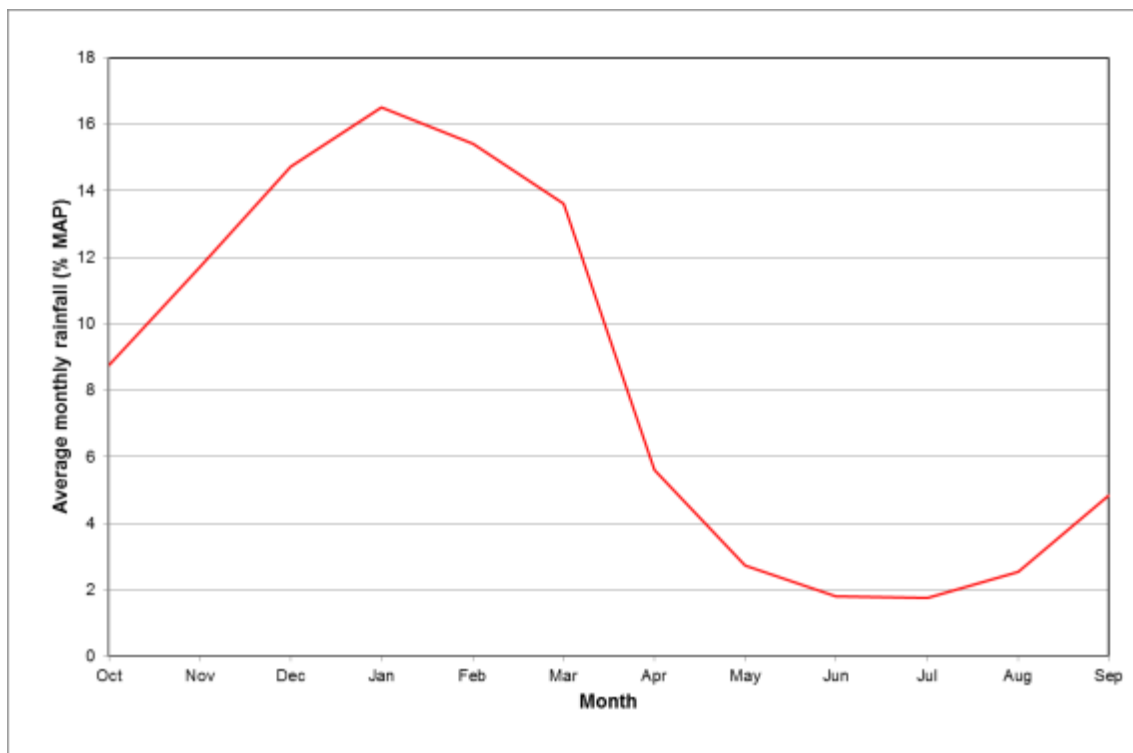


Figure A1- 5 Monthly Rainfall Distribution of Quaternary Catchment T33B

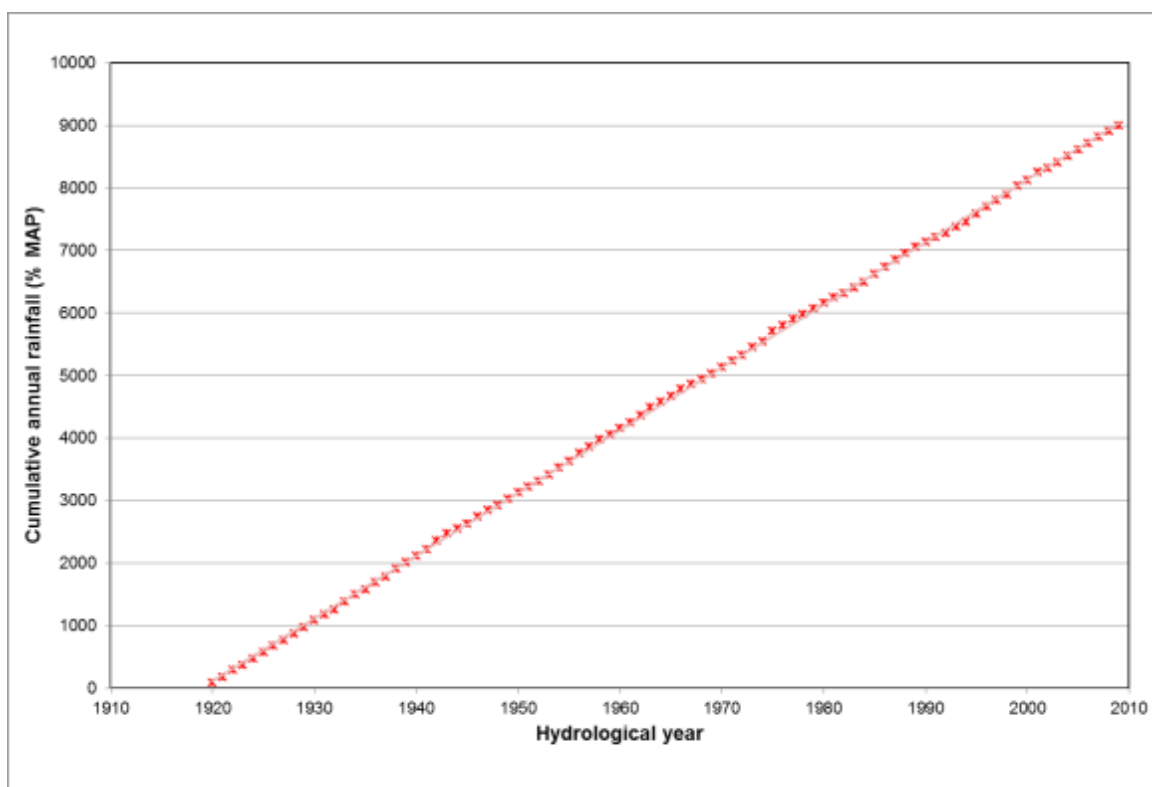


Figure A1- 6 Cumulative annual Rainfall in Quaternary Catchment T33B

Table A1- 3 Quaternary Catchment T33C - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	62.7	68.9	103.5	83.7	92.8	118.3	63.5	18.4	11.5	11.8	1.5	44.0
1921	61.5	174.5	121.7	74.4	63.3	47.5	5.8	86.3	43.8	2.7	55.5	10.8
1922	57.1	156.1	56.2	159.7	188.2	104.6	9.4	6.4	10.3	112.2	8.8	14.1
1923	24.9	49.9	94.4	112.9	116.0	83.3	10.8	18.8	5.7	1.0	19.6	39.9
1924	56.4	101.1	174.7	68.9	112.8	210.7	75.5	15.0	0.9	3.1	0.0	36.8
1925	40.6	109.9	74.7	126.2	79.0	159.6	27.2	17.9	40.1	1.1	12.8	65.6
1926	69.4	83.8	130.3	86.5	99.2	241.3	30.7	13.4	1.0	17.6	17.5	19.1
1927	83.2	38.2	162.8	195.1	93.5	68.6	10.3	14.6	4.1	3.0	46.0	9.9
1928	61.2	77.9	108.1	72.3	89.7	173.2	7.4	25.4	54.2	37.7	12.3	82.8
1929	84.9	99.9	154.2	123.5	56.4	87.2	60.0	9.3	12.7	13.6	60.6	36.3
1930	65.3	30.7	94.8	211.5	127.7	139.0	61.7	1.9	1.3	88.2	2.1	6.4
1931	72.8	60.6	92.3	94.4	185.1	73.1	30.2	30.6	7.8	26.3	3.4	60.9
1932	56.5	113.7	146.9	40.5	75.3	96.4	39.6	1.2	1.1	9.1	7.8	22.8
1933	24.3	207.0	202.6	236.5	126.1	115.5	25.1	12.9	6.2	35.1	4.5	10.1
1934	91.5	109.7	154.8	92.6	72.1	93.0	84.3	50.5	35.3	2.0	60.8	9.7
1935	36.7	48.6	23.2	101.1	173.3	87.1	20.3	93.6	4.0	20.7	0.1	18.9
1936	87.1	223.1	68.6	120.4	225.7	110.1	4.8	2.4	0.5	3.7	1.5	32.5
1937	54.3	46.1	129.5	145.6	138.3	56.3	94.6	7.1	26.8	26.1	27.7	18.2
1938	66.8	62.2	137.4	152.4	216.5	66.2	27.6	35.7	11.3	30.9	21.1	141.1
1939	73.9	103.9	104.5	103.8	186.5	107.7	45.3	106.2	8.0	0.4	5.0	46.4
1940	84.9	88.6	141.5	144.0	114.0	70.5	58.3	0.8	7.3	9.0	12.5	16.0
1941	54.3	54.6	42.5	145.3	207.2	117.4	108.4	23.8	0.0	0.1	32.6	28.9
1942	95.8	112.2	213.1	114.3	59.9	123.1	86.1	32.4	22.4	23.8	115.9	49.9
1943	99.7	141.8	188.4	88.0	113.6	96.5	11.7	14.9	46.8	10.7	1.8	123.5
1944	72.3	51.1	16.2	113.3	180.7	158.7	18.3	10.0	3.0	1.2	2.4	16.5
1945	74.2	28.4	78.3	105.9	106.9	116.0	55.3	31.6	1.8	9.3	4.3	13.5
1946	58.1	119.4	112.5	139.6	121.2	101.1	58.4	0.3	47.0	7.5	3.7	42.6
1947	50.6	146.2	140.8	160.4	133.8	131.5	33.7	5.0	0.5	1.7	1.5	9.6
1948	63.3	49.9	80.8	127.8	111.2	111.7	42.0	13.4	0.0	8.7	7.7	29.5
1949	36.8	63.0	109.1	94.0	130.1	171.4	42.8	33.7	2.7	21.2	89.3	16.9
1950	64.1	53.3	168.7	116.3	133.0	59.8	26.6	5.6	2.0	2.6	41.8	56.6
1951	106.5	17.1	53.0	136.3	177.7	83.7	56.4	14.3	14.3	11.3	5.2	47.1
1952	49.1	97.5	143.0	92.4	84.6	79.6	74.0	2.9	2.0	0.1	17.1	75.6
1953	72.0	84.8	120.1	108.6	106.9	117.5	34.4	80.8	21.9	5.3	2.3	51.3
1954	96.2	86.0	97.4	268.0	169.0	104.9	46.0	18.6	27.5	1.5	0.0	35.9
1955	74.3	112.2	82.7	102.2	155.1	144.1	26.7	27.0	10.6	0.9	5.2	32.7
1956	45.0	135.2	235.4	183.8	117.0	127.6	48.5	7.2	4.8	13.3	41.6	99.9
1957	100.6	71.9	121.9	161.8	94.3	78.3	71.9	18.2	1.4	4.9	0.9	16.9
1958	36.2	134.1	167.8	93.6	110.0	74.7	72.2	142.9	0.0	27.4	15.3	39.9
1959	43.8	98.3	109.0	80.6	81.5	47.7	76.3	12.8	3.7	2.3	23.7	52.3
1960	48.1	125.7	169.2	83.1	104.9	107.0	96.6	12.5	0.9	1.5	14.6	23.3
1961	20.0	113.7	141.2	106.3	132.4	130.4	23.2	12.5	0.0	0.0	17.6	12.3
1962	63.4	121.2	124.3	231.1	122.2	163.2	36.3	6.1	1.4	53.7	0.0	0.7
1963	108.5	125.4	114.4	154.8	64.3	125.4	73.7	1.8	101.6	5.7	7.8	46.6
1964	112.2	32.7	119.8	115.1	80.3	19.2	38.2	2.2	94.7	46.1	53.1	27.2

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	85.3	105.8	45.5	178.1	113.9	20.3	26.5	62.5	5.5	0.0	38.9	38.7
1966	39.7	59.0	99.2	107.7	195.6	174.9	90.7	19.3	44.3	25.3	5.1	1.5
1967	52.5	83.4	79.8	72.9	97.0	94.0	62.3	5.3	1.6	3.7	24.0	39.1
1968	47.9	75.3	69.9	65.3	90.6	164.6	40.4	40.5	2.9	6.5	5.1	27.6
1969	102.2	59.6	127.3	103.0	119.4	41.9	10.9	26.8	25.8	1.2	59.9	45.7
1970	103.2	62.7	100.1	166.1	115.4	64.1	48.0	44.3	5.7	40.4	34.4	14.8
1971	116.2	63.4	86.3	134.6	158.6	108.6	29.6	15.0	9.5	1.0	1.6	27.6
1972	52.0	140.5	50.2	97.7	183.7	70.8	46.8	7.0	0.0	19.4	27.8	35.2
1973	57.8	120.1	104.0	222.5	168.3	157.4	50.7	46.3	15.2	8.3	7.6	7.9
1974	33.7	129.2	148.7	120.0	72.2	102.6	40.9	1.3	0.1	5.3	6.9	106.3
1975	16.6	96.0	247.6	238.7	178.3	274.3	37.5	48.0	2.7	10.1	3.1	71.2
1976	136.3	54.4	52.8	118.7	119.2	108.0	36.2	0.5	0.0	16.3	19.5	58.3
1977	84.2	88.7	94.3	151.8	89.1	138.1	100.5	5.4	3.2	1.7	12.9	38.2
1978	64.9	53.4	152.2	79.7	85.3	68.2	29.3	8.3	0.0	58.4	25.0	25.1
1979	57.6	51.8	94.1	105.4	111.9	81.2	15.2	13.0	0.0	4.6	2.9	81.7
1980	38.9	110.2	68.4	136.3	141.1	74.5	28.9	24.2	9.7	2.0	47.6	40.1
1981	47.2	97.0	123.7	89.4	60.7	166.9	60.2	2.5	22.0	9.2	8.6	59.3
1982	63.3	86.0	55.0	64.2	37.8	71.2	41.0	9.9	3.1	4.9	4.8	18.7
1983	65.6	106.1	141.1	155.1	66.0	115.9	47.9	13.8	14.7	17.8	10.2	19.9
1984	94.7	101.6	54.3	168.3	222.7	22.8	23.5	1.6	0.0	0.4	0.0	9.8
1985	125.9	144.6	148.8	202.2	121.0	93.7	30.0	2.1	11.9	3.2	42.2	50.2
1986	106.8	110.6	74.6	118.0	75.0	113.2	25.5	2.2	25.5	2.3	72.2	194.4
1987	113.3	81.3	81.8	103.4	155.4	124.9	48.6	27.6	14.8	22.7	21.8	30.7
1988	66.6	104.9	158.5	103.2	183.1	66.2	74.9	37.6	7.3	13.9	0.6	1.1
1989	53.4	189.3	133.0	134.8	37.8	127.6	46.4	13.0	16.6	2.8	38.9	22.1
1990	49.3	29.9	114.7	106.5	103.2	54.9	4.1	9.9	4.3	0.4	0.8	73.8
1991	126.7	69.2	118.6	57.9	135.1	45.8	40.8	2.0	1.2	0.0	14.5	37.7
1992	27.8	33.6	34.9	83.0	83.3	75.3	39.0	1.8	0.0	0.0	21.8	36.1
1993	116.1	72.9	171.9	110.3	139.4	103.7	16.0	7.1	4.4	31.5	23.0	2.3
1994	43.3	22.5	95.4	120.1	98.3	157.8	49.8	22.6	46.4	1.4	0.1	25.9
1995	55.4	84.4	198.8	207.8	192.7	89.5	35.9	4.4	5.0	42.3	4.7	16.6
1996	66.4	151.6	136.2	181.7	57.8	120.4	71.9	23.4	94.7	24.6	17.3	39.7
1997	60.8	78.9	41.4	132.9	210.0	122.6	34.1	42.1	1.2	7.6	25.7	21.3
1998	50.0	111.1	155.0	114.2	141.2	119.0	25.0	6.4	3.8	3.6	1.0	16.0
1999	81.8	93.2	173.0	218.6	149.7	135.4	66.4	52.7	4.1	0.8	4.4	62.2
2000	57.6	100.3	127.2	135.2	107.6	108.2	52.4	7.7	5.1	8.1	15.9	34.7
2001	99.0	143.7	159.5	113.7	53.3	173.1	21.9	42.0	19.6	49.5	53.9	27.9
2002	18.1	48.0	118.3	107.8	60.5	81.5	14.7	16.9	20.0	8.8	9.2	56.8
2003	28.8	55.5	87.1	150.3	75.8	102.9	18.6	8.9	3.3	57.5	16.5	80.8
2004	57.2	104.5	165.7	132.8	116.2	86.8	38.6	16.3	0.0	5.9	18.6	18.0
2005	70.8	101.9	41.1	139.4	143.4	84.1	54.3	31.3	11.9	0.0	82.5	77.9
2006	151.7	109.4	117.4	146.1	57.0	92.4	61.6	3.9	33.3	1.8	12.1	12.3
2007	104.4	82.1	76.4	106.4	104.2	133.6	87.5	9.6	38.7	0.0	9.7	28.3
2008	46.1	80.6	105.1	137.2	131.3	77.6	37.1	30.4	14.8	2.7	37.1	20.4
2009	133.8	83.1	71.4	176.8	121.8	57.8	31.9	5.5	26.3	5.8	4.4	12.4

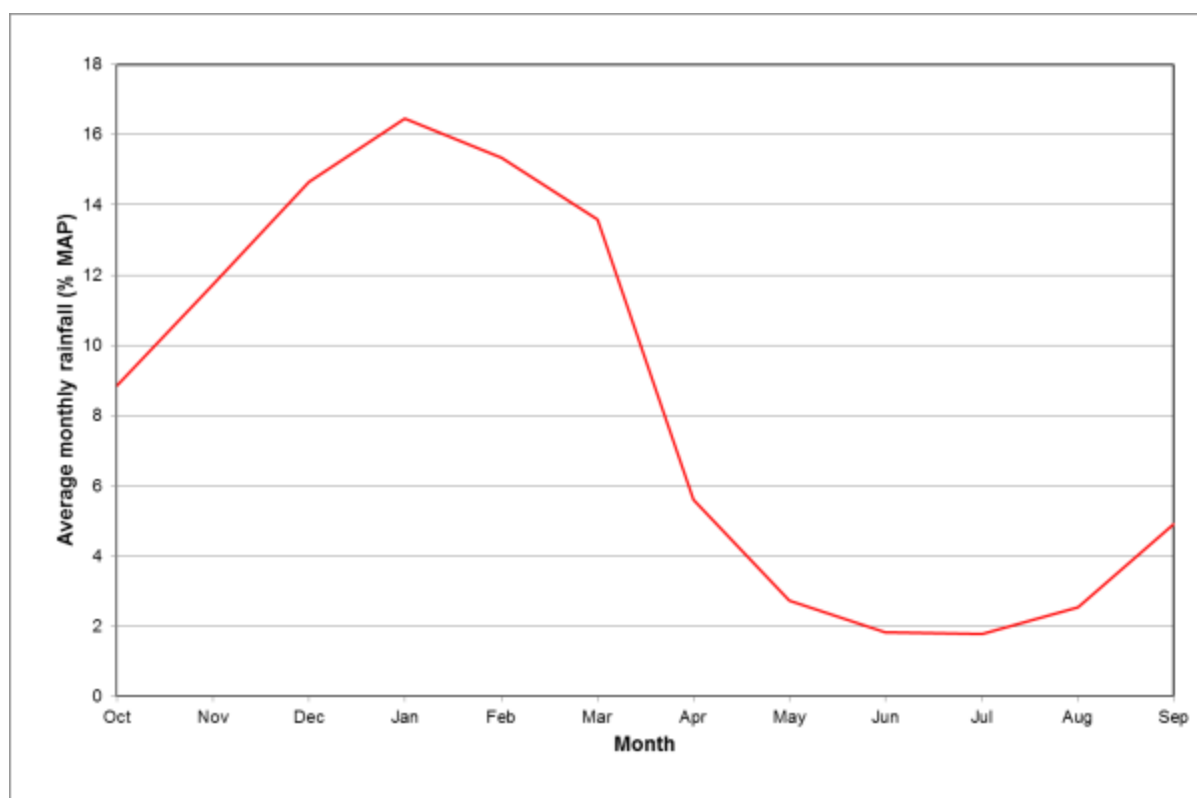


Figure A1- 7 Monthly Rainfall Distribution of Quaternary Catchment T33C

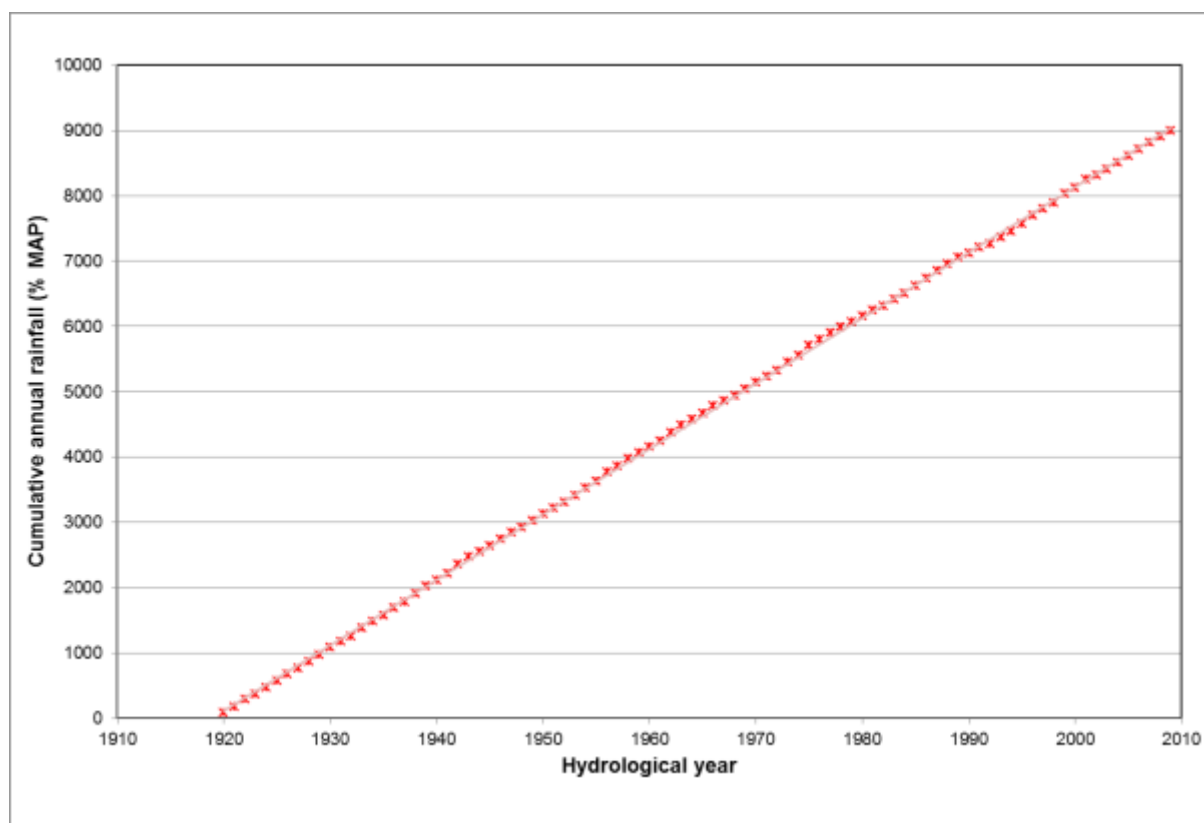


Figure A1- 8 Cumulative Annual Rainfall in Quaternary Catchment T33C

Table A1- 4 Quaternary Catchment T33D - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	54.1	63.7	95.0	71.1	87.9	100.7	55.2	15.9	13.4	13.7	1.1	41.5
1921	54.1	158.6	112.6	69.9	60.7	43.7	5.0	77.1	42.2	2.0	53.8	8.3
1922	50.0	142.2	51.7	143.4	171.8	88.3	8.1	5.3	10.4	96.0	6.9	11.7
1923	21.8	45.9	86.5	107.0	115.4	78.4	8.1	16.5	5.6	0.8	16.6	38.4
1924	48.5	89.5	155.1	61.8	109.5	198.0	67.7	13.1	0.8	2.4	0.0	33.2
1925	37.0	100.1	67.4	129.8	69.2	146.1	25.4	18.3	33.8	0.8	14.4	54.5
1926	68.7	82.2	126.5	76.2	103.0	216.6	28.2	13.1	0.7	16.9	15.0	17.8
1927	79.3	34.6	151.7	183.9	79.4	65.2	7.9	11.1	3.1	2.2	42.8	7.5
1928	56.1	71.5	98.2	72.3	86.6	160.1	5.9	23.3	48.6	35.6	10.4	78.8
1929	73.8	91.6	140.2	116.0	60.0	77.9	56.5	7.4	12.0	11.7	55.4	31.0
1930	58.4	27.6	86.4	185.6	115.3	124.3	58.6	1.5	1.0	77.4	1.6	4.9
1931	66.3	54.8	80.1	87.1	177.2	65.3	25.0	27.8	7.2	23.5	2.7	52.6
1932	49.6	97.7	133.2	39.6	71.4	85.4	39.4	1.3	1.2	9.1	7.1	18.5
1933	21.2	193.9	202.0	215.2	114.3	104.2	22.4	12.6	4.9	29.8	4.4	9.0
1934	86.2	100.9	149.5	89.0	67.1	89.0	69.8	45.5	32.7	2.1	57.9	7.7
1935	33.3	43.2	19.8	96.8	161.9	76.7	19.3	94.1	3.0	18.6	0.1	14.3
1936	76.0	202.6	64.7	113.5	198.6	107.0	4.6	1.8	0.4	3.8	1.2	26.3
1937	45.7	42.2	120.0	128.5	126.6	49.1	89.0	5.2	23.4	23.1	26.6	16.5
1938	59.4	54.0	124.1	140.7	186.2	59.2	22.1	31.8	8.9	25.3	19.7	123.3
1939	65.2	88.9	97.7	99.2	161.4	99.1	40.8	102.2	8.2	0.3	5.4	43.6
1940	82.6	79.3	122.9	137.2	106.9	63.4	52.3	0.6	6.0	8.6	11.2	13.3
1941	48.5	49.3	37.2	142.8	187.3	109.0	109.5	20.9	0.0	0.1	27.3	24.6
1942	85.6	102.2	204.4	103.3	56.4	107.3	76.0	32.1	19.3	24.0	113.4	43.2
1943	91.9	136.1	179.1	75.1	101.8	90.1	9.9	15.4	44.3	8.7	1.4	107.2
1944	67.9	49.1	14.6	101.6	170.7	152.7	15.5	9.1	2.3	0.9	1.9	17.1
1945	62.0	26.1	69.2	81.5	101.3	104.6	51.8	30.5	1.3	7.6	3.2	11.3
1946	53.9	109.6	105.3	123.9	114.7	93.7	53.8	0.2	42.3	5.7	2.8	39.5
1947	45.8	127.7	132.9	150.9	119.8	123.9	29.3	3.9	0.4	1.3	1.1	7.5
1948	53.5	43.8	77.6	130.2	98.9	111.2	40.1	12.4	0.0	7.4	5.9	25.9
1949	32.1	59.0	105.1	82.5	118.5	163.1	38.6	28.0	2.2	18.6	87.9	13.8
1950	55.3	48.2	158.1	100.3	118.4	54.4	26.4	4.5	1.9	2.7	37.2	49.8
1951	93.8	16.1	48.5	139.0	173.6	74.0	50.7	12.7	13.5	10.3	5.0	43.1
1952	42.2	90.3	131.8	83.2	74.9	64.8	64.8	3.1	1.5	0.1	14.8	64.8
1953	66.2	77.3	107.0	95.4	102.7	102.3	30.9	75.9	19.8	5.1	2.2	47.8
1954	87.1	75.3	89.9	237.0	155.6	91.5	43.3	15.2	25.6	1.3	0.0	31.1
1955	65.1	102.1	79.5	100.7	144.0	125.9	23.3	23.7	8.9	1.1	4.9	28.4
1956	37.9	120.4	211.7	175.6	119.7	112.2	40.7	6.7	4.3	11.4	37.2	97.8
1957	95.0	68.6	112.3	143.5	84.4	70.8	63.0	17.3	1.1	3.7	1.0	13.6
1958	32.1	124.2	161.3	81.6	99.6	67.8	70.2	129.9	0.0	26.4	12.8	34.1
1959	38.6	93.8	98.6	74.9	74.0	42.2	70.1	14.5	4.1	1.8	22.6	46.5
1960	45.2	122.2	155.8	80.5	97.4	105.5	90.4	12.6	1.2	1.1	14.4	21.4
1961	16.7	105.0	128.8	100.0	121.2	120.4	22.8	11.9	0.0	0.0	13.3	11.6
1962	55.6	110.5	115.9	221.3	124.1	137.6	32.6	4.4	1.0	49.7	0.0	0.9
1963	90.1	111.9	110.7	143.5	64.0	120.0	67.2	1.5	85.1	4.7	6.8	40.9
1964	106.0	29.5	108.6	111.6	68.0	17.1	37.4	1.8	85.1	43.7	50.9	23.1

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	73.3	93.9	39.7	176.8	105.4	18.8	25.3	53.7	4.6	0.0	35.6	33.4
1966	36.2	53.8	92.8	103.8	178.8	163.1	81.6	17.0	38.5	23.6	3.9	1.1
1967	43.4	72.3	74.7	65.0	80.5	91.0	58.9	5.9	1.5	3.5	21.2	37.3
1968	40.8	61.1	68.9	61.8	82.1	151.9	37.3	35.8	2.2	5.3	5.5	23.7
1969	94.9	49.5	114.8	91.2	107.9	40.0	10.2	23.0	22.4	0.9	53.9	42.5
1970	91.7	58.3	90.9	150.9	108.4	58.8	42.1	38.5	4.7	36.1	30.4	11.6
1971	102.1	56.1	80.4	126.8	151.2	104.3	29.2	14.7	7.8	1.0	1.5	27.0
1972	46.9	124.7	44.0	85.1	170.7	59.8	39.9	6.5	0.0	19.5	25.5	34.6
1973	48.7	114.5	96.2	196.0	158.7	142.4	42.9	43.6	14.6	7.9	8.1	8.6
1974	32.4	121.3	135.0	105.7	68.4	103.4	37.4	1.0	0.1	4.6	7.8	98.0
1975	14.8	88.9	220.6	219.4	161.5	260.4	32.7	43.4	1.9	9.2	2.2	66.3
1976	126.2	47.9	49.5	108.6	113.3	106.6	33.5	0.4	0.0	14.4	15.8	48.8
1977	77.5	77.7	88.7	136.4	84.1	138.8	91.9	4.8	3.6	1.3	11.5	36.3
1978	60.9	49.7	149.7	77.9	81.5	61.2	26.1	7.9	0.0	53.3	24.3	21.4
1979	51.1	45.9	91.1	100.3	103.8	73.5	13.6	12.3	0.0	3.6	2.7	72.2
1980	34.2	98.7	58.9	124.3	127.7	66.3	29.2	20.5	9.3	1.6	43.1	36.2
1981	41.2	90.4	112.0	82.4	50.7	154.1	58.9	1.8	18.9	6.7	7.9	55.7
1982	54.4	79.9	51.5	61.3	32.6	67.6	40.6	9.1	3.1	4.6	4.9	18.0
1983	60.9	98.1	131.6	143.7	59.3	103.5	41.4	13.1	14.3	15.8	8.9	20.1
1984	87.7	91.2	47.8	148.0	199.3	23.5	17.6	1.7	0.0	0.6	0.0	8.8
1985	119.9	130.2	136.0	193.4	112.6	83.5	29.9	1.6	11.8	2.4	42.6	43.9
1986	94.2	106.4	71.3	108.6	73.6	107.1	23.2	2.1	24.9	2.0	69.3	189.7
1987	103.6	74.1	80.6	98.6	150.7	113.3	43.8	24.2	13.4	22.4	19.9	28.4
1988	60.6	94.0	145.9	89.1	166.9	64.5	66.5	35.6	7.6	13.4	0.7	1.2
1989	44.0	179.5	129.2	126.1	33.1	126.1	45.6	11.1	17.9	2.8	37.5	19.3
1990	42.5	28.9	108.7	105.5	101.6	55.1	3.3	7.6	4.5	0.5	0.6	63.1
1991	122.3	64.6	107.0	54.9	129.9	42.9	39.7	1.4	0.9	0.0	13.8	33.0
1992	26.0	33.9	37.5	79.3	80.9	72.4	35.9	2.0	0.0	0.0	20.4	29.0
1993	112.2	67.3	154.8	100.7	122.5	101.6	16.2	6.2	3.3	29.2	18.6	2.0
1994	37.9	20.3	83.6	118.2	79.9	139.2	43.9	23.0	40.2	1.1	0.1	23.3
1995	51.2	77.3	177.7	192.7	177.0	82.0	34.7	3.9	3.7	38.6	4.9	15.3
1996	62.7	136.7	126.0	163.1	53.5	118.9	70.8	21.3	85.2	21.4	15.2	32.0
1997	53.8	75.5	37.3	119.4	192.0	108.2	28.4	37.9	1.1	5.7	22.3	18.3
1998	44.5	99.6	130.1	103.6	136.9	109.5	21.5	7.1	3.1	3.0	0.8	13.1
1999	72.4	85.2	160.2	193.0	134.7	123.0	61.5	48.2	3.7	1.1	3.4	58.9
2000	53.2	91.8	114.3	129.1	99.6	100.0	47.1	8.0	4.8	7.4	15.3	33.4
2001	92.0	131.9	136.2	105.6	45.3	164.7	23.1	39.6	19.8	44.2	45.7	28.8
2002	16.5	39.1	109.5	99.2	57.7	76.7	18.4	15.4	15.3	6.7	9.9	46.3
2003	27.6	52.8	76.1	135.7	71.2	93.2	16.4	7.1	2.6	56.8	15.3	69.3
2004	57.6	105.4	155.0	123.2	108.7	77.4	40.2	14.9	0.0	5.7	16.5	13.9
2005	63.1	85.6	41.4	132.2	135.0	73.8	48.6	26.7	10.7	0.0	77.5	70.9
2006	134.1	101.4	126.6	132.0	52.0	86.9	58.1	4.6	29.4	1.4	10.7	11.7
2007	89.1	71.7	68.7	101.6	96.6	117.7	75.5	9.6	34.3	0.0	7.7	27.2
2008	37.4	76.8	100.7	123.0	116.4	70.2	35.6	24.1	15.9	2.0	33.4	16.2
2009	127.9	76.5	60.1	162.9	128.6	53.3	30.9	5.2	24.7	4.5	3.4	9.6

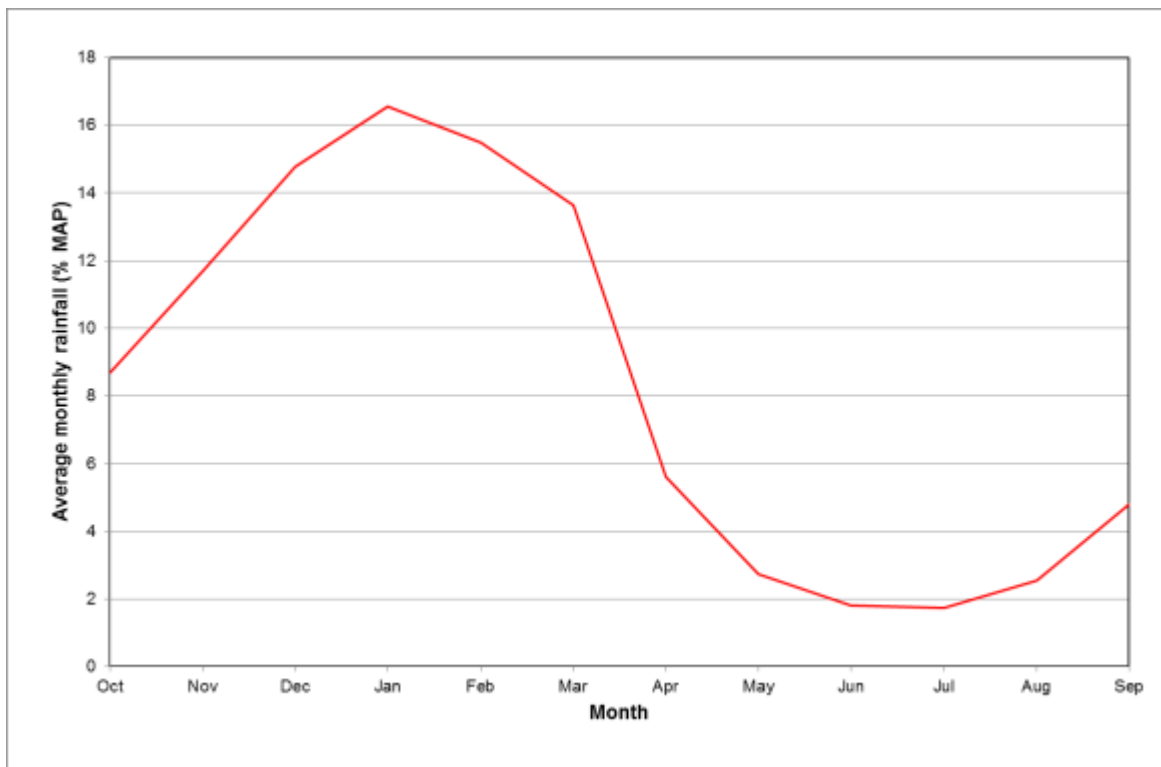


Figure A1- 9 Monthly Rainfall Distribution of Quaternary Catchment T33D

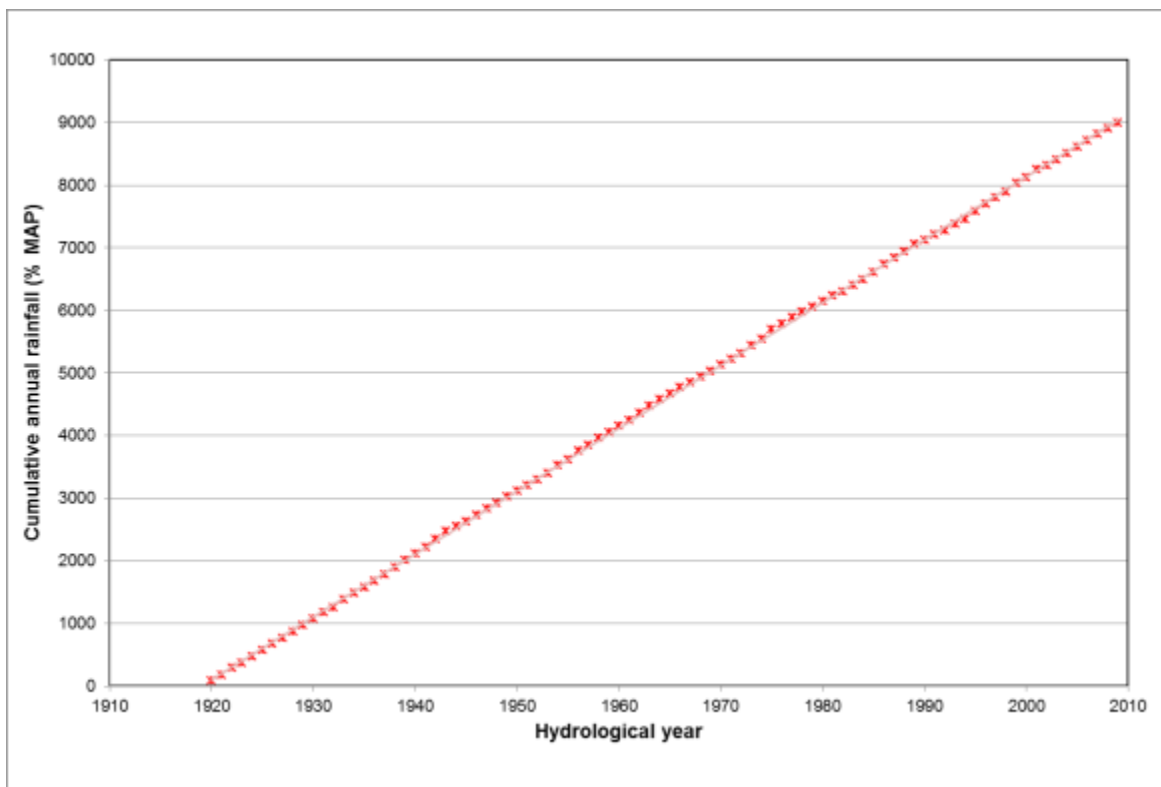


Figure A1- 10 Cumulative annual Rainfall in Quaternary Catchment T33D

Table A1- 5 Quaternary Catchment T33E - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	74.7	80.9	121.4	100.9	109.4	143.2	76.8	22.9	12.4	12.8	1.8	52.0
1921	73.8	208.8	144.8	87.9	74.3	56.7	7.0	102.4	51.0	3.6	64.4	13.3
1922	68.6	185.3	66.8	189.7	224.5	127.0	11.5	7.9	11.8	135.7	10.8	17.2
1923	30.3	59.5	112.0	132.8	133.9	98.5	13.6	22.4	6.7	1.3	23.8	46.5
1924	68.0	121.2	207.5	82.5	130.4	247.4	89.9	18.1	1.1	3.9	0.0	43.8
1925	48.5	130.2	89.1	143.3	95.1	189.4	32.0	20.4	48.7	1.5	14.0	80.3
1926	80.0	97.0	151.2	103.7	110.6	289.1	37.7	15.3	1.1	20.6	21.5	22.1
1927	97.6	45.1	190.4	226.5	112.0	80.5	13.1	18.4	5.2	3.7	54.1	12.0
1928	72.3	91.4	129.7	83.2	103.4	205.1	9.3	29.9	65.2	44.7	15.1	97.0
1929	102.4	116.8	183.3	145.5	62.9	102.7	69.9	11.4	14.9	16.6	72.2	44.0
1930	78.2	36.4	111.3	257.6	152.1	164.5	72.8	2.2	1.6	106.3	2.8	7.8
1931	85.8	71.8	110.6	111.5	217.3	87.5	39.1	36.5	9.3	31.2	4.1	72.2
1932	67.3	137.4	174.5	46.5	88.9	113.9	45.7	1.3	1.2	10.5	9.2	28.4
1933	28.7	242.7	232.8	281.3	153.4	136.6	30.2	15.1	7.4	42.5	5.3	11.9
1934	107.1	129.1	180.3	106.9	84.8	108.6	103.9	60.2	41.5	2.4	71.5	11.6
1935	43.0	57.9	27.9	117.5	203.8	105.4	24.4	107.4	5.1	24.3	0.1	22.7
1936	103.6	266.1	80.6	141.6	272.0	128.3	5.4	3.1	0.5	4.2	1.7	39.8
1937	66.0	53.5	153.1	174.9	165.7	67.6	110.1	9.3	32.4	31.3	32.3	21.9
1938	79.4	74.3	164.4	181.6	260.5	79.7	32.5	42.8	14.6	38.0	25.4	170.8
1939	88.7	128.9	122.5	121.0	226.9	130.9	53.9	124.8	9.1	0.6	5.7	54.0
1940	99.0	105.8	172.9	169.7	136.2	84.5	70.4	0.9	8.7	10.6	14.8	19.5
1941	64.9	63.7	49.8	168.1	252.3	138.5	124.6	28.6	0.0	0.1	39.3	34.6
1942	113.5	132.2	246.1	135.5	70.2	149.7	103.9	37.6	27.1	27.3	134.5	59.8
1943	116.9	165.6	220.6	108.5	134.8	113.0	13.8	17.1	55.0	13.1	2.2	148.9
1944	84.6	59.3	18.3	134.9	211.9	187.3	22.1	12.0	3.6	1.5	3.1	18.9
1945	91.6	33.1	92.8	131.4	124.1	137.4	65.2	37.6	2.0	11.2	5.4	16.3
1946	68.5	143.4	131.8	166.6	141.5	118.0	69.0	0.4	56.1	9.0	4.6	49.4
1947	59.6	176.2	164.1	186.9	159.3	154.8	40.3	6.3	0.6	2.0	1.7	11.8
1948	76.4	58.5	93.5	145.5	131.3	129.0	48.8	15.9	0.0	10.4	9.7	35.3
1949	43.6	74.1	127.2	112.0	155.1	199.4	51.3	41.2	3.1	25.3	103.1	20.6
1950	76.6	62.5	198.6	140.2	158.7	69.3	30.8	6.7	2.5	3.1	49.7	68.3
1951	127.3	20.9	60.7	154.8	205.7	100.5	67.2	17.3	16.6	13.3	6.0	56.0
1952	59.9	117.1	168.5	111.7	103.1	97.5	89.7	3.3	2.5	0.1	20.4	92.4
1953	85.2	100.3	143.5	130.9	126.1	142.1	39.6	95.2	25.8	6.2	2.5	60.4
1954	113.9	104.0	116.5	323.2	199.9	130.0	54.1	22.3	32.5	1.7	0.0	43.7
1955	89.7	132.7	95.8	119.5	183.5	173.0	32.2	32.6	12.5	0.9	5.8	39.0
1956	54.1	162.6	282.5	217.4	133.5	154.1	59.3	7.9	6.1	15.9	49.9	116.2
1957	118.1	83.5	146.2	194.7	112.5	93.5	86.1	21.2	1.6	6.2	1.1	21.0
1958	43.8	158.8	194.6	111.1	130.4	88.5	83.8	171.4	0.0	32.0	18.9	47.7
1959	52.4	114.7	130.8	95.3	94.9	57.5	90.5	14.2	3.9	2.7	27.5	62.3
1960	56.8	145.4	201.2	95.1	122.3	122.1	112.4	14.1	1.0	1.7	16.9	27.4
1961	23.6	133.8	168.3	123.2	156.6	154.9	26.4	13.9	0.0	0.0	22.4	14.4
1962	76.0	143.5	145.7	271.5	138.2	199.1	42.8	7.9	1.8	64.0	0.0	0.8
1963	132.9	149.3	134.0	182.7	73.6	144.6	86.5	2.2	124.4	7.1	9.3	56.7
1964	132.0	38.0	144.0	135.0	97.7	22.4	44.3	2.7	113.8	54.1	62.4	33.1

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	103.7	126.4	54.9	204.6	133.9	23.4	30.5	75.5	6.7	0.0	46.1	46.2
1966	46.9	70.4	116.7	124.0	233.4	206.3	107.6	22.7	53.5	28.9	6.4	2.0
1967	64.6	99.4	94.6	85.8	117.8	109.5	71.7	5.8	2.0	4.2	28.6	45.4
1968	57.2	93.5	80.7	76.8	108.1	194.5	47.8	48.3	3.9	7.4	5.7	33.6
1969	120.3	72.7	152.7	124.8	142.7	49.1	12.9	32.1	31.0	1.4	72.0	54.9
1970	122.2	73.8	118.9	199.7	134.8	75.3	56.8	52.3	7.2	48.4	40.6	18.5
1971	136.9	75.4	103.1	157.7	183.4	127.1	34.2	17.6	11.1	1.3	2.0	32.0
1972	61.4	169.7	60.9	117.8	217.5	87.7	55.1	8.2	0.0	22.5	33.1	40.6
1973	70.1	140.0	123.8	267.3	196.4	187.6	63.6	54.4	18.1	9.4	8.7	9.1
1974	38.9	152.5	177.4	144.3	85.4	117.5	48.8	1.5	0.1	6.6	7.1	126.2
1975	21.0	113.4	297.8	283.9	213.6	318.2	46.2	56.7	3.1	12.0	3.7	84.2
1976	161.9	65.3	61.4	141.2	139.9	125.0	42.3	0.6	0.0	19.7	24.3	70.3
1977	100.2	107.5	108.9	181.8	102.3	155.6	116.7	6.2	3.6	2.3	15.2	45.0
1978	74.2	61.8	172.5	91.8	97.6	81.5	35.3	10.2	0.0	69.1	29.3	30.6
1979	68.6	61.1	109.9	124.3	134.4	97.8	18.2	14.9	0.0	5.6	3.6	97.6
1980	46.8	133.3	80.8	163.7	169.1	88.6	33.2	29.2	11.4	2.7	56.6	47.5
1981	57.6	115.5	146.1	104.6	73.5	196.3	70.2	2.8	26.6	11.3	10.2	69.5
1982	75.5	102.6	64.5	74.3	45.8	84.1	47.5	11.8	3.7	5.5	5.5	21.6
1983	76.6	123.1	164.8	182.3	78.8	138.0	58.1	15.5	16.3	21.6	12.4	22.9
1984	111.6	121.9	65.4	205.5	271.4	25.9	29.4	1.8	0.0	0.5	0.0	11.5
1985	145.3	174.6	179.4	240.2	143.1	111.7	34.2	2.6	14.2	3.7	47.2	60.3
1986	128.6	127.5	86.7	139.5	88.3	132.5	30.2	2.6	29.7	2.7	85.0	224.3
1987	135.6	96.0	93.0	123.3	180.5	149.9	57.5	33.1	17.6	26.1	25.9	36.0
1988	79.5	126.1	188.6	125.2	217.4	77.2	89.2	44.6	8.1	16.1	0.6	1.1
1989	65.5	221.0	153.2	160.9	44.4	141.7	53.1	15.9	18.5	3.3	44.6	26.2
1990	59.7	34.7	133.9	122.7	120.1	63.2	5.1	12.9	4.5	0.4	0.9	91.9
1991	145.8	80.7	141.6	67.2	157.7	53.4	47.7	2.8	1.6	0.0	17.3	45.3
1992	32.8	37.2	36.9	97.7	94.4	87.7	46.1	1.9	0.0	0.0	25.7	43.7
1993	136.8	85.3	208.0	131.3	171.7	121.8	18.7	8.7	5.6	37.8	28.5	2.9
1994	52.0	26.6	115.3	138.1	126.0	189.9	60.5	25.2	56.2	1.7	0.1	31.0
1995	65.4	101.0	236.8	244.8	226.6	107.0	41.7	5.3	6.7	50.4	5.2	19.4
1996	77.9	180.6	165.2	215.9	67.8	139.8	81.8	27.7	113.5	30.1	21.1	50.6
1997	73.5	92.3	50.2	161.2	248.9	147.1	40.8	48.3	1.4	9.5	30.7	25.8
1998	59.8	133.6	193.4	138.9	164.6	142.0	30.2	7.1	4.8	4.5	1.4	19.9
1999	98.9	112.2	205.0	267.2	181.1	159.7	78.3	62.1	5.0	0.9	5.3	72.8
2000	69.5	116.8	150.8	158.4	126.9	128.1	60.8	8.5	5.9	9.5	18.5	42.2
2001	116.3	171.0	193.2	135.8	66.1	200.8	24.7	49.0	22.7	59.2	65.1	32.3
2002	22.2	59.4	139.9	127.7	71.0	96.7	15.2	20.1	24.6	11.0	10.4	69.9
2003	34.2	65.3	103.9	178.5	91.1	122.6	22.7	11.0	4.1	66.1	19.4	97.7
2004	66.0	120.7	195.2	157.1	136.3	103.8	43.3	19.3	0.0	6.8	22.3	22.4
2005	84.5	124.3	47.8	162.5	168.1	101.0	65.1	37.7	14.2	0.0	96.6	91.9
2006	180.5	130.0	132.1	172.2	68.3	108.3	72.0	4.2	40.0	2.3	14.4	14.3
2007	126.9	98.5	91.6	124.5	122.9	160.2	104.8	10.8	45.9	0.0	12.1	33.1
2008	56.7	94.3	123.4	163.9	156.2	92.5	42.9	37.0	16.4	3.7	44.1	24.8
2009	157.1	98.1	87.2	208.3	137.6	68.8	37.3	6.5	30.7	7.1	5.4	15.2

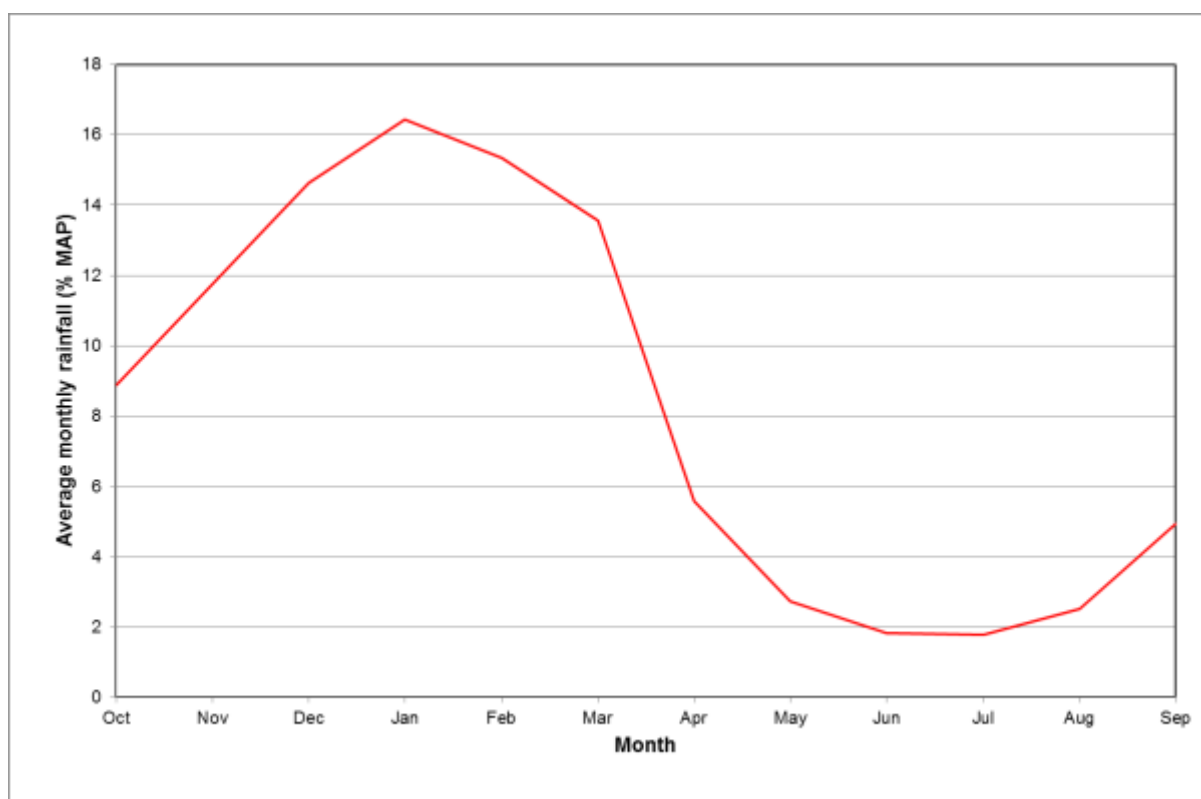


Figure A1- 11 Monthly Rainfall Distribution of Quaternary Catchment T33E

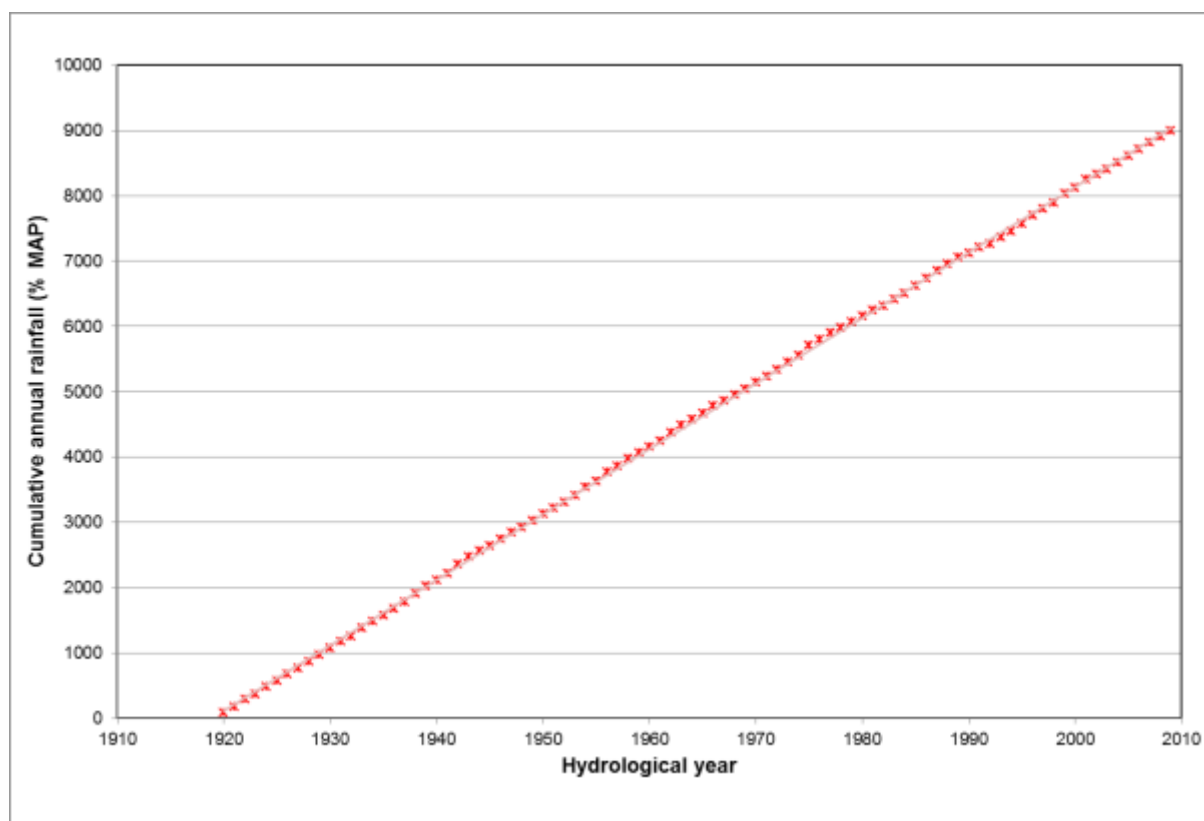


Figure A1- 12 Cumulative Annual Rainfall in Quaternary Catchment T33E

Table A1- 6 Quaternary Catchment T33F - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	84.2	85.5	129.0	114.6	111.6	163.0	84.4	24.7	9.6	10.1	2.2	53.5
1921	81.3	222.9	152.9	90.6	75.5	59.9	7.7	112.7	51.9	4.2	64.9	16.4
1922	76.0	198.0	70.6	205.1	239.7	143.5	13.1	9.0	11.3	153.2	12.9	19.9
1923	33.2	64.1	122.4	136.1	128.8	101.9	16.3	25.0	6.9	1.6	26.7	47.0
1924	78.2	136.7	225.7	92.2	128.3	261.5	97.9	20.5	1.2	5.1	0.0	48.0
1925	51.6	137.6	96.1	134.9	104.2	202.0	33.6	19.5	54.6	1.7	11.6	92.3
1926	80.5	98.1	153.7	115.9	104.9	313.9	39.3	15.1	1.4	21.3	23.5	23.3
1927	100.9	48.1	198.7	236.0	131.5	83.6	16.2	22.6	6.4	4.2	57.0	14.5
1928	77.0	99.2	140.3	82.8	102.9	222.2	12.6	32.2	72.2	46.0	17.5	101.4
1929	112.6	124.3	194.2	149.8	58.4	109.9	73.7	12.2	15.8	18.2	76.6	50.7
1930	86.4	40.4	116.7	287.1	168.5	179.9	75.1	2.8	1.8	116.5	3.2	9.7
1931	93.0	76.5	121.4	118.8	226.8	94.4	43.3	40.2	10.3	34.4	4.9	80.5
1932	75.0	154.5	189.5	46.3	92.6	125.1	43.9	1.0	1.0	10.5	10.2	32.8
1933	31.1	255.8	227.7	312.7	169.4	145.8	32.3	14.7	8.5	47.7	5.3	13.1
1934	111.7	140.4	182.4	108.0	88.2	113.6	125.7	64.6	44.3	2.2	75.2	12.7
1935	45.5	63.0	28.6	123.2	215.9	119.2	24.5	104.4	6.1	26.6	0.2	27.5
1936	115.5	290.5	86.4	149.4	296.8	129.3	5.0	3.5	0.6	4.0	2.1	46.4
1937	76.2	55.7	159.4	192.1	179.8	75.8	115.1	10.9	36.8	34.3	33.3	23.2
1938	86.4	83.0	176.4	193.7	292.9	85.0	39.3	47.3	17.0	45.1	27.9	202.5
1939	97.1	143.1	128.5	125.0	254.3	137.5	59.2	131.5	8.9	0.6	5.2	56.5
1940	99.6	117.4	191.1	179.2	144.2	92.3	79.2	1.1	9.8	10.9	15.9	22.0
1941	69.8	69.0	55.2	171.7	278.2	147.6	121.5	31.0	0.0	0.1	45.1	38.7
1942	126.2	143.4	251.3	146.6	74.3	171.0	114.2	37.8	30.4	27.3	133.6	65.9
1943	125.1	170.2	226.9	126.7	149.7	118.0	15.4	15.9	57.3	14.7	2.8	164.3
1944	87.6	59.0	17.8	147.6	224.9	192.9	24.6	13.0	4.4	1.9	3.8	18.5
1945	102.0	37.5	99.1	160.3	133.6	144.9	72.1	40.0	2.3	13.3	6.4	17.9
1946	72.3	155.1	133.7	181.7	149.5	122.6	74.2	0.5	60.2	10.9	5.4	52.2
1947	62.6	195.3	170.3	193.4	173.1	159.9	45.0	7.5	0.7	2.4	2.1	13.7
1948	85.5	62.2	94.1	142.0	142.8	125.1	49.6	17.5	0.0	11.7	11.8	39.3
1949	48.5	76.8	131.8	124.6	167.1	205.7	56.4	47.5	3.4	28.0	102.5	23.9
1950	85.0	65.1	207.0	156.2	170.1	74.8	30.8	7.9	2.6	3.3	55.1	74.5
1951	140.2	22.5	63.1	150.4	201.3	111.3	73.3	19.9	16.4	13.6	6.0	60.3
1952	66.9	126.5	178.8	121.9	115.1	113.4	98.3	2.8	2.7	0.2	22.6	101.5
1953	90.8	107.0	157.8	148.0	127.9	156.9	41.2	99.7	28.0	6.5	2.7	63.9
1954	123.8	116.0	122.9	354.3	219.7	139.0	56.5	26.1	35.9	1.8	0.0	49.6
1955	98.9	142.0	99.1	123.2	191.5	192.7	35.7	35.1	14.2	0.6	6.3	44.7
1956	61.0	175.5	305.9	226.1	128.1	169.2	67.7	8.4	6.8	17.7	53.9	118.3
1957	128.8	88.8	150.9	213.6	122.8	99.2	97.4	21.2	2.0	7.6	1.1	23.7
1958	49.2	166.8	200.1	121.7	141.9	92.4	82.9	185.3	0.0	32.7	20.7	54.2
1959	55.7	120.3	142.7	101.1	102.5	61.5	95.1	12.0	3.1	3.5	29.0	67.5
1960	59.8	144.2	217.0	93.8	131.7	120.1	119.0	13.8	0.6	1.8	15.5	30.9
1961	28.8	143.5	179.1	128.5	163.0	164.2	26.5	14.7	0.0	0.0	27.1	15.3
1962	82.6	153.2	153.6	280.9	132.6	224.0	46.8	8.9	2.1	66.5	0.0	0.5
1963	149.9	160.9	136.5	195.8	68.5	147.6	90.7	3.1	143.6	8.2	10.0	62.4
1964	139.0	40.9	164.0	138.7	110.0	26.1	43.2	3.9	125.1	56.1	66.1	37.2

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	116.3	138.3	61.4	201.2	136.5	25.6	29.5	82.5	7.8	0.0	48.7	51.9
1966	49.6	73.7	122.0	126.4	255.7	215.9	115.8	25.7	59.9	31.0	8.0	2.2
1967	74.8	110.2	96.8	97.4	136.1	111.2	77.0	5.1	2.2	4.3	31.5	46.6
1968	64.1	107.5	79.9	79.6	118.2	205.5	51.1	53.4	4.8	9.1	4.8	38.1
1969	127.6	81.6	167.3	139.4	152.7	50.7	13.3	36.1	34.7	1.7	77.5	59.9
1970	133.3	78.8	128.3	217.8	143.6	81.4	63.5	58.1	8.2	52.4	45.1	23.1
1971	155.3	82.8	112.7	166.0	190.3	128.5	34.2	17.9	13.3	1.2	2.5	32.6
1972	66.4	185.8	68.1	129.0	230.4	101.3	58.8	8.6	0.0	21.4	35.7	40.3
1973	79.5	146.8	127.6	293.2	205.0	206.9	73.1	56.2	18.6	9.4	8.6	7.9
1974	39.0	159.5	192.1	163.3	90.8	114.6	51.6	2.1	0.2	7.1	5.4	133.5
1975	22.1	119.5	321.6	299.2	230.8	328.9	49.9	55.7	3.5	13.0	4.1	89.4
1976	168.9	69.9	63.5	155.5	137.6	124.3	45.4	0.9	0.0	19.8	28.4	81.8
1977	103.8	114.3	111.5	196.7	111.9	155.1	128.9	6.4	3.0	2.6	16.7	48.3
1978	78.5	66.2	172.9	91.1	98.4	89.3	38.4	10.2	0.0	72.2	29.2	34.3
1979	74.0	63.9	111.3	124.4	139.2	102.6	19.7	15.7	0.0	6.6	3.8	107.4
1980	51.6	147.0	87.4	174.4	180.8	96.8	32.8	31.3	10.7	3.2	59.5	51.5
1981	64.7	118.5	156.4	106.9	84.2	211.6	70.2	3.1	30.0	12.6	10.0	71.5
1982	84.5	108.3	67.2	76.3	49.5	86.1	46.4	12.4	3.4	5.2	4.9	23.3
1983	80.7	132.3	172.0	192.5	85.2	147.5	64.9	15.7	17.6	23.1	14.0	22.6
1984	120.0	132.6	71.6	226.2	293.0	27.9	35.2	1.8	0.0	0.3	0.0	12.3
1985	150.1	191.5	190.5	243.6	151.4	124.2	34.2	3.1	13.8	4.1	46.4	66.2
1986	141.1	128.1	84.4	145.4	84.8	137.1	31.8	2.5	27.6	2.8	84.5	215.4
1987	150.7	103.0	90.8	122.2	181.9	160.9	61.7	33.4	19.7	23.8	28.5	34.9
1988	84.1	129.4	192.3	142.5	222.5	80.8	91.0	44.7	7.1	15.0	0.4	0.8
1989	75.2	219.0	153.7	162.3	47.9	149.5	55.2	19.1	15.5	3.0	41.5	28.2
1990	64.7	33.6	131.9	113.9	111.7	58.0	5.4	13.9	3.8	0.3	1.1	97.1
1991	139.2	79.8	140.8	69.6	160.4	52.5	45.8	3.1	1.7	0.0	17.6	49.9
1992	32.8	34.4	32.0	92.6	88.1	82.8	46.9	1.7	0.0	0.0	24.6	50.2
1993	137.9	90.6	223.1	140.0	187.6	122.4	19.1	9.5	6.6	39.5	33.2	3.8
1994	57.9	28.9	127.6	137.0	144.1	208.3	66.8	23.9	62.6	2.0	0.1	33.3
1995	69.1	107.4	257.5	256.3	240.3	113.5	41.1	6.1	8.0	54.1	5.3	21.2
1996	80.7	194.9	173.3	233.5	71.8	138.5	80.1	33.7	119.5	32.9	23.2	57.5
1997	80.7	94.3	53.9	174.6	265.1	161.5	46.8	51.3	1.7	11.3	33.0	28.9
1998	65.4	144.5	219.2	148.8	165.9	149.8	33.3	6.0	5.9	4.9	1.7	22.3
1999	108.2	119.4	216.0	291.8	194.9	171.8	82.4	66.3	5.3	0.6	6.5	75.1
2000	73.1	125.2	163.7	162.0	134.0	135.4	66.2	8.1	6.1	10.2	18.8	42.3
2001	123.2	180.6	217.9	140.9	73.4	208.2	22.4	51.2	21.7	64.3	74.1	29.7
2002	23.6	69.1	147.7	135.4	72.8	99.3	10.1	21.4	30.2	13.4	9.2	80.9
2003	35.0	67.1	116.6	193.1	92.7	131.0	24.4	12.9	5.0	65.5	20.5	109.7
2004	63.6	115.5	203.6	165.3	143.2	113.4	40.5	20.7	0.0	7.1	24.5	27.1
2005	91.9	142.0	45.9	169.1	175.4	111.8	70.2	42.7	15.5	0.0	100.6	98.7
2006	199.8	136.2	115.9	187.7	72.5	113.0	74.7	3.3	43.9	2.8	16.1	14.8
2007	142.9	109.9	99.0	127.4	129.8	176.4	117.9	10.7	50.8	0.0	14.2	33.6
2008	66.9	97.1	125.1	177.7	172.4	99.8	43.9	44.8	14.8	4.1	47.9	30.1
2009	159.8	104.4	99.5	221.2	125.0	72.8	37.4	6.9	32.0	8.8	6.8	18.7

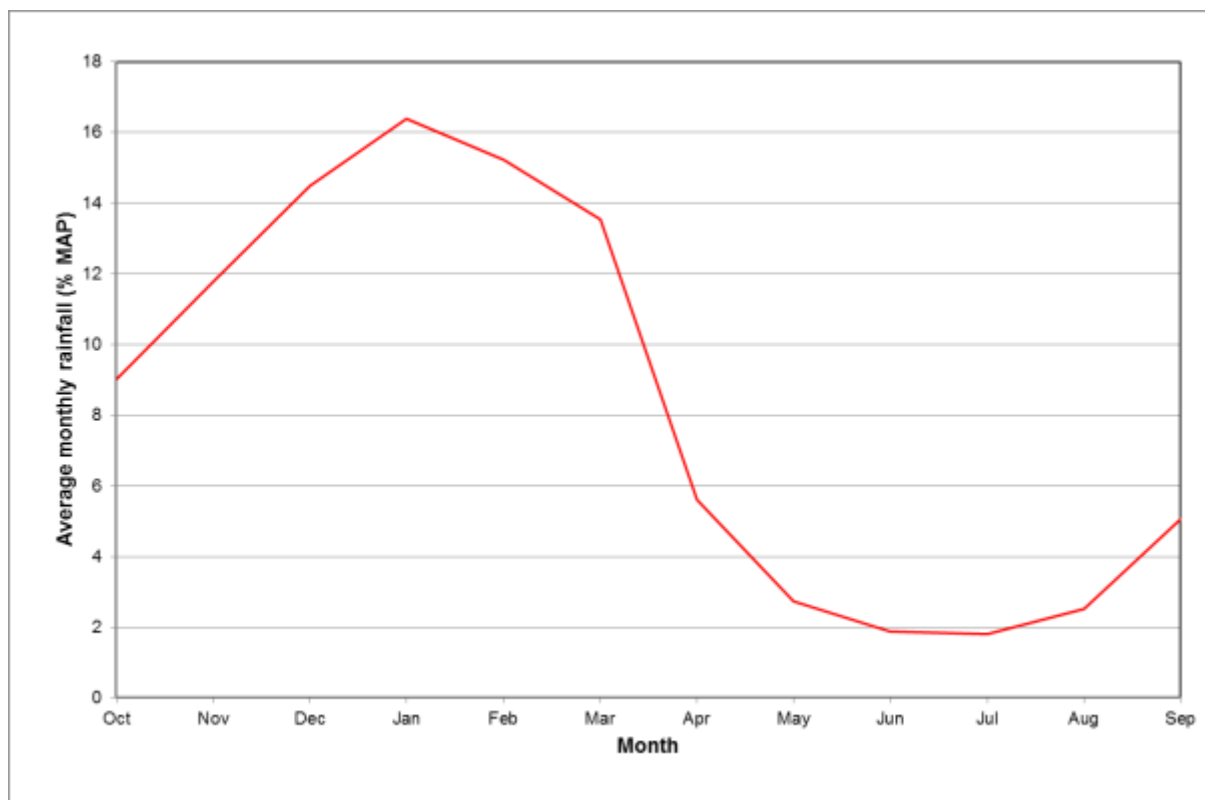


Figure A1- 13 Monthly Rainfall Distribution of Quaternary Catchment T33F

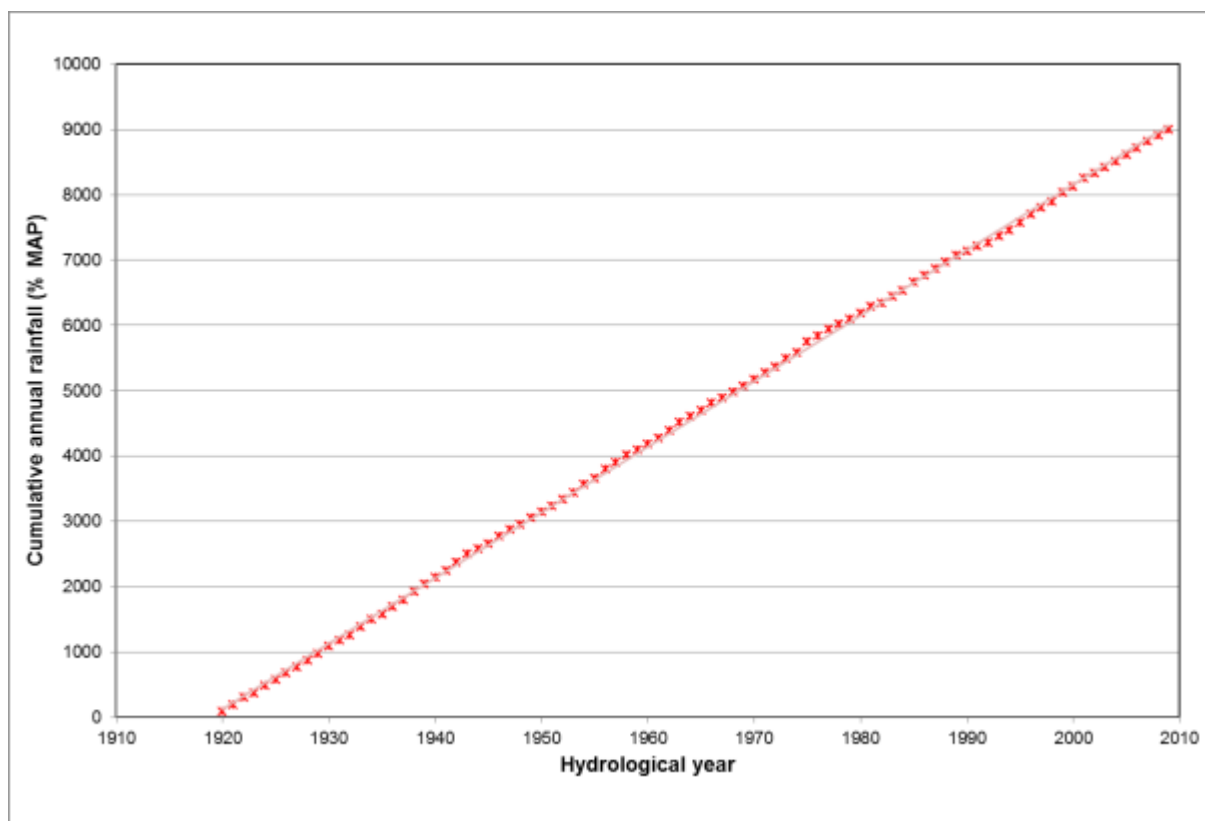


Figure A1- 14 Cumulative Annual Rainfall in Quaternary Catchment T33F

Table A1- 7 Quaternary Catchment T33G - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	84.2	79.3	121.6	112.2	93.7	157.6	76.9	19.3	6.0	6.7	2.3	45.2
1921	75.6	195.8	133.9	77.5	63.7	51.6	7.2	108.7	45.8	3.5	56.2	17.5
1922	71.6	180.2	62.2	191.1	212.8	136.4	12.3	8.6	8.7	146.0	13.0	19.7
1923	29.3	58.3	115.8	116.2	102.3	87.4	15.9	24.5	6.1	1.4	25.3	40.7
1924	77.7	133.1	213.8	88.4	108.5	240.4	92.1	19.9	0.8	5.3	0.0	45.4
1925	44.8	123.5	87.4	109.4	95.5	183.0	30.3	16.1	51.2	1.3	7.9	88.6
1926	71.5	86.3	136.2	111.2	94.4	284.5	28.7	13.8	1.7	19.1	19.9	22.3
1927	89.0	44.6	182.3	221.5	138.5	74.1	15.8	22.3	6.5	3.6	52.2	15.9
1928	70.6	96.7	125.1	71.5	90.0	208.1	14.4	30.6	67.1	38.1	16.1	92.0
1929	103.4	119.3	172.4	128.9	49.7	104.4	69.7	10.4	15.0	15.9	67.4	49.9
1930	81.4	39.9	107.2	259.2	162.0	174.4	64.4	3.7	1.5	106.1	2.6	10.4
1931	89.3	70.0	113.4	109.0	202.3	84.9	30.1	37.9	10.1	33.5	5.7	80.8
1932	73.9	147.1	177.4	41.1	80.5	122.7	35.0	0.9	1.1	9.3	10.3	29.7
1933	30.2	235.7	192.5	303.0	148.5	134.9	28.1	11.2	8.7	45.1	4.7	12.5
1934	101.4	135.7	157.1	96.8	78.9	104.2	127.4	58.1	41.6	1.6	67.7	12.6
1935	42.9	58.7	22.8	115.7	198.5	112.9	18.4	87.2	5.9	26.4	0.1	30.5
1936	114.0	270.0	81.3	135.9	267.8	110.4	4.2	3.1	0.9	3.7	2.7	45.6
1937	74.9	53.0	139.2	177.2	161.4	73.0	107.6	8.5	35.4	31.7	29.8	19.9
1938	81.3	81.3	156.9	171.5	283.4	73.2	46.0	44.3	14.0	45.1	25.1	207.6
1939	89.4	120.2	117.4	112.8	233.4	108.5	56.6	118.8	7.5	0.5	3.9	52.9
1940	84.7	112.5	167.8	161.1	123.5	84.3	74.3	1.1	9.8	9.6	14.6	20.6
1941	63.2	69.0	57.0	154.7	242.6	135.7	101.0	28.3	0.0	0.2	45.2	37.8
1942	125.1	138.1	230.3	137.7	69.5	162.8	103.8	32.1	29.1	24.0	112.3	61.9
1943	119.1	150.4	199.5	120.1	146.7	107.4	15.8	12.0	51.3	13.4	3.2	151.5
1944	78.9	50.2	16.8	139.5	209.1	163.1	23.2	11.9	4.9	1.9	3.9	15.5
1945	88.3	39.8	91.7	164.8	132.5	129.9	70.6	35.1	2.7	14.4	6.2	16.7
1946	65.5	137.1	114.9	169.8	139.9	112.3	69.3	0.3	54.1	12.2	5.5	50.8
1947	56.8	181.6	155.8	177.0	161.6	138.9	43.7	7.1	0.7	3.0	2.5	13.4
1948	81.3	59.7	83.3	123.6	138.1	101.3	43.6	16.8	0.0	11.6	11.9	37.6
1949	48.2	67.8	119.5	121.6	151.8	186.8	52.3	45.5	3.6	26.8	87.9	23.2
1950	82.3	59.9	183.5	147.5	153.3	76.2	26.3	8.8	1.8	3.2	53.5	67.3
1951	132.8	18.3	63.2	131.3	165.6	104.5	68.6	19.1	13.9	11.6	5.6	54.9
1952	60.4	111.1	164.3	107.4	103.6	111.0	87.1	1.9	2.4	0.3	22.0	88.3
1953	82.7	98.2	148.5	142.6	104.7	143.5	40.4	88.9	27.2	6.2	3.0	58.4
1954	117.2	107.3	104.5	320.5	212.3	106.4	50.9	27.4	34.8	1.8	0.0	47.1
1955	90.6	131.5	92.1	107.2	167.5	183.6	33.4	31.0	15.0	0.3	7.3	46.0
1956	60.0	155.6	274.2	193.4	106.3	153.2	64.0	10.1	5.3	17.2	48.3	103.4
1957	125.1	86.1	121.0	195.5	114.2	86.4	96.4	18.0	2.3	7.2	1.0	21.2
1958	46.0	147.2	182.5	117.8	134.2	80.5	68.9	165.2	0.0	28.7	17.7	54.5
1959	49.4	111.1	130.0	91.2	102.3	53.1	83.6	8.0	2.9	4.6	28.0	62.8
1960	53.0	122.8	198.2	83.7	129.5	106.6	114.0	12.5	0.3	2.3	10.8	31.6
1961	33.4	135.1	158.7	121.4	143.0	145.8	24.8	16.1	0.0	0.0	25.6	14.6
1962	75.9	140.9	142.0	245.0	115.2	207.4	45.3	6.8	1.4	56.1	0.0	0.2
1963	137.7	148.0	116.3	182.2	52.9	136.2	83.1	3.9	137.5	7.8	9.7	55.0
1964	125.5	40.8	159.5	119.3	102.7	29.4	34.8	4.8	114.7	49.3	60.5	34.4

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	107.3	129.6	58.2	172.3	116.9	26.7	24.6	75.0	8.0	0.0	43.6	51.5
1966	45.2	63.2	109.2	117.2	238.4	191.8	107.6	26.9	56.3	32.6	7.9	1.7
1967	71.1	107.3	79.8	101.6	134.9	96.4	78.4	4.0	1.9	4.0	30.5	42.2
1968	63.3	98.5	68.1	69.9	110.6	185.3	47.0	51.1	3.8	12.1	3.4	35.6
1969	117.3	75.6	153.3	128.3	135.7	44.8	11.5	35.4	33.5	2.0	68.4	53.6
1970	128.5	73.8	118.4	195.8	136.9	78.6	63.8	58.1	7.2	47.1	45.5	24.0
1971	162.7	79.6	103.5	152.5	179.3	108.8	29.2	15.0	15.8	0.6	2.7	28.9
1972	63.1	166.6	62.2	117.6	206.5	93.0	56.5	7.7	0.0	16.1	32.9	35.1
1973	76.5	136.3	105.4	270.0	189.1	196.7	63.2	49.3	14.7	9.0	7.5	4.6
1974	34.7	140.8	175.5	158.5	81.4	97.2	44.7	2.7	0.2	5.6	4.4	117.8
1975	14.8	107.2	285.1	261.8	207.0	304.2	40.6	43.5	3.7	12.1	4.2	81.1
1976	145.0	61.7	58.7	148.0	108.7	105.5	44.1	1.1	0.0	14.6	26.3	83.7
1977	87.5	95.8	103.7	177.6	118.1	148.4	134.7	6.4	1.8	1.9	16.1	45.0
1978	80.2	66.6	164.5	79.2	91.7	83.3	34.0	6.8	0.0	63.5	23.5	31.4
1979	68.4	57.6	95.0	99.7	111.8	84.7	17.8	15.8	0.0	6.8	2.7	101.9
1980	47.5	132.7	84.5	150.2	158.7	91.9	28.2	27.6	7.8	2.4	51.9	49.1
1981	59.2	96.4	145.9	94.5	83.1	202.1	58.7	3.8	29.0	11.8	7.5	62.7
1982	83.9	93.5	60.4	69.8	43.4	72.4	37.5	10.8	2.0	4.3	3.0	23.1
1983	75.9	132.2	158.4	176.8	78.2	133.3	59.7	15.8	20.0	19.4	12.8	19.2
1984	112.8	119.7	65.0	196.9	245.4	29.2	34.3	1.8	0.0	0.1	0.0	11.9
1985	141.2	171.8	159.9	193.3	135.7	120.5	31.5	3.5	9.4	4.8	45.0	61.4
1986	129.0	114.9	68.2	127.6	60.9	122.0	28.1	1.9	19.2	2.4	67.2	173.4
1987	142.6	96.5	80.9	90.5	157.5	141.2	57.0	25.9	19.2	17.4	27.4	27.1
1988	73.2	103.0	156.3	136.2	185.2	74.0	75.5	35.3	5.5	11.1	0.2	0.7
1989	71.2	181.0	137.2	125.2	46.8	167.0	53.5	19.8	10.3	1.6	32.5	26.3
1990	56.9	26.6	107.6	84.5	78.5	41.9	3.7	9.2	3.9	0.1	1.5	70.7
1991	112.7	66.0	107.6	64.6	138.8	42.9	34.0	1.7	0.9	0.0	14.0	46.1
1992	26.0	30.8	31.2	65.4	73.5	61.7	39.4	1.5	0.0	0.0	17.9	50.3
1993	111.8	85.8	189.4	125.4	154.8	99.3	16.3	8.4	6.2	32.6	31.3	4.2
1994	55.0	27.8	117.3	119.5	114.8	190.7	59.6	21.8	58.0	1.9	0.0	29.4
1995	62.6	93.2	240.5	229.9	223.3	98.5	33.8	5.9	6.0	49.0	5.5	21.2
1996	71.8	178.4	136.5	217.6	66.8	114.6	71.9	38.0	101.6	28.4	20.3	46.1
1997	72.7	82.0	45.6	149.8	240.9	149.9	48.0	53.1	1.5	10.8	29.9	27.1
1998	60.5	128.6	188.7	123.1	141.9	129.3	30.8	4.7	5.8	4.0	1.4	18.9
1999	96.8	101.3	190.9	247.9	166.9	162.4	74.2	61.8	3.9	0.3	7.5	66.9
2000	59.4	123.5	154.6	139.8	121.8	120.8	68.2	7.9	5.4	9.5	16.2	29.0
2001	114.0	158.4	207.4	116.6	61.6	193.2	17.1	47.4	16.5	59.4	72.4	20.5
2002	18.0	65.1	132.5	122.0	62.6	82.0	4.8	19.1	32.3	13.6	6.6	76.9
2003	28.7	57.7	115.3	180.2	71.1	117.2	20.0	12.1	5.5	56.9	18.9	104.5
2004	50.4	89.9	180.7	146.9	131.2	105.1	34.4	19.1	0.0	6.5	22.8	27.0
2005	84.8	135.8	34.8	154.9	158.3	105.1	62.9	41.8	14.5	0.0	91.2	92.5
2006	193.8	118.0	81.0	182.5	62.4	102.1	67.1	2.2	40.9	2.7	15.9	13.2
2007	133.8	105.5	89.1	111.1	117.8	164.7	115.6	9.8	50.1	0.0	13.0	29.2
2008	66.4	85.7	104.9	162.8	166.5	91.4	39.8	48.1	11.9	2.2	45.0	32.3
2009	135.4	96.0	94.3	204.0	95.0	63.9	31.6	6.6	29.4	9.6	7.3	20.5

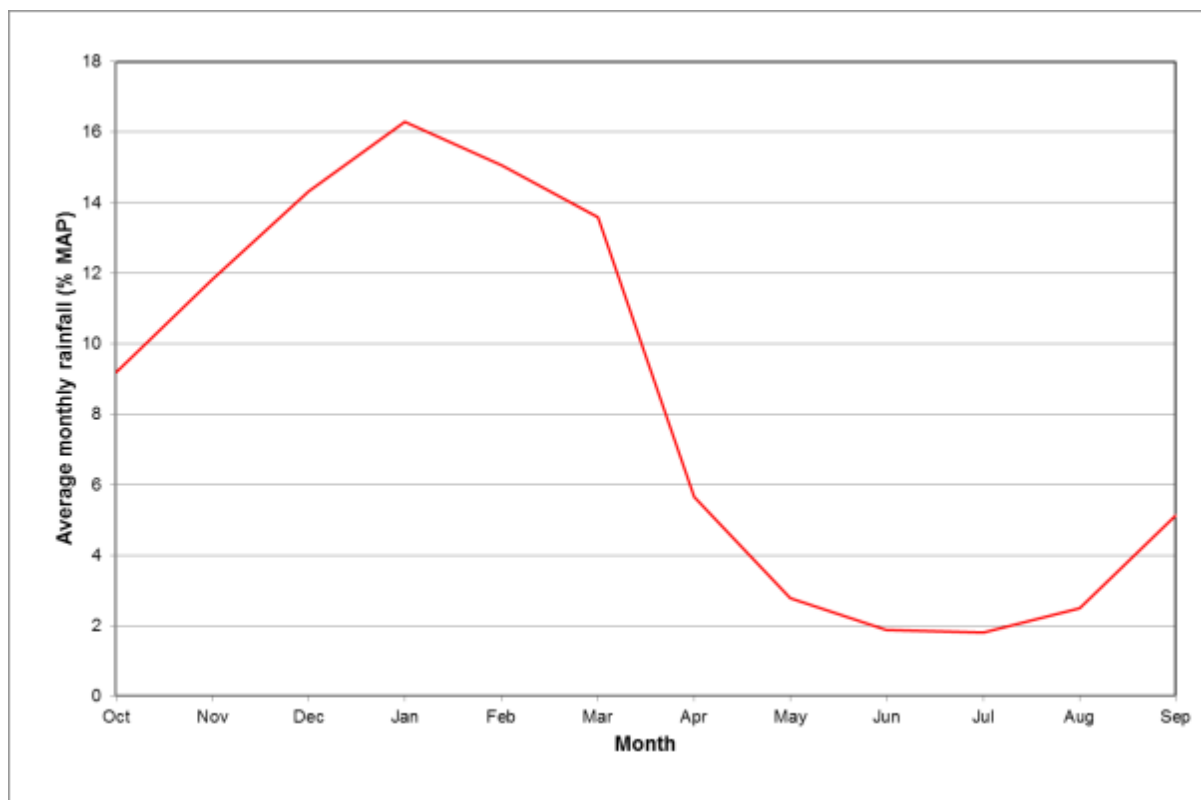


Figure A1- 15 Monthly Rainfall Distribution of Quaternary Catchment T33G

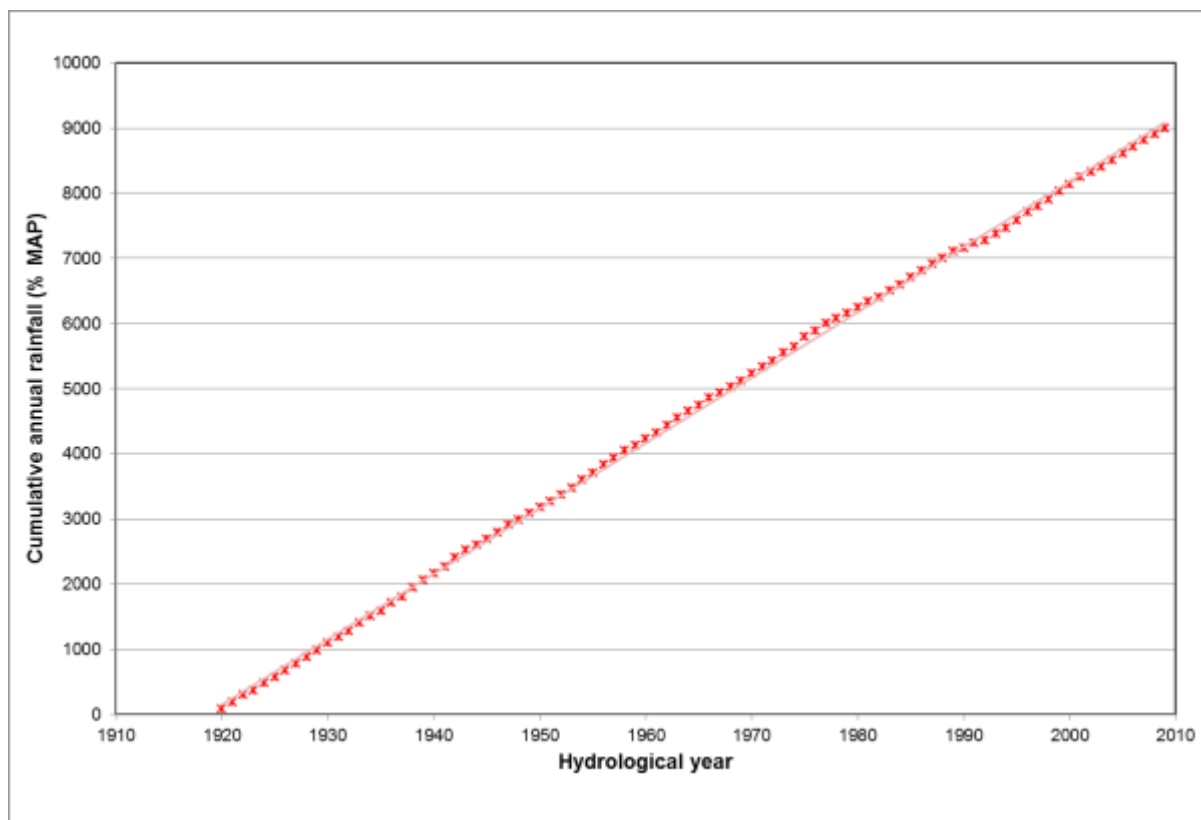


Figure A1- 16 Cumulative Annual Rainfall in Quaternary Catchment

Table A1- 8 Quaternary Catchment T33H - Monthly Rainfall file in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	82.5	82.9	125.2	111.3	105.2	158.1	79.8	22.1	9.2	9.7	2.2	50.5
1921	78.1	211.6	146.1	85.8	71.7	56.7	7.3	110.5	50.1	3.7	62.4	16.2
1922	73.3	190.0	67.3	197.3	228.9	137.0	12.7	8.6	10.6	147.7	12.5	19.3
1923	31.2	62.4	121.2	129.2	120.3	96.9	15.3	24.5	6.8	1.5	25.4	44.9
1924	77.5	135.8	217.2	91.4	120.6	256.3	94.9	20.3	1.0	5.2	0.0	46.9
1925	48.8	130.5	92.1	129.6	98.9	194.3	32.4	18.8	51.6	1.4	11.0	88.6
1926	79.3	95.9	149.6	113.5	104.8	301.0	35.5	14.6	1.4	20.8	21.5	22.8
1927	97.7	46.1	191.5	230.8	133.1	81.0	15.6	21.8	6.3	3.5	55.2	14.1
1928	74.2	98.7	135.0	81.3	97.8	219.6	13.9	31.7	70.5	43.3	16.8	99.5
1929	106.7	121.2	183.8	141.8	58.5	105.1	72.8	10.5	15.7	16.9	72.9	49.9
1930	84.4	40.3	110.8	275.6	167.1	175.7	71.9	3.0	1.5	110.6	2.7	9.6
1931	91.5	73.0	115.1	115.3	222.3	89.6	37.4	39.7	10.3	34.0	5.0	78.4
1932	73.6	148.9	184.7	44.8	89.4	122.1	41.1	1.0	1.0	10.5	10.3	30.6
1933	29.7	249.8	219.0	313.5	164.5	139.3	30.1	13.4	7.9	45.5	5.2	12.7
1934	108.3	139.7	174.8	103.9	84.2	112.2	126.7	61.5	43.4	2.1	73.9	11.5
1935	43.5	60.5	24.2	122.8	210.9	117.4	22.3	100.8	5.8	26.2	0.1	26.9
1936	112.8	284.0	86.4	146.3	280.9	124.2	4.5	3.1	0.6	4.0	2.2	44.5
1937	74.4	53.2	150.8	184.1	174.6	73.8	112.6	9.4	36.3	32.9	32.6	21.7
1938	83.0	80.8	167.7	186.6	283.7	79.3	40.2	46.0	15.4	44.5	27.8	209.0
1939	92.8	132.3	124.5	121.9	243.6	127.3	58.2	130.7	8.8	0.5	5.1	55.1
1940	95.6	115.7	179.7	176.7	138.9	89.2	78.5	1.0	9.3	10.6	15.2	20.6
1941	66.1	68.0	54.4	170.4	269.0	144.1	117.9	29.3	0.0	0.1	44.0	37.2
1942	125.4	141.1	244.7	142.1	73.3	168.5	109.2	36.9	29.4	27.3	127.2	62.7
1943	122.8	165.1	218.0	125.0	148.6	113.8	14.8	15.0	55.6	13.4	2.9	156.1
1944	84.2	55.3	15.9	143.7	222.8	186.0	23.2	12.6	4.3	1.9	3.7	18.5
1945	93.5	39.1	93.1	156.3	136.1	135.9	73.8	39.8	2.0	13.3	5.9	16.5
1946	69.7	150.2	124.6	174.6	148.0	117.2	72.8	0.4	57.3	10.6	5.1	51.2
1947	58.9	187.5	165.2	186.8	166.8	152.4	43.8	7.0	0.6	2.4	2.1	12.7
1948	81.0	58.4	90.0	140.5	138.3	118.3	47.4	17.6	0.0	11.3	11.4	38.1
1949	47.4	73.3	129.9	121.8	161.4	199.8	55.1	45.6	3.3	27.1	98.8	23.0
1950	81.7	61.1	198.6	149.5	160.2	74.4	30.0	7.8	2.3	3.6	54.1	70.6
1951	135.4	21.7	61.0	148.7	188.5	108.0	71.0	20.1	15.1	12.4	5.8	58.4
1952	63.3	123.0	172.9	116.9	111.4	109.0	92.7	2.5	2.3	0.2	21.7	93.7
1953	87.7	102.9	153.3	145.9	120.9	149.3	39.1	96.3	27.5	6.5	2.9	62.2
1954	120.9	111.9	116.1	338.1	220.4	123.9	54.8	25.7	36.3	1.7	0.0	48.5
1955	94.5	137.0	97.8	122.3	181.8	186.8	34.2	32.6	13.9	0.6	6.8	44.9
1956	58.7	165.6	292.5	218.6	124.5	160.9	65.0	8.9	6.4	16.9	51.3	115.7
1957	131.3	89.8	138.2	205.0	118.7	93.1	96.6	19.8	2.0	7.3	1.2	21.6
1958	48.2	159.2	196.0	116.7	138.7	86.0	78.1	178.2	0.0	31.7	18.7	53.2
1959	51.5	119.0	138.3	98.0	101.2	56.9	90.0	11.6	3.0	3.8	29.1	64.5
1960	58.0	136.8	211.8	89.3	131.7	116.0	117.6	13.8	0.6	1.7	13.5	31.9
1961	30.3	140.9	170.4	125.7	152.6	157.5	26.2	15.3	0.0	0.0	25.4	15.2
1962	78.0	147.6	149.4	272.5	129.2	211.8	45.9	7.2	1.6	62.2	0.0	0.5
1963	140.1	153.1	131.4	192.2	62.0	143.6	86.0	3.5	139.1	7.9	9.5	58.9
1964	136.0	40.1	166.8	134.9	104.6	27.6	40.1	4.6	121.6	54.1	65.8	35.4

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	111.1	133.3	59.6	194.0	126.3	26.2	26.8	76.9	7.8	0.0	46.3	50.8
1966	47.3	68.7	117.4	123.7	252.1	206.9	111.3	26.0	57.8	31.7	7.8	1.8
1967	71.8	106.2	90.0	99.3	132.0	107.3	78.8	5.1	2.2	4.2	30.5	45.2
1968	61.7	100.5	76.8	76.7	115.7	197.3	49.8	51.9	4.4	9.8	4.3	36.8
1969	124.2	76.2	162.6	135.7	145.0	49.0	12.6	35.1	33.7	1.7	73.5	59.1
1970	129.2	77.4	124.2	211.3	142.8	80.4	62.6	56.6	7.6	49.8	44.6	23.2
1971	156.8	80.3	112.3	162.6	187.7	122.0	33.1	17.3	13.7	1.0	2.8	32.0
1972	64.6	177.4	65.6	121.8	222.8	97.8	54.1	8.2	0.0	19.9	34.8	38.9
1973	76.3	145.2	118.0	280.2	199.9	204.3	69.4	53.7	17.6	9.1	9.0	7.1
1974	37.4	153.6	185.9	161.8	89.4	111.5	48.8	2.5	0.2	6.3	5.2	127.6
1975	19.2	114.7	303.8	283.8	221.7	320.6	45.3	47.8	3.0	12.8	3.5	86.9
1976	159.2	64.8	61.2	154.8	124.7	119.8	45.1	1.0	0.0	16.7	26.8	80.9
1977	96.4	103.7	107.3	188.1	116.7	157.1	131.7	5.9	2.8	2.3	16.4	48.4
1978	79.0	66.4	171.9	87.5	94.9	86.8	36.3	9.2	0.0	67.7	27.4	32.4
1979	70.3	58.8	106.8	114.7	128.8	94.4	18.7	15.8	0.0	6.2	3.5	104.0
1980	49.3	142.2	82.1	165.1	171.3	93.6	32.3	28.3	9.2	2.9	55.6	50.2
1981	62.5	109.5	150.5	99.5	81.4	209.2	67.1	2.9	29.1	10.7	8.5	67.8
1982	82.0	103.5	64.7	74.2	45.5	81.5	43.9	11.7	2.9	4.6	4.2	24.2
1983	78.5	132.2	165.9	186.3	81.9	139.0	61.9	15.4	19.0	21.4	13.6	22.1
1984	118.2	127.2	68.1	213.7	274.1	31.1	32.9	2.0	0.0	0.3	0.0	11.9
1985	147.4	185.0	179.0	227.4	146.5	122.5	34.2	3.0	12.7	3.7	46.9	63.1
1986	134.8	122.9	76.6	137.0	76.1	132.0	30.0	2.2	23.8	2.4	78.0	197.6
1987	150.8	99.9	87.4	110.1	175.0	153.2	59.0	28.3	19.8	20.8	28.4	30.1
1988	79.2	114.8	174.8	139.2	202.2	81.1	80.4	40.9	6.4	13.0	0.4	0.8
1989	71.5	201.0	148.7	146.8	45.6	161.0	56.4	19.7	13.9	2.5	36.4	26.4
1990	59.5	30.5	120.1	101.5	97.8	51.7	4.4	11.1	3.7	0.3	1.2	83.3
1991	125.8	72.0	121.2	68.0	153.8	47.2	41.0	2.4	1.3	0.0	16.5	47.7
1992	29.6	32.6	32.2	79.7	79.2	72.3	42.9	1.9	0.0	0.0	21.0	47.6
1993	130.2	88.4	209.4	134.0	174.0	116.9	19.3	9.0	6.1	37.1	31.4	4.2
1994	56.1	28.4	122.3	132.5	130.2	199.0	63.7	23.5	59.8	1.9	0.0	31.6
1995	66.5	102.0	248.2	245.1	232.1	107.8	38.4	6.0	7.1	52.2	5.6	21.3
1996	77.7	187.2	160.8	224.7	69.9	132.4	77.2	37.3	110.5	30.6	21.9	51.5
1997	77.0	90.5	50.7	165.1	254.7	155.1	45.7	50.2	1.7	10.4	30.6	27.7
1998	63.0	137.5	204.3	139.5	159.0	141.9	31.4	5.8	5.9	4.5	1.6	20.2
1999	103.0	112.6	206.5	273.3	183.7	166.8	79.2	64.1	4.9	0.6	6.6	72.3
2000	68.4	123.4	158.6	155.0	129.2	129.8	65.8	8.2	5.9	9.9	18.0	38.3
2001	119.9	171.5	209.6	131.5	67.4	204.0	21.4	49.9	20.2	61.7	71.9	27.1
2002	21.6	65.9	141.9	130.1	69.7	93.1	9.7	20.4	29.9	13.0	8.7	76.9
2003	33.1	64.2	114.7	186.9	84.7	124.7	22.4	12.2	5.1	63.3	19.9	105.5
2004	60.4	108.7	195.1	158.4	139.2	109.2	39.7	20.0	0.0	7.0	23.6	26.1
2005	88.2	136.5	43.1	165.1	169.9	107.9	66.6	41.5	15.0	0.0	97.2	95.7
2006	195.2	129.1	108.8	184.6	68.5	109.4	72.0	3.3	42.2	2.7	15.9	14.3
2007	136.7	106.8	94.6	122.3	125.3	169.7	114.9	10.7	49.9	0.0	13.3	32.2
2008	65.1	93.6	118.5	170.4	168.3	96.1	42.8	44.6	14.4	3.1	46.3	30.0
2009	151.7	101.2	95.5	214.2	119.1	69.5	35.6	6.9	31.2	8.8	6.8	18.8

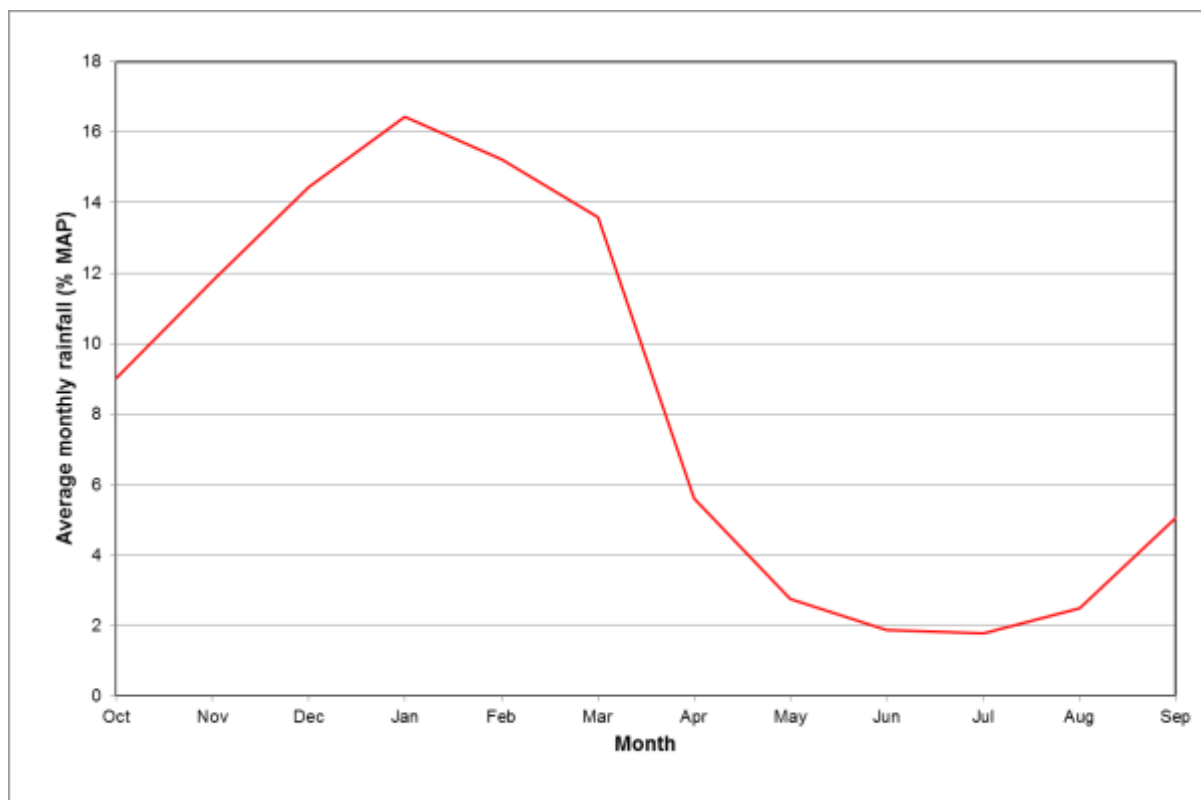


Figure A1- 17 Monthly Rainfall Distribution of Quaternary Catchment T33H

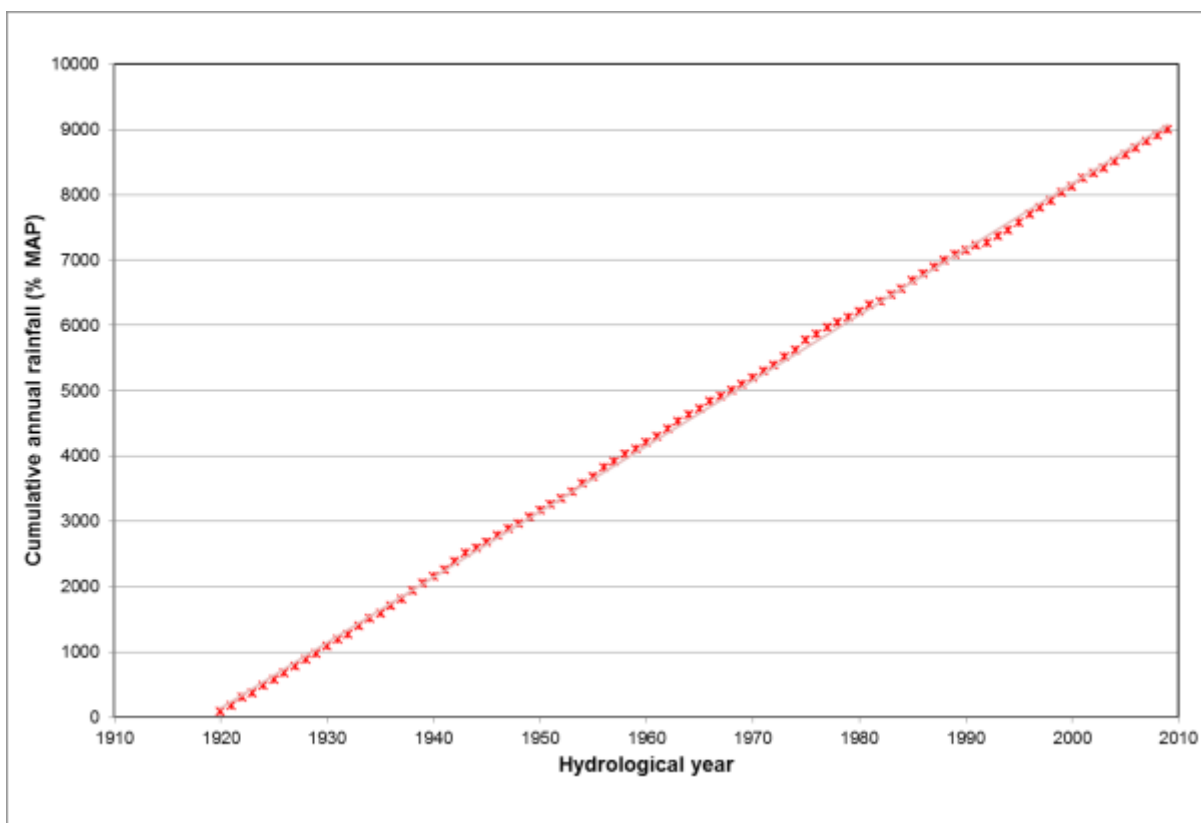


Figure A1- 18 Cumulative Annual Rainfall in Quaternary Catchment T33H

Table A1- 9 Quaternary Catchment T33J - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	83.7	84.2	127.7	112.4	106.8	158.7	81.1	22.3	9.5	10.1	2.2	51.2
1921	78.8	213.2	146.7	87.0	72.5	57.1	7.4	111.1	50.8	3.7	63.3	16.3
1922	73.9	192.4	67.9	200.5	230.2	139.0	12.6	8.7	10.8	148.6	12.6	19.5
1923	31.4	61.9	119.8	130.9	123.9	97.8	15.6	24.7	6.7	1.5	25.9	45.8
1924	76.8	133.9	221.8	90.0	125.4	256.3	95.8	20.0	1.0	4.9	0.0	46.9
1925	49.2	133.5	93.0	132.2	100.5	196.0	32.8	19.1	52.7	1.5	11.4	89.2
1926	79.4	96.1	150.8	113.2	107.0	302.2	35.1	15.2	1.5	20.8	21.9	23.3
1927	98.0	47.2	195.9	235.2	132.0	81.2	15.3	21.6	6.2	3.9	55.9	14.7
1928	75.2	98.9	134.2	81.1	101.5	217.3	12.5	31.8	69.7	43.6	16.5	99.3
1929	108.5	124.1	187.3	144.3	58.7	109.0	73.3	11.5	15.7	17.1	73.5	49.5
1930	84.0	40.1	114.9	272.6	165.3	178.3	72.1	3.1	1.6	112.0	2.9	9.7
1931	92.1	74.6	118.1	116.0	220.3	90.8	36.8	39.2	10.2	34.0	5.1	80.6
1932	74.3	150.1	185.2	45.9	89.0	124.5	42.3	1.2	1.2	10.4	10.2	30.8
1933	31.0	251.4	222.9	307.4	159.2	142.9	30.7	13.8	8.5	46.2	5.2	12.8
1934	109.5	139.2	177.1	106.9	86.0	111.7	122.1	62.3	43.7	2.1	73.1	12.8
1935	45.1	61.4	26.8	122.3	211.5	115.1	22.5	101.9	5.8	26.7	0.1	28.1
1936	114.6	282.2	85.0	145.8	284.6	125.3	5.0	3.3	0.8	4.1	2.4	45.1
1937	74.3	56.0	153.8	185.6	172.3	74.1	114.3	9.5	35.7	33.2	32.6	22.0
1938	84.6	81.9	169.2	185.8	286.7	80.6	41.3	45.9	15.2	43.9	26.6	199.3
1939	93.8	131.8	126.1	122.7	242.9	126.2	58.1	127.9	8.7	0.6	5.0	56.1
1940	96.4	114.9	179.9	173.8	136.7	88.9	76.2	1.1	9.8	10.6	15.5	21.2
1941	67.5	69.7	56.2	169.2	261.0	144.2	118.2	30.0	0.0	0.2	44.5	38.2
1942	125.5	142.1	249.9	143.8	73.3	164.8	109.5	36.6	29.6	26.9	129.5	64.2
1943	124.0	165.9	220.7	120.7	148.1	115.8	15.6	15.2	55.8	14.0	2.8	158.5
1944	85.9	57.5	18.4	144.5	221.1	184.1	23.9	12.6	4.5	1.8	3.7	18.0
1945	95.2	38.3	97.2	156.6	134.6	140.8	71.4	38.2	2.5	13.5	6.1	17.4
1946	70.5	147.7	129.7	177.2	147.8	121.1	72.7	0.4	58.1	11.2	5.3	52.6
1947	61.2	188.6	168.0	191.1	169.0	154.4	44.2	7.1	0.7	2.6	2.2	13.3
1948	83.2	62.2	92.7	140.8	141.8	120.7	48.5	17.2	0.0	11.6	11.4	38.4
1949	48.3	74.6	129.4	123.0	161.5	202.7	54.5	45.8	3.5	27.4	100.2	23.2
1950	83.8	64.4	200.9	151.7	164.4	76.4	29.9	8.2	2.2	3.3	54.3	71.5
1951	137.0	20.7	65.0	149.6	194.9	108.0	71.5	19.2	16.0	13.1	6.1	58.4
1952	63.5	120.2	175.0	115.5	109.0	110.1	93.3	2.7	2.6	0.2	22.4	95.5
1953	88.4	104.5	153.8	144.1	121.3	150.6	42.0	96.8	27.9	6.5	2.9	62.5
1954	121.6	111.4	116.4	339.4	216.7	125.1	55.1	26.2	35.4	1.8	0.0	47.9
1955	95.1	139.0	98.6	118.9	184.6	188.0	34.6	33.5	14.5	0.6	6.8	44.7
1956	60.1	167.7	293.3	216.0	125.5	162.0	65.1	9.4	6.1	17.5	51.7	115.2
1957	127.7	89.0	140.9	205.6	119.4	94.8	96.1	20.6	2.1	7.1	1.1	22.3
1958	47.3	161.0	197.9	120.5	139.3	89.0	80.1	177.3	0.0	31.8	19.3	53.9
1959	53.7	118.5	137.3	98.1	103.6	58.3	91.6	11.5	3.5	3.8	29.1	65.9
1960	57.8	140.7	210.2	93.7	132.2	119.8	118.9	13.9	0.6	2.1	14.5	31.0
1961	30.0	141.3	172.2	128.4	157.7	158.2	26.8	15.7	0.0	0.0	25.5	15.2
1962	80.0	149.6	151.2	271.3	132.6	214.6	46.3	7.9	1.7	63.2	0.0	0.5
1963	143.0	156.6	131.5	191.8	66.3	147.3	89.2	3.2	138.3	7.8	10.0	58.9
1964	135.3	41.4	159.7	133.5	105.8	27.2	41.5	4.0	120.3	54.3	64.5	35.7

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	111.4	134.8	59.6	197.5	132.0	26.3	28.9	79.4	7.7	0.0	47.2	51.4
1966	48.4	70.4	118.8	126.4	248.2	209.3	113.2	26.1	57.9	32.3	7.6	2.0
1967	71.7	108.9	91.8	98.5	133.4	108.1	78.7	5.1	2.0	4.3	31.1	46.0
1968	63.6	101.6	78.0	77.1	115.1	199.8	49.9	52.3	4.1	10.2	4.7	36.6
1969	124.9	78.3	161.2	133.4	146.6	49.3	12.8	35.6	34.0	1.8	74.0	57.1
1970	131.9	77.6	124.9	208.3	142.7	80.9	63.5	58.2	7.6	50.3	45.3	22.4
1971	157.6	81.6	108.7	163.0	190.3	123.9	33.3	17.1	14.1	1.0	2.5	32.0
1972	65.5	177.3	65.0	124.1	223.0	95.5	58.8	8.4	0.0	20.2	34.7	39.7
1973	77.3	145.0	120.7	283.2	202.4	202.3	67.1	54.5	17.3	9.7	8.4	7.2
1974	38.6	154.2	185.8	159.5	87.7	112.4	49.3	2.2	0.2	6.4	6.0	128.5
1975	19.0	116.0	307.3	287.2	221.5	326.7	45.9	52.8	3.6	12.7	4.2	86.9
1976	161.6	67.0	63.1	152.1	130.7	120.9	45.4	0.9	0.0	18.2	26.8	81.2
1977	98.8	107.4	111.6	189.3	115.6	158.9	132.0	6.6	2.8	2.2	16.5	47.3
1978	81.0	67.4	176.4	89.7	99.3	86.8	36.6	9.0	0.0	69.8	27.7	32.7
1979	72.2	62.5	107.6	117.8	129.7	96.2	19.0	16.1	0.0	6.5	3.3	105.1
1980	49.7	140.2	87.1	165.4	172.7	95.0	32.1	30.0	10.1	2.7	57.2	50.8
1981	61.6	111.6	153.7	104.7	82.6	209.4	67.6	3.5	29.3	12.3	9.4	69.5
1982	84.0	103.2	65.6	75.6	47.1	82.3	44.6	11.9	3.0	5.2	4.5	23.5
1983	80.1	134.0	169.8	188.8	82.7	142.9	62.2	16.4	19.0	21.6	13.3	22.1
1984	118.0	127.3	68.8	212.4	272.7	28.8	33.8	1.9	0.0	0.3	0.0	12.3
1985	150.3	182.5	178.8	228.1	146.6	122.2	34.4	3.2	12.4	4.5	48.2	64.1
1986	135.8	127.1	81.4	140.5	78.4	133.7	30.7	2.4	25.7	2.7	80.0	208.6
1987	146.4	101.3	91.1	112.5	177.4	153.4	60.3	31.2	19.3	22.8	28.0	33.2
1988	80.4	120.9	181.7	137.9	212.0	79.3	86.8	42.0	7.1	14.3	0.4	0.9
1989	72.2	211.3	152.3	150.7	48.0	161.2	55.9	18.8	15.0	2.6	40.4	27.7
1990	61.6	32.2	127.0	108.7	104.3	55.1	4.7	11.7	4.4	0.3	1.2	86.2
1991	135.7	77.2	131.4	69.2	155.7	50.7	43.0	2.4	1.3	0.0	16.4	48.2
1992	31.0	35.5	35.4	85.8	88.0	78.5	45.0	1.8	0.0	0.0	22.9	49.7
1993	130.6	89.9	209.6	135.1	172.5	116.1	18.3	9.0	6.2	37.1	31.6	3.8
1994	56.4	28.6	122.7	135.1	127.8	200.7	63.3	24.6	60.2	1.9	0.1	31.9
1995	67.3	102.3	251.3	249.6	236.6	108.2	39.6	5.9	6.7	52.3	5.6	21.3
1996	78.7	189.1	159.1	228.2	70.8	133.5	80.5	34.5	113.4	30.8	21.9	51.3
1997	77.1	91.5	50.5	164.0	257.7	156.5	46.8	53.2	1.6	10.8	32.0	27.9
1998	63.4	138.2	202.2	138.2	160.9	142.9	32.2	6.1	5.6	4.5	1.5	20.6
1999	103.2	112.5	208.3	272.0	183.5	169.4	80.2	65.2	4.7	0.6	6.7	73.4
2000	67.9	126.2	160.8	156.7	130.8	131.0	67.8	8.5	6.0	10.0	18.2	37.5
2001	121.1	173.4	211.3	132.9	67.6	206.8	21.8	50.6	20.6	62.5	72.6	27.7
2002	21.2	65.8	143.3	131.3	70.2	94.0	10.3	20.6	30.0	13.0	8.9	77.6
2003	33.0	64.6	115.4	188.8	85.4	126.3	22.5	12.2	5.0	64.5	20.1	106.6
2004	61.0	110.4	197.6	159.9	140.6	110.0	40.6	20.2	0.0	7.0	23.8	26.2
2005	89.2	137.3	43.3	166.7	171.5	108.6	67.4	41.9	15.1	0.0	98.6	97.0
2006	197.1	130.5	111.2	186.5	68.8	110.5	73.1	3.3	42.6	2.6	16.0	14.5
2007	137.6	107.5	95.2	123.7	126.6	171.2	116.2	10.8	50.5	0.0	13.3	32.7
2008	65.0	94.6	119.9	172.1	169.9	96.8	43.4	44.9	14.7	3.1	46.9	30.2
2009	153.7	102.1	95.8	216.8	121.5	69.9	36.2	6.9	31.6	8.8	6.7	18.8

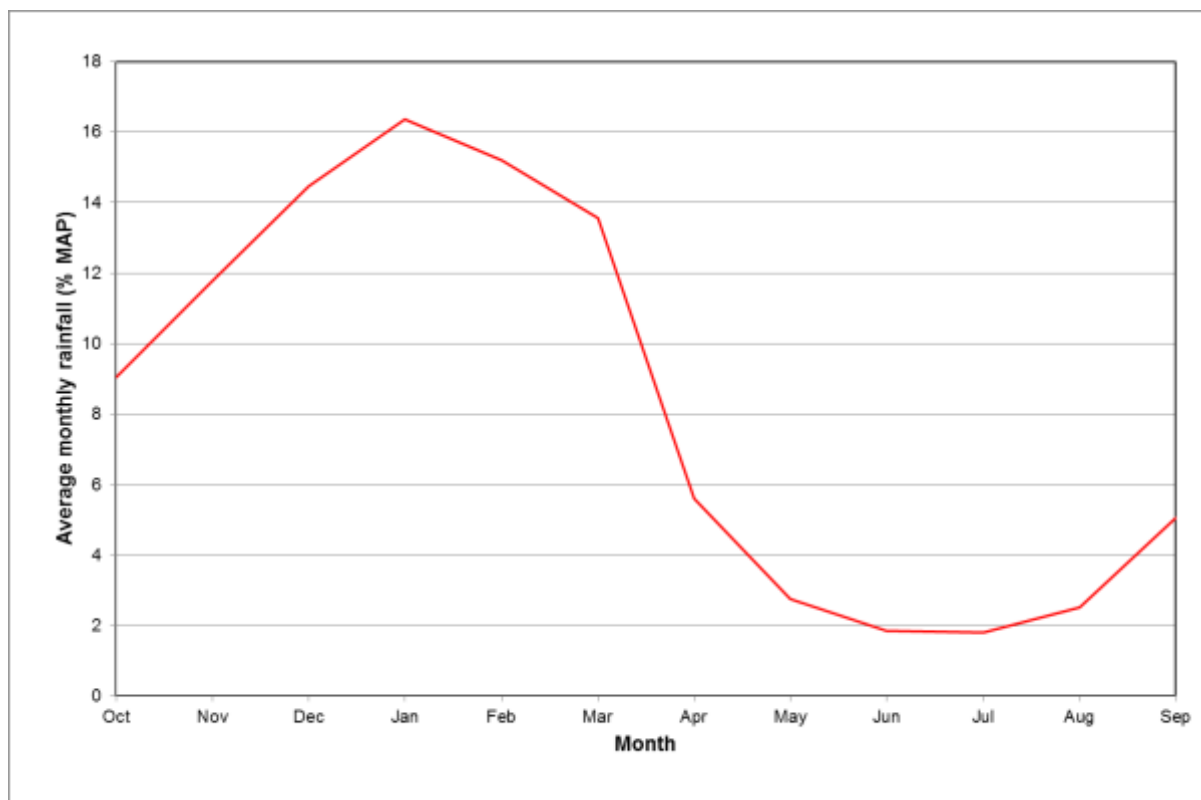


Figure A1- 19 Monthly Rainfall Distribution of Quaternary Catchment T33J

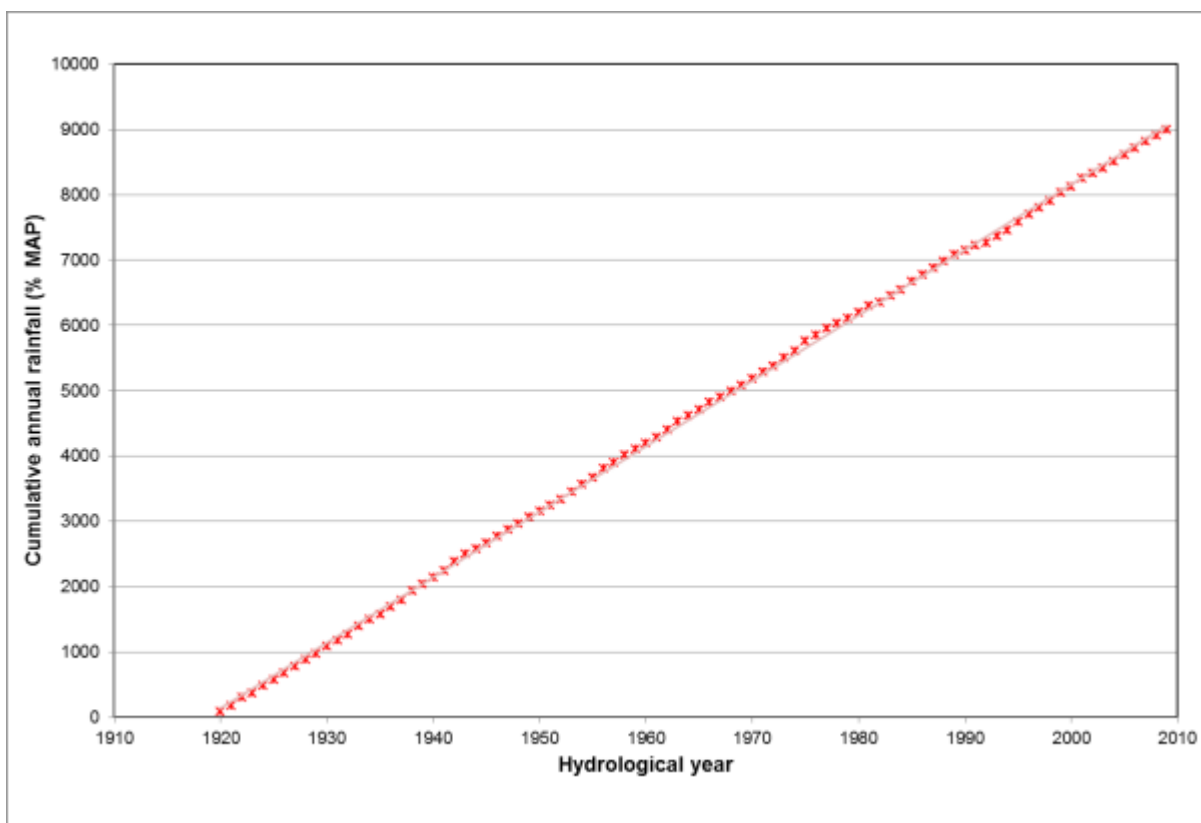


Figure A1- 20 Cumulative Annual Rainfall in Quaternary Catchment T33J

APPENDIX A2

MONTHLY RAINFALL INFORMATION TSITSA RIVER SYSTEM

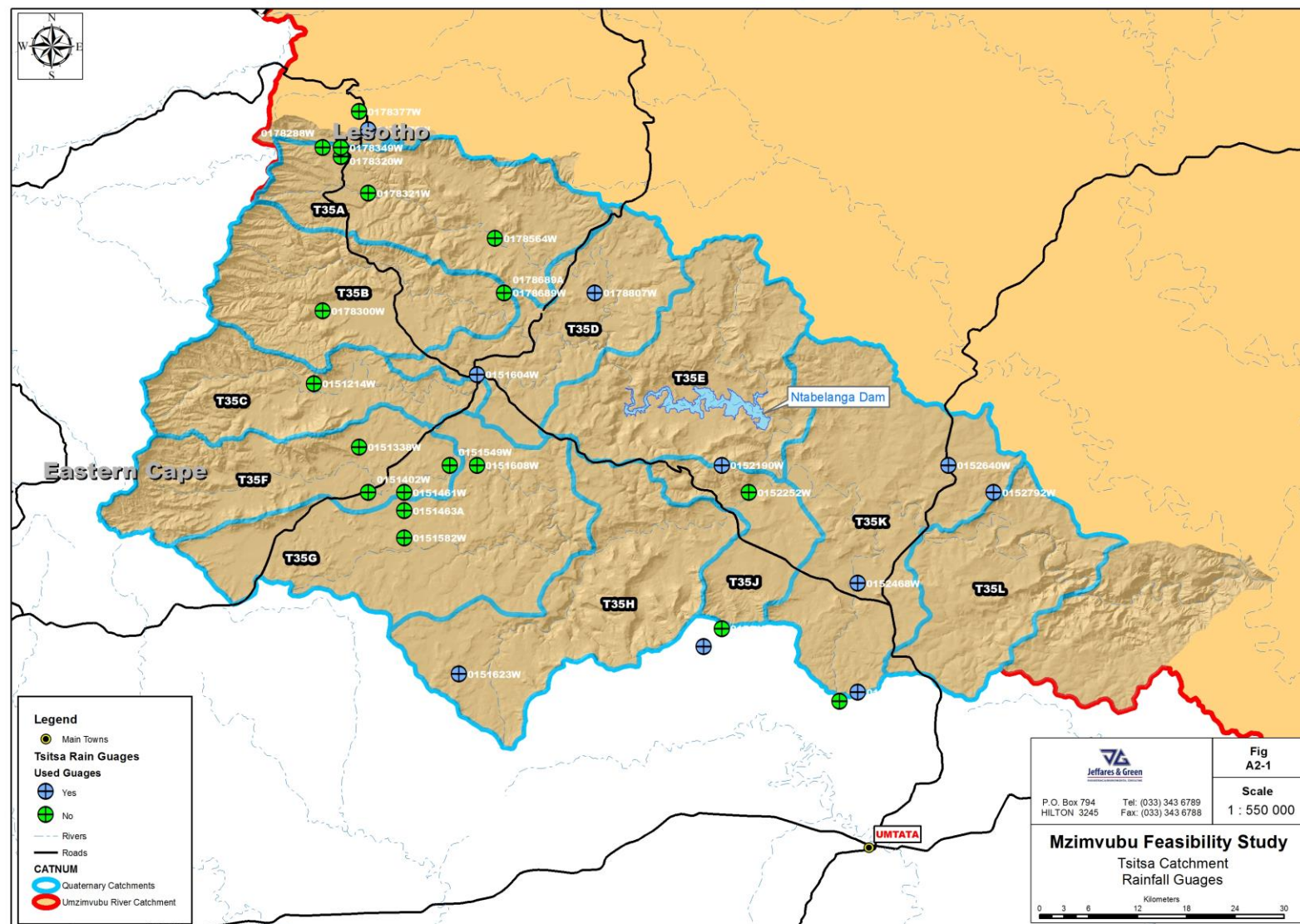


Figure A2- 1 Map of Rain gauges used in Phase 1 for the Kinira River System

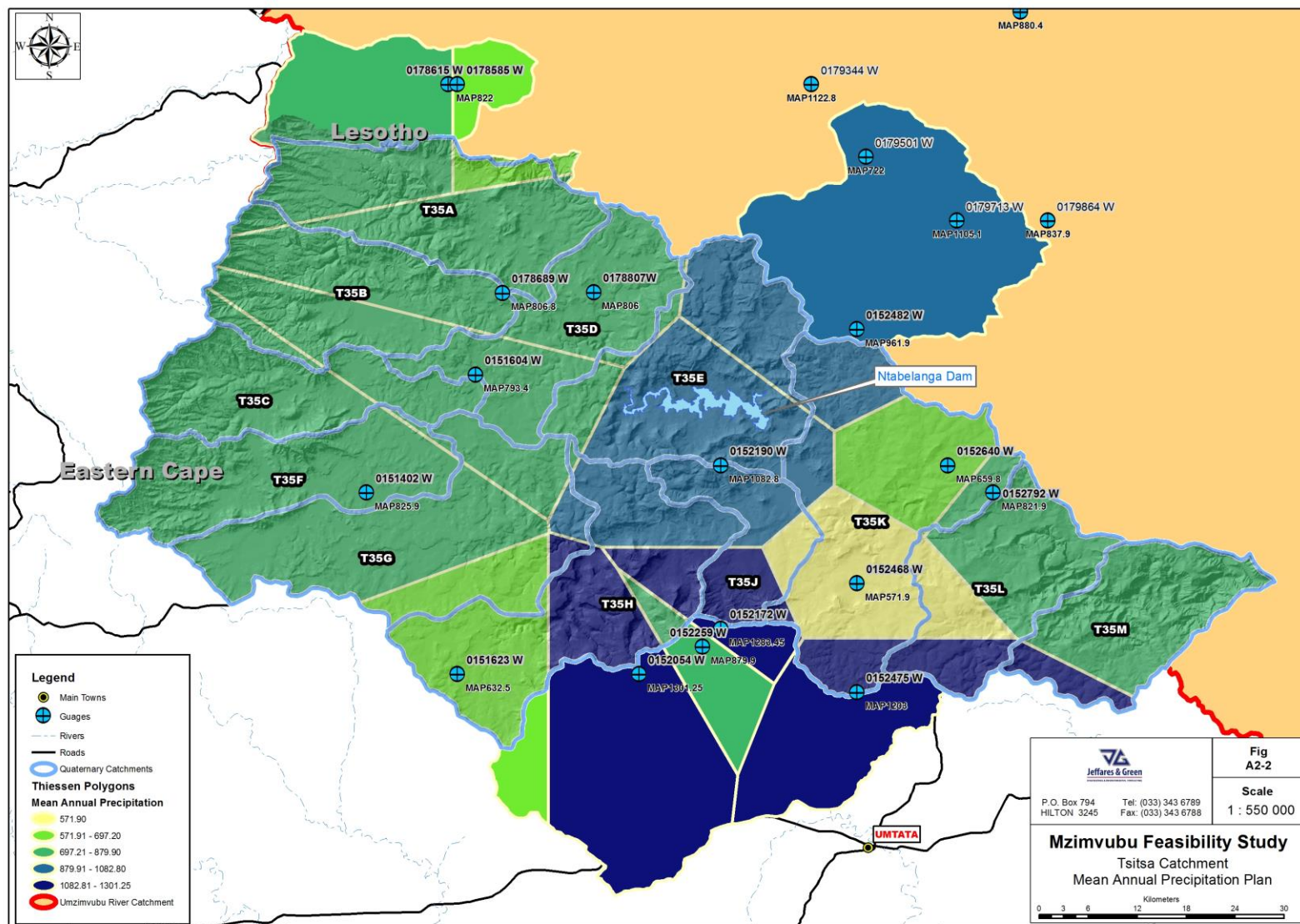


Figure A2- 2 Map of Thiessen Polygons Used in Phase 1 for the Kinira River System

Table A2- 1 Quaternary Catchment T35A - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	67.8	63.5	108.6	114.3	88.2	127.1	79.1	12.6	0.6	0.8	1.4	35.5
1921	73.0	149.4	140.6	82.0	77.0	41.7	3.0	80.8	34.1	43.2	64.6	30.0
1922	72.0	177.7	65.8	193.9	162.0	107.2	19.3	5.8	9.0	101.6	12.2	16.5
1923	38.1	59.2	115.0	110.2	120.5	96.5	10.2	16.5	8.2	2.2	21.3	43.1
1924	48.9	87.3	225.5	73.2	75.3	216.7	128.3	15.9	1.3	0.8	0.6	40.2
1925	26.9	103.4	76.5	100.2	89.1	135.5	25.5	35.7	41.2	2.7	4.9	65.4
1926	73.6	78.8	127.6	81.6	74.2	233.5	16.6	6.9	0.7	5.9	23.6	29.4
1927	69.9	43.6	185.7	191.6	95.4	72.2	22.4	20.0	5.2	3.2	39.1	14.8
1928	53.0	90.8	149.4	98.4	134.4	172.3	5.9	38.9	53.6	31.6	17.4	71.7
1929	120.4	118.8	153.1	167.2	46.7	136.2	66.7	5.4	14.8	8.3	54.1	31.4
1930	65.1	27.1	112.1	172.4	134.2	146.3	41.9	2.6	2.2	151.2	4.2	9.1
1931	64.5	88.7	119.4	93.3	171.9	64.0	10.9	26.5	5.7	22.3	6.0	97.3
1932	84.9	180.7	149.2	45.3	70.6	123.1	46.0	2.5	3.7	4.2	7.2	16.8
1933	27.0	214.0	176.2	269.2	78.3	145.4	26.7	6.9	9.7	59.1	2.1	8.7
1934	67.0	99.5	180.3	62.7	72.9	113.7	83.3	38.3	40.6	0.4	45.8	16.0
1935	49.2	43.4	32.7	76.3	201.9	78.5	19.3	74.8	6.0	29.1	0.5	33.1
1936	92.3	220.1	60.1	146.4	186.9	106.5	15.2	6.9	2.6	2.4	4.0	35.4
1937	56.7	39.0	100.3	158.4	146.6	74.8	120.7	10.5	20.5	21.3	30.5	11.5
1938	68.8	98.9	168.7	183.6	204.6	52.4	18.5	29.9	8.2	34.1	12.4	102.5
1939	81.2	93.4	80.8	102.3	131.5	81.2	43.4	57.6	5.5	1.1	8.1	44.7
1940	61.2	71.2	102.1	111.5	88.1	80.3	53.8	6.6	8.6	11.6	14.1	11.9
1941	56.1	57.4	49.5	115.2	135.5	132.3	69.1	29.7	0.0	0.3	35.6	39.6
1942	104.8	135.7	177.9	124.4	58.4	144.1	91.8	38.6	24.3	8.6	88.6	68.2
1943	98.0	146.8	161.3	105.3	87.1	123.0	16.8	8.9	29.9	10.9	2.2	108.5
1944	65.4	35.1	40.7	91.3	139.6	113.4	20.1	16.3	2.5	2.1	2.5	12.7
1945	94.0	24.6	86.6	180.4	96.7	107.1	56.7	37.0	1.5	6.0	5.4	12.5
1946	46.6	93.9	81.0	135.9	128.9	124.7	83.4	1.1	59.5	5.9	3.0	50.8
1947	52.9	173.9	178.1	159.3	163.0	105.8	51.3	14.6	1.8	3.0	1.0	13.5
1948	86.7	49.0	91.3	83.9	108.1	71.5	43.0	19.3	0.3	12.3	10.6	30.1
1949	38.9	70.6	100.0	119.7	174.1	133.3	54.2	64.6	1.3	16.2	67.8	25.4
1950	83.2	51.2	195.1	113.1	95.9	74.9	27.0	8.6	3.5	0.6	34.2	39.1
1951	108.8	20.4	72.6	99.8	158.5	62.0	50.6	11.4	12.2	12.8	8.2	49.3
1952	45.2	84.5	108.5	96.8	137.1	75.1	79.3	1.0	2.2	0.2	24.2	63.9
1953	82.8	106.2	116.6	117.1	118.3	131.7	29.5	70.7	34.3	1.0	0.6	42.4
1954	82.5	88.4	89.1	222.3	160.3	86.6	72.6	15.1	23.2	1.8	0.1	33.5
1955	61.2	103.3	85.7	37.6	125.0	153.9	26.4	20.6	24.1	0.8	3.0	41.7
1956	48.5	144.1	181.8	124.0	76.3	186.8	64.7	13.9	3.6	13.1	47.9	73.5
1957	79.7	63.1	97.6	194.0	96.6	62.3	78.1	15.4	0.3	9.0	1.0	25.6
1958	35.4	153.9	115.0	72.3	92.3	84.7	89.8	89.0	0.0	37.6	19.4	32.9
1959	36.9	101.1	110.1	93.4	109.3	63.7	61.8	16.2	2.4	10.3	25.6	62.1
1960	43.0	116.5	142.3	119.5	84.9	112.4	82.1	35.4	0.2	1.2	14.6	23.2
1961	28.7	124.8	126.1	107.1	141.6	121.5	58.8	14.9	0.1	0.0	14.6	10.9
1962	71.4	144.2	134.1	211.3	116.5	204.8	47.7	5.2	2.5	33.4	0.3	5.4
1963	119.2	158.8	68.8	129.7	59.6	128.7	76.6	0.4	93.8	7.3	7.2	50.2
1964	110.8	27.4	102.8	100.1	149.0	29.5	49.0	8.8	127.8	16.6	43.5	26.3

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	78.7	138.3	51.0	150.7	129.9	9.3	21.5	65.2	5.6	0.1	32.9	39.3
1966	38.9	70.8	101.2	130.0	150.3	168.6	97.6	20.9	31.2	19.8	6.0	2.7
1967	56.6	91.5	46.7	66.0	79.5	65.0	44.5	3.0	0.9	5.1	25.4	33.5
1968	53.1	76.9	62.3	61.8	99.8	165.1	21.8	30.9	3.7	10.3	8.2	21.1
1969	86.3	62.6	118.3	59.5	104.0	29.6	14.0	26.6	28.6	1.9	96.9	44.7
1970	114.2	58.8	83.2	106.7	91.3	75.8	49.8	54.3	12.0	31.7	66.5	28.0
1971	129.1	81.4	109.9	136.0	206.9	105.8	21.7	12.3	6.2	0.8	1.2	9.8
1972	47.7	142.9	61.8	88.2	168.6	129.0	57.5	9.0	0.0	11.0	20.2	29.6
1973	66.8	91.2	92.4	217.1	140.0	204.4	46.9	43.9	15.1	3.1	7.6	1.8
1974	32.3	129.5	97.4	95.8	70.4	105.2	32.3	1.1	2.3	4.9	2.8	98.1
1975	12.6	104.2	219.0	177.7	147.2	260.6	41.3	69.9	6.5	11.9	7.9	57.5
1976	173.6	46.5	77.9	100.2	115.9	85.8	51.5	0.7	2.0	18.9	18.3	75.9
1977	62.5	106.2	105.3	116.4	66.2	93.1	231.8	14.2	2.2	0.3	22.5	62.0
1978	90.5	72.2	146.2	81.9	110.7	87.7	27.1	16.5	1.7	56.7	9.9	31.8
1979	60.8	53.7	80.1	92.4	79.6	82.0	25.7	5.3	0.6	7.5	2.7	90.2
1980	39.0	89.4	104.5	132.4	175.2	64.4	18.9	54.7	10.5	3.5	33.5	14.9
1981	26.8	67.5	104.1	113.2	70.0	169.4	39.2	8.0	22.1	24.3	3.8	34.9
1982	57.2	113.1	40.3	57.9	49.2	67.3	56.4	11.0	6.9	14.9	3.7	30.2
1983	71.5	143.2	155.6	117.7	104.3	137.1	69.4	17.0	26.2	20.6	11.1	20.8
1984	96.1	107.3	66.6	158.1	220.6	44.1	28.6	1.8	4.9	0.6	0.2	23.5
1985	144.9	131.4	173.2	127.7	114.7	96.1	20.9	2.6	3.3	11.7	46.5	54.9
1986	128.8	147.5	88.0	102.4	95.0	102.2	32.2	3.8	19.9	0.9	47.8	207.7
1987	89.7	105.7	107.1	117.2	247.3	129.8	54.8	35.6	9.9	14.3	21.3	47.0
1988	62.5	122.5	193.6	115.0	205.8	92.5	113.3	10.3	10.1	31.1	0.0	5.0
1989	84.9	237.6	95.3	132.2	35.7	138.8	61.0	7.7	15.7	2.2	56.6	18.6
1990	83.8	48.9	98.1	132.9	95.3	57.5	10.7	13.8	7.2	0.8	6.0	48.0
1991	143.6	104.0	192.9	84.7	100.3	57.3	46.3	0.4	1.7	0.0	9.7	37.4
1992	39.7	67.6	59.2	85.5	96.1	98.6	55.9	3.8	0.2	0.5	14.2	64.6
1993	128.6	101.2	152.3	156.7	155.9	172.7	11.4	13.2	7.6	28.0	22.8	4.4
1994	44.4	38.4	117.2	140.0	58.7	163.0	82.2	20.1	14.0	3.6	0.6	33.3
1995	71.4	86.6	228.4	225.2	152.5	88.9	31.5	14.2	4.0	18.2	4.8	20.8
1996	55.0	183.6	150.3	149.6	66.9	113.2	69.2	16.1	128.2	42.7	13.1	24.4
1997	81.5	96.1	92.1	179.6	207.8	182.9	62.2	38.3	8.5	24.2	31.9	29.0
1998	51.8	158.9	166.8	122.9	171.5	85.8	21.2	9.4	7.0	5.6	3.7	11.2
1999	99.9	85.2	158.8	217.7	177.2	179.8	105.8	45.2	11.1	5.6	3.9	53.2
2000	58.7	101.2	107.0	154.9	117.4	101.1	51.7	8.1	1.1	6.1	5.6	43.2
2001	90.6	202.2	149.2	151.0	82.8	112.6	34.2	42.2	16.6	46.6	68.1	45.1
2002	30.2	64.8	112.0	117.0	87.8	97.6	45.0	33.5	10.7	1.3	23.4	65.4
2003	22.7	80.8	72.5	178.9	100.8	164.5	50.3	8.4	8.2	48.7	9.4	113.3
2004	44.9	118.1	107.1	232.8	93.8	104.5	44.1	19.3	0.6	0.6	24.5	15.8
2005	57.0	121.4	66.3	154.1	125.6	96.9	92.2	40.8	7.3	8.2	86.9	82.4
2006	148.2	116.8	120.3	103.9	80.5	68.8	63.0	0.1	20.6	0.1	10.2	16.2
2007	106.1	90.9	95.2	125.9	129.6	108.4	83.3	11.8	44.7	0.7	20.0	18.0
2008	33.1	81.2	138.2	97.2	152.3	20.4	28.3	24.6	14.7	0.0	31.7	25.7
2009	106.6	58.8	69.8	189.9	90.5	63.5	45.6	7.4	19.3	2.8	4.7	7.9

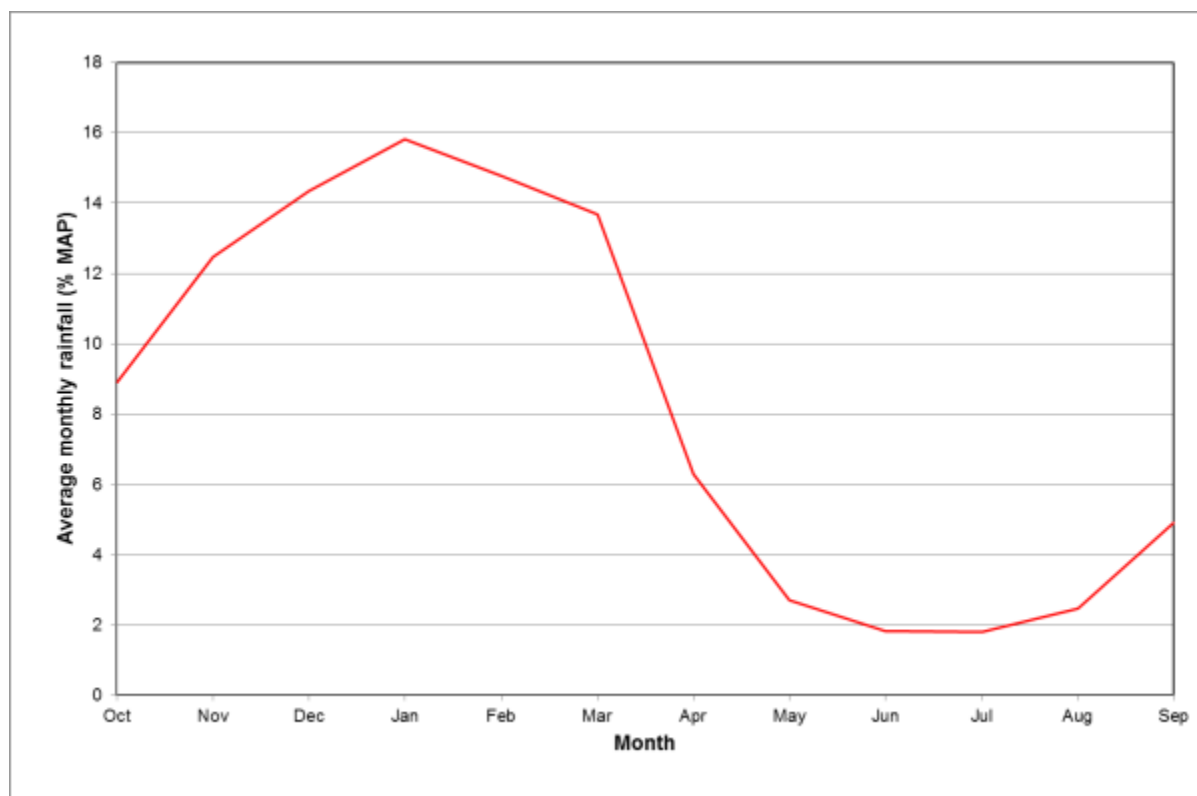


Figure A2- 3 Monthly Rainfall Distribution of Quaternary Catchment T35A

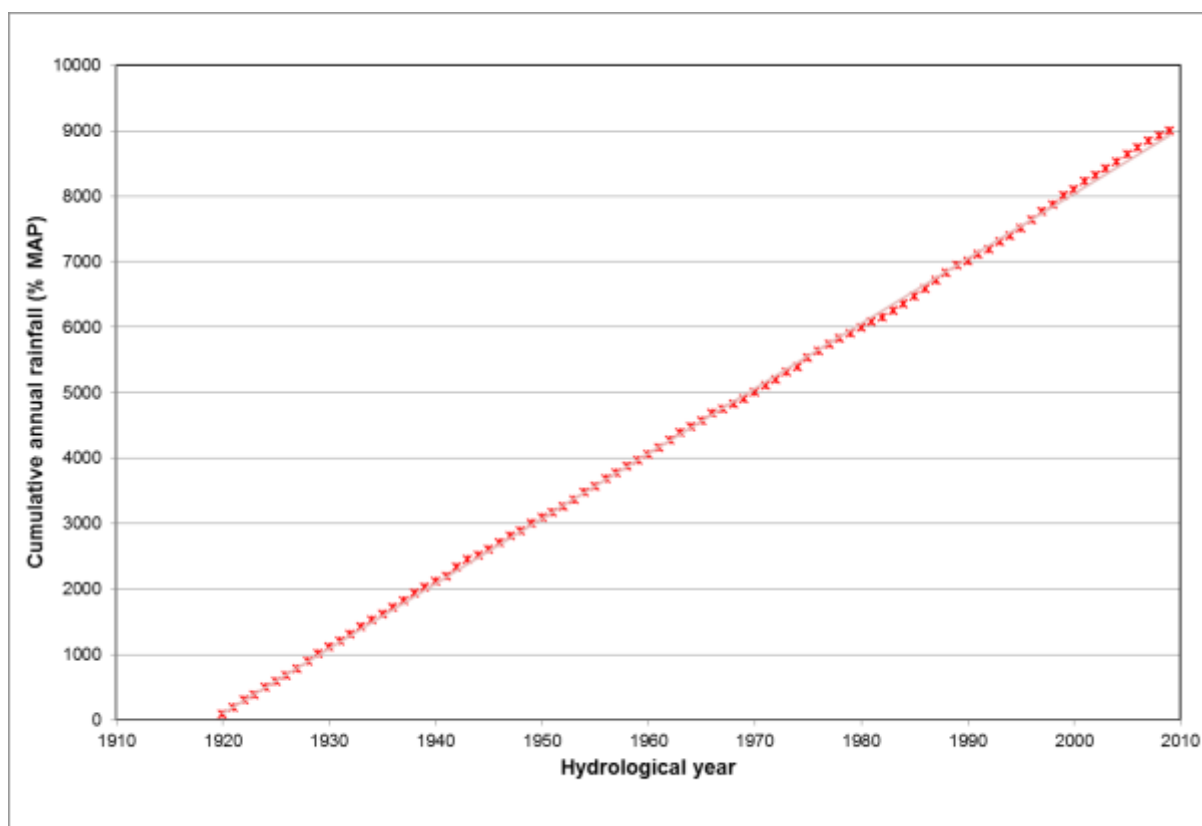


Figure A2- 4 Cumulative Annual Rainfall in Quaternary Catchment T35A

Table A2- 2 Quaternary Catchment T35B - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	66.9	61.5	109.4	114.7	90.8	128.6	80.6	13.2	0.6	0.8	1.3	35.0
1921	71.3	151.0	140.3	83.1	78.3	43.0	2.8	80.1	34.4	47.5	67.0	30.2
1922	71.7	176.5	67.4	191.9	161.8	109.4	20.3	6.0	9.3	98.6	12.8	16.4
1923	36.7	58.1	115.7	110.2	117.3	101.0	10.3	16.4	8.5	2.5	20.2	43.4
1924	48.0	87.2	227.0	73.0	75.1	222.0	127.2	15.9	1.3	0.8	0.5	40.9
1925	26.9	101.8	76.4	101.7	88.3	135.7	25.9	36.8	41.3	2.8	4.5	65.6
1926	72.8	78.3	127.6	83.0	75.8	232.3	17.1	7.3	0.6	5.6	24.0	28.8
1927	69.1	43.5	189.6	194.7	95.1	72.4	22.3	20.0	5.1	3.0	38.6	14.5
1928	52.1	88.6	155.5	99.6	136.0	173.1	5.9	40.1	54.5	32.6	17.4	71.0
1929	119.7	119.4	156.7	171.9	47.4	135.1	67.2	5.2	14.4	8.4	53.2	30.3
1930	64.3	25.9	108.1	172.6	137.8	146.2	42.3	2.5	2.1	153.5	4.2	8.9
1931	63.4	87.2	121.4	92.8	168.9	65.6	12.5	26.2	5.6	22.1	5.5	97.0
1932	83.5	178.8	147.5	44.4	70.7	121.9	48.0	2.4	3.7	4.1	7.2	16.8
1933	26.1	214.1	176.0	274.6	77.9	146.3	27.0	7.1	9.4	59.5	2.1	8.2
1934	67.7	98.2	176.1	60.2	75.3	113.2	83.0	34.6	39.2	0.4	46.1	15.7
1935	48.0	43.2	32.5	74.6	203.2	71.3	19.1	74.3	6.0	29.1	0.5	32.7
1936	89.8	217.1	59.0	145.1	185.9	111.2	15.5	6.7	2.3	2.4	3.9	34.7
1937	55.7	38.9	93.4	155.2	150.3	74.6	122.7	10.7	20.3	21.7	30.7	11.8
1938	67.5	96.2	165.8	183.9	197.3	53.9	18.1	29.5	8.3	32.8	11.9	100.7
1939	79.8	91.2	76.4	99.9	127.2	76.3	42.3	56.7	5.3	1.0	7.9	43.3
1940	59.3	64.0	102.1	110.0	87.9	79.7	54.2	6.7	8.0	12.2	13.3	11.0
1941	51.5	54.9	48.3	112.7	141.1	131.9	70.1	29.0	0.0	0.3	35.8	38.7
1942	103.8	122.8	175.4	121.8	58.3	145.7	90.6	39.7	23.3	8.4	86.8	67.7
1943	97.1	146.5	157.3	105.8	79.4	121.4	16.7	9.2	29.1	10.2	2.1	98.7
1944	63.9	33.1	41.9	86.5	137.6	115.3	19.2	15.9	2.3	2.1	2.7	12.2
1945	90.6	24.0	84.9	181.7	93.9	104.4	57.3	37.7	1.4	5.9	5.7	12.1
1946	45.4	90.0	77.3	137.2	133.8	127.6	83.2	1.0	58.3	5.5	2.8	50.6
1947	52.6	170.7	182.0	160.1	164.2	106.0	50.0	16.5	1.6	2.7	0.9	13.3
1948	83.3	48.7	91.8	83.8	104.3	70.1	42.3	19.9	0.3	12.0	10.5	28.3
1949	37.4	64.7	101.3	117.5	172.5	131.0	54.1	65.0	1.1	15.9	66.8	25.0
1950	85.7	51.7	197.3	113.5	98.6	74.9	26.8	7.9	4.1	0.6	33.3	37.2
1951	108.8	21.3	72.2	97.5	159.8	62.4	51.2	10.6	12.2	12.5	8.5	50.0
1952	44.9	90.1	110.7	98.4	141.5	74.2	80.5	1.0	2.1	0.1	23.5	63.7
1953	81.5	105.6	114.5	117.9	119.1	131.6	29.5	69.6	34.9	0.9	0.5	41.5
1954	80.7	89.5	89.2	224.1	160.9	89.6	73.7	15.0	23.6	2.1	0.1	32.6
1955	60.0	103.7	89.8	38.4	126.3	153.2	27.3	20.3	23.4	0.8	2.8	41.9
1956	47.8	143.5	185.1	124.6	78.6	188.6	64.5	14.1	3.6	13.4	48.0	74.1
1957	80.0	62.7	97.3	197.2	94.4	62.8	77.4	16.1	0.3	8.6	0.9	25.2
1958	34.4	153.9	113.9	72.6	95.1	87.5	90.1	85.9	0.0	36.3	19.3	31.5
1959	35.7	101.9	110.0	96.8	108.8	61.7	60.1	16.7	2.6	9.8	25.1	61.3
1960	42.6	114.4	141.3	116.8	81.9	114.0	84.2	35.7	0.2	1.2	14.9	22.6
1961	28.4	125.4	126.2	105.6	142.4	121.2	61.1	13.7	0.1	0.0	13.9	11.3
1962	69.3	145.7	136.6	216.9	114.2	206.2	47.9	4.8	2.5	33.0	0.3	5.0
1963	118.8	159.8	68.6	127.4	58.0	128.5	76.8	0.4	92.5	7.4	7.0	50.3
1964	109.7	27.1	104.8	101.4	157.4	29.7	50.4	8.4	128.3	15.7	43.2	26.6

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	76.5	137.7	50.6	153.7	130.1	9.0	21.4	62.7	5.1	0.1	33.1	39.4
1966	36.9	70.6	101.9	132.7	149.4	165.6	98.1	20.1	31.3	19.8	5.8	2.4
1967	55.7	88.9	46.2	64.2	77.0	64.6	43.4	3.2	0.9	4.7	24.7	31.5
1968	52.1	76.3	61.2	63.6	98.3	165.4	21.8	29.5	4.1	10.0	8.2	19.7
1969	85.6	61.1	120.2	56.5	101.7	28.1	14.2	25.5	27.3	2.1	98.7	43.7
1970	111.3	55.6	83.4	107.2	89.7	74.8	51.2	54.0	10.9	31.0	63.9	27.1
1971	128.4	81.3	109.1	136.1	206.5	104.1	20.8	11.9	6.3	0.7	1.2	9.7
1972	47.2	142.8	59.8	88.2	166.6	123.4	59.7	10.0	0.0	10.4	19.0	28.7
1973	64.9	89.6	90.8	214.0	140.3	213.1	42.3	43.2	14.7	3.2	7.3	1.7
1974	31.2	133.6	100.4	95.8	71.1	106.9	32.6	1.1	2.4	5.1	2.7	97.8
1975	12.5	104.6	219.2	172.0	141.7	263.6	41.1	68.6	7.3	11.7	8.1	56.9
1976	171.4	48.7	74.1	98.2	120.3	85.6	54.0	0.7	1.6	19.5	18.5	74.6
1977	60.7	106.6	103.8	118.3	64.5	95.9	216.1	13.0	2.0	0.3	22.2	61.7
1978	89.7	71.3	147.2	81.2	113.4	89.7	28.0	16.0	1.5	57.8	9.4	32.5
1979	59.7	54.1	81.9	91.0	79.4	80.1	24.9	4.7	0.6	7.1	2.5	88.8
1980	38.8	88.3	105.5	133.8	177.1	64.7	19.5	54.9	9.9	3.1	35.3	15.3
1981	25.8	68.6	102.6	109.4	72.3	169.2	39.2	7.8	22.0	24.7	3.5	35.1
1982	55.2	113.8	41.0	57.3	50.6	67.3	57.2	10.4	6.9	15.2	3.6	29.4
1983	71.7	143.8	155.4	118.1	104.5	137.4	69.4	16.9	26.6	20.6	10.8	20.8
1984	95.5	105.6	66.4	154.4	221.2	43.3	27.5	1.7	5.2	0.6	0.2	24.0
1985	146.2	133.8	178.9	135.0	112.6	94.4	20.0	2.4	3.2	12.1	46.2	54.1
1986	127.3	148.7	86.3	102.1	98.4	103.3	32.3	3.6	19.9	0.9	47.2	203.9
1987	88.5	104.8	106.8	117.3	255.3	128.5	55.3	34.7	10.2	13.9	20.8	47.8
1988	60.2	121.3	199.5	116.3	205.1	97.2	111.9	9.3	10.1	29.2	0.0	4.9
1989	81.8	238.8	98.8	134.5	36.1	138.6	61.7	7.8	16.0	2.2	56.7	18.0
1990	83.8	48.0	96.2	138.4	96.6	59.2	9.9	14.0	7.0	0.7	5.6	46.0
1991	144.6	103.9	199.1	83.5	105.8	58.8	45.2	0.4	1.6	0.0	10.3	36.0
1992	38.9	68.1	60.0	85.3	99.7	102.7	56.9	3.9	0.2	0.5	14.3	63.6
1993	131.6	103.1	155.0	159.1	157.3	174.8	12.1	13.0	7.5	28.7	23.1	4.3
1994	43.1	38.6	117.4	145.7	58.5	167.3	81.1	20.4	12.8	3.8	0.6	32.3
1995	71.4	88.3	230.8	225.8	155.9	88.9	33.0	13.7	4.2	17.7	5.2	21.0
1996	54.6	187.1	155.1	153.9	66.9	116.5	68.3	15.7	126.7	41.5	12.7	23.6
1997	83.8	95.7	94.2	182.0	209.7	179.5	63.3	36.0	7.5	22.9	32.5	27.2
1998	52.6	161.6	164.9	125.8	184.5	84.9	20.8	9.3	6.6	5.4	3.3	10.3
1999	98.6	85.9	158.2	219.8	182.9	177.6	104.8	46.3	11.2	5.1	3.5	54.3
2000	57.6	100.7	109.0	157.6	119.1	105.5	52.0	7.6	1.1	6.2	5.4	45.0
2001	91.9	201.3	152.0	152.9	82.5	114.7	34.8	41.8	17.1	47.7	72.0	45.9
2002	28.9	64.7	120.2	117.5	89.5	98.9	45.7	34.2	10.5	1.1	23.4	65.9
2003	22.1	80.6	71.6	185.4	104.6	164.4	51.9	8.5	8.6	48.8	9.7	112.3
2004	46.9	125.1	110.9	231.2	94.6	107.7	46.9	19.3	0.6	0.6	25.0	15.5
2005	58.2	119.4	65.4	161.3	128.2	98.5	93.2	41.0	7.2	7.5	89.0	81.6
2006	150.2	117.1	118.7	109.1	80.7	70.3	62.8	0.1	19.9	0.1	10.1	15.9
2007	107.3	91.8	100.2	130.7	131.5	113.9	83.8	11.9	45.1	0.6	21.6	18.8
2008	32.0	82.1	148.4	101.8	157.8	18.9	28.6	23.0	15.5	0.0	33.4	25.1
2009	107.9	61.3	73.0	196.0	92.8	64.9	49.0	7.6	17.6	2.7	4.9	8.5

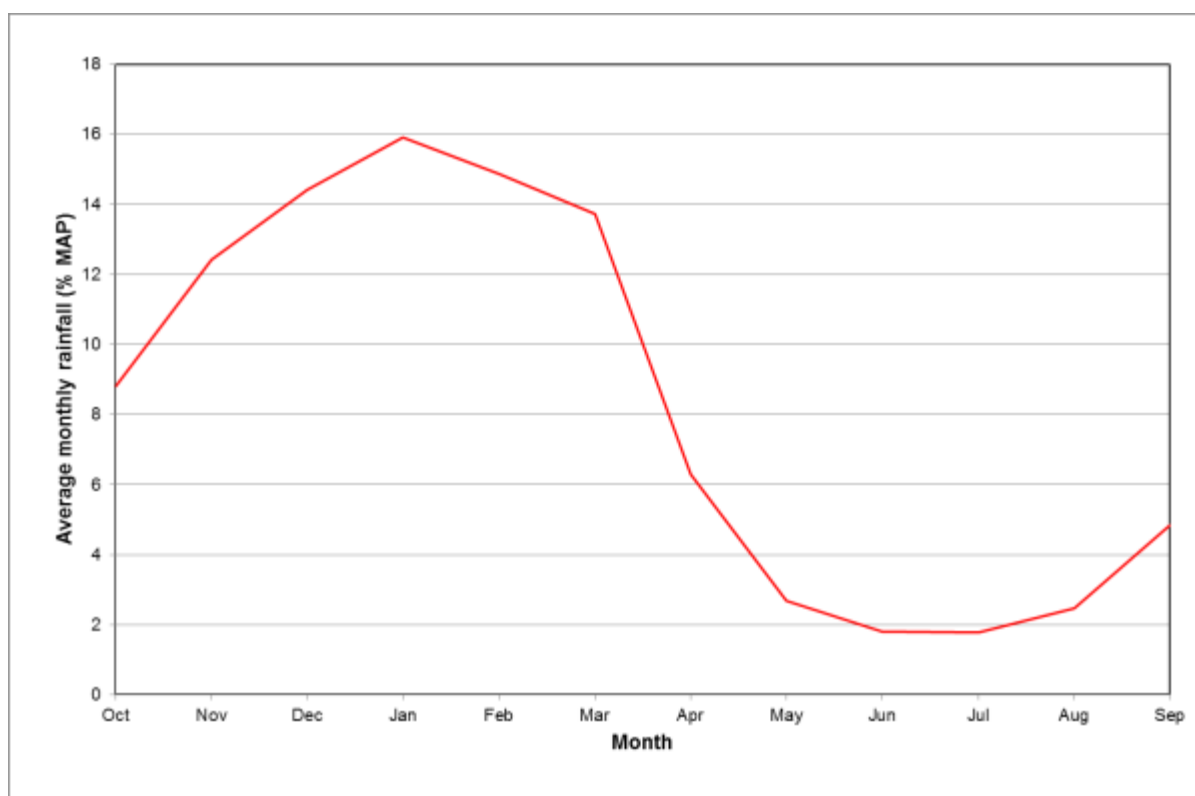


Figure A2- 5 Monthly Rainfall Distribution of Quaternary Catchment T35B

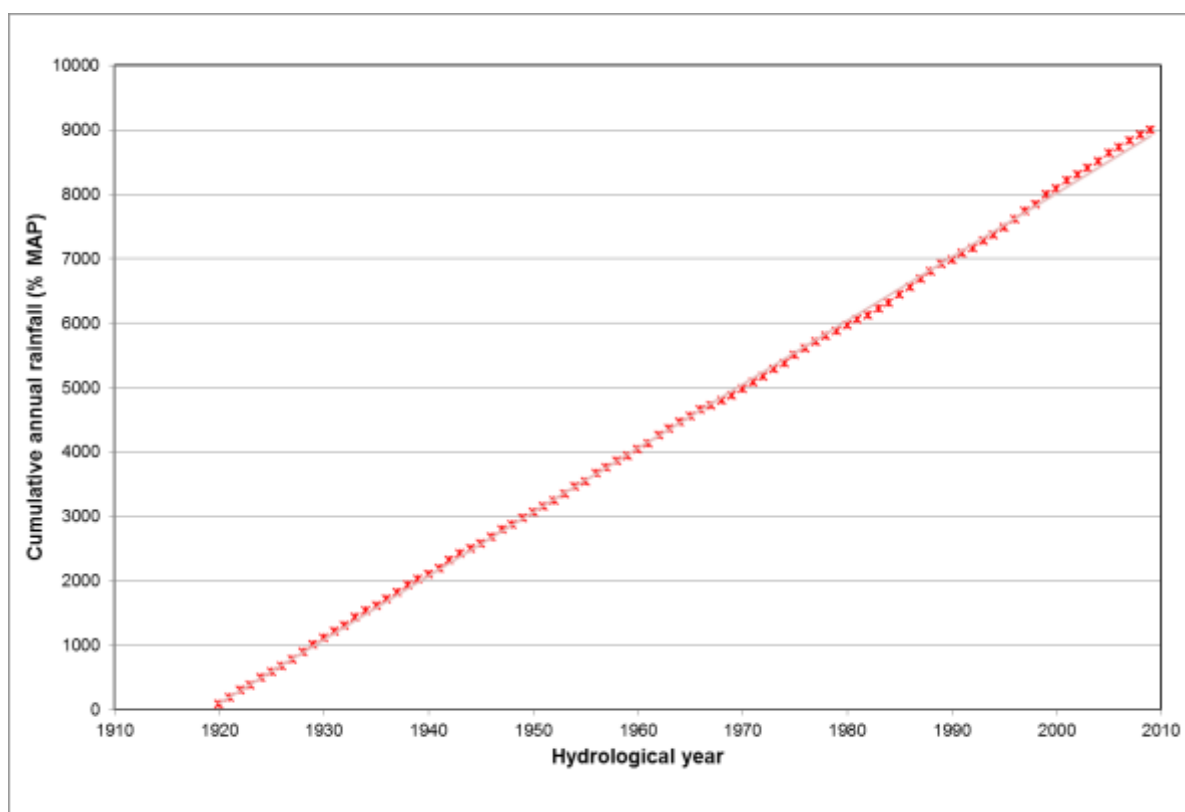


Figure A2- 6 Cumulative Annual Rainfall in Quaternary Catchment T35B

(Middleton and Bailey, 2008)

Table A2- 3 Quaternary Catchment T35C - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	68.8	63.8	111.4	117.8	91.0	131.1	81.7	13.5	0.7	0.9	1.5	35.9
1921	73.5	152.9	142.9	84.1	78.8	43.8	3.2	82.0	34.8	45.6	66.5	30.9
1922	73.6	179.1	68.0	196.0	164.8	111.0	20.3	6.3	9.3	102.4	13.0	17.0
1923	38.0	59.5	117.4	111.9	120.5	101.9	10.4	16.8	9.0	2.4	21.1	43.7
1924	49.5	88.5	228.8	73.9	76.2	223.0	129.3	16.0	1.5	0.8	0.6	41.2
1925	27.4	104.9	78.6	102.8	90.1	137.5	25.7	36.5	42.3	2.9	4.6	65.8
1926	74.4	80.7	129.1	83.5	77.4	236.1	17.3	7.4	0.6	5.7	24.3	29.5
1927	69.6	44.3	189.9	196.2	96.0	73.9	22.8	20.3	5.3	3.3	39.2	15.1
1928	53.5	91.4	155.8	99.8	137.1	177.0	6.2	40.1	55.2	32.6	17.7	72.7
1929	122.6	121.7	156.0	172.4	47.4	137.1	67.9	5.5	15.0	8.5	54.7	31.5
1930	65.2	26.6	109.3	175.8	140.4	148.8	42.7	2.5	2.2	155.0	4.1	9.0
1931	65.4	89.6	121.6	94.6	172.2	64.2	12.0	26.8	5.8	22.6	6.0	98.8
1932	86.2	182.7	150.8	45.3	70.9	125.2	47.9	2.5	3.8	4.4	7.4	16.9
1933	26.8	218.5	181.2	278.9	79.3	147.8	27.4	7.1	9.9	60.9	2.1	8.7
1934	68.7	98.1	183.9	62.3	75.9	116.4	84.4	37.1	40.6	0.4	46.5	16.1
1935	49.6	43.9	32.4	75.2	206.6	75.9	19.1	76.3	6.1	29.8	0.5	33.2
1936	92.4	222.9	60.0	149.0	189.7	111.7	16.2	6.9	2.4	2.4	4.1	35.9
1937	57.4	39.8	99.7	158.5	151.8	75.6	125.1	10.9	20.8	21.9	31.2	12.1
1938	69.9	100.7	170.1	187.6	204.1	54.2	19.2	30.2	8.4	34.1	12.5	104.0
1939	82.6	92.5	78.4	104.4	129.1	81.2	43.5	58.4	5.5	1.2	8.3	45.5
1940	61.4	68.2	102.6	112.7	89.8	82.5	54.8	6.7	8.6	12.0	13.9	11.7
1941	55.7	57.8	50.0	114.8	140.9	134.8	71.8	30.2	0.0	0.3	36.2	39.7
1942	105.9	131.3	179.4	126.7	59.5	146.9	92.9	39.7	24.4	8.6	89.2	69.7
1943	98.7	149.7	162.0	108.3	84.7	125.4	17.2	9.3	30.0	11.1	2.1	106.1
1944	66.3	34.5	41.6	90.5	140.2	116.5	20.0	16.6	2.5	2.2	2.6	12.9
1945	93.8	24.9	87.2	183.6	97.4	107.8	58.1	38.3	1.5	6.2	5.5	12.6
1946	46.9	93.3	80.3	137.9	133.5	129.5	84.9	1.2	60.4	6.0	3.0	52.0
1947	53.8	173.4	183.1	163.3	166.1	107.7	50.8	15.8	1.8	3.0	1.0	13.6
1948	86.0	50.6	92.9	84.6	107.5	71.1	43.8	19.7	0.3	12.3	10.9	29.5
1949	39.2	69.8	101.8	120.6	175.2	132.3	55.8	66.2	1.2	16.5	68.0	25.7
1950	86.5	53.6	200.2	114.7	97.3	76.0	27.6	8.3	3.9	0.6	34.1	38.3
1951	109.8	21.4	73.6	99.9	161.5	63.6	51.4	10.9	12.2	12.8	8.4	50.9
1952	45.7	88.5	111.3	98.4	140.9	75.6	81.3	1.0	2.4	0.1	24.3	65.0
1953	83.1	108.0	117.0	118.6	120.4	133.4	29.7	71.7	35.4	0.9	0.6	42.7
1954	83.5	91.1	90.2	225.4	163.1	89.9	76.0	15.4	24.3	2.0	0.1	33.4
1955	61.7	105.5	89.5	38.3	127.5	157.2	27.7	20.6	23.9	0.8	3.0	42.6
1956	48.9	147.3	185.3	126.3	78.3	189.9	65.6	14.3	3.8	13.6	48.9	74.5
1957	81.4	64.3	99.6	199.5	97.2	64.1	78.7	16.0	0.3	9.2	0.9	26.1
1958	35.2	154.8	115.6	73.5	94.7	88.4	91.9	88.7	0.0	37.5	19.8	32.9
1959	36.6	103.7	111.1	97.4	110.8	64.5	61.8	16.7	2.5	10.1	25.9	62.7
1960	43.4	116.2	142.9	120.3	84.9	116.3	84.5	37.1	0.3	1.3	15.3	23.5
1961	28.9	127.8	129.0	107.2	145.2	122.6	61.0	14.4	0.1	0.0	14.4	11.5
1962	72.0	147.9	137.1	217.7	115.0	207.6	48.3	4.9	2.5	34.2	0.3	5.2
1963	121.0	160.8	69.8	130.8	60.0	130.8	78.5	0.4	94.8	7.4	7.4	51.1
1964	112.9	27.3	106.3	102.7	155.3	30.0	50.8	9.5	129.8	16.6	43.9	26.9

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	79.2	141.0	51.5	154.1	132.7	9.4	22.3	65.7	5.5	0.1	33.8	40.0
1966	38.9	72.0	103.0	133.9	152.2	171.4	98.3	20.7	31.9	20.1	6.1	2.5
1967	56.8	91.3	47.1	66.4	79.0	66.4	44.9	3.2	1.0	5.0	25.2	33.9
1968	53.7	78.1	63.7	64.0	101.2	168.3	22.4	30.4	3.9	10.7	8.6	20.6
1969	87.7	63.3	121.2	58.7	105.1	29.5	14.1	26.7	28.4	2.1	99.3	45.9
1970	113.3	58.1	85.7	109.3	92.3	75.7	52.0	54.9	11.2	32.1	64.6	28.0
1971	129.3	83.1	110.0	139.3	209.8	105.4	21.1	11.9	6.7	0.7	1.2	10.2
1972	48.6	144.6	63.5	89.8	169.7	125.8	59.4	9.8	0.0	11.1	20.2	29.1
1973	67.2	92.5	93.8	218.2	142.2	213.5	45.0	44.7	15.1	3.3	7.8	1.9
1974	32.3	134.2	99.8	97.5	72.4	106.5	33.1	1.1	2.4	5.2	2.9	100.0
1975	12.8	106.7	223.6	176.1	145.4	266.8	41.7	70.2	7.0	11.9	8.3	58.4
1976	174.4	48.7	78.2	100.4	120.0	87.4	52.9	0.8	1.6	19.8	19.2	76.2
1977	62.0	107.5	106.5	119.9	66.2	96.1	224.6	13.9	2.2	0.3	22.9	63.2
1978	91.5	74.0	149.3	83.4	113.5	89.9	28.0	16.7	1.6	59.4	9.9	33.0
1979	61.7	55.1	82.7	93.2	81.0	81.5	26.2	5.0	0.7	7.4	2.8	92.5
1980	40.0	89.7	106.7	136.4	179.1	66.7	19.1	57.7	10.1	3.2	35.4	15.6
1981	26.3	69.3	107.0	111.9	73.3	172.9	39.8	8.1	22.2	25.0	3.7	35.6
1982	57.5	114.9	41.1	58.6	50.6	68.7	57.9	10.7	7.2	15.6	3.7	30.6
1983	72.6	145.8	157.9	118.9	106.9	138.9	70.3	17.3	26.9	21.2	11.2	21.3
1984	97.3	107.9	67.5	157.3	224.4	44.3	28.4	2.0	5.2	0.6	0.2	24.3
1985	147.2	135.0	177.8	133.7	115.8	97.2	20.5	2.6	3.3	12.2	47.3	55.5
1986	130.3	151.1	87.9	103.5	98.3	104.1	33.1	4.0	20.3	0.9	48.1	207.2
1987	90.0	105.8	108.5	119.9	255.4	130.2	55.6	36.1	10.2	14.4	21.4	48.4
1988	61.6	124.2	201.3	116.4	209.0	97.4	114.9	9.6	10.3	30.0	0.0	5.3
1989	84.9	243.2	98.3	136.3	37.0	140.4	62.3	7.9	16.1	2.2	57.6	18.9
1990	85.4	49.6	98.6	138.2	96.9	59.8	10.4	14.0	7.1	0.8	6.0	47.2
1991	146.1	106.6	200.0	85.4	103.8	59.4	46.9	0.4	1.7	0.0	10.2	37.0
1992	40.1	68.9	60.9	86.9	100.2	101.4	57.4	4.0	0.2	0.5	14.6	64.7
1993	132.5	104.4	155.8	160.1	159.8	175.5	12.2	13.2	7.7	28.7	24.1	4.5
1994	44.4	39.1	119.1	145.5	60.5	167.9	83.5	20.4	13.2	3.8	0.7	32.9
1995	73.1	89.8	234.0	226.9	157.4	90.8	32.7	13.9	4.2	17.9	5.2	21.4
1996	56.0	189.0	155.4	154.1	68.2	115.8	70.9	16.3	129.2	43.5	13.0	24.3
1997	83.6	98.3	94.3	183.4	212.3	185.5	64.4	36.2	7.9	23.6	33.6	27.9
1998	53.5	163.2	169.0	125.8	183.7	86.6	21.3	9.4	7.0	5.6	3.5	11.2
1999	100.4	86.7	160.1	220.8	182.0	180.8	106.2	46.3	11.4	5.3	3.7	54.9
2000	59.0	102.2	110.0	159.2	121.5	105.4	54.2	8.3	1.1	6.2	5.6	45.0
2001	93.6	205.2	153.0	154.1	83.3	115.4	35.1	42.9	17.0	48.8	70.8	46.0
2002	30.0	66.0	119.6	118.5	89.8	100.7	46.1	34.4	10.7	1.2	23.9	66.2
2003	22.8	81.7	73.5	184.5	103.4	167.0	51.3	8.5	8.4	49.8	9.7	115.0
2004	46.7	123.7	110.8	234.4	96.0	108.6	46.9	19.5	0.6	0.6	25.3	16.2
2005	59.5	123.3	66.3	157.6	128.2	99.1	95.1	42.1	7.7	7.6	88.2	83.0
2006	152.4	118.6	120.0	108.3	80.7	70.9	62.9	0.1	20.7	0.1	10.4	16.7
2007	108.3	92.0	100.1	129.6	132.1	111.3	83.5	12.4	45.4	0.7	21.0	19.0
2008	33.6	82.4	146.2	101.0	157.7	19.6	29.7	23.4	15.3	0.0	32.6	25.7
2009	107.9	60.5	73.9	195.9	92.8	65.4	48.4	8.4	19.0	3.0	5.1	8.6

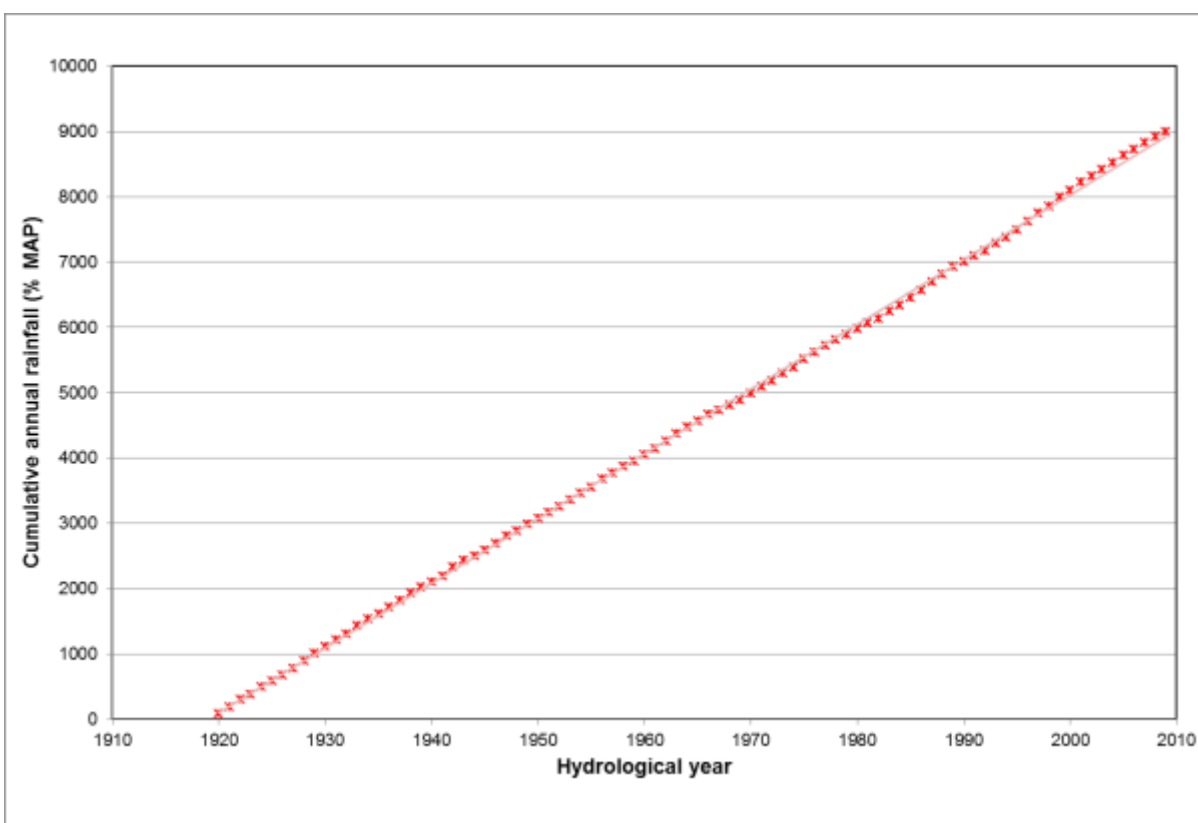
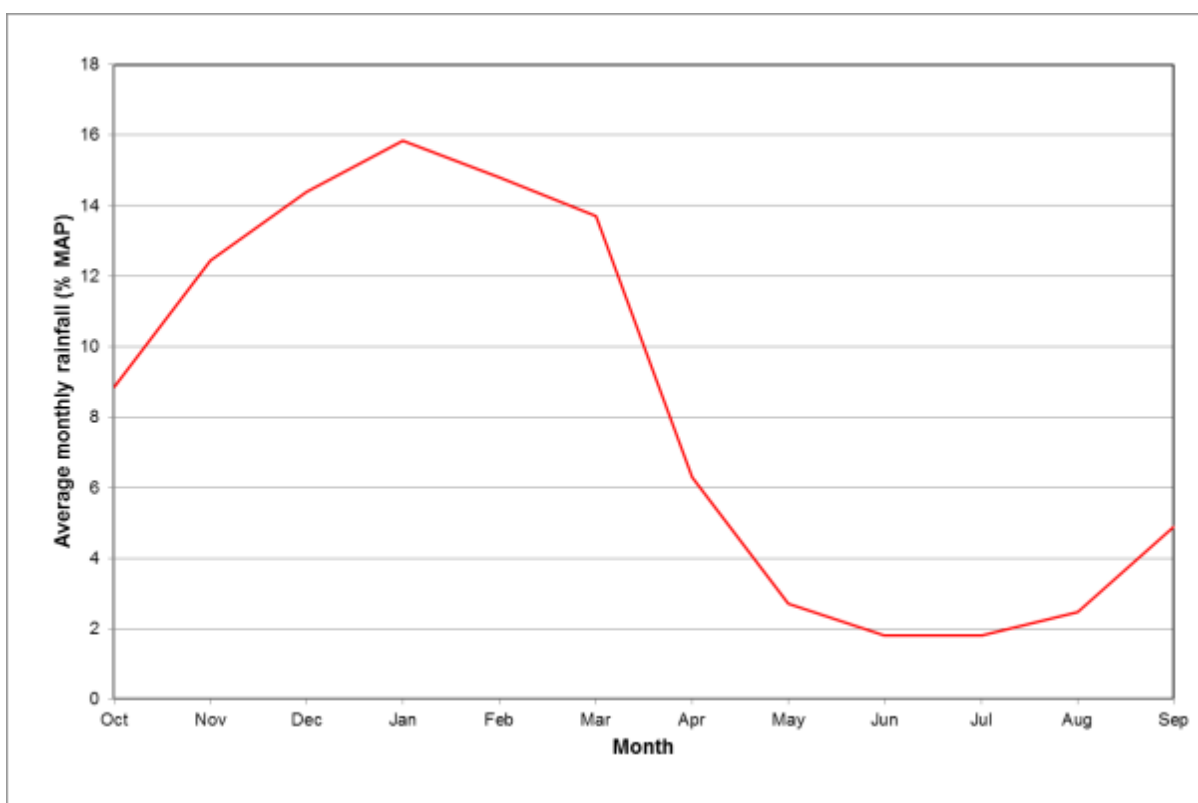


Figure A2- 7 Monthly Rainfall Distribution of Quaternary Catchment T35C

Table A2- 4 Quaternary Catchment T35D - Monthly Rainfall File in millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	67.0	61.6	108.3	111.6	90.8	126.4	79.0	12.5	0.5	0.7	1.2	34.3
1921	71.3	150.4	138.8	82.4	78.3	42.4	2.7	79.5	34.0	47.4	66.5	29.4
1922	70.8	177.0	67.1	190.6	160.9	108.2	19.8	5.7	9.3	97.6	12.5	16.0
1923	37.1	58.9	116.0	111.0	118.0	98.8	10.4	16.2	8.0	2.4	20.3	43.7
1924	47.5	87.2	228.9	73.2	73.9	217.1	132.0	16.0	1.2	0.8	0.5	40.5
1925	26.8	100.7	75.4	101.5	88.2	136.0	26.2	36.7	40.6	2.6	4.6	66.4
1926	71.9	77.3	126.7	82.3	74.0	231.5	16.7	7.1	0.6	5.7	23.3	28.7
1927	70.9	43.6	188.6	193.8	96.0	71.4	22.1	19.5	5.0	2.8	38.8	14.3
1928	51.7	89.1	153.5	100.6	137.0	170.3	5.7	40.0	53.9	32.2	17.1	70.9
1929	118.7	119.5	156.6	170.4	47.5	135.9	67.1	5.1	14.0	8.3	52.6	30.0
1930	65.2	26.8	110.1	172.7	134.8	146.2	42.0	2.5	2.2	152.1	4.3	9.2
1931	62.6	86.9	121.6	92.8	169.6	67.3	12.3	26.0	5.6	21.8	5.4	96.8
1932	83.7	178.4	147.6	45.4	71.9	122.2	47.7	2.4	3.6	4.0	7.2	17.0
1933	26.1	213.7	173.4	271.8	77.7	147.0	26.7	7.0	9.1	58.5	2.3	8.1
1934	66.7	100.2	174.6	60.4	74.9	111.3	81.8	34.6	39.0	0.4	46.1	15.5
1935	48.4	43.0	33.4	75.2	200.9	72.2	19.4	73.4	5.9	28.8	0.4	33.3
1936	90.0	217.2	60.0	144.1	183.7	109.1	15.0	6.6	2.4	2.4	3.8	34.4
1937	56.0	38.6	94.1	157.3	149.7	74.2	121.0	10.6	20.0	21.8	30.5	11.4
1938	66.8	94.4	167.0	184.3	196.6	53.0	17.2	29.3	8.2	32.8	11.8	99.7
1939	79.0	92.5	78.9	98.6	129.9	76.9	42.8	56.2	5.2	0.9	7.7	42.4
1940	59.1	65.3	103.8	109.8	87.8	80.1	53.5	6.7	7.9	12.0	13.5	11.0
1941	51.0	54.8	48.4	113.9	139.8	131.3	69.0	28.1	0.0	0.2	36.3	38.6
1942	103.8	124.2	176.2	121.7	57.9	145.9	90.2	39.6	23.1	8.4	86.5	66.7
1943	97.4	145.8	157.3	105.1	80.6	120.6	16.3	9.2	29.1	9.6	2.2	98.9
1944	63.4	33.3	41.9	87.2	138.6	115.1	19.3	15.8	2.3	2.0	2.7	12.0
1945	90.4	24.0	84.7	181.7	94.0	104.4	56.9	37.3	1.3	5.7	5.8	12.0
1946	45.0	90.2	76.9	137.8	132.8	125.2	81.7	1.0	56.9	5.2	2.7	50.0
1947	52.4	171.4	181.5	158.9	164.3	105.1	50.1	16.3	1.6	2.7	0.9	13.2
1948	84.4	47.6	91.5	84.5	103.8	71.3	41.7	19.7	0.2	11.8	10.2	28.6
1949	37.2	65.0	102.3	117.3	173.9	132.8	53.4	64.9	1.2	15.6	67.2	24.8
1950	84.6	50.5	196.4	113.6	99.0	75.1	26.5	8.1	4.0	0.5	33.4	38.1
1951	109.4	20.7	72.6	99.0	159.6	62.1	51.0	11.2	12.3	12.6	8.4	49.6
1952	45.4	89.9	110.5	98.1	141.8	74.5	80.8	0.9	1.9	0.1	23.4	63.1
1953	82.6	105.3	115.1	119.4	119.9	131.4	30.2	68.7	34.6	0.9	0.6	42.1
1954	80.2	88.9	89.8	225.3	161.0	90.3	72.4	14.9	22.9	2.1	0.0	33.1
1955	60.0	102.9	88.9	38.6	126.2	152.4	27.1	20.1	23.4	0.8	2.9	41.9
1956	47.9	141.7	186.7	123.8	78.6	192.8	65.0	13.7	3.5	13.3	47.9	74.0
1957	79.9	63.1	97.0	197.1	94.8	62.4	78.1	16.4	0.3	8.3	0.9	25.4
1958	35.0	155.8	114.9	72.2	94.9	86.0	89.7	85.8	0.0	36.2	19.0	31.1
1959	35.8	101.2	111.3	95.6	108.4	61.7	61.4	17.1	2.7	10.0	24.6	60.9
1960	43.0	116.3	143.3	118.1	82.6	111.6	84.8	34.9	0.2	1.2	14.6	22.7
1961	28.7	125.1	125.0	105.8	142.3	121.5	61.9	13.6	0.1	0.0	13.5	11.1
1962	69.6	144.6	136.7	215.9	115.7	207.0	47.2	4.9	2.6	32.2	0.3	5.2
1963	120.2	161.5	68.5	129.2	57.6	127.7	75.7	0.4	91.0	7.4	7.0	50.2
1964	109.6	27.7	104.1	100.3	157.1	29.4	50.0	7.4	128.3	15.3	43.6	26.5

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	75.7	137.1	50.6	154.2	129.9	9.2	20.6	61.9	5.0	0.0	32.6	39.5
1966	37.4	70.6	102.8	132.2	148.5	162.2	99.4	20.5	30.2	19.5	5.7	2.6
1967	56.0	89.8	45.5	64.4	77.4	64.0	43.8	3.1	0.7	4.7	24.1	30.8
1968	52.3	76.1	60.3	63.8	98.0	166.1	22.2	30.1	4.1	9.8	7.6	20.0
1969	85.9	60.6	120.5	57.5	101.6	27.8	14.3	25.0	27.2	2.0	98.5	42.7
1970	112.7	56.4	82.0	107.8	89.7	76.1	50.5	53.9	11.0	30.1	64.9	26.9
1971	128.0	79.5	109.6	133.8	205.5	104.6	20.9	12.0	5.8	0.7	1.2	9.2
1972	46.1	142.6	57.6	87.6	169.0	123.8	60.1	9.7	0.0	10.4	19.0	29.1
1973	64.5	89.0	90.5	215.4	140.8	210.5	43.6	41.7	14.9	3.0	7.4	1.5
1974	30.9	132.4	100.3	96.1	70.9	107.6	31.9	1.0	2.4	4.9	2.7	97.3
1975	12.2	103.9	215.9	172.1	140.3	258.9	41.7	68.3	7.2	11.6	8.0	56.4
1976	171.4	47.7	72.8	100.5	119.5	84.6	53.7	0.6	1.8	19.0	17.9	75.5
1977	60.3	106.9	102.8	116.3	64.6	94.6	219.4	14.0	2.2	0.3	22.2	61.3
1978	90.1	69.0	146.6	80.3	112.8	88.4	27.8	15.8	1.5	56.3	9.4	31.8
1979	58.9	53.8	82.3	91.6	79.2	80.5	23.8	4.9	0.5	7.0	2.5	87.6
1980	38.4	89.2	105.3	133.8	176.4	63.0	19.6	52.9	10.0	3.1	33.9	15.1
1981	26.2	68.2	100.4	109.8	72.0	168.2	39.5	7.7	22.0	24.3	3.6	35.0
1982	55.3	114.3	41.0	57.6	50.5	66.9	55.8	10.3	6.7	14.7	3.5	28.6
1983	72.0	143.1	156.8	118.0	104.0	138.1	69.7	17.1	26.3	20.3	10.8	20.7
1984	95.6	105.1	66.8	157.8	222.1	42.9	27.7	1.5	5.2	0.7	0.1	23.6
1985	145.4	132.9	178.5	132.4	112.2	93.2	20.1	2.3	3.1	11.9	45.9	53.7
1986	126.5	148.5	88.0	103.4	97.5	102.7	31.9	3.4	19.8	0.9	47.3	205.5
1987	89.2	105.9	107.4	117.2	254.6	129.8	55.2	34.2	10.1	13.7	21.0	46.8
1988	60.4	121.1	199.1	116.1	203.5	95.7	111.6	9.8	10.0	29.2	0.0	4.8
1989	82.0	236.2	98.0	134.7	35.4	140.8	61.0	7.5	15.8	2.2	56.6	17.5
1990	83.6	48.0	96.6	137.4	97.2	59.1	10.3	13.6	6.8	0.7	5.4	45.3
1991	145.0	103.4	197.3	83.7	105.9	58.3	44.3	0.3	1.4	0.0	10.0	36.3
1992	39.0	67.6	59.9	85.4	99.1	103.7	56.4	3.8	0.1	0.5	14.2	63.8
1993	130.5	102.3	153.0	160.8	155.2	173.4	11.4	12.5	7.8	28.4	22.2	4.8
1994	43.5	38.8	117.6	145.1	57.1	167.1	80.5	19.9	13.1	3.9	0.5	32.3
1995	71.3	87.5	232.4	226.3	154.2	88.3	33.4	13.9	4.2	17.6	5.1	20.7
1996	54.1	186.8	153.5	154.5	66.4	115.3	66.9	15.3	125.1	41.2	12.6	23.9
1997	84.8	96.7	94.3	182.2	207.1	174.8	62.9	36.1	7.0	22.2	31.4	27.1
1998	51.8	160.8	164.8	125.8	180.1	85.2	20.2	9.1	6.6	5.4	3.0	10.0
1999	99.1	85.8	159.1	221.6	186.8	176.7	103.8	46.7	11.0	5.0	3.2	53.4
2000	58.1	100.1	108.7	156.8	117.8	104.3	50.3	7.3	1.1	6.2	5.3	44.5
2001	90.3	202.1	151.0	152.0	83.1	113.8	34.3	41.6	16.9	46.3	71.5	45.8
2002	29.4	64.7	118.5	116.7	89.2	98.1	46.0	34.2	10.3	1.2	23.3	65.8
2003	22.5	80.6	71.8	185.1	106.4	164.0	51.9	8.5	8.7	48.1	9.7	111.7
2004	46.7	123.9	110.1	231.8	93.9	107.6	45.5	19.1	0.5	0.6	24.5	15.2
2005	57.5	118.4	65.5	161.5	128.1	98.2	93.1	40.5	6.8	7.6	88.2	80.4
2006	149.2	117.3	119.7	109.2	80.3	68.5	63.0	0.1	19.3	0.1	9.8	15.4
2007	106.8	91.8	99.4	130.9	134.1	114.5	85.6	11.4	44.7	0.6	21.5	18.5
2008	31.4	82.3	147.9	101.1	156.1	19.7	26.8	24.0	15.4	0.0	32.7	25.3
2009	108.2	60.7	71.3	193.4	93.9	64.6	48.5	6.8	17.4	2.5	4.7	8.1

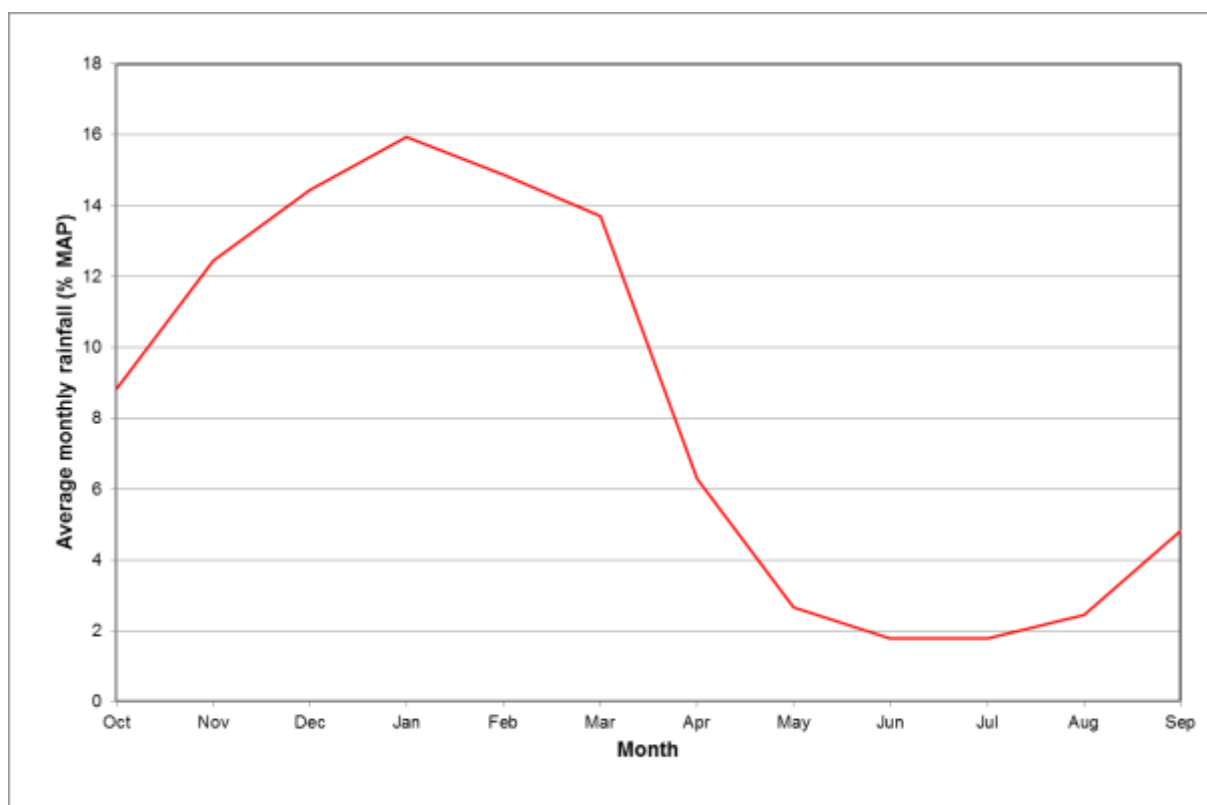


Figure A2- 8 Monthly Rainfall Distribution of Quaternary Catchment T35D

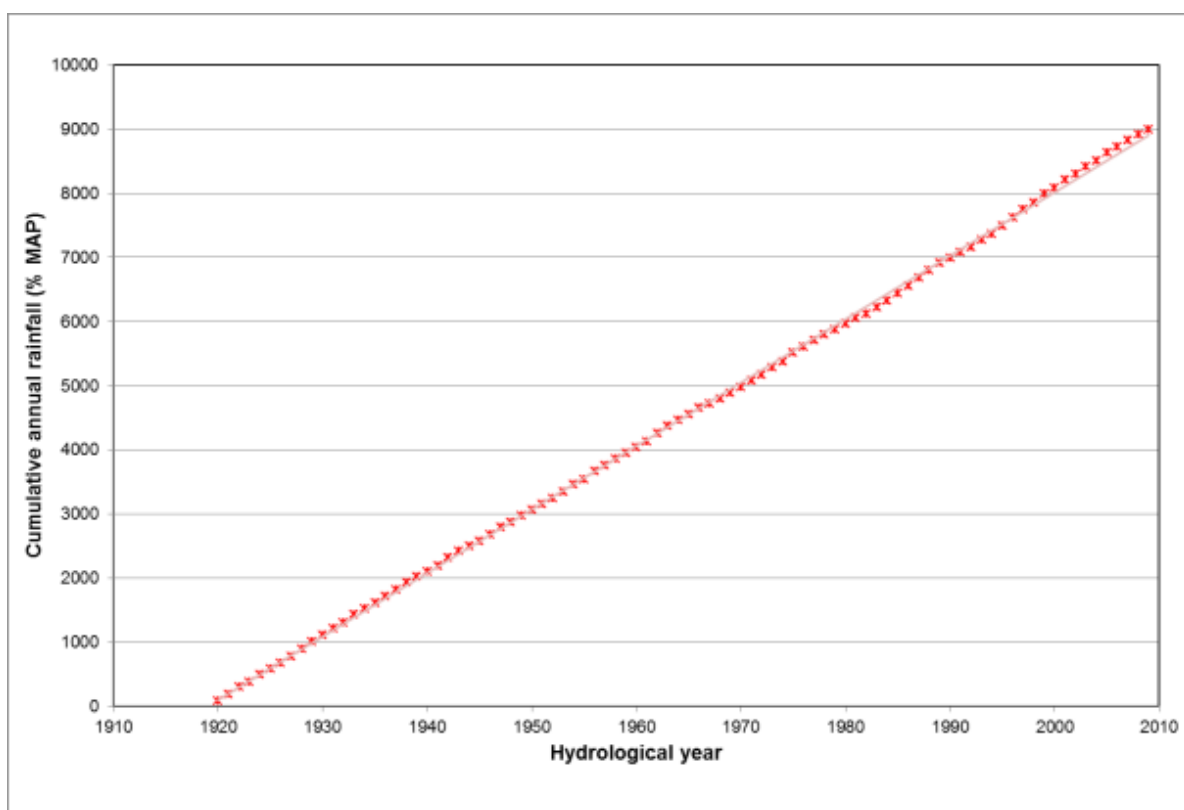


Figure A2- 9 Cumulative Annual Rainfall in Quaternary Catchment T35D

Table A2- 5 Quaternary Catchment T35E - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	90.8	88.0	132.2	135.9	103.7	150.6	90.1	12.8	0.7	0.9	1.6	43.2
1921	98.6	182.4	173.1	99.0	93.3	49.0	4.3	102.5	40.7	39.5	71.5	35.1
1922	90.9	227.4	78.0	246.1	202.0	126.8	19.6	6.0	10.4	135.4	12.5	20.2
1923	54.4	81.6	146.4	144.3	164.5	104.0	13.5	20.5	8.8	1.4	31.0	53.9
1924	62.9	109.9	283.6	92.2	89.2	234.0	188.7	20.1	1.6	1.0	0.9	46.2
1925	33.5	132.7	95.8	122.1	114.3	171.7	30.9	40.0	50.5	2.7	7.1	82.9
1926	91.2	100.4	155.3	95.7	84.4	294.0	17.5	7.1	1.0	9.0	26.5	38.5
1927	95.3	56.1	214.9	228.5	122.8	88.7	27.6	23.5	6.6	4.3	51.0	18.8
1928	68.1	125.6	163.9	122.1	170.0	207.2	7.4	45.2	63.5	35.3	21.1	93.5
1929	152.3	152.0	174.4	190.7	55.5	176.9	81.3	7.8	18.9	9.9	68.7	42.7
1930	87.0	41.1	151.6	219.5	152.2	185.7	49.8	3.6	3.2	178.6	5.7	13.4
1931	82.8	116.6	142.2	120.0	225.7	78.8	8.6	34.1	7.4	27.4	9.1	123.9
1932	115.3	232.8	194.5	64.2	91.5	164.4	50.9	3.2	4.4	5.9	8.8	21.7
1933	36.0	271.7	220.2	321.8	99.6	182.9	32.2	7.9	12.5	71.4	3.4	12.2
1934	79.1	131.0	243.7	87.7	85.3	140.4	99.9	59.7	54.7	0.5	56.6	20.5
1935	69.1	53.6	43.7	98.5	244.4	125.3	25.4	94.2	7.4	36.2	0.7	45.3
1936	124.7	292.8	81.6	187.5	228.4	114.5	18.0	9.2	4.3	3.1	4.9	46.5
1937	78.3	49.0	156.7	218.2	174.6	92.1	144.1	13.1	25.6	27.1	37.2	13.3
1938	90.5	130.8	228.5	235.7	275.9	58.7	23.3	38.4	10.2	47.4	17.9	133.6
1939	106.0	125.9	121.6	136.9	181.3	125.8	60.4	74.7	7.4	1.3	10.2	59.7
1940	82.7	115.4	132.4	145.6	113.6	110.0	63.1	7.9	12.9	12.0	21.0	18.1
1941	87.7	83.1	68.0	155.8	149.3	168.5	82.4	37.1	0.0	0.3	46.4	51.5
1942	134.7	218.6	236.3	171.5	73.3	177.6	119.2	44.5	34.1	11.1	116.6	85.9
1943	126.7	186.6	215.8	132.8	140.0	161.2	20.9	10.6	40.8	14.3	3.2	172.0
1944	87.4	50.9	45.4	133.8	184.8	138.4	28.4	22.0	3.8	2.6	2.5	18.0
1945	128.5	33.6	114.4	222.3	133.8	145.4	69.7	43.8	1.9	7.3	5.2	17.0
1946	61.1	131.1	111.8	168.2	143.4	142.9	99.8	1.8	74.6	8.6	4.8	64.8
1947	67.4	226.4	211.9	198.3	202.8	129.5	66.2	11.4	2.7	4.5	1.5	17.8
1948	124.7	61.7	112.6	107.3	143.6	97.4	55.8	21.4	0.3	15.2	13.1	44.2
1949	54.4	114.0	125.7	158.3	228.6	176.3	68.6	82.1	2.3	20.3	89.2	32.6
1950	94.9	62.8	239.1	139.8	107.9	95.6	34.7	13.2	2.2	0.8	45.6	57.7
1951	137.7	20.7	95.6	139.3	193.7	77.2	60.1	18.5	14.7	18.0	8.7	59.6
1952	60.2	88.6	129.2	113.4	158.6	98.8	98.9	1.4	2.7	0.3	33.0	78.7
1953	112.6	137.0	154.6	149.8	150.7	164.7	39.1	90.3	40.9	1.7	1.0	60.4
1954	110.9	108.5	113.5	275.0	201.7	106.0	88.8	18.8	27.0	1.5	0.1	47.7
1955	81.7	127.0	92.4	45.0	152.9	198.2	30.9	25.1	31.2	1.2	5.4	52.5
1956	64.2	179.5	223.4	151.2	88.5	249.2	85.4	15.5	4.6	16.7	60.3	88.6
1957	100.6	84.9	125.0	239.1	130.8	76.7	103.1	18.1	0.5	12.0	1.5	35.7
1958	49.8	197.6	151.3	88.1	104.7	95.3	113.6	120.5	0.0	51.4	24.1	45.2
1959	49.4	124.9	142.5	105.1	137.8	89.3	90.3	21.0	2.9	14.9	32.1	79.8
1960	57.9	157.8	188.1	167.8	121.0	130.3	100.4	44.1	0.3	1.9	17.8	32.2
1961	38.5	157.9	157.1	136.1	179.6	151.3	71.6	21.4	0.1	0.0	18.4	12.6
1962	100.5	173.8	160.5	246.3	151.1	255.8	55.4	7.9	3.7	41.2	0.5	9.1
1963	159.4	201.2	87.0	180.8	79.9	160.6	93.3	0.7	114.5	8.8	10.1	63.2
1964	147.0	36.9	123.8	118.1	160.3	34.4	57.7	10.5	159.0	22.1	57.3	32.1

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	103.6	178.7	65.2	181.7	166.1	13.6	26.5	89.2	8.5	0.1	39.6	49.7
1966	59.7	90.2	129.4	155.6	188.5	212.1	123.3	30.0	34.7	24.0	7.5	5.1
1967	75.3	127.4	56.4	90.4	107.7	82.5	62.5	3.1	1.0	8.1	30.4	48.6
1968	72.9	99.6	82.9	75.2	133.4	212.6	30.4	44.8	2.9	14.0	9.0	32.1
1969	115.1	83.4	145.8	88.9	140.4	42.2	16.8	35.6	39.5	1.4	116.2	59.3
1970	154.7	87.5	103.2	139.2	121.8	101.7	59.0	67.9	17.3	38.4	89.1	37.0
1971	157.2	96.3	138.1	164.5	257.5	135.6	28.9	15.7	7.0	1.3	1.4	11.7
1972	57.7	177.5	81.3	108.5	227.8	170.4	67.2	7.9	0.0	16.9	31.0	39.5
1973	90.1	120.4	123.2	287.1	176.8	225.3	78.9	53.0	20.5	3.5	11.2	2.2
1974	43.4	147.7	109.7	124.0	88.0	126.3	37.3	1.7	2.6	4.9	4.3	124.7
1975	15.1	129.7	264.6	235.7	189.1	298.3	54.9	89.5	5.6	15.0	9.2	73.6
1976	222.8	49.0	107.7	143.5	129.0	105.0	52.4	0.8	3.3	21.3	21.7	103.9
1977	79.9	132.0	135.3	135.1	89.0	102.7	344.9	27.2	4.2	0.5	30.1	78.7
1978	119.2	87.9	180.4	104.4	126.6	97.9	29.5	21.8	2.5	66.6	14.2	36.4
1979	78.8	66.5	99.5	123.9	101.5	107.2	31.7	8.8	0.7	10.6	4.4	118.9
1980	49.6	118.9	128.8	168.5	212.3	76.8	21.3	67.4	14.3	5.3	32.1	18.4
1981	36.5	80.3	134.2	151.1	85.0	214.5	50.9	10.4	27.2	28.1	6.5	43.7
1982	80.7	141.9	48.4	77.1	56.8	85.1	62.9	14.6	8.5	16.4	5.1	38.3
1983	91.1	176.3	204.2	142.5	132.7	174.3	88.5	23.3	30.5	25.7	14.8	26.3
1984	124.0	137.8	86.2	221.3	283.0	56.0	39.5	2.1	5.6	1.5	0.2	26.9
1985	171.9	155.8	195.4	127.5	151.5	123.6	29.3	3.9	3.9	12.9	59.3	71.0
1986	164.7	184.3	122.5	136.0	105.9	122.1	39.4	5.3	25.2	1.7	62.6	275.1
1987	118.2	137.5	139.5	150.9	285.3	170.6	65.9	47.1	10.8	18.7	29.8	53.4
1988	83.6	158.6	231.8	134.9	256.0	99.9	148.3	16.8	12.7	42.9	0.0	7.2
1989	119.3	289.7	104.3	164.5	43.0	184.0	71.9	8.8	18.3	3.0	70.7	23.6
1990	106.8	66.9	131.3	148.4	116.9	69.5	18.4	14.3	8.3	1.0	8.6	61.2
1991	179.9	133.2	220.0	111.5	106.4	66.6	59.8	0.5	2.1	0.0	8.9	51.8
1992	54.5	81.0	74.0	109.9	110.6	112.5	65.8	4.5	0.2	0.8	17.8	84.9
1993	149.4	121.0	172.9	198.5	185.6	200.4	10.3	14.3	11.6	31.4	26.3	8.6
1994	61.8	48.8	148.2	157.8	72.1	193.1	107.3	21.8	21.7	4.4	0.8	43.8
1995	92.1	104.0	292.6	274.7	176.8	111.8	36.4	19.8	5.0	23.1	4.5	25.6
1996	69.6	221.6	167.4	178.0	82.7	123.6	87.9	19.9	158.2	58.3	16.1	34.3
1997	99.6	131.2	108.8	219.4	244.5	225.9	77.0	49.3	11.0	30.7	37.5	39.1
1998	61.3	190.1	218.9	144.0	167.7	112.0	24.8	11.6	10.1	7.8	4.6	16.8
1999	131.3	104.6	202.8	272.1	222.7	226.9	128.3	54.4	13.4	7.5	4.8	60.8
2000	79.8	125.0	128.3	186.3	142.7	110.0	61.8	11.5	1.0	7.3	7.3	48.2
2001	106.1	263.1	175.7	180.8	105.3	132.1	39.5	54.7	17.6	52.3	70.9	53.4
2002	45.1	82.8	115.5	139.1	103.6	118.6	56.6	40.0	12.9	2.1	29.1	79.1
2003	33.6	102.1	95.7	202.5	120.8	206.0	56.2	9.6	9.7	58.7	10.4	144.7
2004	49.2	123.0	120.2	296.3	114.2	124.2	42.5	23.2	0.7	0.5	28.2	20.6
2005	68.5	160.6	85.4	161.7	146.9	115.7	116.8	50.9	9.5	11.3	94.7	100.5
2006	178.9	147.6	155.3	117.0	93.8	74.0	77.0	0.3	25.8	0.1	11.6	20.7
2007	127.8	108.5	105.5	141.5	169.4	116.3	107.2	14.1	52.4	0.8	19.4	20.2
2008	44.6	98.8	143.9	105.5	168.2	32.7	29.6	37.2	15.8	0.0	29.6	35.3
2009	128.5	61.6	76.3	207.1	111.8	75.0	46.9	7.6	29.4	4.2	4.8	7.5

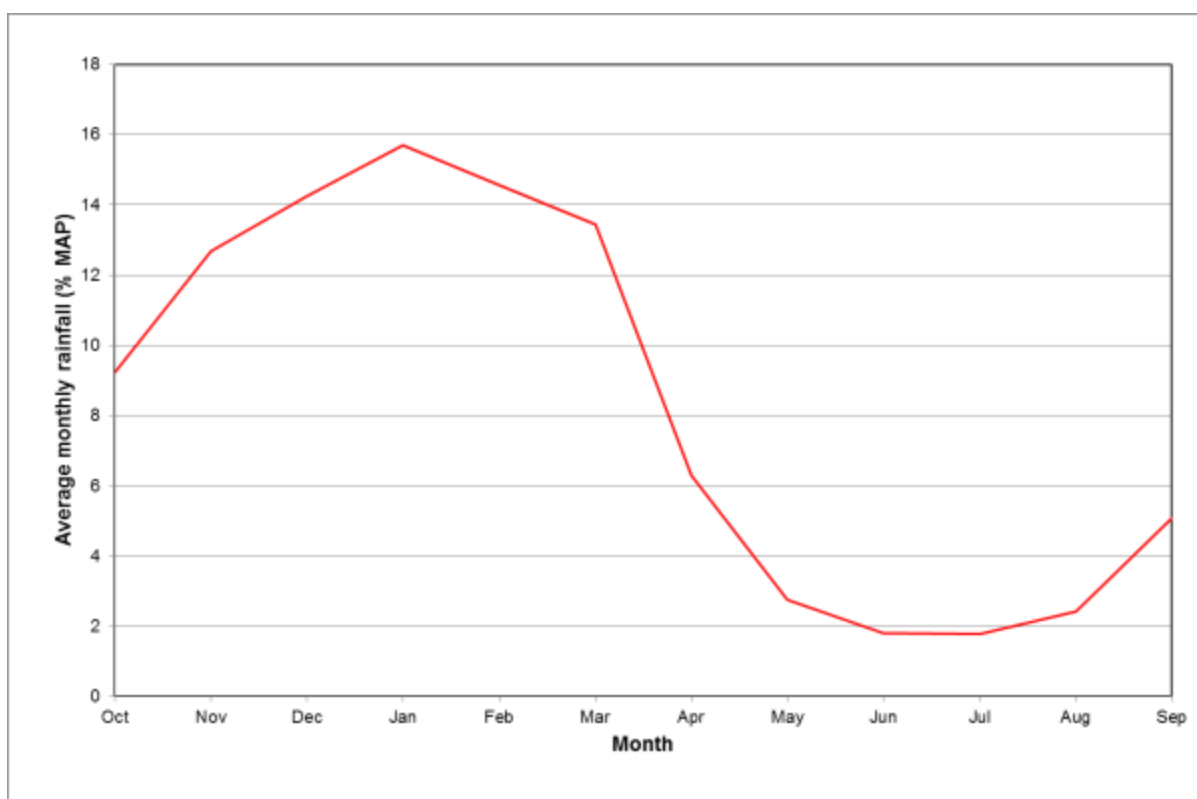


Figure A2- 10 Monthly Rainfall Distribution of Quaternary Catchment T35E

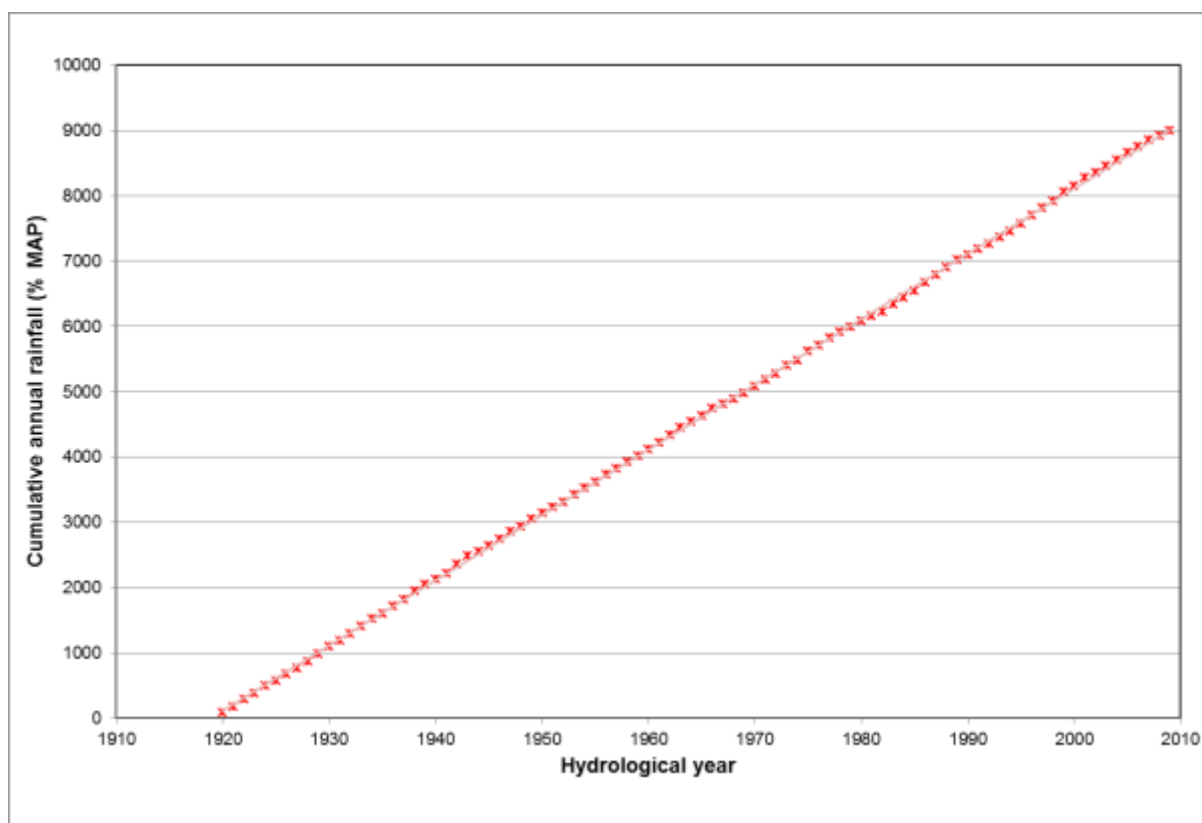


Figure A2- 11 Cumulative Annual Rainfall in Quaternary Catchment T35E

Table A2- 6 Quaternary Catchment T35F - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	70.6	66.2	112.5	120.3	89.8	132.5	82.0	13.6	0.8	1.0	1.7	36.6
1921	75.7	153.4	144.5	84.4	78.3	44.0	3.5	83.7	35.0	42.2	64.9	31.5
1922	75.2	180.7	67.6	199.3	166.7	111.4	19.9	6.5	9.1	106.4	12.8	17.5
1923	39.4	60.8	118.0	112.9	123.8	101.2	10.4	17.2	9.4	2.1	22.1	43.6
1924	50.9	89.1	228.4	74.3	76.8	221.0	130.8	16.1	1.6	0.7	0.6	40.9
1925	27.8	107.8	80.6	102.8	91.5	138.2	25.2	35.6	43.2	3.1	4.8	65.4
1926	75.6	82.8	129.6	83.2	78.3	238.6	17.2	7.4	0.7	6.0	24.5	30.2
1927	69.8	44.8	187.7	195.6	96.2	75.0	23.2	20.5	5.5	3.7	39.7	15.6
1928	54.9	94.2	153.4	98.8	136.8	179.7	6.5	39.5	55.3	32.2	17.9	74.1
1929	125.0	123.2	153.0	170.5	46.7	138.3	67.9	5.9	15.8	8.6	56.1	32.9
1930	65.8	27.4	110.7	177.9	141.4	150.6	42.7	2.6	2.2	154.8	4.1	9.2
1931	67.3	92.0	120.2	96.0	174.9	61.8	11.0	27.3	5.9	23.0	6.6	100.2
1932	88.9	186.0	153.6	46.2	70.5	128.1	46.9	2.5	4.0	4.7	7.4	16.8
1933	27.5	221.7	185.6	280.3	80.2	148.0	27.7	7.1	10.5	61.9	2.1	9.2
1934	69.1	97.3	192.2	64.7	75.4	119.2	85.3	40.3	42.1	0.4	46.5	16.4
1935	51.4	44.3	31.9	75.5	208.4	81.9	19.1	78.1	6.3	30.3	0.6	33.5
1936	95.0	228.2	60.7	152.4	192.5	110.4	16.7	7.2	2.6	2.5	4.2	37.1
1937	59.2	40.5	107.5	161.4	151.5	76.1	126.2	11.0	21.3	22.0	31.4	12.3
1938	72.2	105.6	174.2	190.0	211.6	53.8	20.5	30.9	8.6	35.5	13.2	107.2
1939	85.4	93.7	80.9	109.2	130.9	87.2	44.7	60.0	5.7	1.3	8.7	48.0
1940	63.7	73.9	102.2	115.0	91.2	85.2	54.9	6.7	9.4	11.5	14.6	12.6
1941	61.1	61.1	51.6	116.8	138.3	137.0	72.8	31.5	0.0	0.3	36.3	40.6
1942	107.6	142.5	182.9	131.8	60.2	146.7	94.9	39.1	25.7	8.8	91.6	71.4
1943	99.8	151.9	166.7	110.0	91.5	129.3	17.7	9.2	31.0	12.2	2.1	115.7
1944	68.7	36.2	40.5	95.3	142.5	116.4	20.9	17.2	2.7	2.3	2.5	13.8
1945	97.5	25.8	89.4	183.8	101.2	111.2	58.5	38.4	1.7	6.5	5.0	13.1
1946	48.5	97.0	83.9	137.2	130.9	130.0	86.0	1.3	62.5	6.7	3.3	53.2
1947	54.7	175.5	181.9	165.4	166.6	108.6	51.6	14.4	2.0	3.3	1.1	13.9
1948	88.9	52.4	93.2	84.8	110.9	71.9	45.4	19.2	0.3	12.6	11.3	30.9
1949	41.2	76.3	101.0	123.6	177.0	133.0	57.2	66.9	1.3	17.0	68.9	26.3
1950	86.1	55.4	201.2	114.9	94.3	76.5	28.3	8.9	3.5	0.7	34.9	39.7
1951	110.0	21.0	74.6	102.2	161.7	64.3	51.0	11.4	12.0	13.1	8.2	51.3
1952	46.2	84.7	110.6	97.2	138.0	76.8	81.2	1.2	2.7	0.2	25.1	66.0
1953	84.6	110.0	119.3	118.0	120.6	134.4	29.5	73.7	35.6	1.0	0.6	43.9
1954	86.5	91.9	90.4	224.4	164.1	88.9	77.7	15.8	24.8	1.8	0.1	34.3
1955	63.2	106.6	87.5	37.6	127.5	160.5	27.7	20.9	24.3	0.8	3.3	42.9
1956	50.0	150.7	183.1	126.9	76.8	189.2	66.4	14.5	3.9	13.8	49.4	74.2
1957	82.2	65.6	101.3	199.8	100.0	64.8	79.7	15.5	0.3	9.9	1.0	26.9
1958	36.0	154.3	116.9	73.8	92.7	88.1	93.1	91.7	0.0	38.9	20.3	34.6
1959	37.5	104.7	111.2	96.5	112.2	67.5	63.5	16.5	2.4	10.5	26.7	63.9
1960	44.1	117.6	143.5	123.9	88.2	117.5	83.7	38.4	0.3	1.4	15.6	24.5
1961	29.3	129.4	131.1	108.3	146.9	123.0	59.8	15.2	0.1	0.0	15.0	11.5
1962	75.0	148.7	135.8	215.5	115.3	207.0	48.2	5.1	2.5	35.3	0.3	5.6
1963	122.6	160.2	70.5	134.0	62.2	132.3	79.6	0.4	96.8	7.4	7.7	51.6
1964	115.8	27.3	106.7	102.9	149.7	29.9	50.6	10.7	130.3	17.7	44.3	26.9

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	82.1	143.8	52.1	152.6	134.4	9.8	23.3	69.1	5.9	0.1	34.1	40.2
1966	41.4	72.9	103.2	133.6	154.3	177.3	97.4	21.3	32.4	20.4	6.3	2.7
1967	57.7	93.8	47.9	68.7	81.1	67.8	46.5	3.2	1.2	5.5	25.7	36.8
1968	55.3	79.4	66.3	63.5	104.0	170.1	22.9	31.5	3.5	11.5	9.1	21.8
1969	89.5	65.5	120.9	61.4	108.4	31.3	13.9	28.1	29.7	2.1	98.8	48.1
1970	115.0	61.1	87.6	110.5	94.8	76.2	52.3	55.5	11.7	33.3	65.3	29.0
1971	129.3	84.3	110.3	141.7	211.7	106.4	21.5	11.9	7.2	0.7	1.2	10.8
1972	49.9	145.4	67.8	90.9	172.1	128.7	58.0	9.3	0.0	11.9	21.6	29.5
1973	69.6	95.3	96.7	221.8	143.1	210.1	48.7	46.2	15.4	3.4	8.2	2.1
1974	33.6	132.7	97.5	98.6	73.1	104.6	33.3	1.3	2.3	5.2	3.1	101.7
1975	13.1	108.0	226.6	180.4	149.4	267.6	41.9	71.8	6.6	12.1	8.3	59.7
1976	176.7	47.8	83.1	102.4	117.6	88.7	50.6	0.9	1.6	19.9	19.8	77.7
1977	63.3	107.5	109.1	120.2	67.8	94.8	235.7	15.1	2.5	0.4	23.6	64.5
1978	93.0	76.6	150.1	85.3	111.9	88.8	27.5	17.4	1.8	60.5	10.4	33.2
1979	63.8	55.7	82.4	95.3	82.0	82.9	27.5	5.4	0.8	7.8	3.1	96.2
1980	40.9	90.8	107.1	137.9	179.4	68.3	18.5	60.4	10.3	3.5	34.8	15.8
1981	26.9	69.2	111.4	114.5	73.3	175.8	40.1	8.4	22.3	25.0	4.0	35.9
1982	60.0	115.0	40.8	59.7	49.7	69.6	57.9	11.1	7.4	15.9	3.9	32.0
1983	72.9	146.6	159.4	118.6	108.6	139.3	70.7	17.7	26.9	21.7	11.6	21.6
1984	98.6	109.8	68.1	160.0	225.9	45.1	29.4	2.2	5.1	0.6	0.2	24.3
1985	146.7	134.7	173.6	129.5	119.0	99.9	21.2	2.8	3.4	12.2	48.2	56.8
1986	132.8	152.1	89.4	104.2	96.7	103.9	33.6	4.5	20.6	1.0	48.9	209.9
1987	91.2	106.2	109.7	121.8	251.5	131.4	55.4	37.6	9.9	15.0	22.0	48.6
1988	63.1	126.6	200.3	115.2	211.6	95.7	117.5	10.1	10.5	31.1	0.0	5.7
1989	88.3	245.7	96.1	136.7	37.6	141.2	62.2	8.0	16.0	2.2	58.0	19.8
1990	86.6	51.3	101.1	135.5	96.2	59.6	11.0	13.9	7.2	0.9	6.4	48.6
1991	146.4	108.7	198.0	87.1	99.4	59.2	48.8	0.5	1.9	0.0	9.9	38.1
1992	41.3	69.1	61.3	88.0	99.3	98.0	57.3	4.1	0.2	0.5	14.8	65.6
1993	131.7	104.5	154.6	159.1	161.1	174.3	12.1	13.3	7.9	28.4	24.9	4.6
1994	45.6	39.3	120.0	142.7	62.3	166.0	85.8	20.3	13.8	3.7	0.7	33.5
1995	74.4	90.4	235.1	226.0	156.9	92.2	31.8	14.2	4.2	18.2	5.0	21.8
1996	57.3	188.8	153.4	152.0	69.1	113.3	73.5	16.8	131.1	45.7	13.2	25.0
1997	82.1	100.5	93.0	182.8	213.0	191.4	65.0	36.5	8.5	24.5	34.5	28.7
1998	53.9	163.1	172.6	123.9	178.4	87.9	21.7	9.6	7.5	5.9	3.8	12.4
1999	101.7	86.7	161.0	219.4	178.1	183.2	107.0	45.6	11.6	5.6	4.0	54.8
2000	60.3	103.1	109.7	159.0	122.8	103.5	56.2	9.2	1.0	6.2	5.8	44.3
2001	94.5	208.0	152.1	153.7	83.5	114.9	35.1	44.0	16.5	49.4	68.0	45.5
2002	31.2	66.8	116.1	118.4	88.9	101.5	46.0	34.1	10.9	1.3	24.2	65.7
2003	23.7	82.2	75.1	180.5	100.0	168.5	49.7	8.4	8.2	50.5	9.6	117.4
2004	45.6	119.4	108.9	236.2	96.7	108.0	45.9	19.5	0.7	0.6	25.4	17.0
2005	60.1	127.1	66.9	150.5	126.5	98.5	96.2	42.9	8.3	7.8	86.0	83.9
2006	153.0	119.1	120.7	105.2	80.0	70.6	62.5	0.1	21.6	0.1	10.5	17.6
2007	108.2	91.2	98.1	126.0	131.1	105.9	82.2	12.9	45.3	0.8	19.7	18.8
2008	35.3	81.7	140.3	98.2	154.9	20.5	30.6	23.9	14.9	0.0	31.0	26.3
2009	106.8	58.5	73.5	192.7	91.4	65.0	46.5	9.3	20.8	3.3	5.1	8.6

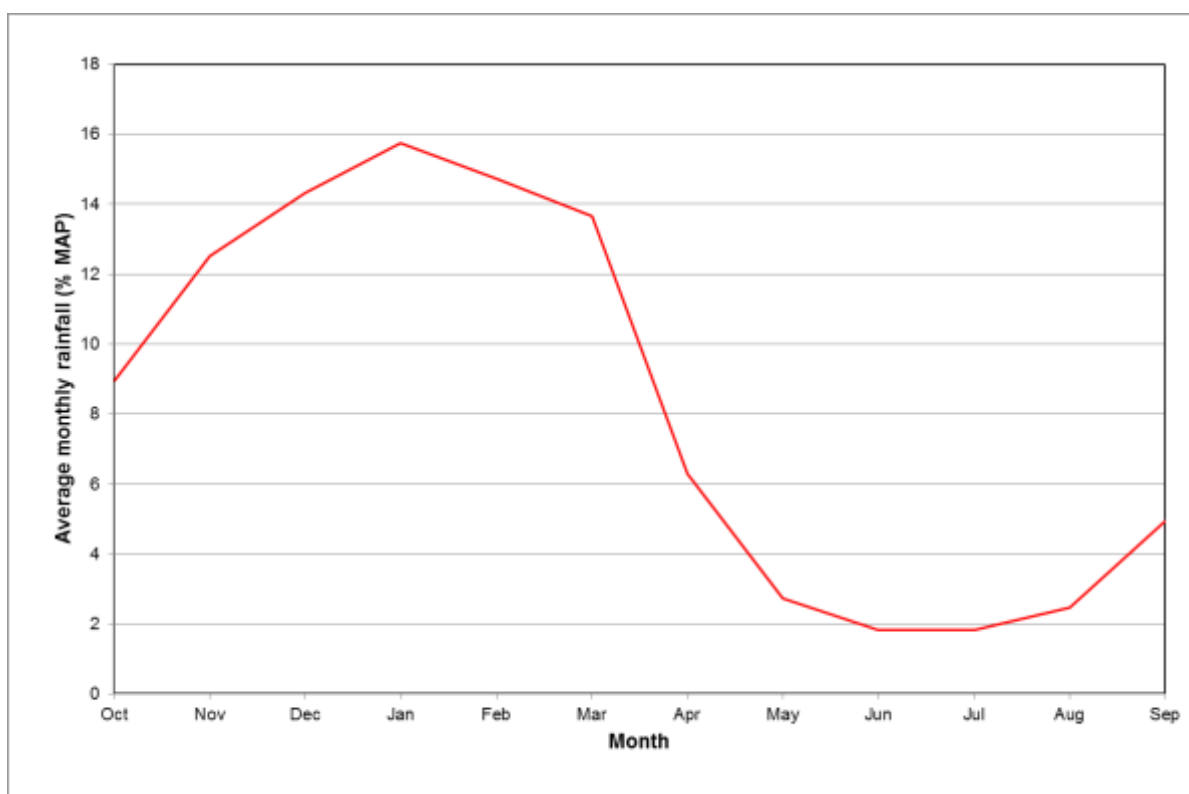


Figure A2- 12 Monthly Rainfall Distribution of Quaternary Catchment T35F

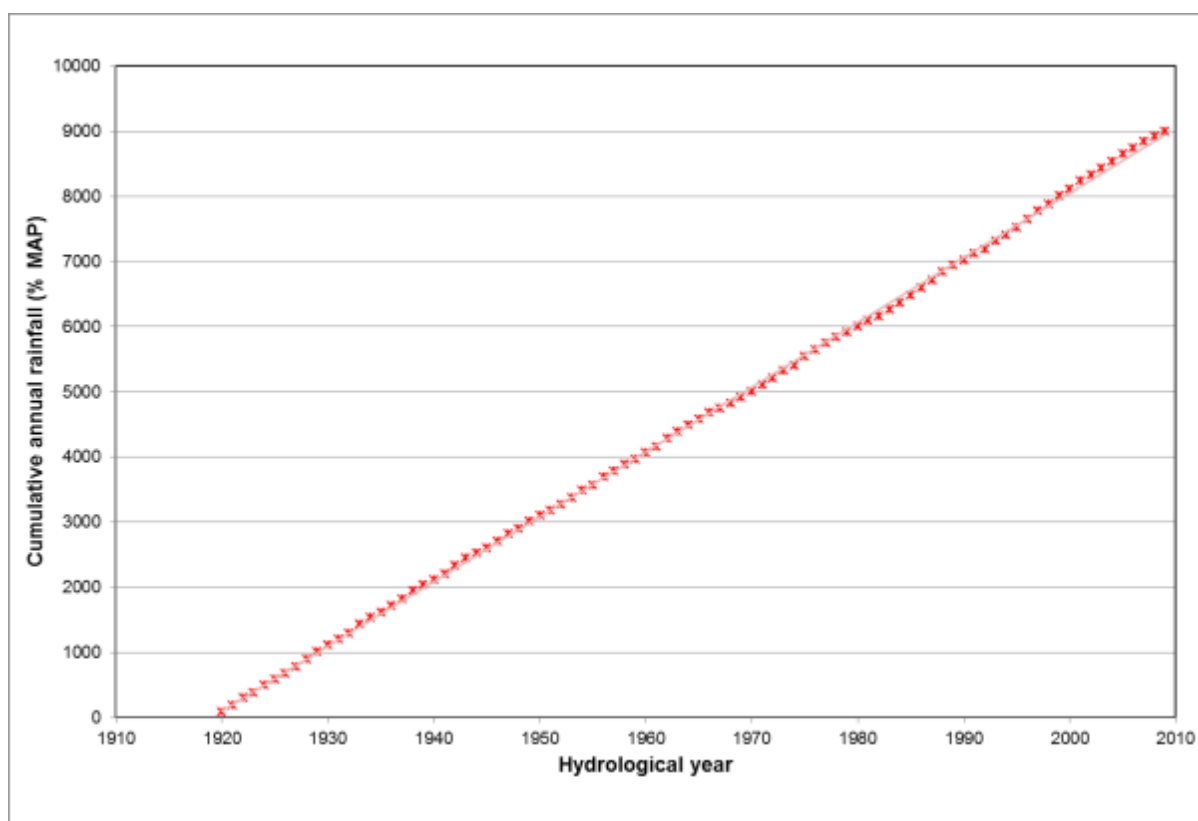


Figure A2- 13 Cumulative Annual Rainfall in Quaternary Catchment T35F

Table A2- 7 Quaternary Catchment T35G - Monthly Rainfall file in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	70.2	66.1	110.2	117.8	86.8	129.6	79.5	13.3	0.9	1.2	1.8	35.6
1921	75.0	149.6	140.5	82.0	75.7	43.2	3.8	82.5	34.2	38.6	61.5	30.7
1922	74.0	176.1	65.6	194.9	163.0	109.1	18.9	6.5	8.8	106.0	12.5	17.4
1923	39.2	60.5	115.2	110.6	122.5	98.7	10.0	17.1	9.7	1.9	22.0	42.3
1924	50.3	87.0	222.2	72.4	74.3	211.7	129.8	15.6	1.7	0.7	0.6	39.5
1925	27.4	106.7	79.9	100.1	89.6	134.7	23.9	34.0	42.7	3.2	4.6	63.3
1926	73.8	82.0	125.4	80.2	77.2	232.3	16.9	7.3	0.7	5.9	23.6	29.7
1927	68.2	44.2	180.0	189.8	93.3	73.4	22.7	19.8	5.5	3.8	38.6	15.7
1928	54.1	93.6	147.8	95.3	132.8	176.8	6.7	38.0	53.8	30.9	17.5	73.0
1929	122.8	121.5	146.2	164.3	44.7	134.8	66.1	6.1	15.9	8.4	55.2	32.8
1930	64.3	27.2	107.4	174.9	139.0	147.8	41.5	2.5	2.1	150.0	3.9	9.0
1931	66.5	91.0	115.6	94.5	171.3	57.9	10.0	26.7	5.9	22.4	6.8	98.2
1932	88.7	182.6	151.1	45.7	68.1	127.0	45.2	2.4	3.9	4.9	7.3	16.3
1933	26.9	218.6	184.3	274.8	78.1	144.0	27.2	6.8	10.6	61.1	2.1	9.3
1934	67.2	92.7	194.4	64.6	73.7	118.0	83.1	41.1	41.9	0.4	45.2	16.1
1935	51.4	43.1	30.4	72.3	203.2	83.3	18.4	77.2	6.2	29.7	0.6	32.7
1936	93.9	225.5	59.5	151.0	188.5	106.7	16.9	7.1	2.6	2.4	4.2	36.8
1937	59.0	39.9	110.6	158.7	148.2	73.9	123.9	10.7	21.0	21.6	30.7	12.1
1938	71.7	106.1	172.6	187.4	210.0	51.9	20.8	30.5	8.5	35.3	13.4	106.4
1939	85.3	91.2	79.9	110.0	128.0	89.8	44.4	59.4	5.6	1.3	8.7	48.5
1940	63.3	75.3	99.0	113.1	89.8	85.9	53.1	6.5	9.7	10.8	14.7	12.9
1941	63.2	61.9	51.4	114.5	133.0	134.8	72.0	31.4	0.0	0.3	35.4	39.9
1942	105.6	145.6	180.0	132.6	58.9	142.2	93.3	37.5	25.9	8.6	90.4	70.5
1943	97.6	149.0	165.4	108.5	93.5	129.0	17.5	9.0	30.8	12.6	2.0	118.9
1944	68.4	36.2	38.5	95.9	140.0	113.3	20.9	17.2	2.8	2.4	2.3	14.1
1945	97.1	25.9	88.4	178.4	101.0	110.5	57.1	37.7	1.8	6.5	4.5	13.0
1946	48.0	96.3	83.5	132.6	125.4	126.6	83.6	1.4	61.7	7.0	3.4	52.5
1947	53.8	170.6	176.1	162.3	162.3	105.7	50.2	13.1	2.1	3.4	1.2	13.6
1948	88.1	52.4	90.5	82.5	109.2	70.2	45.2	18.2	0.3	12.3	11.2	30.8
1949	41.4	79.0	97.8	121.9	173.1	129.0	56.8	65.6	1.3	16.8	67.4	25.9
1950	83.6	55.7	196.9	112.0	89.2	74.8	28.0	9.1	3.1	0.7	34.2	39.5
1951	106.6	20.1	73.3	101.0	157.6	63.2	48.9	11.4	11.5	13.0	7.7	50.4
1952	45.3	79.9	107.3	93.0	132.7	75.3	79.2	1.2	2.9	0.1	24.9	64.7
1953	83.3	108.4	117.5	114.2	117.5	130.8	28.8	72.9	34.7	0.9	0.7	43.6
1954	86.1	90.2	87.9	217.1	160.1	86.4	77.8	15.6	24.7	1.6	0.1	33.9
1955	62.4	104.3	84.1	36.0	123.8	158.9	27.2	20.2	23.8	0.8	3.5	42.0
1956	49.2	149.3	176.6	123.5	73.3	184.3	65.0	14.1	3.9	13.7	48.6	71.8
1957	80.7	65.0	99.9	195.2	99.4	63.7	78.3	14.8	0.3	10.0	1.1	27.0
1958	35.4	149.2	114.4	71.6	88.7	85.7	91.5	90.7	0.0	38.5	20.1	34.7
1959	36.8	102.7	108.4	93.7	109.9	68.2	63.1	16.2	2.3	10.3	26.3	62.7
1960	43.4	115.1	139.7	123.4	88.0	115.4	81.3	38.8	0.3	1.5	15.4	24.6
1961	28.7	127.4	128.8	105.5	144.7	119.8	57.9	15.1	0.1	0.0	14.8	11.3
1962	75.2	145.4	131.0	208.1	111.2	199.6	45.8	5.1	2.4	34.9	0.3	5.7
1963	120.9	155.5	68.7	133.0	61.7	129.1	78.0	0.4	95.1	7.1	7.8	50.5
1964	115.0	26.2	104.6	100.1	142.0	28.8	49.2	11.4	126.8	17.8	43.4	26.2

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	81.3	141.8	50.9	147.6	132.0	10.0	23.4	69.4	6.0	0.1	33.4	39.1
1966	42.4	71.8	101.0	129.8	150.8	176.1	93.9	21.2	31.5	19.9	6.3	2.8
1967	56.6	92.7	46.8	68.5	79.8	67.0	46.4	3.1	1.3	5.7	24.8	38.2
1968	54.7	78.0	66.6	61.8	102.6	167.3	22.9	31.2	3.1	11.9	9.2	21.8
1969	88.5	65.0	117.3	61.4	107.7	31.6	13.2	28.2	29.6	2.0	95.7	48.4
1970	112.4	61.5	86.6	109.0	93.9	74.3	51.3	54.2	11.3	33.0	63.2	28.6
1971	124.1	82.2	106.6	139.5	206.4	103.4	20.9	11.1	7.6	0.7	1.1	10.9
1972	49.3	141.4	68.9	89.2	169.4	125.2	55.5	8.7	0.0	12.3	22.0	28.6
1973	69.0	94.6	96.3	217.9	140.1	202.6	49.7	45.5	15.1	3.4	8.5	2.1
1974	33.4	128.3	92.9	96.8	71.9	99.7	32.4	1.3	2.3	5.1	3.3	100.3
1975	12.9	105.9	221.8	176.5	145.8	259.6	41.2	70.4	6.1	11.8	8.2	58.9
1976	172.3	45.8	84.1	101.2	112.5	87.1	47.1	0.9	1.5	19.6	19.8	76.4
1977	61.7	104.1	107.0	116.8	66.7	91.0	234.5	15.8	2.7	0.4	23.4	63.6
1978	91.3	75.8	146.2	84.2	107.5	84.9	26.6	17.5	1.8	59.9	10.4	32.5
1979	63.5	54.7	80.4	94.4	80.3	81.1	27.3	5.5	0.8	7.7	3.3	96.7
1980	40.6	89.1	104.4	136.1	174.8	67.3	17.5	61.0	10.1	3.4	33.3	15.5
1981	26.3	67.5	111.6	112.0	71.9	173.1	39.2	8.5	21.8	24.0	4.2	35.1
1982	60.2	111.9	39.5	58.8	47.7	67.9	55.8	10.8	7.4	15.8	3.9	31.8
1983	70.9	142.6	156.6	114.6	106.9	135.4	68.9	17.5	26.1	21.3	11.5	21.2
1984	96.6	107.4	66.6	157.6	220.5	44.0	29.3	2.4	5.0	0.7	0.2	23.5
1985	141.5	130.5	165.3	122.6	117.7	98.3	20.8	2.8	3.4	11.8	47.3	56.0
1986	130.1	148.9	88.1	101.8	92.7	100.3	33.1	4.8	20.4	1.1	47.8	204.6
1987	89.1	103.1	107.4	120.2	242.2	128.4	53.5	37.4	9.5	15.0	21.8	47.2
1988	61.7	124.9	195.6	110.6	206.9	92.3	115.8	10.1	10.2	30.3	0.0	6.0
1989	88.0	239.9	91.7	134.0	37.1	138.7	60.1	7.8	15.4	2.1	56.7	19.9
1990	85.0	51.3	100.1	130.0	93.0	58.4	11.1	13.2	6.7	0.8	6.5	47.4
1991	142.4	107.7	191.5	85.6	93.6	57.8	48.4	0.5	1.9	0.0	9.3	37.4
1992	41.1	66.9	60.2	86.4	96.8	93.2	55.4	4.1	0.2	0.5	14.7	63.8
1993	127.6	102.0	148.5	154.3	157.3	167.4	11.7	12.6	7.9	27.2	25.0	4.7
1994	45.2	38.5	117.3	137.5	61.8	160.1	84.9	19.3	13.5	3.5	0.8	32.5
1995	73.5	88.8	231.3	218.2	152.4	90.7	30.6	13.8	4.1	17.4	4.8	21.5
1996	56.7	184.6	148.1	147.0	67.8	107.1	73.4	16.6	127.4	46.4	12.8	24.6
1997	78.9	100.2	89.4	177.4	206.9	188.8	64.0	34.2	8.1	23.5	34.4	27.6
1998	52.6	159.0	170.3	118.9	170.7	86.3	20.8	9.3	7.6	5.9	3.6	12.9
1999	99.4	84.0	156.9	212.1	172.1	178.4	103.4	44.1	11.4	5.4	3.8	53.1
2000	59.6	100.4	106.7	154.5	121.0	99.7	56.6	9.7	0.9	6.0	5.7	42.6
2001	92.8	204.6	146.9	148.3	80.8	110.9	34.0	43.6	15.5	48.6	63.9	43.7
2002	31.1	65.5	111.5	114.3	85.6	99.9	44.7	33.0	10.5	1.3	23.7	62.9
2003	23.8	79.8	74.5	173.0	95.0	164.6	47.0	8.0	7.7	49.4	9.2	115.7
2004	43.8	113.4	104.5	229.9	94.5	105.9	44.3	18.7	0.7	0.6	24.8	17.1
2005	59.4	125.8	64.7	140.3	121.4	95.3	94.9	42.6	8.5	7.5	80.7	80.6
2006	149.7	116.0	117.3	100.4	76.3	68.1	59.8	0.1	21.5	0.1	10.2	17.8
2007	104.8	87.6	94.7	120.0	127.4	98.4	78.4	13.1	43.6	0.8	18.1	18.3
2008	35.3	78.5	133.6	93.7	148.2	20.3	29.9	23.2	14.2	0.0	28.4	25.9
2009	102.4	55.1	71.4	184.6	88.5	63.0	44.2	10.1	21.5	3.6	5.1	8.5

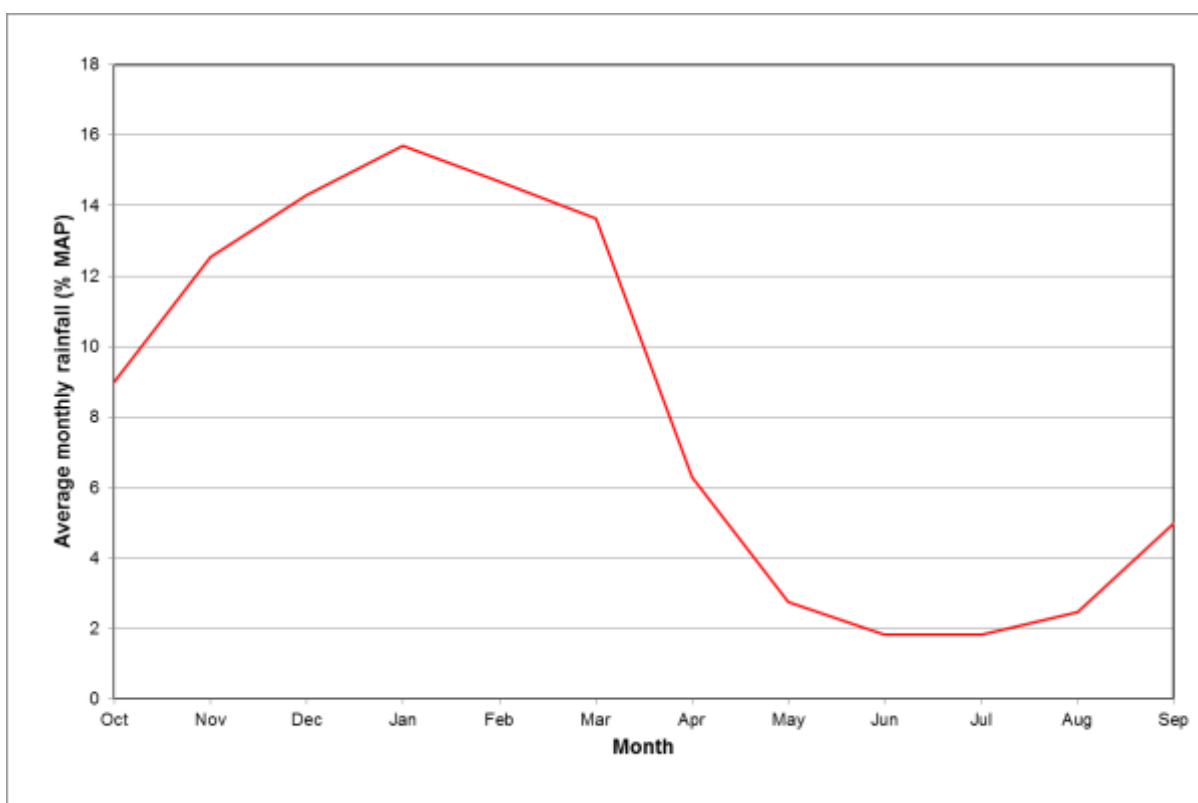


Figure A2- 14 Monthly Rainfall Distribution of Quaternary Catchment T35G

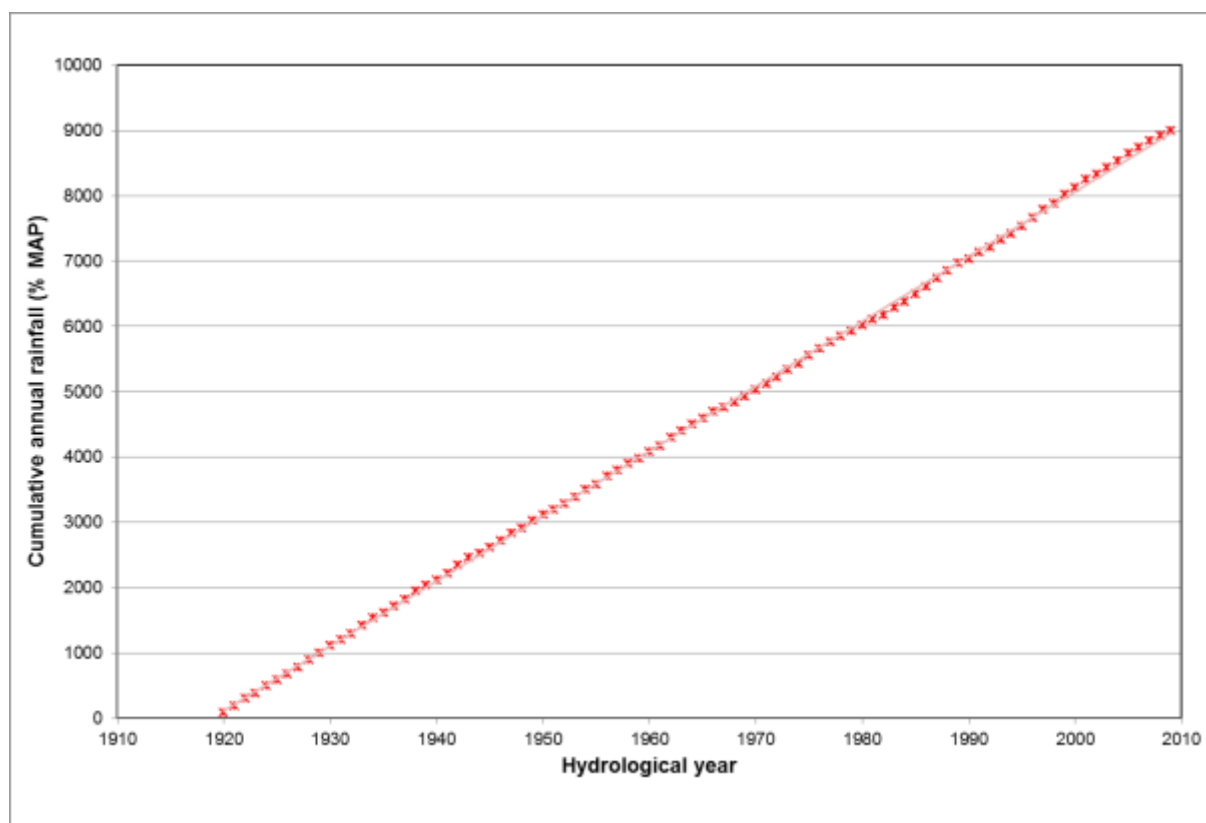


Figure A2- 15 Cumulative Annual Rainfall in Quaternary Catchment T35G

Table A2- 8 Quaternary Catchment T35H - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	91.5	87.6	136.1	146.7	99.6	159.8	94.9	16.4	1.9	2.4	3.0	43.6
1921	95.9	180.2	168.0	97.2	86.8	53.0	6.3	105.5	42.1	32.1	64.9	37.9
1922	93.0	212.3	76.7	239.8	199.9	134.1	20.5	8.8	10.1	141.8	14.9	22.8
1923	50.5	78.4	137.5	133.1	157.8	119.7	11.0	22.8	15.1	1.4	28.7	49.2
1924	65.3	105.8	263.2	87.6	89.2	243.3	157.5	18.4	2.9	0.7	0.9	46.0
1925	34.8	138.5	104.0	119.0	110.5	160.9	25.5	37.2	55.7	4.9	5.3	73.4
1926	91.1	105.7	147.9	92.3	99.2	279.9	21.5	9.4	0.8	7.7	27.5	37.1
1927	81.7	55.6	202.5	224.0	109.0	90.3	28.3	23.1	7.4	6.0	46.3	21.9
1928	69.2	120.7	168.4	108.0	153.7	224.9	10.2	42.4	64.4	35.0	21.7	91.6
1929	153.5	151.8	163.0	188.2	49.7	161.8	79.9	9.0	22.4	10.5	70.9	44.0
1930	76.8	34.6	129.5	217.3	174.7	183.4	49.9	2.8	2.5	177.5	4.1	10.3
1931	85.9	117.2	130.8	118.5	211.2	55.4	8.3	33.2	7.7	27.7	10.3	121.1
1932	116.5	227.3	189.1	56.7	76.7	161.7	51.2	2.6	5.3	7.3	9.2	18.7
1933	33.7	275.7	241.0	337.6	93.4	170.6	34.3	7.6	15.2	78.4	2.4	13.1
1934	81.1	99.2	272.4	86.4	88.6	153.6	102.4	60.5	55.6	0.4	53.6	20.3
1935	67.6	52.1	31.7	81.5	247.0	118.8	20.8	99.9	7.8	37.0	0.8	38.8
1936	120.2	286.2	72.8	195.6	236.5	124.5	23.2	9.5	3.5	3.0	5.3	47.9
1937	76.4	50.1	162.3	195.1	179.5	88.8	153.7	12.9	26.8	26.3	37.8	15.1
1938	93.4	146.8	221.0	235.0	277.7	60.3	30.4	38.9	11.0	46.7	18.5	138.7
1939	114.5	109.5	100.8	151.7	157.7	131.9	57.8	76.3	7.2	1.9	11.8	68.3
1940	83.4	109.3	113.6	141.3	111.6	116.3	63.2	7.4	14.3	10.8	20.2	18.8
1941	95.6	86.1	67.4	140.4	150.7	168.3	92.6	42.7	0.0	0.5	41.8	50.3
1942	131.4	211.2	224.7	179.1	71.8	165.5	116.4	42.0	35.6	10.8	115.1	90.1
1943	119.2	183.2	215.7	135.7	134.3	171.6	23.0	10.5	40.2	20.2	2.2	176.7
1944	89.7	48.5	41.5	131.4	174.1	133.9	28.4	22.9	4.3	3.4	2.3	20.3
1945	129.6	34.5	113.2	210.1	133.5	143.7	68.9	46.7	3.1	9.3	3.6	17.0
1946	62.7	126.4	111.9	152.1	139.0	152.8	101.9	2.3	81.0	10.9	4.8	66.5
1947	67.5	204.4	203.5	200.2	193.7	128.2	61.6	10.5	3.2	5.1	1.7	16.6
1948	112.4	70.5	106.7	98.2	140.3	83.9	60.0	19.3	0.5	15.8	15.0	40.7
1949	56.2	118.1	112.1	154.1	209.9	152.2	73.6	80.0	1.8	21.8	82.6	32.9
1950	98.9	76.4	240.0	135.5	94.3	90.3	36.4	13.0	2.3	1.2	43.0	51.2
1951	124.5	22.4	90.2	126.6	190.0	78.8	55.0	14.9	12.7	16.5	7.8	63.2
1952	54.9	80.2	126.3	103.7	148.9	93.1	93.4	1.8	4.7	0.2	31.9	81.2
1953	103.6	136.1	148.3	130.5	139.0	157.0	34.0	94.9	41.7	1.1	1.1	55.2
1954	113.1	111.2	103.8	252.1	192.5	98.8	103.9	20.3	32.5	1.2	0.1	42.8
1955	78.6	128.8	95.4	39.3	146.1	203.5	33.6	24.0	29.5	1.0	5.2	51.1
1956	61.8	195.4	199.5	149.1	79.4	211.7	78.2	17.7	5.2	17.2	60.6	84.1
1957	99.6	82.1	126.0	234.3	129.7	79.5	96.9	16.0	0.3	14.4	1.7	35.4
1958	43.9	171.4	139.8	85.5	98.7	102.4	113.4	118.1	0.0	50.2	26.4	47.7
1959	46.1	126.5	128.6	110.4	136.1	94.5	79.7	18.5	2.2	12.9	33.9	78.7
1960	53.7	140.0	164.8	159.8	115.4	145.7	94.4	53.6	0.4	2.2	20.0	33.0
1961	34.3	158.7	160.6	129.3	180.1	145.1	65.0	20.0	0.2	0.1	19.9	13.8
1962	100.7	178.5	150.0	239.2	129.4	226.0	50.4	6.3	2.5	45.9	0.3	7.8
1963	149.6	182.0	82.7	168.4	80.3	156.9	97.2	0.5	122.7	8.3	10.6	61.6
1964	148.2	28.6	128.3	120.3	148.0	33.8	58.2	19.9	151.8	25.4	53.0	31.3

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	106.2	178.1	62.4	170.0	161.7	14.1	32.1	95.8	8.5	0.2	41.1	46.4
1966	61.1	90.1	121.6	153.2	185.8	234.9	106.2	27.1	39.7	24.9	8.3	4.0
1967	69.5	116.6	59.2	90.1	100.3	85.3	60.8	3.9	2.5	8.6	30.4	59.1
1968	68.8	96.1	90.0	71.8	128.3	207.2	29.0	40.2	2.2	17.9	13.9	29.3
1969	111.1	84.6	136.1	80.9	140.3	44.1	14.1	39.4	39.0	2.2	111.5	66.0
1970	137.0	83.9	110.8	134.5	121.1	88.3	62.6	67.1	14.0	44.5	76.3	36.7
1971	142.5	101.6	125.0	178.0	250.6	125.1	26.1	11.7	12.2	0.8	1.1	15.3
1972	65.0	169.4	100.0	112.3	209.5	156.4	59.4	8.6	0.0	18.0	30.6	34.5
1973	89.6	123.2	126.7	270.4	171.8	230.8	70.4	58.6	18.7	4.9	12.4	3.5
1974	44.6	148.2	101.2	117.9	89.4	107.8	39.1	2.0	2.6	6.2	5.3	126.6
1975	16.5	131.1	276.7	220.5	184.5	314.7	51.0	88.8	5.8	14.5	10.5	74.7
1976	209.6	51.6	120.2	124.5	123.8	109.8	46.8	1.6	1.6	24.3	27.0	93.7
1977	76.9	121.5	133.5	139.8	83.8	103.3	311.3	22.5	4.2	0.8	30.2	80.8
1978	112.8	99.8	175.6	107.6	122.1	95.7	31.3	24.2	2.7	77.0	14.1	40.1
1979	84.4	67.6	94.6	120.8	98.0	101.3	36.5	7.9	1.3	10.2	5.1	131.7
1980	52.7	109.5	125.5	169.4	210.1	85.8	18.4	84.7	13.0	4.3	38.5	18.4
1981	32.4	81.5	151.1	139.6	85.8	217.5	47.3	11.7	26.8	26.6	6.4	42.7
1982	80.8	132.6	46.5	72.9	53.1	81.7	65.8	14.0	9.6	21.2	4.9	43.3
1983	83.8	170.5	191.1	134.9	133.3	159.1	82.2	21.7	31.2	26.3	14.8	26.0
1984	119.0	132.9	80.5	194.9	263.0	53.9	38.7	4.1	5.9	0.9	0.3	28.0
1985	165.1	153.1	178.0	130.2	151.7	124.8	26.1	4.0	4.6	14.1	59.2	71.2
1986	160.6	180.8	109.0	121.0	103.6	116.8	41.9	8.1	26.2	1.8	58.4	247.2
1987	108.4	121.7	130.4	150.8	273.4	155.8	62.8	49.5	10.4	20.2	27.7	57.4
1988	77.0	158.5	232.1	126.5	255.0	104.8	146.0	13.3	12.5	38.4	0.0	9.6
1989	115.3	292.2	100.6	161.9	47.0	168.8	70.1	9.5	17.9	2.3	68.7	27.6
1990	105.1	67.8	129.0	144.2	107.0	69.9	14.7	15.4	7.3	1.1	9.5	60.5
1991	168.6	137.7	222.2	106.9	95.5	69.7	63.9	0.8	2.8	0.0	9.9	47.0
1992	53.2	79.3	73.5	106.5	115.8	97.9	65.0	5.4	0.3	0.7	18.8	75.5
1993	149.3	123.4	170.2	176.2	193.5	192.2	14.0	15.0	10.3	31.0	34.4	5.8
1994	57.6	46.5	141.8	155.6	80.3	181.2	109.2	21.8	16.2	3.6	1.7	39.0
1995	92.3	109.9	284.4	255.3	181.3	113.6	34.1	16.3	4.6	20.2	5.2	27.4
1996	73.8	224.4	173.1	167.8	84.7	113.9	99.3	22.1	155.1	66.1	16.1	30.4
1997	86.5	129.0	100.4	208.7	250.1	246.7	79.3	37.6	10.1	28.4	45.6	32.9
1998	64.1	191.3	214.5	133.0	187.4	107.0	24.6	11.3	10.7	7.9	4.5	20.6
1999	120.5	98.8	188.8	242.8	189.2	216.4	123.6	51.0	14.2	6.5	5.0	63.4
2000	75.3	121.9	127.1	182.7	151.3	113.9	79.1	16.1	0.7	7.3	7.4	47.9
2001	117.3	253.5	169.7	171.0	94.1	128.5	40.0	56.7	15.9	62.0	64.0	49.1
2002	39.5	80.3	122.2	134.5	97.1	124.8	52.0	38.2	11.8	1.6	29.7	69.7
2003	31.6	94.5	96.0	191.9	96.8	200.1	49.0	9.1	7.5	61.7	10.5	147.2
2004	49.2	119.9	117.0	276.1	115.9	129.0	51.6	21.4	0.9	0.5	30.3	23.8
2005	75.6	161.2	75.1	137.3	136.7	110.6	118.0	55.2	12.7	9.2	83.1	92.4
2006	183.6	138.2	140.3	106.6	86.2	81.9	67.5	0.2	29.8	0.2	12.8	25.0
2007	123.4	99.9	106.8	128.7	144.7	92.0	83.3	18.8	50.4	1.0	16.1	21.0
2008	47.3	87.7	139.8	101.7	164.0	25.7	38.5	27.4	15.2	0.0	25.5	31.7
2009	115.0	57.0	83.7	209.0	100.0	73.7	45.9	18.5	33.0	6.2	6.7	10.9

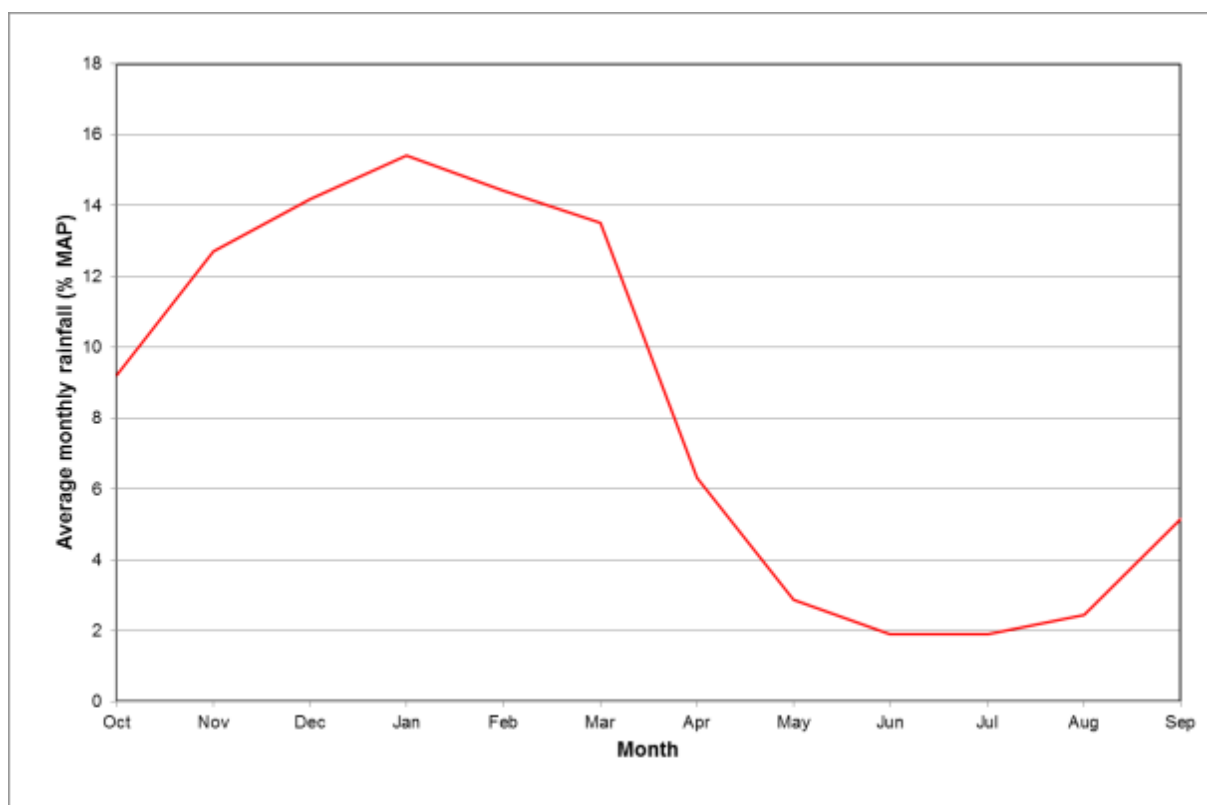


Figure A2- 16 Monthly Rainfall Distribution of Quaternary Catchment T35H

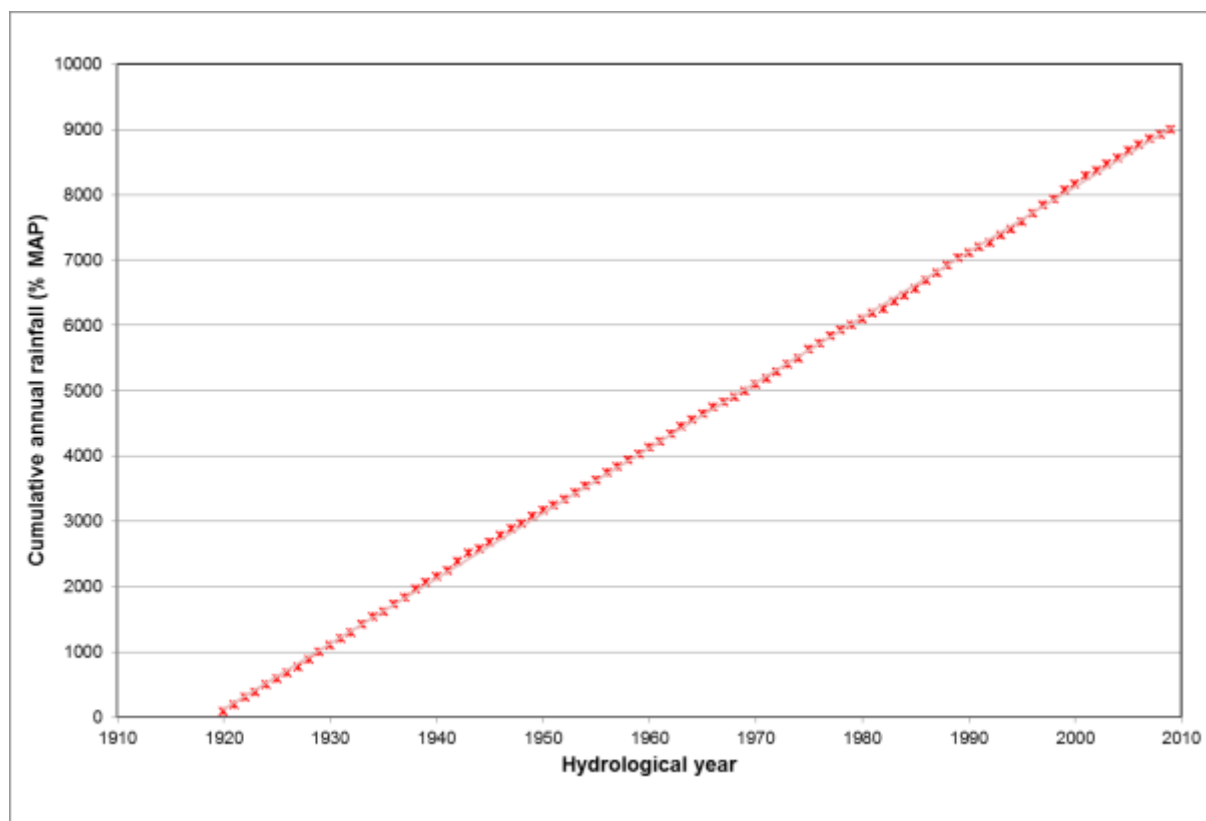


Figure A2- 17 Cumulative Annual Rainfall in Quaternary Catchment T35H

Table A2- 9Quaternary Catchment T35J - Monthly rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	100.3	98.4	143.9	154.7	106.4	166.3	97.5	15.5	1.4	1.8	2.7	46.9
1921	108.9	192.8	184.8	105.7	96.2	56.0	6.2	111.8	42.9	32.2	69.8	39.5
1922	101.5	235.3	82.8	262.6	215.4	138.1	20.5	8.1	10.7	152.4	14.1	23.6
1923	59.9	86.8	156.6	153.4	177.4	115.4	13.8	22.5	12.6	1.1	34.3	54.6
1924	69.9	114.8	287.9	94.1	92.4	239.2	200.6	20.3	2.6	0.8	1.1	47.1
1925	35.7	147.8	109.0	128.9	120.7	179.3	29.1	38.6	56.7	3.9	6.8	81.8
1926	97.6	113.3	160.3	98.5	95.6	307.8	18.8	8.6	1.0	9.4	29.1	41.5
1927	95.4	59.7	214.7	236.5	123.7	98.0	30.0	25.1	7.6	5.9	52.7	21.4
1928	74.1	138.9	171.2	120.2	176.0	229.6	9.3	45.8	68.2	36.0	22.6	101.8
1929	167.0	165.6	167.0	196.2	54.2	183.9	84.1	9.5	22.1	10.6	74.7	48.1
1930	89.2	42.5	143.7	233.8	171.2	197.5	50.9	3.5	3.2	187.9	5.3	13.3
1931	92.1	127.3	140.6	128.3	235.5	69.2	7.4	36.7	8.1	29.6	11.5	132.1
1932	128.7	250.3	209.2	67.3	89.3	182.2	52.0	3.1	5.2	7.6	9.5	21.7
1933	37.5	294.7	250.0	355.1	106.1	188.9	34.8	8.1	15.1	80.1	3.6	14.1
1934	84.6	122.5	285.0	96.0	91.7	157.4	105.0	68.7	60.4	0.4	57.8	21.8
1935	77.3	55.7	41.0	95.5	263.7	141.4	24.7	104.8	8.3	39.9	1.0	46.3
1936	134.1	321.1	83.2	207.6	243.0	122.2	23.0	10.2	4.2	3.3	5.6	52.1
1937	88.0	53.8	186.3	229.9	187.4	95.3	161.2	14.6	28.3	29.2	39.8	16.1
1938	102.5	154.5	247.7	255.3	299.3	61.4	31.0	41.8	11.4	52.4	20.9	150.2
1939	120.0	126.3	123.7	160.8	177.9	151.0	65.0	83.6	8.3	2.0	12.5	71.1
1940	91.1	128.0	131.2	157.4	124.1	127.3	65.3	8.1	16.2	11.1	23.1	21.2
1941	108.3	96.9	76.0	161.6	152.2	183.5	93.7	43.2	0.0	0.5	48.5	54.6
1942	142.7	250.6	253.9	198.7	80.0	183.8	129.3	44.7	39.5	11.8	126.9	96.2
1943	132.0	203.5	234.8	147.8	160.1	182.8	23.9	11.5	44.8	18.9	2.8	202.7
1944	99.1	55.5	42.7	149.5	193.1	147.0	31.3	25.5	4.5	3.3	2.2	22.1
1945	140.7	38.6	123.7	229.0	149.9	161.0	74.9	47.4	2.7	8.9	3.4	19.2
1946	67.3	142.5	122.7	169.3	144.9	156.9	107.4	2.5	85.0	11.9	6.2	73.1
1947	73.2	231.6	218.4	216.5	212.7	137.6	65.7	9.3	3.5	5.5	2.0	19.2
1948	135.5	73.8	117.1	109.3	153.1	99.2	64.0	20.2	0.5	16.2	15.4	47.6
1949	62.6	138.3	128.4	171.5	238.0	174.0	78.6	89.1	2.4	23.1	92.6	35.5
1950	101.4	75.7	256.3	143.4	97.3	101.2	39.4	14.7	1.6	1.2	48.1	60.4
1951	140.3	21.7	101.8	148.7	200.4	83.9	60.3	18.9	13.7	19.2	8.2	65.5
1952	63.1	84.2	133.0	111.7	157.3	104.2	104.2	2.0	4.5	0.2	36.7	84.2
1953	118.8	149.4	162.6	151.1	157.4	171.0	38.6	100.2	44.8	1.5	1.4	66.3
1954	125.3	119.2	116.4	276.4	212.5	112.1	105.0	21.0	32.0	1.2	0.1	51.1
1955	88.7	136.8	94.3	43.6	158.3	220.1	33.9	25.9	32.3	1.4	6.6	56.0
1956	69.3	200.2	223.6	159.7	87.6	255.9	90.7	17.0	5.6	18.9	65.0	89.4
1957	108.3	93.5	136.8	255.5	142.8	84.0	108.1	17.7	0.5	15.0	1.8	40.5
1958	52.4	196.5	156.8	91.5	102.2	103.7	124.0	130.3	0.0	56.5	27.2	51.4
1959	51.5	136.2	146.1	112.2	146.8	103.2	98.0	22.0	2.8	15.6	35.6	85.9
1960	62.0	160.7	191.7	185.3	133.6	145.0	103.7	54.6	0.4	2.5	20.6	36.9
1961	41.2	172.7	172.7	137.7	195.5	153.3	73.1	23.3	0.2	0.1	20.2	14.2
1962	114.0	186.1	162.5	253.9	143.8	260.7	55.9	8.1	3.5	47.1	0.3	9.9
1963	170.6	203.4	91.7	196.9	89.2	171.5	102.6	0.6	122.4	8.8	11.8	67.6
1964	165.1	36.5	134.6	125.1	155.4	34.9	61.7	17.3	165.5	26.0	60.0	33.6

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	115.3	197.3	68.8	184.0	180.9	15.6	32.4	103.2	10.0	0.1	42.8	52.3
1966	69.5	97.1	135.3	164.4	200.2	240.7	121.0	32.0	37.9	25.3	8.7	5.5
1967	79.4	135.8	58.4	99.2	113.0	92.2	70.1	3.8	1.9	9.7	30.8	61.0
1968	80.9	108.5	98.2	79.7	148.2	227.8	33.9	47.6	1.7	18.2	11.8	35.3
1969	126.5	93.5	152.4	97.2	156.8	48.3	15.7	41.2	43.9	1.7	120.3	72.2
1970	157.5	96.8	117.6	151.4	133.1	103.1	67.5	71.0	16.3	43.0	83.7	40.6
1971	154.9	105.2	136.5	181.4	270.8	134.6	27.8	13.8	10.6	1.2	1.3	14.9
1972	64.2	182.9	102.6	115.5	239.0	164.9	66.4	8.0	0.0	20.7	37.1	38.3
1973	100.9	134.9	137.7	301.7	183.9	236.5	88.0	61.3	21.6	4.4	13.7	3.2
1974	48.4	154.7	105.0	132.9	96.7	120.8	40.2	2.3	2.8	6.0	5.2	136.4
1975	16.6	141.6	287.1	242.9	195.0	312.5	57.3	94.2	5.3	15.9	10.2	81.6
1976	231.9	51.2	127.1	153.0	130.0	113.1	45.5	1.4	1.9	24.8	26.3	110.7
1977	81.8	133.6	148.1	146.0	94.9	105.0	363.8	32.1	5.5	0.8	33.9	86.8
1978	127.7	102.8	191.8	116.2	126.9	98.1	29.9	25.2	2.8	79.5	15.8	40.1
1979	88.4	72.5	105.9	132.8	110.5	109.0	38.3	9.8	1.2	11.5	5.9	140.0
1980	55.7	123.5	135.1	185.8	222.4	89.3	18.9	86.8	13.4	5.6	34.7	21.6
1981	36.4	84.0	160.9	154.8	95.2	235.5	53.9	12.1	27.9	29.8	7.5	46.4
1982	91.8	146.1	48.9	83.3	56.5	92.5	66.0	15.3	10.1	19.2	5.8	44.3
1983	94.9	184.7	215.8	142.0	146.1	180.2	92.0	25.5	32.4	29.4	16.6	28.8
1984	131.4	146.7	90.7	227.8	299.9	59.9	42.4	3.6	6.3	1.7	0.3	28.6
1985	174.1	163.9	189.9	126.0	167.2	136.8	30.8	4.8	4.3	14.0	65.0	77.6
1986	177.4	198.2	127.1	141.5	106.8	125.4	44.3	7.7	27.2	2.1	66.1	284.3
1987	122.3	137.9	147.7	166.0	292.0	174.1	66.4	53.8	10.7	20.9	32.4	57.3
1988	85.6	170.8	249.3	131.3	275.4	107.2	162.8	16.7	14.3	43.1	0.0	9.9
1989	132.6	314.4	101.6	176.2	48.8	189.2	75.1	9.6	18.9	2.7	74.7	27.8
1990	115.0	76.1	140.3	152.3	117.4	74.5	20.5	13.7	8.3	1.3	10.5	63.4
1991	186.8	148.4	230.8	119.0	96.9	71.0	67.9	0.8	2.8	0.0	8.8	54.3
1992	60.4	84.1	80.1	117.1	118.1	105.6	68.7	5.3	0.3	0.9	19.7	88.6
1993	156.5	129.5	176.0	205.0	199.8	199.0	11.8	14.5	12.6	31.1	32.8	9.6
1994	66.1	51.3	155.7	160.5	83.5	199.9	119.7	21.4	21.6	4.6	1.4	44.5
1995	102.1	114.7	313.9	271.3	188.2	122.1	35.5	19.7	5.6	23.0	5.0	28.9
1996	76.5	233.2	172.7	180.7	88.7	117.9	102.8	22.9	168.4	69.4	16.1	36.4
1997	99.5	147.6	109.0	226.2	257.0	258.1	86.6	43.4	12.5	33.6	46.9	39.6
1998	67.4	200.5	238.6	143.7	181.4	118.6	26.4	12.1	12.0	8.7	5.4	21.5
1999	137.3	108.0	208.3	274.0	222.4	236.3	130.3	54.3	15.0	8.0	5.8	64.8
2000	85.6	129.5	134.6	196.8	159.4	113.4	76.3	15.4	0.6	7.4	8.1	50.4
2001	117.1	281.6	181.3	186.6	106.5	136.4	41.6	60.6	16.6	60.0	66.7	53.7
2002	49.8	89.3	123.4	140.5	105.0	130.2	59.3	41.1	13.8	2.3	31.4	78.8
2003	37.7	106.1	104.5	200.2	115.3	217.1	52.2	9.3	9.3	63.8	10.7	157.9
2004	49.6	121.2	122.0	304.4	122.2	133.3	46.1	23.3	1.0	0.5	30.9	24.5
2005	78.0	181.5	87.3	138.2	145.0	118.6	129.5	57.8	13.2	10.0	87.5	105.6
2006	191.7	154.1	154.9	117.5	88.9	76.6	73.7	0.3	28.7	0.2	12.5	25.3
2007	132.3	106.5	112.0	136.1	173.7	101.6	102.1	17.6	53.4	1.1	16.8	22.4
2008	52.8	98.8	143.6	104.1	170.8	33.8	36.5	35.2	15.8	0.0	25.0	37.8
2009	126.0	57.3	87.0	207.5	113.1	78.3	47.7	13.8	35.4	6.2	6.2	9.3

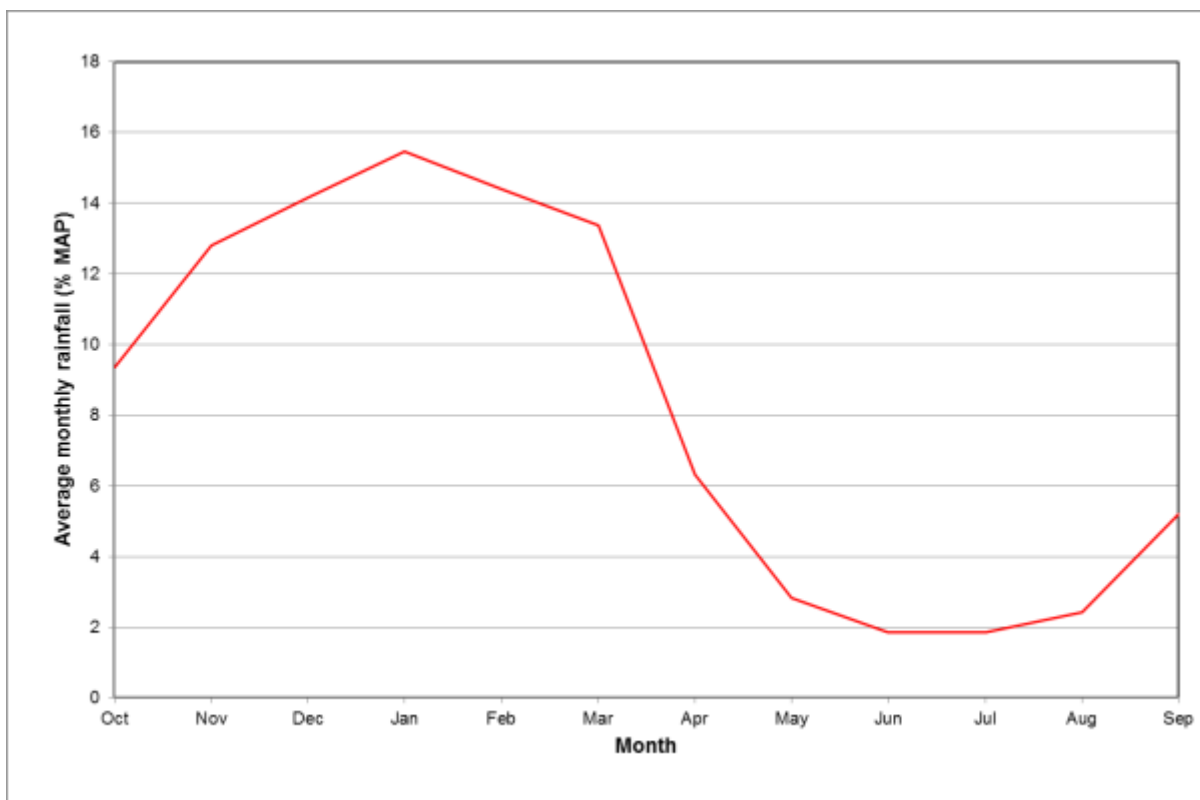


Figure A2- 18 Monthly Rainfall Distribution of Quaternary Catchment T35J

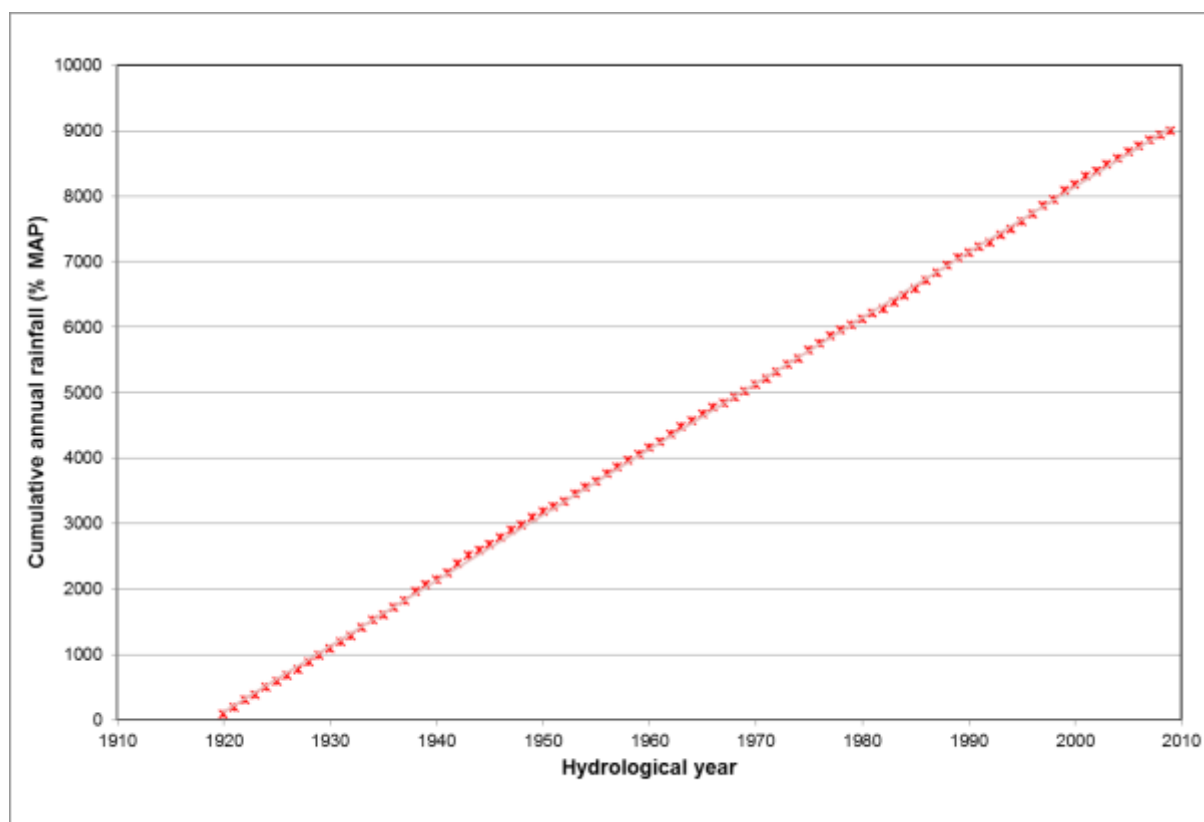


Figure A2- 19 Cumulative Annual Rainfall in Quaternary Catchment T35J

Table A2- 10 Quaternary Catchment T35K - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	69.2	70.3	103.6	119.9	73.9	122.3	74.2	11.8	0.7	0.8	2.2	39.5
1921	80.1	137.2	143.0	77.5	69.4	38.2	4.1	81.7	31.3	22.3	54.1	30.9
1922	75.2	173.8	58.4	199.0	158.6	96.0	15.2	5.7	7.4	113.8	9.8	17.6
1923	44.3	56.5	114.0	108.1	133.0	75.4	8.7	15.3	7.2	0.7	25.9	38.1
1924	52.9	83.0	197.8	66.6	74.4	195.2	123.6	14.6	1.4	0.6	0.8	34.1
1925	24.1	110.3	76.0	91.7	86.1	129.8	22.7	29.8	40.6	2.5	6.1	59.9
1926	78.7	80.8	127.7	73.9	65.7	231.5	12.6	5.1	0.8	7.1	24.7	31.9
1927	67.3	41.0	161.4	169.9	88.0	74.7	23.1	21.2	5.4	4.6	39.6	15.0
1928	55.0	99.8	120.2	83.4	121.6	169.0	5.6	32.4	50.0	27.5	17.7	74.4
1929	121.8	111.5	124.6	144.1	42.3	138.1	61.9	6.2	16.0	7.5	55.9	35.3
1930	63.0	28.0	108.1	154.3	113.5	136.7	36.6	2.5	2.2	143.4	3.3	8.4
1931	70.0	91.5	100.7	90.3	178.0	51.8	4.2	27.7	5.9	23.2	8.3	93.2
1932	85.4	186.3	152.4	43.9	61.1	125.6	34.5	2.2	3.9	4.7	6.6	15.4
1933	28.9	201.2	174.4	249.8	81.7	132.8	24.8	6.5	11.2	57.6	2.0	10.5
1934	64.0	98.2	189.4	72.9	60.1	113.0	82.5	53.9	46.2	0.4	41.1	17.2
1935	51.8	42.3	30.6	81.7	199.6	107.4	19.2	76.3	6.0	29.9	0.7	31.5
1936	98.6	229.5	57.1	149.2	181.6	82.7	14.9	7.6	3.7	2.5	4.6	37.8
1937	61.0	38.1	127.3	165.1	125.5	74.5	115.7	10.1	20.9	18.7	29.1	12.6
1938	75.2	112.2	172.4	171.4	221.3	46.0	24.5	31.7	8.0	38.1	15.0	111.4
1939	84.3	94.5	90.4	109.6	130.0	102.6	44.8	63.1	6.9	1.6	10.3	49.1
1940	64.7	94.2	92.4	115.7	88.9	79.0	51.7	6.1	11.2	8.9	15.8	15.0
1941	77.2	66.4	54.5	119.7	105.8	131.5	64.1	34.2	0.0	0.4	32.4	40.6
1942	101.4	190.3	184.1	133.7	62.0	133.2	95.0	31.6	28.8	8.9	93.8	69.8
1943	96.0	148.4	170.6	100.7	116.0	126.9	18.5	8.0	33.0	13.9	2.2	148.4
1944	70.7	41.8	31.2	106.4	136.5	104.3	22.4	19.7	3.3	2.4	1.7	14.6
1945	103.1	27.8	89.2	162.3	103.8	117.6	53.9	32.3	1.7	6.3	2.7	14.7
1946	49.2	106.3	95.0	121.2	105.0	112.7	87.4	1.3	68.3	9.2	4.7	53.7
1947	53.6	183.0	149.3	152.5	152.4	106.3	50.0	6.3	2.4	4.0	1.6	14.4
1948	103.2	54.1	86.2	78.9	120.6	73.3	46.6	16.6	0.4	13.4	11.6	35.1
1949	44.1	96.5	93.0	125.5	173.9	131.2	55.0	61.7	1.6	18.8	68.9	25.9
1950	70.1	47.0	179.9	102.4	73.3	75.5	29.9	10.3	1.0	0.7	37.6	43.2
1951	104.3	16.5	70.3	104.0	141.5	58.4	48.1	12.0	10.7	12.8	6.8	44.8
1952	43.6	57.5	93.4	86.8	111.9	76.0	71.7	1.2	2.9	0.2	27.8	61.1
1953	82.3	105.7	115.9	105.7	110.7	124.3	24.8	74.3	33.2	1.3	0.7	45.7
1954	91.3	83.2	82.0	198.1	152.5	71.5	65.6	14.5	22.1	0.6	0.1	37.1
1955	63.9	100.7	65.7	30.9	113.1	155.1	20.0	21.9	27.4	0.7	3.7	38.8
1956	50.0	144.3	157.5	122.4	64.9	165.3	62.6	13.2	3.9	12.2	46.2	67.4
1957	76.5	61.8	95.9	175.2	100.5	57.2	76.5	11.1	0.2	10.8	1.3	26.5
1958	38.1	142.4	112.5	69.1	75.5	72.0	88.3	99.9	0.0	44.2	21.2	38.6
1959	40.1	97.2	105.8	77.4	109.1	69.8	68.6	12.8	1.4	11.6	27.8	66.4
1960	44.5	112.8	137.5	128.5	93.7	106.3	68.2	36.2	0.3	1.3	13.2	24.0
1961	30.0	120.1	124.1	103.3	131.7	110.6	44.2	20.4	0.2	0.1	18.2	9.4
1962	78.1	134.1	116.9	180.6	108.5	195.5	48.7	6.2	2.3	35.7	0.3	6.6
1963	113.2	144.4	66.9	132.5	67.2	128.4	77.2	0.5	93.9	6.8	7.8	48.6
1964	116.9	27.8	90.7	91.9	108.6	28.5	41.6	13.4	121.5	20.7	42.4	24.3

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	87.8	142.3	52.5	128.5	127.8	10.0	23.0	75.5	8.1	0.1	31.4	38.5
1966	44.9	69.7	92.5	114.4	151.3	182.0	87.8	22.8	32.0	19.1	6.9	3.1
1967	59.2	95.6	42.9	67.6	83.2	67.3	47.8	2.1	1.0	7.1	28.7	41.3
1968	57.7	80.7	71.2	51.8	106.3	155.7	19.3	34.9	1.3	10.9	9.0	25.9
1969	87.3	68.6	106.1	69.5	114.0	34.4	11.5	31.7	33.4	1.0	86.8	53.8
1970	118.8	67.4	84.7	99.9	92.9	75.3	48.8	53.2	15.8	33.6	66.4	31.6
1971	127.9	85.0	103.0	133.2	202.3	99.8	22.5	13.5	7.1	1.0	0.9	10.4
1972	48.2	134.7	75.0	82.6	163.3	128.4	43.9	4.8	0.0	14.5	27.2	28.8
1973	76.2	98.2	94.6	215.1	125.9	164.9	63.8	51.8	15.9	2.6	8.1	2.7
1974	36.7	111.2	75.7	91.8	67.4	91.4	31.4	1.9	1.8	4.5	2.9	97.8
1975	13.1	102.8	218.4	188.2	163.4	239.9	41.1	69.3	3.4	13.6	6.7	61.5
1976	177.0	37.2	95.3	103.1	94.7	83.8	36.8	0.9	2.0	17.7	18.1	78.8
1977	67.4	95.4	112.8	112.2	72.0	79.9	279.1	18.8	2.6	0.4	23.6	62.7
1978	92.8	82.3	141.9	86.5	96.7	78.9	21.8	18.6	2.1	57.3	11.7	28.8
1979	63.2	49.6	69.4	89.5	84.6	82.0	32.7	7.7	0.9	9.2	3.8	96.8
1980	38.1	89.6	94.6	121.7	158.6	66.5	14.4	58.3	10.9	6.0	28.8	15.3
1981	27.2	57.7	118.6	120.1	60.8	169.4	38.6	9.1	21.8	23.1	4.9	32.8
1982	65.4	102.7	35.4	57.9	39.7	68.8	53.4	14.4	6.6	13.6	4.6	34.7
1983	67.7	133.9	145.0	107.3	100.7	130.1	66.5	16.8	24.7	20.9	12.4	21.1
1984	94.8	116.7	63.7	155.2	215.2	50.2	30.5	2.5	3.7	0.7	0.2	20.4
1985	134.6	119.7	142.7	97.4	125.2	106.2	24.8	4.0	3.4	9.6	49.2	57.5
1986	132.3	138.7	85.4	98.0	75.7	95.2	32.5	5.3	17.8	1.1	48.2	223.3
1987	89.1	101.9	104.3	113.3	208.0	123.0	50.0	39.4	8.5	14.9	22.5	43.9
1988	69.4	118.9	160.2	101.4	214.8	73.2	118.0	12.2	11.4	38.6	0.0	5.9
1989	96.5	236.2	73.4	111.4	34.2	119.3	59.4	8.0	14.4	2.3	54.4	20.9
1990	80.3	53.5	96.1	109.1	82.7	45.0	15.2	11.7	10.5	1.7	8.5	57.1
1991	131.8	101.1	164.2	85.7	68.6	46.9	50.1	0.6	2.9	0.0	7.0	41.9
1992	42.7	62.5	53.3	81.4	77.6	70.7	50.4	3.9	0.3	0.6	12.9	69.7
1993	114.2	90.7	140.8	140.9	148.1	153.5	8.8	16.5	7.0	23.6	21.4	4.5
1994	47.1	34.9	108.5	106.7	58.6	145.4	86.6	19.2	18.1	2.8	0.6	36.4
1995	69.9	75.1	209.6	206.0	137.7	86.7	20.4	15.4	3.9	21.1	3.4	21.3
1996	53.7	153.8	129.1	117.9	62.9	94.7	75.9	20.5	142.9	47.5	13.7	26.1
1997	68.0	96.0	78.5	161.9	196.9	221.0	60.1	50.0	19.1	39.2	34.1	40.9
1998	49.0	140.9	170.2	105.6	122.7	85.2	24.9	10.2	8.9	6.7	8.5	15.1
1999	101.3	79.3	152.2	197.9	139.2	182.9	106.9	36.8	10.9	10.1	8.7	48.4
2000	60.8	99.1	94.2	140.3	109.9	79.5	51.8	10.2	0.5	5.3	6.6	35.9
2001	83.6	196.2	134.4	141.0	79.6	101.9	31.8	43.0	15.6	41.5	50.3	40.8
2002	36.4	63.9	77.5	108.8	78.0	89.9	40.9	29.4	12.3	1.9	22.5	62.2
2003	24.8	79.9	72.6	139.3	78.7	158.9	40.9	7.3	6.7	47.8	7.5	114.9
2004	34.5	85.4	88.5	226.6	88.0	84.9	32.3	19.4	1.2	0.6	22.3	17.3
2005	52.1	135.0	70.1	105.1	106.2	86.5	85.8	39.9	8.8	10.2	75.8	92.5
2006	134.3	111.1	116.5	79.8	73.7	60.8	60.3	0.1	23.3	0.1	10.6	18.1
2007	97.6	81.3	74.1	97.6	114.5	78.6	75.9	12.1	42.0	1.3	12.7	15.5
2008	40.5	74.5	90.8	74.5	127.0	25.6	31.2	28.2	11.0	0.0	24.5	28.2
2009	94.8	46.3	61.2	157.1	75.2	56.1	31.4	7.1	26.2	3.7	4.1	5.8

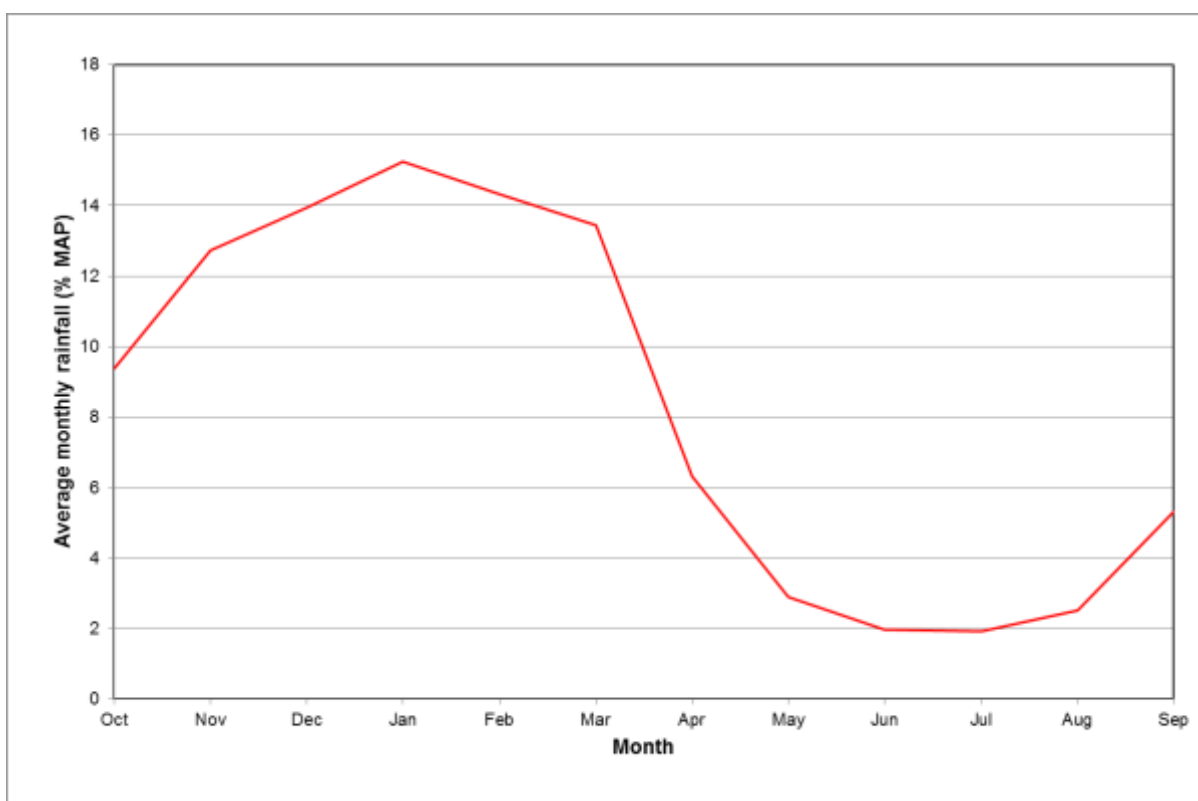


Figure A2- 20 Monthly Rainfall Distribution of Quaternary Catchment T35K

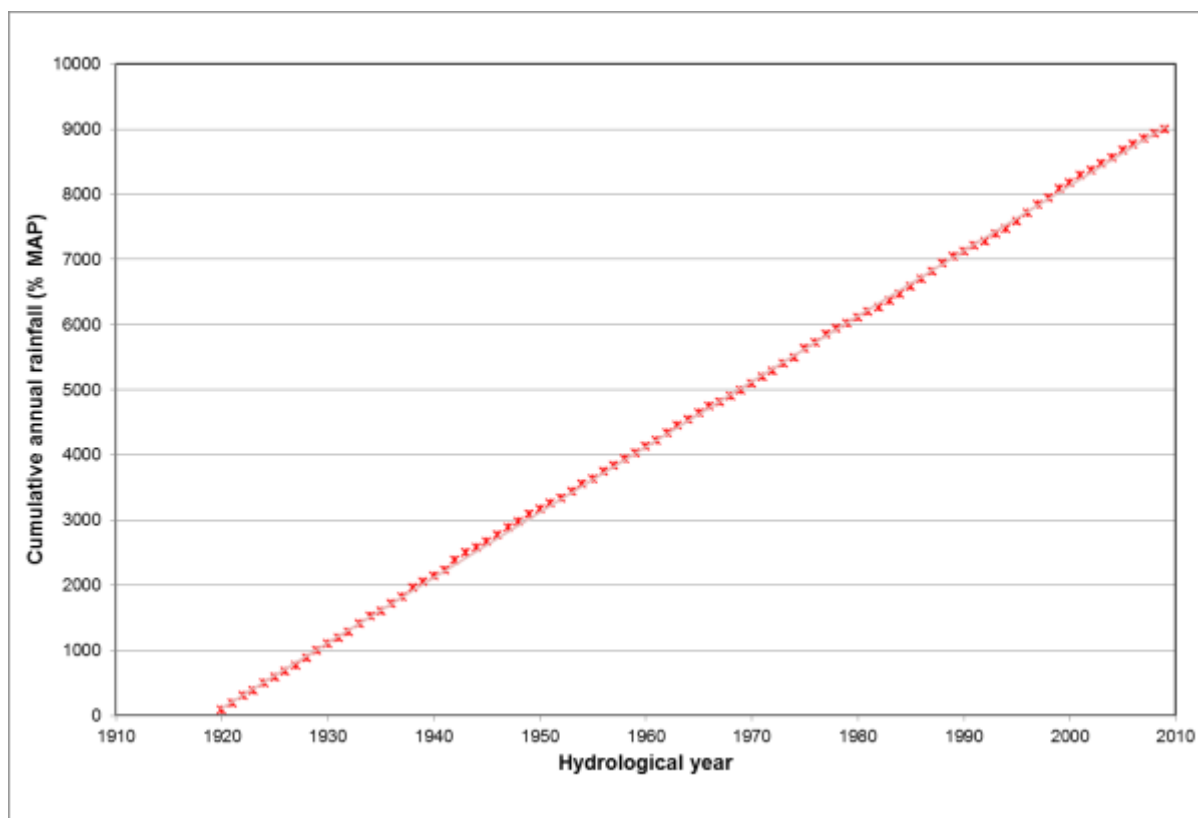


Figure A2- 21 Cumulative Annual Rainfall in Quaternary Catchment T35K

Table A2- 11 Quaternary Catchment T35L - Monthly Rainfall File in Millimetres

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	73.4	76.8	114.3	142.6	77.7	138.5	85.5	14.5	0.7	0.8	2.9	47.4
1921	89.3	148.0	164.3	86.5	75.2	42.5	4.8	89.8	33.8	22.0	60.7	36.8
1922	85.6	188.5	63.5	223.5	175.0	103.7	17.6	7.0	7.8	128.0	11.1	20.4
1923	49.1	55.8	125.3	116.0	145.5	80.6	9.0	15.8	7.6	0.8	29.2	39.7
1924	59.8	89.2	202.3	69.6	85.3	226.5	119.3	15.4	1.6	0.6	0.9	37.0
1925	24.8	123.9	83.7	99.1	93.0	140.4	24.3	32.2	44.6	3.0	7.1	62.3
1926	90.9	90.1	145.1	82.3	71.8	256.9	13.0	5.2	0.9	7.7	30.4	36.0
1927	67.6	42.7	176.9	182.7	92.6	85.9	26.2	25.7	5.9	5.7	43.4	16.2
1928	61.1	109.1	130.9	85.2	128.5	188.8	5.7	34.7	55.7	30.6	20.1	82.1
1929	136.0	117.3	131.0	158.0	46.4	151.1	66.3	6.6	17.9	8.1	62.4	39.4
1930	66.1	27.5	110.5	159.0	122.8	144.4	38.9	2.6	2.2	160.8	3.1	8.3
1931	79.5	99.6	105.9	96.1	194.7	52.5	4.1	31.1	6.4	26.8	9.7	100.3
1932	89.7	206.4	166.4	43.9	61.8	135.3	35.6	2.4	4.5	5.1	7.0	16.1
1933	32.0	212.6	191.3	273.8	92.9	140.2	26.6	7.5	12.9	64.0	1.7	11.8
1934	72.4	106.9	200.9	80.1	62.2	125.3	93.2	61.3	51.8	0.4	43.3	19.5
1935	54.7	46.9	32.1	93.2	225.9	119.9	20.7	84.6	6.8	34.0	0.9	32.3
1936	107.7	250.8	58.0	163.0	200.6	89.4	16.9	8.4	4.1	2.8	5.7	42.2
1937	66.0	41.8	137.5	176.7	131.2	83.4	129.5	11.3	23.6	18.9	31.8	15.3
1938	85.0	127.2	182.6	179.0	242.3	51.8	30.1	35.4	8.7	42.0	16.8	125.4
1939	91.6	100.7	93.9	120.1	132.1	110.4	46.5	71.5	8.3	2.3	12.6	54.6
1940	70.4	101.6	95.1	128.2	97.4	80.1	58.6	6.7	12.7	10.1	16.4	16.4
1941	87.4	72.6	59.7	129.0	112.1	144.1	69.8	40.4	0.0	0.5	33.4	44.6
1942	108.6	213.3	200.3	143.9	71.2	144.5	105.8	33.5	32.4	9.8	104.0	78.6
1943	103.1	165.5	185.0	109.4	127.4	137.4	21.4	8.7	36.3	16.4	2.1	165.6
1944	78.9	46.3	32.6	114.9	143.6	113.2	24.0	22.7	3.6	2.9	1.8	16.1
1945	112.4	30.9	97.0	173.5	112.4	129.8	59.3	34.3	1.8	7.0	2.4	16.9
1946	54.5	117.3	106.8	128.5	114.1	127.0	102.6	1.4	80.7	11.4	5.8	60.8
1947	59.1	204.2	157.5	167.1	164.2	120.0	53.6	6.5	2.8	4.5	2.0	16.4
1948	115.1	62.4	94.7	83.1	136.1	78.1	52.4	18.5	0.6	15.5	13.4	38.3
1949	49.0	106.8	99.2	138.4	186.7	139.1	61.2	66.7	1.6	22.3	74.6	28.7
1950	76.1	49.6	193.6	107.4	75.1	83.0	33.9	10.8	1.1	0.9	41.8	44.9
1951	113.2	19.1	74.5	109.9	149.1	62.8	54.2	11.2	11.4	13.2	7.9	47.8
1952	45.7	59.3	98.3	95.9	116.2	82.0	76.0	1.5	3.7	0.1	31.7	66.7
1953	85.8	115.1	122.5	110.4	117.5	134.6	23.4	83.0	37.5	1.4	0.7	48.9
1954	102.0	90.6	86.6	208.5	164.8	73.0	68.9	15.8	24.9	0.5	0.1	39.8
1955	70.1	111.2	69.2	32.3	121.5	169.0	19.7	25.7	31.3	0.6	3.5	41.3
1956	54.4	158.1	164.2	136.7	70.6	165.0	66.8	15.2	4.6	12.8	49.8	72.8
1957	82.5	64.7	103.7	186.2	107.0	61.3	80.4	10.5	0.2	12.7	1.4	27.8
1958	41.0	149.8	118.9	76.6	80.0	79.3	96.6	111.3	0.0	50.3	24.1	43.5
1959	44.6	106.6	111.7	83.5	120.0	74.4	72.9	11.9	1.0	12.6	32.3	74.7
1960	47.8	116.2	145.0	136.9	101.0	119.2	69.2	40.0	0.5	1.2	14.1	25.3
1961	33.0	129.3	137.6	110.5	139.2	115.9	42.2	24.4	0.3	0.1	21.9	10.3
1962	84.0	145.8	124.6	194.3	113.1	216.0	58.7	6.7	2.2	41.1	0.3	6.7
1963	116.5	150.2	73.6	138.7	76.2	143.6	87.6	0.5	104.6	7.4	8.5	52.9
1964	128.2	30.6	96.3	101.6	113.6	32.4	44.3	17.2	131.8	24.3	44.7	26.3

FEASIBILITY STUDY MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1965	99.9	157.5	58.2	133.9	139.9	9.9	26.7	84.9	9.7	0.1	35.1	42.5
1966	46.0	75.0	95.6	122.8	168.4	207.1	91.6	24.2	38.2	21.0	8.3	2.6
1967	64.8	102.2	46.3	71.4	90.3	75.3	51.0	2.2	1.2	7.9	34.4	45.1
1968	64.0	90.7	80.9	53.7	119.3	163.3	18.5	37.4	1.2	11.6	10.7	28.4
1969	93.9	77.1	113.6	74.8	126.2	38.1	12.0	36.2	37.9	1.2	93.7	63.2
1970	127.8	71.3	95.7	104.3	99.6	79.6	55.6	57.9	18.4	38.5	69.4	36.3
1971	144.7	99.9	110.4	148.3	223.3	105.2	24.1	15.8	8.3	1.1	1.0	12.4
1972	54.3	146.0	88.0	88.4	168.2	136.4	44.7	5.1	0.0	16.2	31.3	30.2
1973	86.7	109.4	101.6	228.6	129.6	179.3	69.0	63.7	17.2	2.8	8.2	3.4
1974	41.3	121.5	79.1	98.1	72.8	98.1	36.4	2.3	1.9	5.5	2.6	106.8
1975	15.1	113.8	246.7	207.8	187.3	269.2	42.7	75.4	3.4	16.0	7.1	69.6
1976	195.8	41.7	108.4	107.0	103.3	92.5	39.5	1.2	1.6	20.3	20.3	84.9
1977	76.4	101.4	128.9	128.7	80.0	89.5	304.7	18.3	2.2	0.3	25.9	69.2
1978	101.1	98.7	157.1	97.4	106.0	89.9	23.0	20.8	2.3	66.4	12.9	32.1
1979	69.4	53.3	72.0	92.4	96.1	87.3	41.2	8.6	1.2	10.5	4.3	107.0
1980	41.2	95.0	100.6	127.5	170.2	78.0	14.6	67.8	11.2	7.6	34.8	17.9
1981	28.8	60.4	137.2	131.9	64.8	186.2	41.5	10.2	23.7	27.3	4.8	35.3
1982	71.9	108.2	37.1	62.1	41.8	78.1	62.6	17.3	7.4	15.3	5.6	40.5
1983	72.9	146.4	150.0	115.2	109.3	140.3	71.6	17.6	27.8	24.1	14.1	23.7
1984	102.4	132.9	68.0	157.1	234.0	59.0	32.4	3.3	3.8	0.5	0.3	22.5
1985	149.0	132.0	154.8	110.4	139.7	122.5	28.0	4.9	3.8	10.6	55.5	64.0
1986	148.6	149.7	86.2	103.0	81.5	105.6	36.6	6.2	18.0	0.9	52.6	248.1
1987	95.5	108.2	111.6	121.4	223.3	127.8	54.0	44.7	9.6	16.3	24.0	49.8
1988	77.7	126.7	165.7	109.4	243.6	80.2	130.6	12.2	13.5	44.6	0.0	6.2
1989	106.9	267.4	78.2	113.3	38.2	115.3	68.1	9.6	16.2	2.5	59.4	24.2
1990	86.4	58.4	99.9	118.9	86.2	44.6	16.8	13.4	14.1	2.5	10.2	67.4
1991	140.3	108.7	178.4	92.9	69.1	48.8	57.3	0.8	3.9	0.0	8.1	46.3
1992	46.3	69.0	56.1	86.7	79.9	69.3	55.6	4.3	0.4	0.7	13.6	79.1
1993	125.3	97.7	160.6	148.2	164.8	169.1	10.7	21.3	6.1	25.8	24.1	3.6
1994	50.4	36.3	115.2	109.6	66.6	159.0	96.4	22.8	20.7	2.8	0.6	41.5
1995	75.3	79.5	215.8	220.2	152.1	94.7	17.8	16.9	4.4	25.2	3.8	23.9
1996	57.7	156.7	140.9	118.8	67.9	106.7	86.3	24.9	168.6	51.3	15.5	28.5
1997	70.2	99.8	83.8	172.7	220.2	266.8	65.9	61.5	27.1	52.2	40.3	50.7
1998	55.2	150.3	185.7	113.7	137.3	91.5	31.3	11.9	10.2	7.5	12.3	16.9
1999	110.4	86.2	162.2	209.8	133.3	205.1	121.9	36.7	12.3	13.6	12.6	54.3
2000	64.9	109.6	100.2	152.7	119.8	84.9	57.8	11.1	0.4	5.5	7.7	39.6
2001	91.8	208.7	148.3	157.5	86.2	112.9	36.0	46.6	18.7	46.5	55.1	45.1
2002	40.6	69.7	81.8	120.3	85.3	96.5	43.4	31.5	15.5	2.3	24.4	70.2
2003	25.7	88.4	76.9	144.5	79.8	173.4	44.2	7.9	7.2	53.7	8.0	126.2
2004	36.1	91.2	96.1	245.8	95.9	85.0	35.9	22.5	1.7	0.8	24.8	19.3
2005	56.2	154.0	80.0	107.6	113.2	93.8	91.0	43.4	10.5	11.7	87.5	112.7
2006	143.9	120.0	123.9	83.9	81.8	69.0	66.6	0.1	26.7	0.1	12.6	20.9
2007	106.8	87.8	78.7	101.7	116.0	83.8	79.9	13.6	47.4	1.9	13.7	17.5
2008	48.0	81.8	91.1	79.3	141.3	27.6	40.4	29.9	11.7	0.0	29.8	31.4
2009	101.8	51.6	70.7	173.1	75.9	60.8	33.2	7.4	29.5	4.0	4.7	6.5

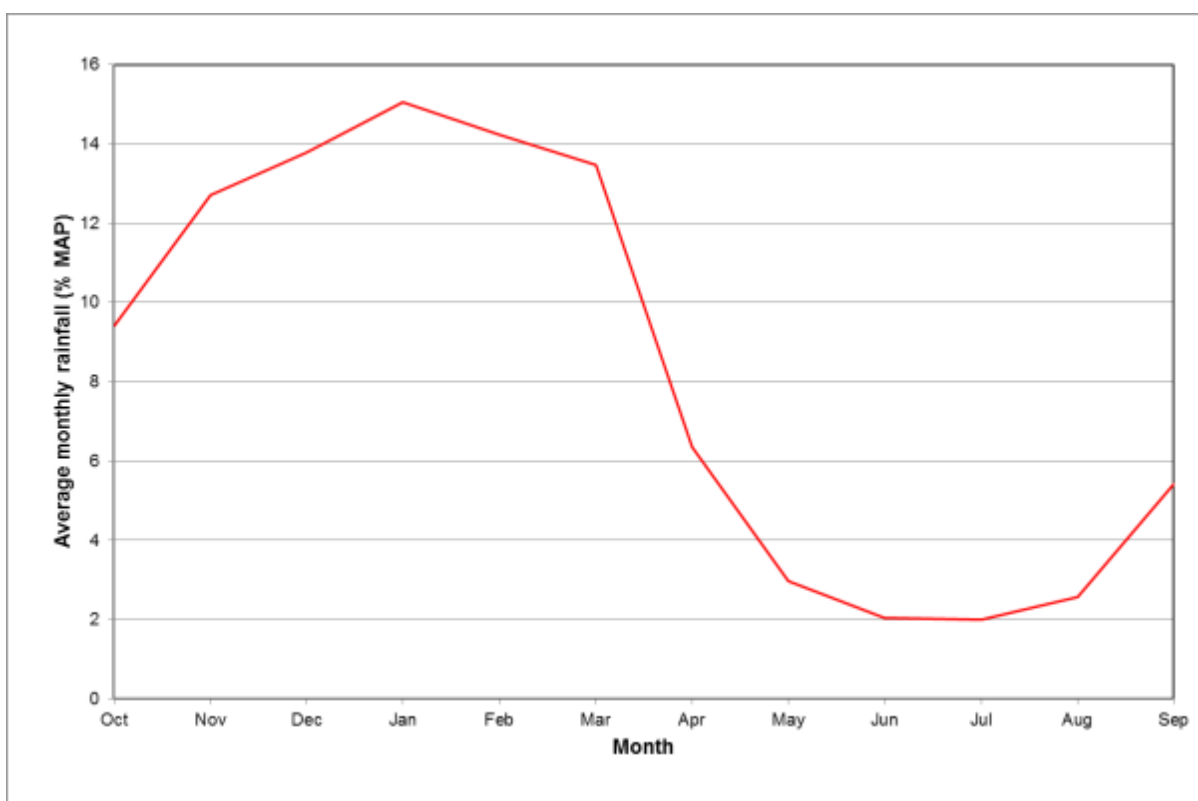


Figure A2- 22 Monthly Rainfall Distribution of Quaternary Catchment T35L

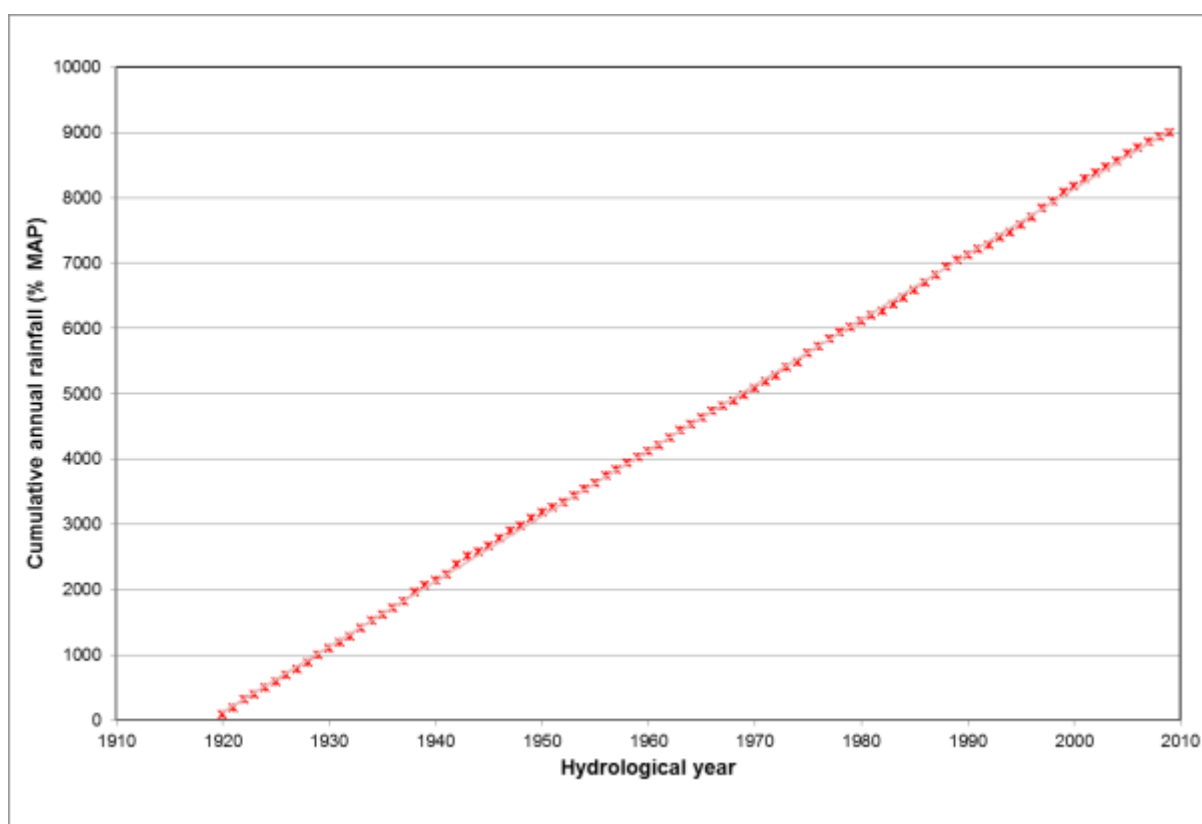


Figure A2- 23 Cumulative Annual Rainfall in Quaternary Catchment T35L



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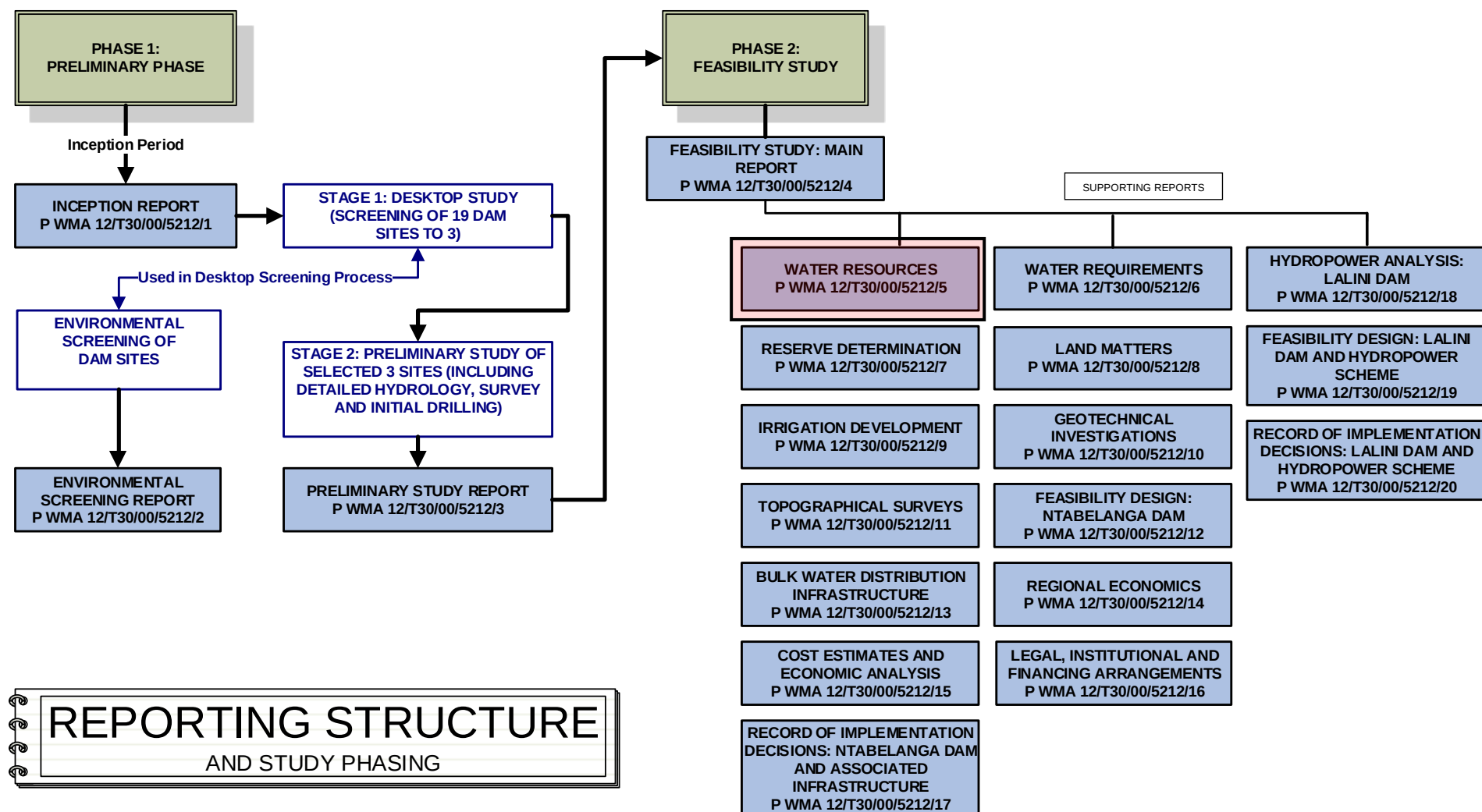
WATER RESOURCES APPENDICES B-E



OCTOBER 2014

LIST OF REPORTS

REPORT TITLE	DWS REPORT NUMBER
Inception Report	P WMA 12/T30/00/5212/1
Environmental Screening	P WMA 12/T30/00/5212/2
Preliminary Study	P WMA 12/T30/00/5212/3
Feasibility Study: Main Report	P WMA 12/T30/00/5212/4
Volume 1: Report	
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FEASIBILITY STUDY: SUPPORTING REPORTS:	
Water Resources	P WMA 12/T30/00/5212/5
Water Requirements	P WMA 12/T30/00/5212/6
Reserve Determination	P WMA 12/T30/00/5212/7
Volume 1: River	
Volume 2: Estuary: Report	
Volume 3 :Estuary: Appendices	P WMA 12/T30/00/5212/8
Land Matters	
Irrigation Development	
Geotechnical Investigations	P WMA 12/T30/00/5212/10
Volume 1: Ntabelanga, Somabadi and Thabeng Dam Sites: Report	
Volume 2: Ntabelanga, Somabadi and Thabeng Dam Sites: Appendices	
Volume 3: Lalini Dam and Hydropower Scheme: Report	
Volume 4: Lalini Dam and Hydropower Scheme: Appendices	P WMA 12/T30/00/5212/11
Topographical Surveys	
Feasibility Design: Ntabelanga Dam	
Bulk Water Distribution Infrastructure	P WMA 12/T30/00/5212/13
Regional Economics	P WMA 12/T30/00/5212/14
Cost Estimates and Economic Analysis	P WMA 12/T30/00/5212/15
Legal, Institutional and Financing Arrangements	P WMA 12/T30/00/5212/16
Record of Implementation Decisions: Ntabelanga Dam and Associated Infrastructure	P WMA 12/T30/00/5212/17
Hydropower Analysis: Lalini Dam	P WMA 12/T30/00/5212/18
Feasibility Design: Lalini Dam and Hydropower Scheme	P WMA 12/T30/00/5212/19
Record of Implementation Decisions: Lalini Dam and Hydropower Scheme	P WMA 12/T30/00/5212/20



REFERENCE

This report is to be referred to in bibliographies as:

*Department of Water and Sanitation. **Feasibility Study for the Mzimvubu Water Project: Water Resources – Appendices B-E***

DWS Report No: P WMA 12/T30/00/5212/5

Prepared for: Directorate – Options Analysis

Prepared by: Jeffares & Green (Pty) Ltd, P O Box 794, Hilton, 3245

Tel: 033 343 6700, Fax: 033 343 6701

Contact: Mr A Pepperell

Email: pepperella@jgi.co.za

Note on Departmental Name Change:

In 2014, the Department of Water Affairs changed its name to the Department of Water and Sanitation, which happened during the course of this study. In some cases this was after some of the study reports had been finalized. The reader should therefore kindly note that references to the Department of Water Affairs and the Department of Water and Sanitation herein should be considered to be one and the same.

Note on Spelling of Lalení:

The settlement named Lalení on maps issued by the Surveyor General is locally known as Lalini and both names therefore refer to the same settlement.

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VOLUME 3	APPENDIX B	Observed And Simulated Streamflows
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	APPENDIX C	Sedimentation Calculations
	APPENDIX D	Stochastic Streamflow Analysis Tests
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APPENDIX B

OBSERVED AND SIMULATED STREAMFLOWS

APPENDIX B1

OBSERVED AND SIMULATED STREAMFLOWS KINIRA RIVER SYSTEM

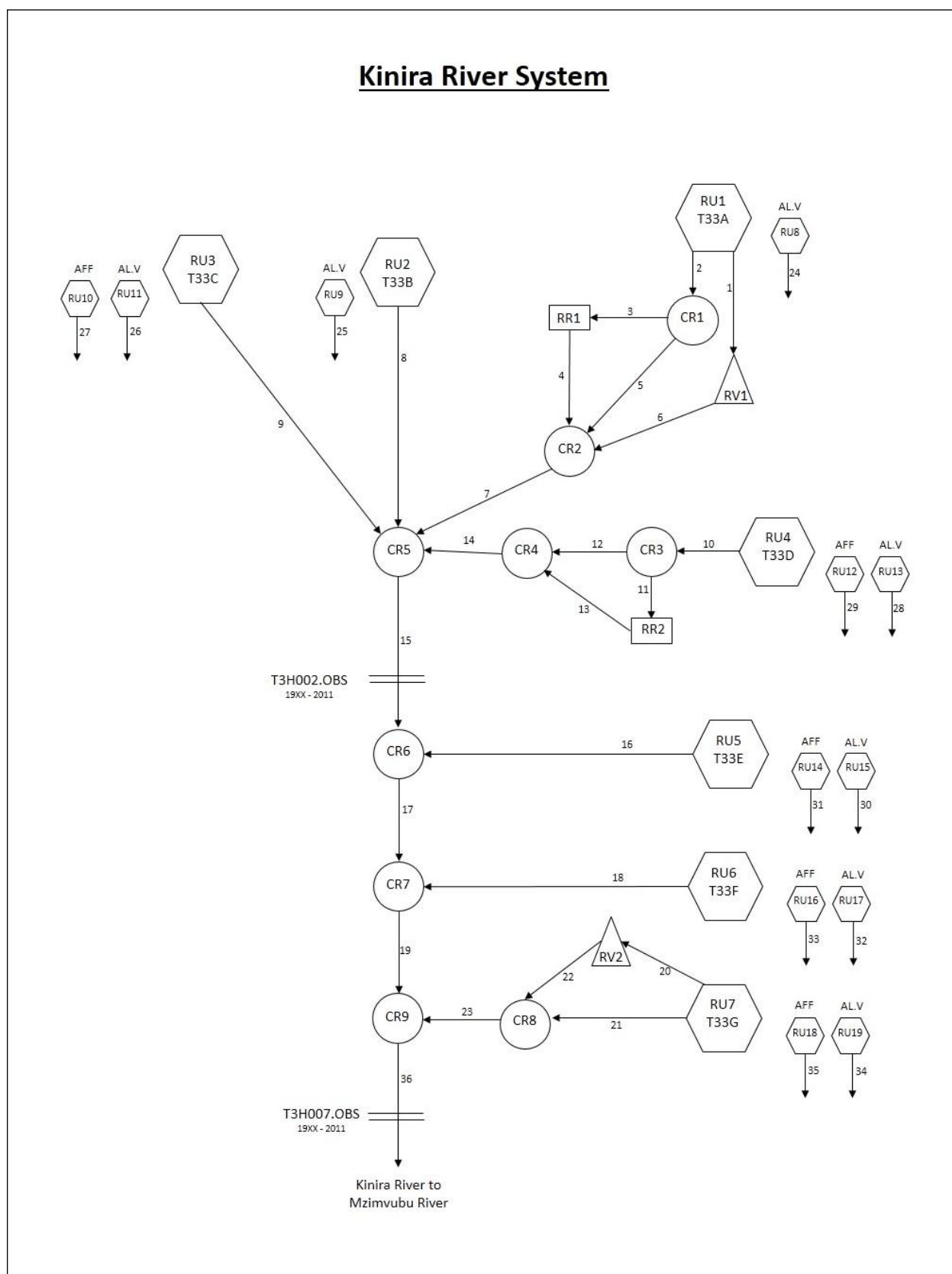


Figure B1 - 1 Kinira River Catchment WRS2000Systems Diagram

Table B1- 1 Observed Gauged Raw Stream Flow Data for Gauge T3H002 (1964-2009)

Year	Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Total	
1964	30.22		32.5		30.01		27.16		31.11		6.91		11.55		2.8		17.32		28.51		12.44		31.24		261.78	
1965	30.44		32.16		6.35		28.01		44.39		18.96		5.44		4.79		3.2		2.13		2.11		2.48		180.46	
1966	2.56		11.24		16.59		29.83		48.09		54.88		72.86		17.77		18.59		11.44		6.31		3.52		293.68	
1967	2.2		11.78		11.69		3.09		4.69		11.76		16.19		4.54		2.36		2.65		2.82		3.2	+	76.97	
1968	0.72	+	11.13		14.44		11.79		29.23		69.28		47.37		5.59		3.12		2.18		1.49		0.96		197.3	
1969	16.03		7.11		15.89		23.94		34.03		8.01		1.82		0.9		0.77		0.64		5.3		4.73		119.17	
1970	36.16		8.42		7.26		40.88		49.44		22.21		27.46		7.96		3.06		4.82		3.81		1.66		213.13	
1971	5.4		8.61		22.09		81.52		111.98		147.72		17.5	+	7.72		3.8		2.64		1.75		1.65		412.39	
1972	0.96	+	6.49		3.3		2.01		22.47		10.27	+	21.06		4.01		1.87		1.31		2.01		0.89		76.66	
1973	1.86	+	16.78	+	29.97		110.82		235.83		165.35		61.64		15		9.08		5.29		4.74		2.8		659.17	
1974	1.85		23.74		49.36		24.14		126.52		126.99		16.25		5.5		3.24		2.66		1.69		10.91		392.85	
1975	4.47		5.48		68.4	+	312.74		246.82		319.88		49.33		34.91		5.29	+	7.5		4.2		6		1065.03	
1976	105.91		42.5		6.42		8.27		64.23		73.65	+	10.03	+	5.38		2.1		2.37		1.31	+	4.41	+	326.59	
1977	16.99		25.19	+	10.22	+	91.76		19.52	+	15.17	+	0	#	0	#	0	#	0	#	0	#	0	#	178.85	
1978	0	#	0	#	0	#	0	#	10.25	+	27.28	+	3.53	+	1.56	+	0.67	+	5.59		10.24		6.08		65.2	
1979	5.9		4.09		15.63		41.87		51.57		53.25		6.4	+	0	#	1.43	+	1.86		1.77		4.87		188.65	
1980	4.9		4.67	+	18.2		12.18		107.46		28.28		5.26		4.45		3.78	+	1.38		10.12		2.31	+	202.99	
1981	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#		#
1982	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0.03	+	0.03	+	0.05			#
1983	49.84		18.29		36.21	+	52.8	+	0	+	0	#	0	#	1.97	+	4.7		4.14		2.63		4.91		175.47	
1984	4.36		8.8		6.37		27.72		88.42		41.15		6.26		3.14		2.33		1.79		0.99		0.69	+	192.01	
1985	21.33	+	72.91		77.31		99.76		69.84		22.36		6.61		6.78		8.41		7.11		7.88		11.95		412.27	
1986	19.61		74.57		31.8		28.37		11.99		23.99		10.47		7.46		6.16		5.12		8.71	+	88.68		316.93	
1987	143.97		57.21		9.2		6.83		138.3		251.22		22.96		7.72		3.8		3.84		3.73		29.46		678.24	
1988	32.59		17.63		114.3		67.4		212.98		77.53		51.11		23.79		6.42		2.52		0.76		0.43		607.46	
1989	0.6		41.43		62		30.01		6.01		64.7		31.19		3.92		3.7		2.1		2.36		6.36		254.4	
1990	1.71		0.63		25.05		29.87		136.8		14.43		1.74		0.63		0.5		0.38		0.21		0.29		212.24	
1991	43.15		18.26		64.51		12.7		16.88		11.92		6.81		1.45		0.89		0.73		0.67		1.13		179.1	
1992	2.34		1.54		4.42		5.85		8.47		22.32		7.18		2.26		0.75		0.57		0.55		0.25		56.5	
1993	17.95		20.14		50.86		74.86		200.68		79.43		12.44		5.95		3.2		1.63	+	3.8		2.04		472.98	
1994	1.58		0.63		0.04	+	0	#	15.8	+	72.49		30.47		7.65		6.28		2.91		1.72		1.56		141.13	

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Total	
1995	2.11		5.17	+	19.8	+	42.88	+	131.47	+	108.23		27.4		8.53		4.39		4.61		4.24		1.94		360.77	
1996	3.16		16.74	+	32.52	+	144.01		25.81	+	85.7		36.64		8.94		35.09		12.76		8.25		3.96		413.57	
1997	9.53		9.05		11.84		41.72		175.67		63.64		21.54		9.46		4.37		2.93		3.04		1.94		354.73	
1998	2.01		17.62		38.45		51.18		79.65		44.18		9.74		1.73	+	1.33	+	1.68		1.1		0.65	+	249.33	
1999	0	#	0	#	0	#	0	#	0	+	0	#	0	#	0	#	0	#	0	#	0	#	0	#		#
2000	5.46	+	9.42		20.98		20.9		38.38		32.54		12.54		6.42		2.82		2.2		1.51		13.03		166.22	
2001	13.08		104.28		67.95		58.36		52.08		27.17		5.98		4.03		6.26		6.91		33.67		38.74		418.49	
2002	6.85		4.51		37.17		48.57		39.92		30.06		10.45		4.54		2.82		1.99		1.82		2.2		190.9	
2003	0.94		0.06	+	0.86	+	31.42		54.03		47.41		16.47		4.26		2.2		2.67		2.14		7.63		170.09	
2004	10.06		17.78		26.95		44.65		27.09		46.14		14.26		4.34		2.07		1.56		1.97		0.67		197.54	
2005	4.73		10.75		3.71		27.4		87.63		46.91		36.69		32.75		7.39		4.27		9.63		15.38		287.24	
2006	52.75		37.94		44.14		20.66		21.26		11.63		9.01		2.58		1.85		1.52		1.04		0.57		204.96	
2007	9.45		4.56		28.65		33.63		53		58.52		20.89		13.57		8.96		4.44		2.47		1.6		239.73	
2008	1.26		8.11		14.79		24.39		71.17		52.76		8.95		4.77		5.19		4.09		6.56		2.3		204.34	
2009	48.38		42.6		10.05		68.14		43.24		21.69		15.71		3.66		4.92		2.66		1.62		0.8		263.47	

Table B1- 2 Observed Gauged Raw Stream Flow Data for Gauge T3H007 (1964 - 2003)

Year	Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Total	
1964	15.15		25.77		18.32		66.36		80.91		80.78		10.7		2.55		1.42		0.54		0.18		0.1		302.78	
1965	18.61		101.2		144.89		155.96		130.77		75.3		16.58		6.99		4.71		0.63		3.42		16.79		675.84	
1966	26.15		88.57		49.63		70.02		24.13		51.33		13.09		0.65		0.38	+	0.98		14.28		11.25	+	350.47	
1967	0	#	0	#	0	#	0	#	0	+	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#
1968	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#
1969	0	#	0	#	0	#	0	#	0	#	0	#	79.47	+	19.79	+	15.45		19.89		13.42		29.79		177.81	
1970	13.14		9.32		39.61		88.41		382.58		60.56		16.46		8.88		7.67		6.1		4.3		4.06		641.07	
1971	71.59		49.24		89.63		27.55	+	13.08	+	31.98		15.21		3.7		2.95		2.53		2.49		3.6		313.55	
1972	3.48		6.76		9.02		12.71		39.49		52.75		17.73		4.47		0.89	+	0	#	0	#	0	#	147.29	
1973	0	#	36.63	+	80.53		190.11		325.5		147.7		37.93		8.06		7.57		15.77		11.19		5.76		866.75	
1974	4.71		2.95	+	27.71	+	74.32		59.87		132.25		70.45		19.25		16.07	+	8.79	+	4.56		4.43		425.36	
1975	7.37	+	20.65		204.25		406.29		487.98		298.13		63.91		23.15		13.17		26.39		15.04		7.53		1573.86	
1976	9.49		63.03		116.27		365.53		131.16		199.71		123.65		39.11		204.76		67.66		36.07		19.59		1376.03	
1977	23.98		17.3		34.15		84.49		350.67		200.93		67.77		26.52		16.54		12.04		12.36		8.32		855.08	
1978	6.82		31.86		99.08		85.41		202.9		148.53	+	32.21		15.22		9.52		7.5		4	+	0	#	643.05	
1979	9.79	+	11.82	+	119.17	+	485.45		276.06		718.64		313.59		66.77	+	27.02	+	23.66		16.65		43.55		2112.18	
1980	29.54		35.05		59.3		85.97		121.35		147.78		58.83		25.21		12.48		11		8.28		38.01		632.81	
1981	34.78		234.53		229.57		135.7		99.96		87.78		22.46		14.29		18.03		25.29		65.13		97.88		1065.39	
1982	20.15		15.21		63.34		61.98		71.13		69.68		26.97		13.09		8.01		6.46		5.82		6.76		368.61	
1983	2.72		8.85		7.1		59.54		90.58		87.25		41.77		9.31		5.14		7.61		6.85		24		350.71	
1984	23.33		65.59		127.74		199.41		92.41		111.41		37.24		14.02		7.02		5.85		6.35		2.71		693.08	
1985	11.2		25.6		9.1		56.54		170.7		97.49		59.9		55.8		14.39		9.37		37.45		74		621.53	
1986	251.16		97.74		139.73		80.48		72.63		48.61		23.76		9.82		12.27		11.26		5.9		3.25		756.62	
1987	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#
1988	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#
1989	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#	0	#
1990	13.2		9.36		39.9		87.8		187.71	+	61.2		16.5		8.92		7.7		6.13		4.32		4.08		627	
1991	71.8		49.7		90.6		57.41	+	110.78	+	32.2		15.3		3.72		2.96		2.54		2.5		3.62		316	
1992	3.5		6.78		9.08		12.8		39.8		53.1		17.8		4.49		13.73	+	13.03	+	16.67	+	12.91	+	0	#
1993	68.52	+	37.18	+	80.7		190		303		147		38.1		8.1		7.6		15.9		11.2		5.79		0	#
1994	4.73		20.18	+	17.27	+	74.8		60		132		71		19.3		25.45	+	17.73	+	4.58		4.45		427	

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Year	Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Total	
1995	27.35	+	20.8		196		370		456		285		64.6		23.2		13.2		26.5		15.1		7.57		1486	
1996	9.53		63.6		114		347		131		199		124		39.3		193		68.3		36.3		19.7		1345	
1997	24.1		17.4		34.4		84.7		326		199		68.3		26.6		16.6		12.1		12.4		8.35		830	
1998	6.85		32.1		99.6		85.7		200		108.49	+	32.4		15.3		9.56		7.53		13.47	+	12.03	+	0	#
1999	18.89	+	23.22	+	264.2	+	456		270		434.47	+	303		44.11	+	25.47	+	23.7		16.7		44		1995	
2000	29.7		35.3		59.8		86.5		121		147		59.3		25.3		12.5		11		8.32		38.3		633	
2001	35		230		228		135		100		88.6		22.5		14.4		18.1		25.5		65.8		98.1		1061	
2002	20.2		15.3		63.9		62.6		71.9		70.3		27.1		13.1		8.04		6.49		5.85		6.79		371	
2003	2.73		8.89		7.14		59.6		91.3		98.8	+	39.58	+	9.35		5.17		7.64		6.88		24.2		353	

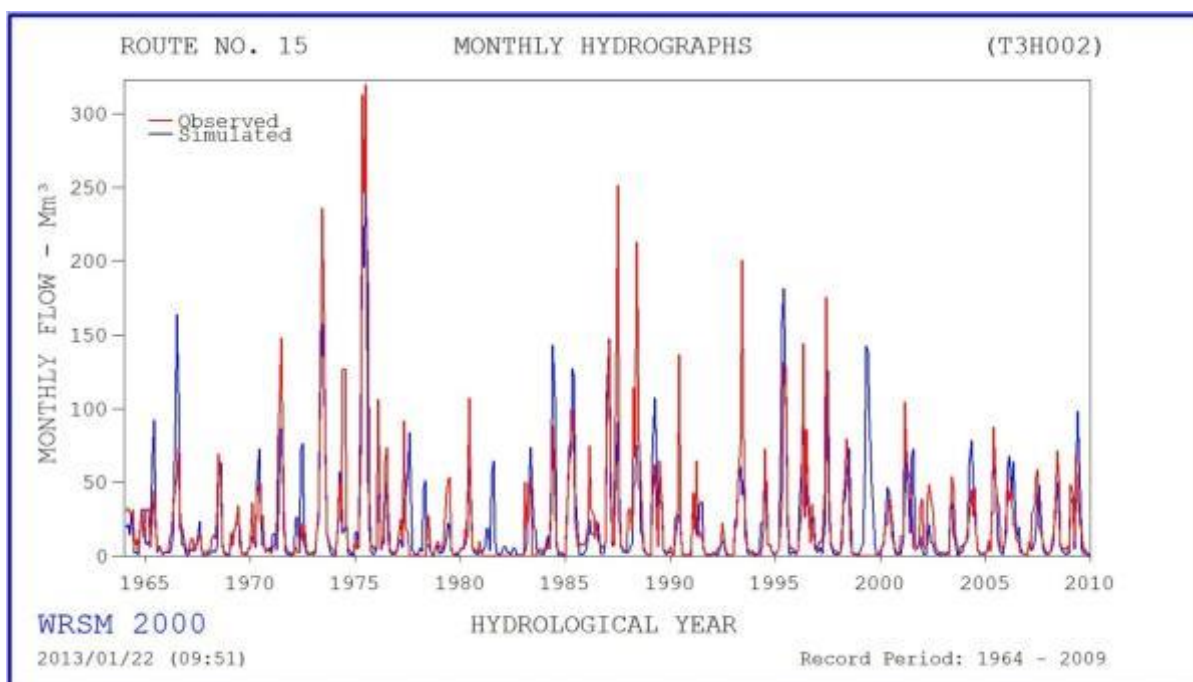


Figure B1 - 2 Comparison of Observed and Simulated Stream Flow Monthly Hydrographs at Gauge T3H002

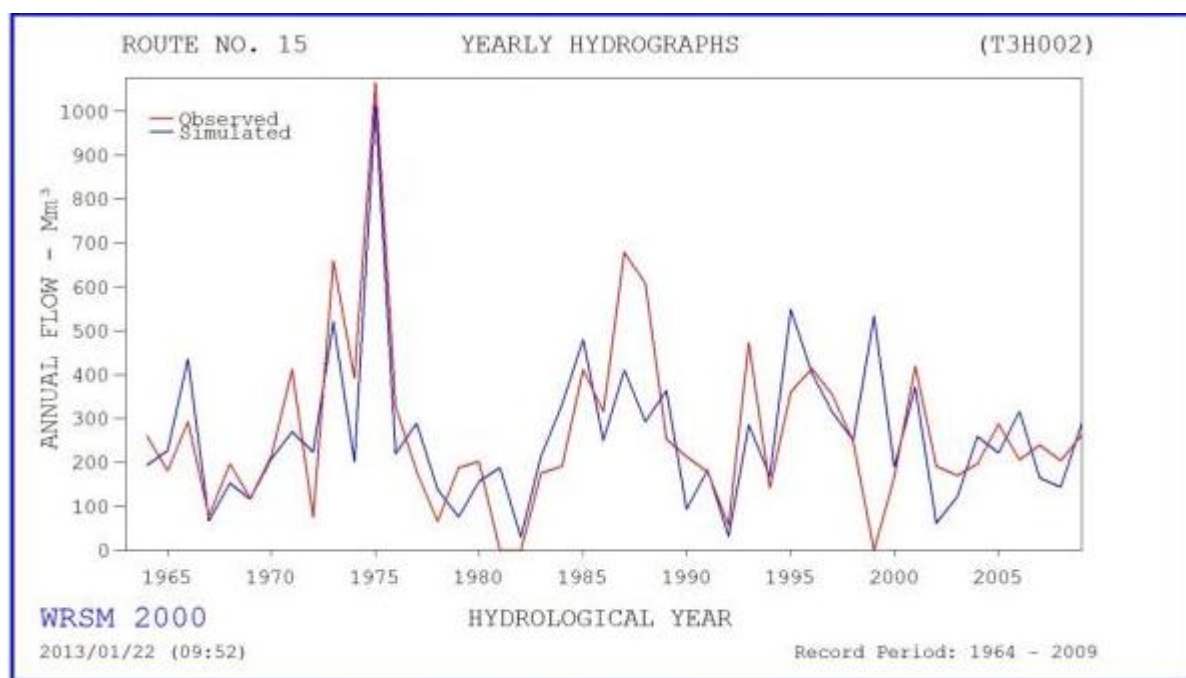


Figure B1 - 3 Comparison of Observed and Simulated Stream Flow Annual Hydrographs at Gauge T3H002

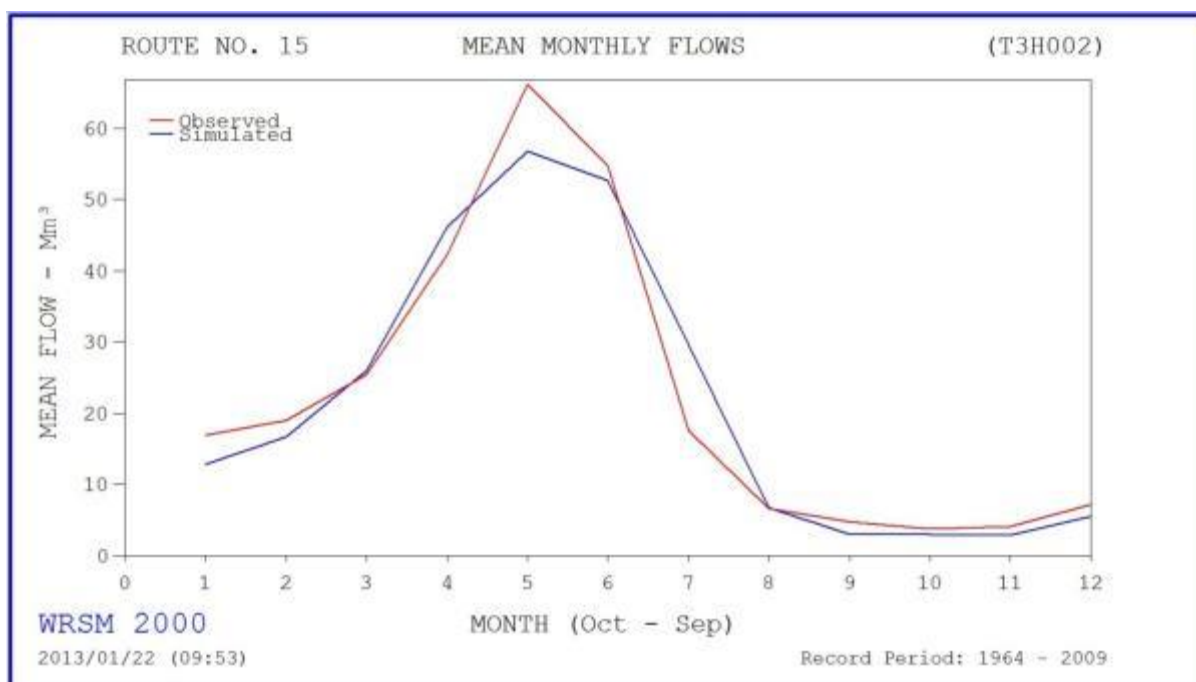


Figure B1 - 4 comparison of Observed and Simulated Stream Flow Mean Monthly Flows at Gauge T3H002

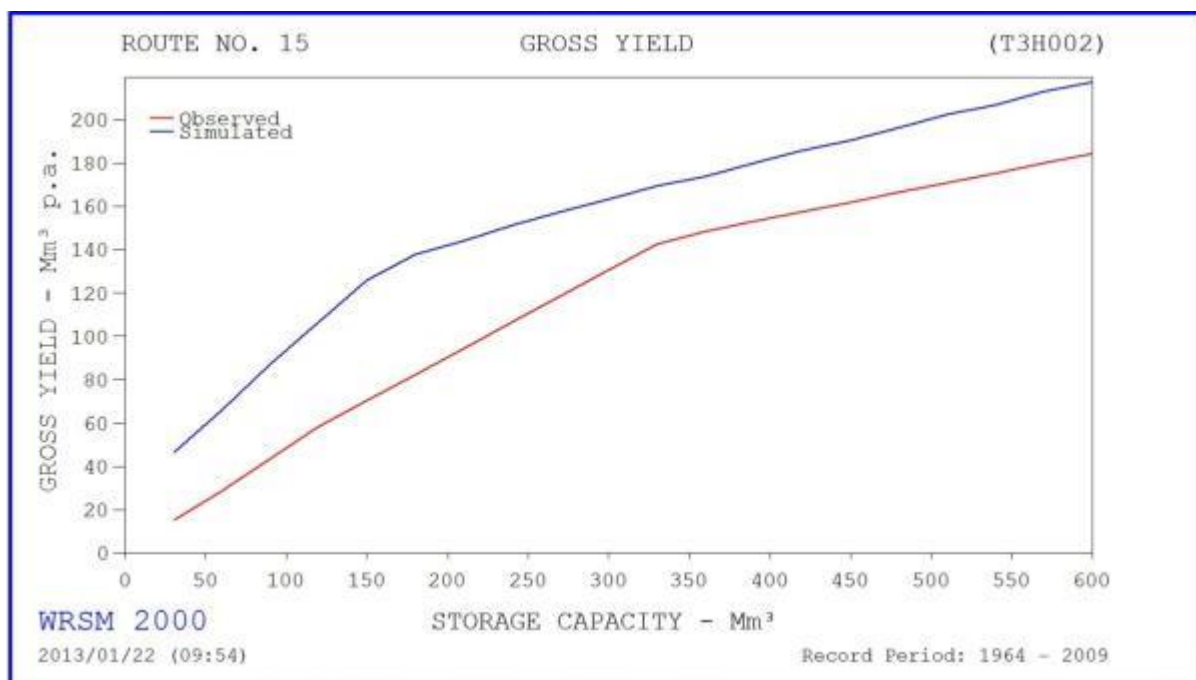


Figure B1 - 5 Comparison of Observed and Simulated Stream Flow Gross Yield at Gauge T3H002

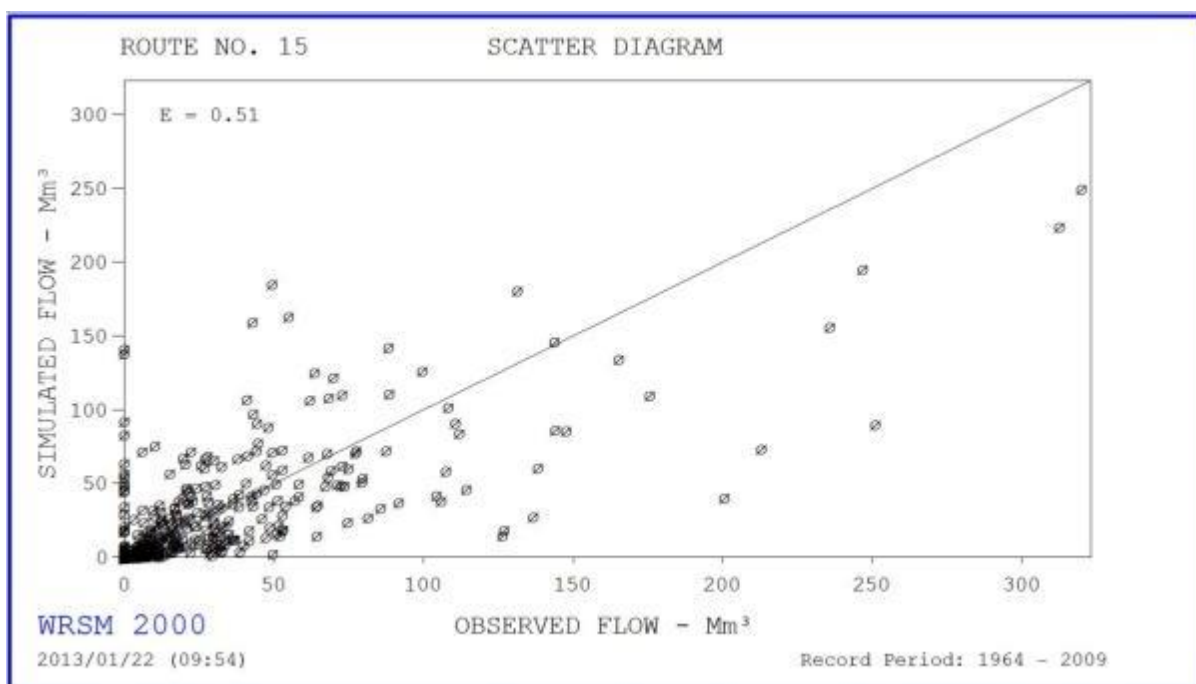


Figure B1 - 6 Observed vs. Simulated Stream Flow Scatter Diagram at Gauge T3H002

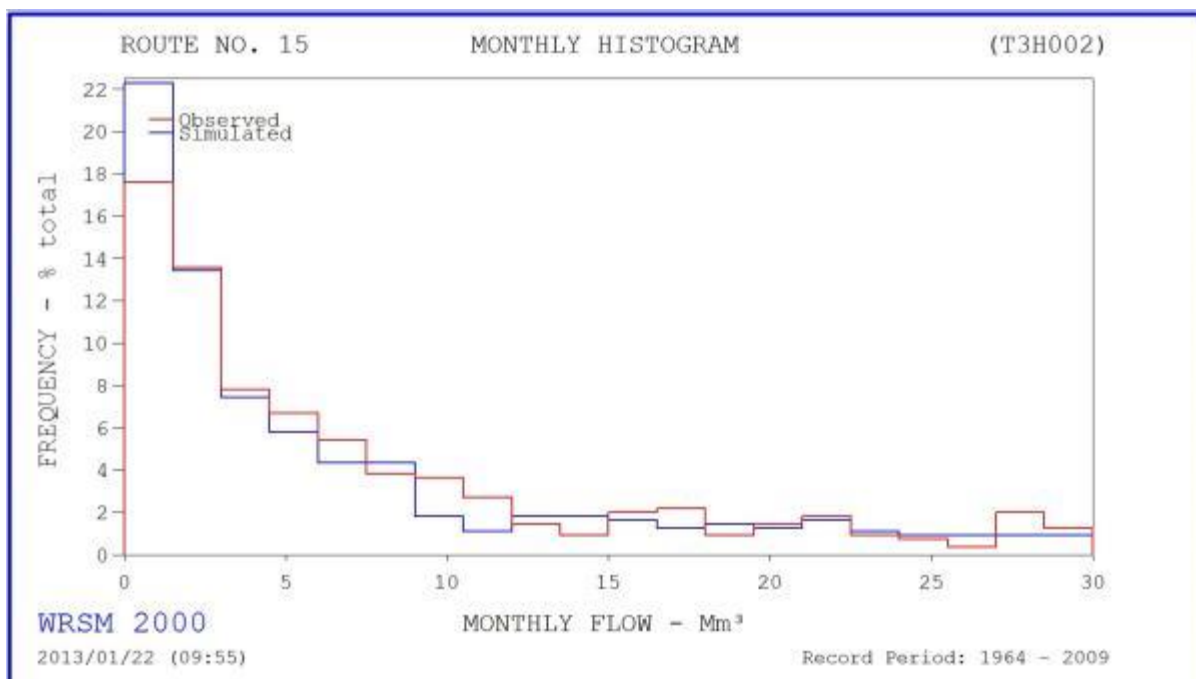


Figure B1 - 7 Comparison of Observed and Simulated Stream Flow Monthly Histogram at Gauge T2H002

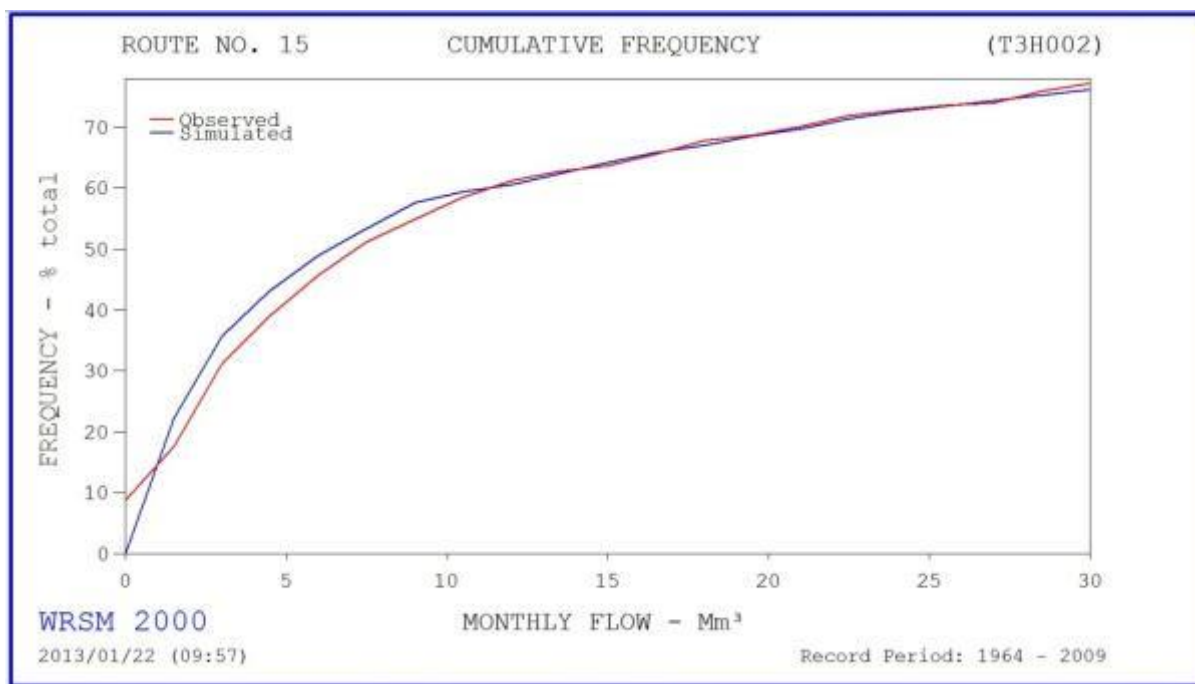


Figure B1 - 8 Observed vs. Simulated Streamflow Cumulative Frequency at Gauge T3H007

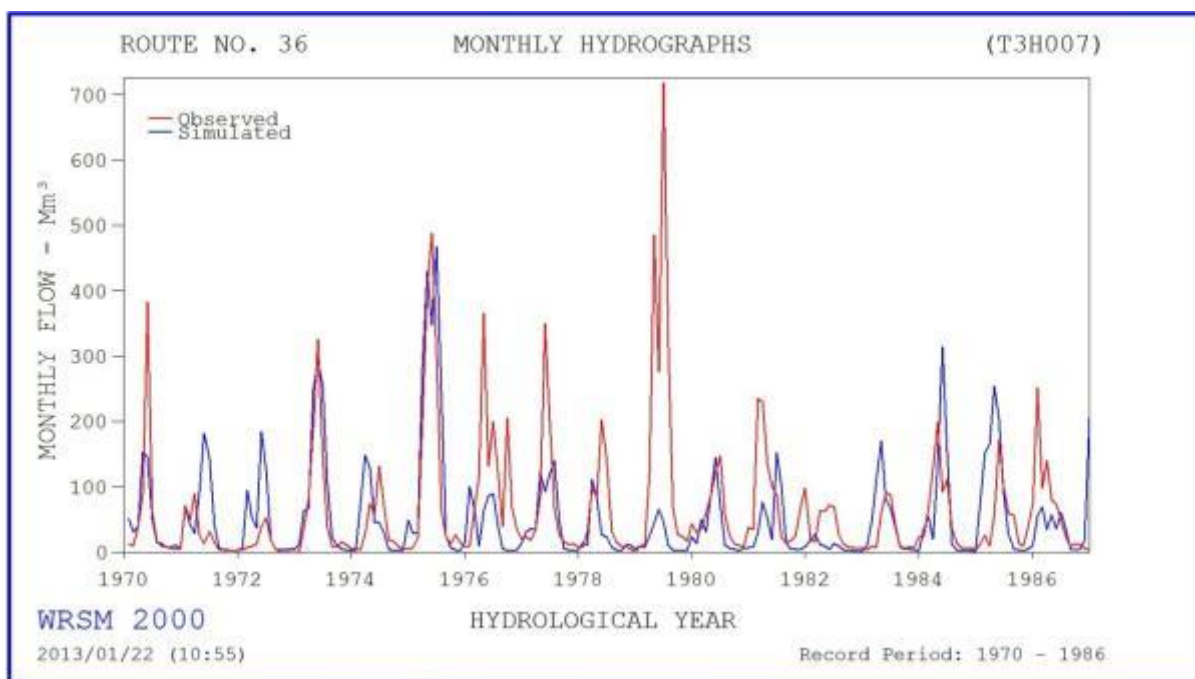


Figure B1 - 9 Observed vs. Simulated Streamflow Monthly Hydrographs at Gauge T3H007

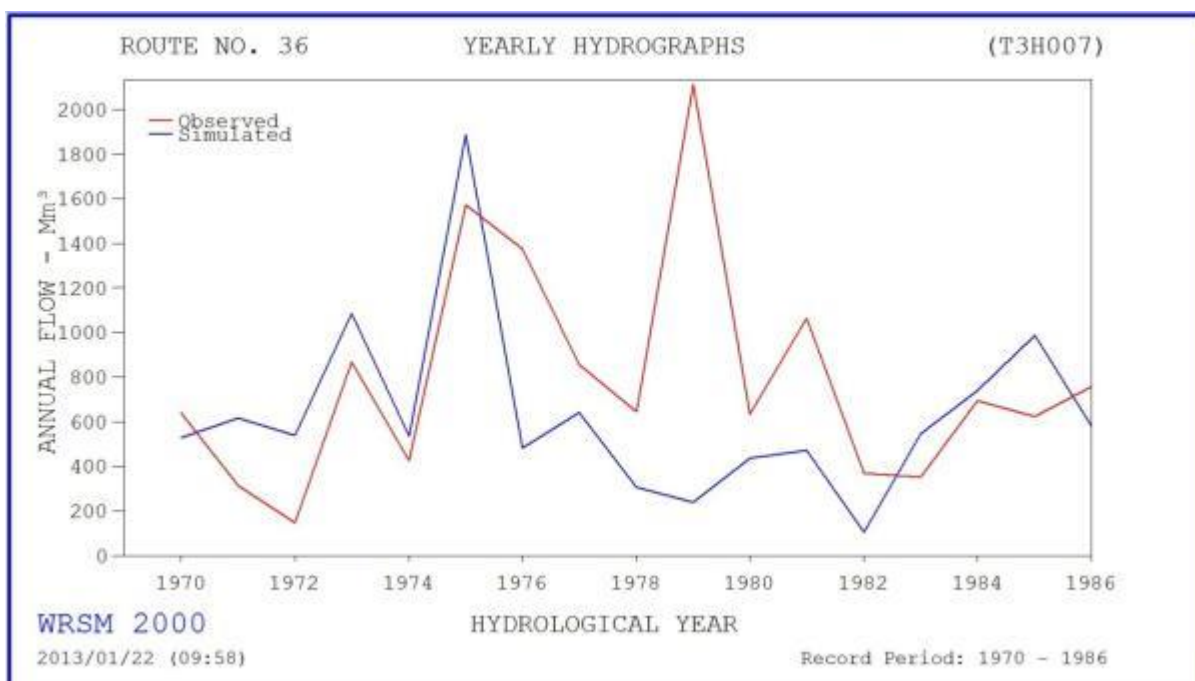


Figure B1 - 10 Observed vs. Simulated Streamflow Annual Hydrographs at Gauge T3H007

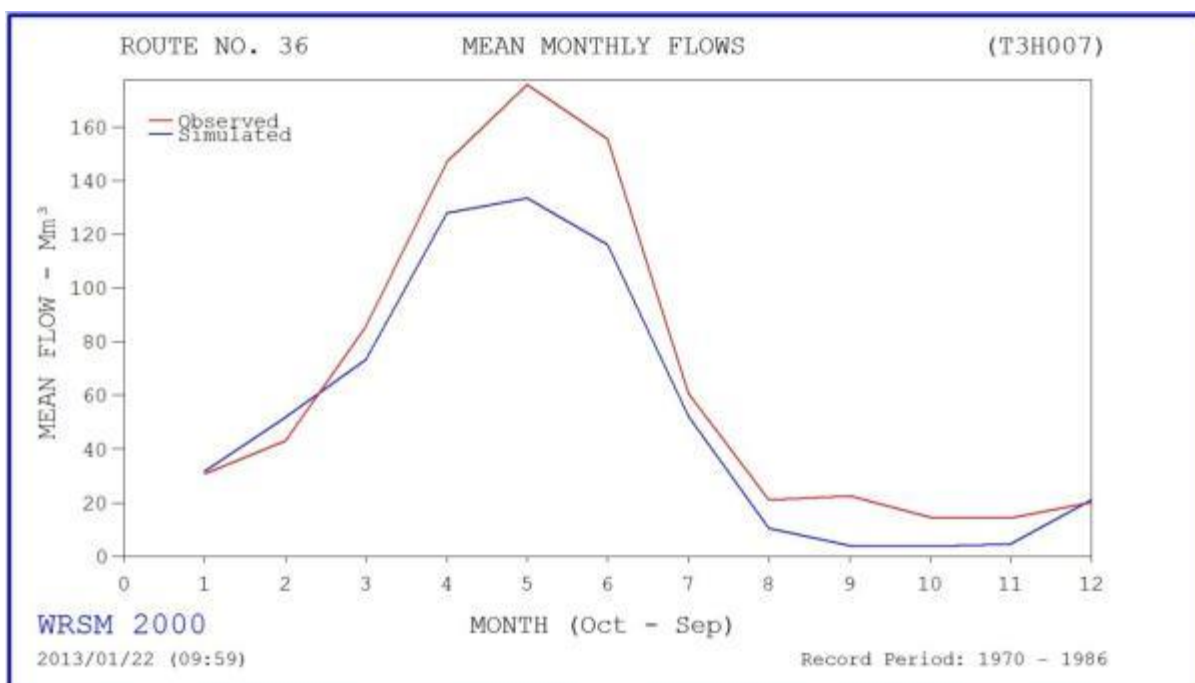


Figure B1 - 11 Observed vs. Simulated Streamflow Mean Monthly Flows at Gauge T3H007

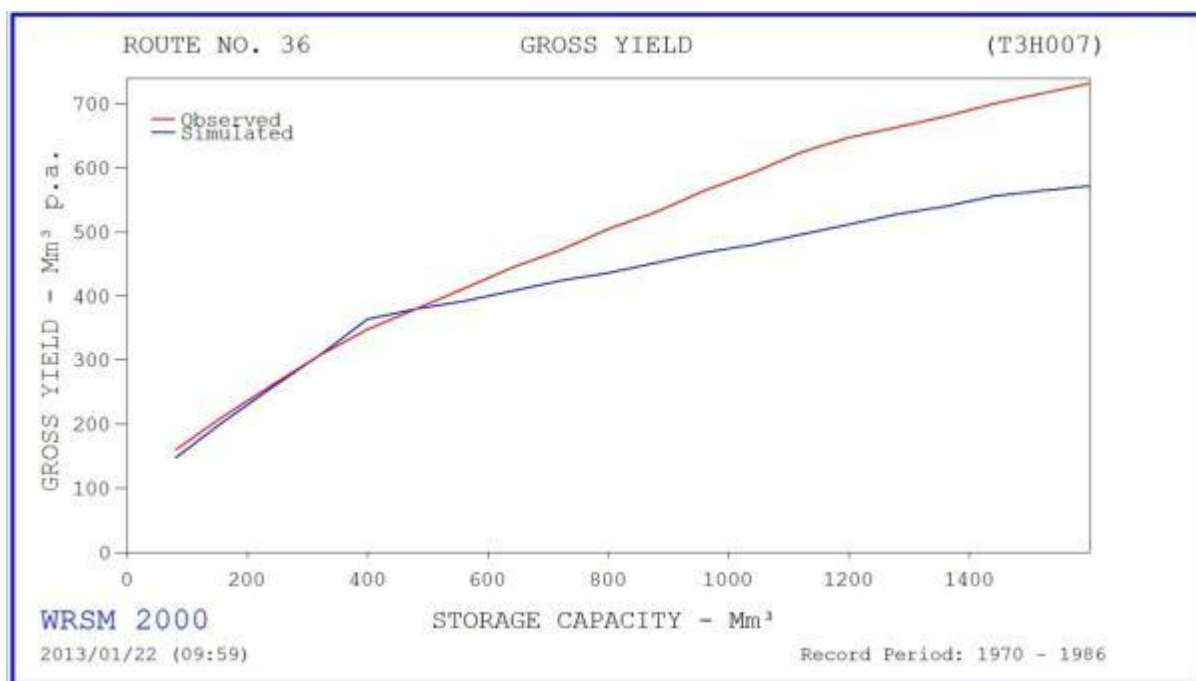


Figure B1 - 12 Observed vs. Simulated Streamflow Gross Yield Comparison at Gauge T3H007

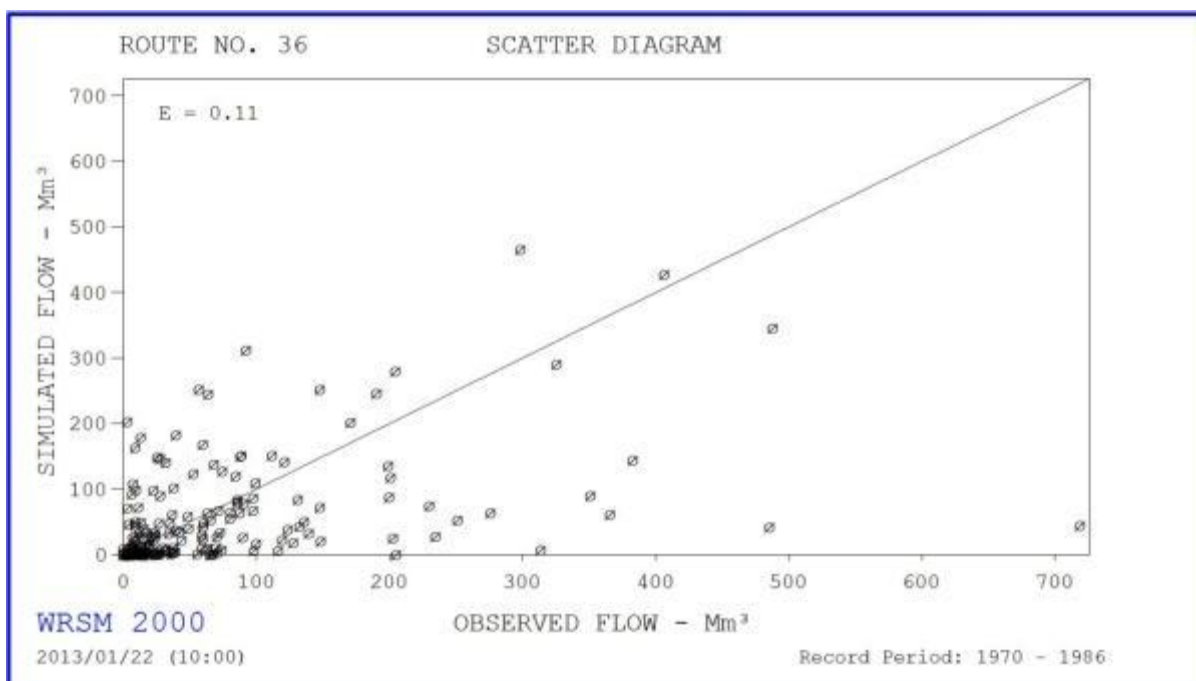


Figure B1 - 13 Observed vs. Simulated Streamflow Scatter Diagram at Gauge T3H007

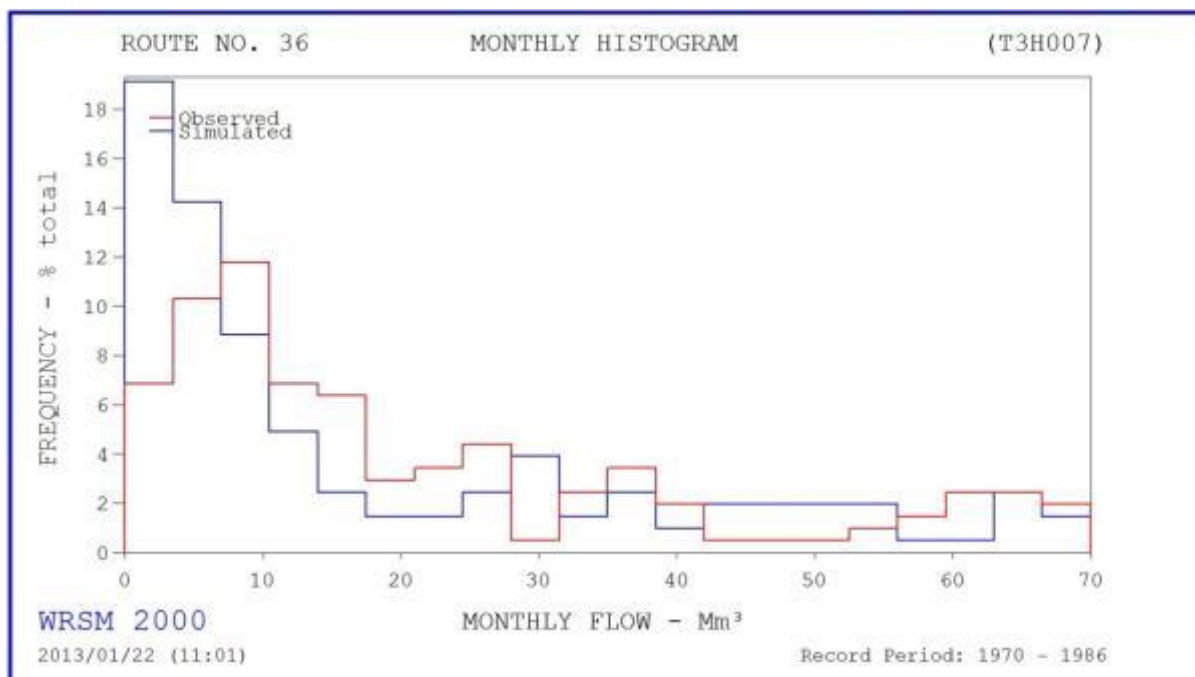


Figure B1 - 14 Observed vs. Simulated Streamflow Monthly Histogram at Gauge T3H007

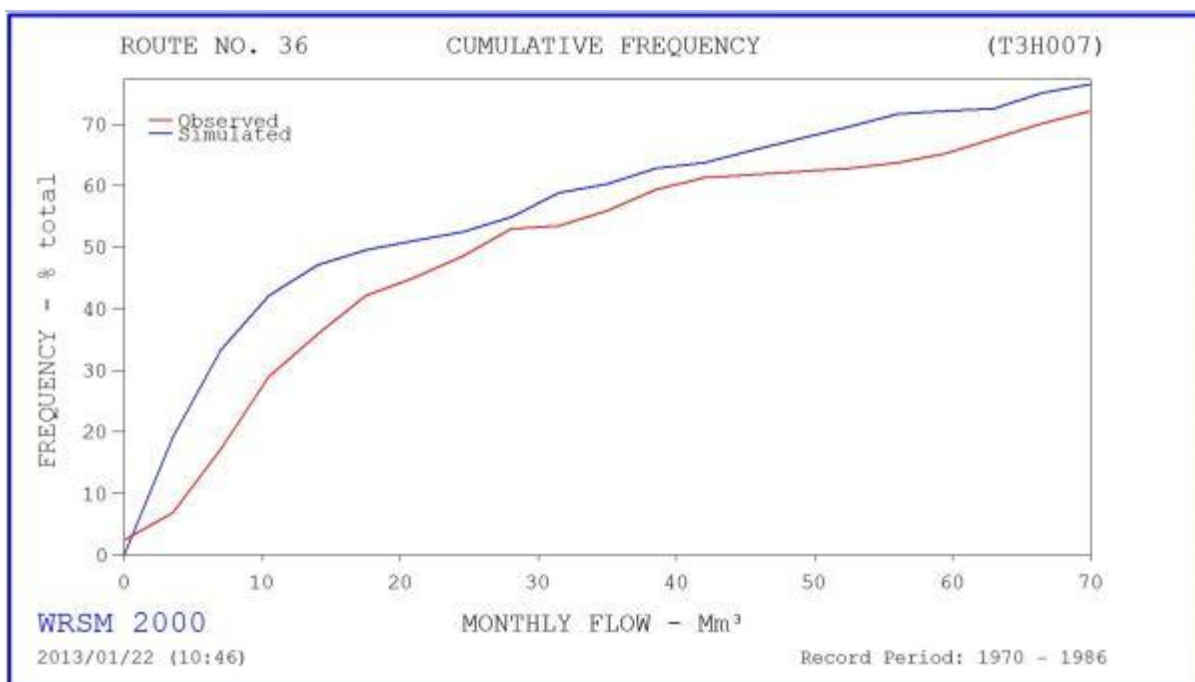


Figure B1 - 15 Observed vs. Simulated Streamflow Cumulative Frequency at Gauge T3H007

**Table B1- 3 Simulated Natural Streamflow Time-Series (T33A.INC) for Quaternary T33A (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	2.04	1.56	2.09	2.14	2.85	5.12	6.75	1.75	0.91	0.90	0.42	0.75
1921	1.56	17.14	25.32	8.93	2.02	1.41	0.51	2.95	10.25	3.49	3.36	1.07
1922	0.98	12.50	13.64	13.39	37.42	29.03	4.68	0.56	0.54	7.31	7.94	0.75
1923	0.46	0.61	1.54	5.77	16.48	14.43	3.21	0.70	0.58	0.45	0.44	0.91
1924	1.27	2.17	15.43	16.03	9.42	45.69	43.17	6.61	0.71	0.51	0.43	0.56
1925	0.84	2.62	2.91	14.55	15.66	18.81	19.10	1.81	1.61	0.88	0.60	1.32
1926	3.54	3.43	11.99	12.06	9.49	48.14	43.20	4.04	0.56	0.61	0.63	0.51
1927	3.01	1.42	16.31	44.68	30.48	3.29	0.82	0.51	0.43	0.37	0.92	0.52
1928	1.03	1.78	2.29	2.75	3.21	23.87	24.39	2.32	2.58	5.12	1.54	3.70
1929	8.02	5.80	13.73	21.10	10.03	4.21	4.35	1.40	0.68	0.63	2.19	1.71
1930	1.71	0.53	1.26	22.57	31.26	22.06	15.17	4.26	0.55	3.10	3.29	0.40
1931	1.35	1.32	1.36	2.01	28.63	30.19	2.87	1.08	0.73	0.82	0.47	0.97
1932	1.52	2.38	10.94	10.70	1.68	4.44	5.51	0.82	0.33	0.31	0.28	0.26
1933	0.26	28.32	67.01	75.69	49.24	20.34	9.45	0.87	0.57	0.84	0.61	0.37
1934	2.68	5.53	20.67	21.18	3.89	4.83	8.85	10.92	7.65	1.79	3.02	1.07
1935	0.64	0.63	0.30	2.91	24.87	24.25	2.51	11.21	12.02	1.14	0.60	0.45
1936	1.75	29.67	32.36	9.27	35.90	42.56	14.13	1.33	0.48	0.45	0.39	0.41
1937	0.75	0.64	7.28	16.27	22.08	14.25	7.38	6.69	1.07	1.38	1.43	0.72
1938	1.36	1.09	7.31	20.68	38.67	27.23	2.57	1.15	0.84	0.85	0.88	10.29
1939	11.27	2.97	3.37	6.33	21.27	25.95	9.22	14.68	15.18	1.43	0.52	1.00
1940	4.45	4.45	6.24	19.09	21.23	8.67	3.40	0.95	0.51	0.49	0.45	0.37
1941	0.78	0.81	0.36	15.89	45.16	40.62	31.11	20.97	1.98	0.51	0.60	0.67
1942	3.30	6.47	37.44	41.48	7.88	5.43	10.22	7.61	2.35	1.93	16.70	18.26
1943	6.59	19.07	43.65	30.73	6.28	8.85	5.52	0.76	2.24	1.76	0.48	5.83
1944	6.57	1.59	0.37	2.45	27.46	52.45	29.01	2.74	0.52	0.45	0.39	0.40
1945	1.16	0.48	0.79	0.98	4.50	12.25	8.59	3.26	0.94	0.50	0.39	0.33
1946	0.95	4.58	9.12	12.23	18.48	17.25	8.92	1.21	1.57	1.26	0.46	0.75
1947	1.28	6.86	19.04	30.15	27.81	26.01	17.47	1.65	0.50	0.44	0.38	0.33
1948	0.72	0.68	1.34	14.93	19.67	18.25	14.32	1.73	0.58	0.48	0.42	0.47
1949	0.57	0.97	4.75	5.50	8.93	36.15	30.23	3.09	0.75	0.69	7.53	8.18
1950	1.29	1.02	18.26	21.50	11.13	8.79	1.51	0.66	0.46	0.41	0.75	1.83
1951	4.73	3.23	0.47	16.52	47.30	32.98	4.03	1.38	0.81	0.69	0.47	0.86
1952	1.09	2.22	11.56	11.73	2.31	1.98	3.29	1.08	0.32	0.24	0.25	1.49
1953	3.28	2.45	3.43	4.56	7.46	12.00	6.71	5.58	5.72	1.37	0.56	1.09
1954	4.62	4.03	2.31	37.75	61.04	29.12	8.55	1.49	1.23	0.74	0.41	0.49
1955	1.69	3.17	3.81	5.27	21.28	29.98	14.01	1.74	0.78	0.51	0.42	0.50
1956	0.67	6.04	37.65	60.57	46.38	28.39	11.78	1.10	0.56	0.53	1.04	8.64
1957	16.01	8.42	6.48	17.43	13.75	4.04	4.15	2.07	0.64	0.43	0.36	0.32
1958	0.43	8.68	30.63	23.93	5.90	5.96	6.20	26.44	26.01	2.46	0.99	0.85
1959	0.94	2.39	4.61	2.84	2.36	1.26	3.24	2.05	0.52	0.25	0.36	1.11
1960	1.36	9.67	27.59	20.05	6.27	14.25	21.27	11.75	1.09	0.51	0.51	0.56

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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1961	0.41	3.73	12.82	13.22	13.95	23.26	14.51	1.37	0.54	0.45	0.41	0.38
1962	0.96	4.74	12.66	48.59	60.83	35.05	16.27	1.54	0.50	1.68	1.02	0.36
1963	1.79	4.66	10.80	20.90	15.60	13.56	15.86	4.16	4.37	4.39	0.74	0.94
1964	7.75	8.40	4.57	10.73	7.83	0.74	0.94	0.56	4.96	10.50	9.93	3.95
1965	2.50	3.31	1.40	27.10	36.09	9.74	0.91	2.34	1.35	0.49	0.80	1.07
1966	0.85	0.85	1.92	6.43	30.52	54.78	37.86	10.48	2.49	2.69	0.83	0.41
1967	0.55	1.30	1.59	1.14	1.81	4.44	8.52	2.82	0.50	0.35	0.42	0.91
1968	0.91	0.76	1.20	1.09	2.29	20.09	21.47	2.25	0.83	0.40	0.32	0.36
1969	3.72	4.03	5.32	6.33	6.78	5.96	0.56	0.54	0.79	0.44	1.47	2.32
1970	4.56	2.93	1.91	17.11	25.82	10.69	2.81	2.31	1.03	1.43	1.88	0.57
1971	3.59	3.86	1.63	10.38	32.09	33.30	12.35	1.62	0.69	0.49	0.40	0.50
1972	1.04	6.75	7.34	1.34	24.35	26.09	2.47	0.75	0.42	0.54	0.89	1.11
1973	1.17	6.66	9.45	28.05	50.15	45.66	22.82	5.11	2.17	0.93	0.56	0.42
1974	0.56	8.75	19.96	14.66	4.14	9.39	9.78	1.08	0.50	0.45	0.43	5.67
1975	6.14	1.86	34.58	73.40	66.25	86.31	64.50	5.98	1.21	0.64	0.46	1.79
1976	13.80	15.02	1.43	4.32	13.32	20.76	12.56	1.34	0.49	0.51	0.53	1.01
1977	3.86	3.59	2.27	12.53	14.50	25.69	33.83	12.43	1.17	0.52	0.48	0.81
1978	2.15	1.21	18.25	20.68	3.60	2.66	1.16	0.54	0.33	1.68	2.52	0.69
1979	0.98	0.69	2.14	5.73	9.23	6.79	1.78	0.57	0.36	0.29	0.25	1.65
1980	1.33	2.13	2.10	7.81	19.27	12.56	1.73	1.02	0.64	0.40	0.96	1.42
1981	0.98	2.17	6.18	5.84	1.27	19.31	22.77	3.94	0.87	0.66	0.48	1.48
1982	2.09	2.28	0.93	0.99	0.49	1.64	2.21	0.73	0.22	0.16	0.13	0.16
1983	1.23	2.88	13.19	25.80	16.00	6.28	5.47	1.23	0.79	0.78	0.50	0.45
1984	3.19	5.31	1.50	12.23	43.86	34.09	3.21	0.49	0.43	0.39	0.34	0.30
1985	10.87	22.02	23.12	44.84	44.99	15.07	6.09	0.78	0.57	0.47	1.23	2.02
1986	4.54	9.33	7.46	5.59	5.60	9.02	8.93	0.84	0.84	0.68	3.29	43.18
1987	55.66	14.75	2.65	4.72	24.45	32.69	12.62	2.18	1.08	1.23	1.08	0.85
1988	1.79	2.94	15.87	16.29	24.31	24.58	6.33	4.27	1.54	0.89	0.50	0.36
1989	0.52	25.47	41.06	27.62	13.62	15.18	15.35	2.28	1.01	0.69	1.18	0.86
1990	0.80	0.47	5.44	11.95	14.84	9.14	0.87	0.47	0.43	0.37	0.31	1.13
1991	14.24	15.64	5.49	4.52	13.73	14.61	1.80	0.73	0.42	0.37	0.36	0.59
1992	0.54	0.43	0.40	1.37	3.46	5.32	2.10	0.47	0.20	0.16	0.23	0.39
1993	9.70	10.69	16.28	19.41	12.41	18.10	10.77	1.00	0.52	0.84	0.91	0.39
1994	0.49	0.32	1.00	9.43	9.96	14.53	14.95	2.04	2.60	1.21	0.44	0.45
1995	1.13	2.00	21.30	52.31	61.02	34.50	7.48	0.91	0.50	1.15	0.84	0.43
1996	1.53	11.15	21.05	28.30	20.00	14.33	18.44	6.59	8.64	8.81	1.54	0.88
1997	1.40	2.22	0.62	6.00	36.11	40.67	11.45	2.54	0.97	0.52	0.58	0.53
1998	0.80	2.40	7.88	9.27	20.26	27.55	11.70	1.10	0.54	0.46	0.39	0.35
1999	1.57	2.82	19.01	45.18	42.81	30.21	16.69	11.33	3.32	0.69	0.46	1.49
2000	2.47	2.85	6.38	16.39	16.71	12.62	8.33	1.55	0.61	0.52	0.53	0.83
2001	3.95	15.20	20.85	13.82	5.48	24.60	26.41	3.32	2.21	3.58	4.26	1.91
2002	0.60	0.44	4.75	7.62	3.40	3.27	1.44	0.64	0.48	0.33	0.27	0.67
2003	0.59	0.69	1.07	10.26	11.30	4.75	3.47	0.44	0.30	2.60	3.22	2.84

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2004	3.59	6.28	24.28	27.94	17.69	9.06	3.83	1.41	0.58	0.46	0.48	0.40
2005	1.25	2.14	0.70	11.41	27.41	17.22	3.11	1.93	0.95	0.50	3.01	9.16
2006	18.88	22.11	21.93	28.47	13.51	4.73	9.43	3.09	1.41	0.82	0.50	0.42
2007	2.24	2.22	1.27	3.93	7.48	13.42	13.90	4.64	1.90	0.97	0.48	0.58
2008	0.68	1.67	4.27	11.06	16.00	9.61	2.40	1.31	1.04	0.61	0.81	0.57
2009	13.73	15.33	1.79	18.91	39.20	21.73	2.56	0.73	0.84	0.68	0.39	0.32

**Table B1- 4 Simulated Natural Streamflow Time-Series (T33B.INC) for Quaternary T33B (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	2.05	1.19	1.83	2.16	2.28	6.36	8.32	4.02	0.55	0.35	0.10	0.38
1921	1.26	16.00	22.43	6.77	1.02	0.76	0.12	2.32	7.70	2.36	1.96	0.51
1922	0.65	12.60	13.79	13.84	35.97	28.74	6.27	0.61	0.12	9.16	10.02	0.97
1923	0.12	0.27	1.07	4.30	9.72	7.24	1.63	0.24	0.15	0.06	0.10	0.48
1924	1.00	1.92	17.24	17.37	6.12	36.46	37.05	5.81	0.55	0.09	0.04	0.20
1925	0.47	2.50	2.80	7.64	8.16	16.63	17.28	1.62	1.12	0.52	0.16	1.14
1926	2.59	2.07	7.78	8.36	4.67	41.17	40.77	3.61	0.35	0.18	0.24	0.16
1927	1.76	0.49	14.08	38.45	26.57	3.16	0.34	0.14	0.08	0.04	0.56	0.24
1928	0.73	1.36	2.34	2.51	2.14	20.41	21.42	1.96	2.18	4.21	1.07	2.94
1929	7.66	5.64	13.19	18.13	6.87	2.42	3.16	0.81	0.26	0.25	1.70	1.39
1930	1.47	0.27	0.90	24.58	33.75	22.83	14.08	1.94	0.12	3.71	4.05	0.40
1931	1.00	0.94	1.13	1.52	22.92	24.00	2.25	0.72	0.36	0.49	0.18	0.84
1932	1.45	2.53	12.72	11.00	1.15	3.56	3.57	0.41	0.08	0.08	0.07	0.10
1933	0.12	24.64	53.70	63.87	46.40	19.26	8.65	0.84	0.15	0.55	0.28	0.05
1934	2.06	4.39	16.00	15.34	2.42	3.60	8.72	9.83	6.90	1.11	2.00	0.55
1935	0.26	0.31	0.05	1.79	20.50	21.66	3.30	6.62	6.95	0.81	0.16	0.08
1936	1.64	29.16	31.50	7.59	35.05	39.67	10.28	0.96	0.09	0.05	0.03	0.13
1937	0.67	0.40	6.23	16.05	20.56	11.65	5.45	4.88	0.65	1.02	0.91	0.29
1938	1.02	0.88	7.48	19.84	40.62	30.56	2.74	0.83	0.50	0.68	0.63	12.42
1939	13.66	3.79	3.54	4.50	22.23	27.10	7.65	11.05	11.34	1.09	0.10	0.47
1940	2.75	2.31	8.19	18.78	16.65	6.20	2.83	0.48	0.11	0.11	0.11	0.08
1941	0.53	0.56	0.19	11.03	38.26	37.39	23.26	13.77	1.29	0.12	0.25	0.39
1942	2.79	5.35	30.48	33.04	6.09	6.72	10.90	6.41	1.75	1.15	11.82	12.94
1943	5.31	14.37	32.98	23.86	6.33	7.72	3.94	0.38	1.32	1.11	0.13	7.33
1944	8.10	1.47	0.08	2.90	23.97	41.99	22.24	2.01	0.19	0.06	0.03	0.06
1945	1.04	0.26	0.58	1.42	4.47	10.78	8.00	3.00	0.41	0.14	0.06	0.05
1946	0.61	4.06	7.69	11.81	15.65	12.22	7.64	0.78	1.06	0.88	0.12	0.38
1947	0.86	9.05	19.47	25.23	25.12	22.25	13.02	1.21	0.11	0.05	0.03	0.02
1948	0.60	0.50	0.86	7.88	11.95	12.16	8.58	0.95	0.13	0.09	0.07	0.17
1949	0.32	0.60	2.95	3.96	8.68	31.24	25.29	2.32	0.36	0.31	4.35	4.75
1950	1.08	0.67	15.46	20.06	12.92	9.19	0.89	0.18	0.07	0.04	0.42	1.58
1951	4.09	4.23	0.41	9.67	31.77	23.87	3.90	0.91	0.34	0.26	0.10	0.47
1952	0.83	1.72	10.53	10.90	2.35	2.31	4.19	1.97	0.15	0.07	0.09	1.59

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1953	2.99	1.99	4.32	6.45	6.04	10.72	7.75	5.30	5.04	1.01	0.12	0.57
1954	3.64	3.51	1.68	39.24	61.14	28.32	6.39	0.91	0.77	0.31	0.05	0.19
1955	1.54	2.92	3.52	2.81	16.32	28.46	15.19	1.43	0.37	0.12	0.05	0.19
1956	0.49	6.75	37.70	54.50	33.60	20.85	11.52	1.10	0.13	0.14	0.69	5.21
1957	11.12	6.40	5.15	17.86	15.15	3.29	4.20	2.66	0.28	0.10	0.04	0.05
1958	0.20	7.22	24.31	18.94	6.23	5.40	5.19	23.17	23.72	2.16	0.49	0.51
1959	0.62	1.68	3.90	2.90	1.79	0.94	2.70	1.26	0.19	0.06	0.16	0.90
1960	1.02	6.22	22.37	17.68	5.05	9.87	15.14	9.15	0.86	0.08	0.09	0.16
1961	0.10	3.26	12.25	12.15	11.91	20.10	12.22	1.16	0.11	0.05	0.07	0.07
1962	0.72	4.41	10.33	38.83	45.44	29.98	18.92	1.73	0.16	1.15	0.55	0.03
1963	2.85	9.44	11.10	17.22	13.71	9.68	11.57	3.27	6.81	7.16	0.69	0.55
1964	5.63	6.13	4.71	8.68	4.97	0.60	0.43	0.17	4.95	9.12	9.51	1.75
1965	2.17	2.78	1.98	19.32	25.76	6.83	0.65	1.95	1.02	0.11	0.42	0.77
1966	0.55	0.54	1.38	4.33	26.69	49.27	33.36	8.85	2.10	2.29	0.41	0.05
1967	0.32	1.22	1.09	0.86	2.02	4.10	6.67	1.54	0.12	0.07	0.16	0.55
1968	0.73	0.90	0.81	0.67	1.84	17.94	18.94	2.88	0.52	0.14	0.07	0.14
1969	2.87	3.14	5.70	7.42	7.31	5.81	0.57	0.29	0.61	0.24	1.26	1.85
1970	3.81	3.55	1.68	15.63	21.04	7.15	1.85	2.04	0.68	1.09	1.58	0.31
1971	5.09	5.56	1.14	8.29	24.60	24.43	8.40	0.81	0.22	0.09	0.04	0.13
1972	0.65	7.91	8.66	1.72	21.74	22.68	2.36	0.40	0.08	0.17	0.47	0.60
1973	0.98	4.84	7.14	29.10	48.70	40.41	20.29	3.94	1.33	0.40	0.14	0.05
1974	0.17	6.40	17.49	15.82	5.36	4.56	4.44	0.48	0.07	0.06	0.05	4.50
1975	4.93	1.52	33.53	67.68	57.53	72.85	54.14	4.74	0.85	0.20	0.08	1.23
1976	11.50	12.53	1.15	4.14	10.37	13.42	7.71	0.74	0.07	0.11	0.21	0.98
1977	3.16	2.42	1.59	11.84	12.50	14.93	23.28	10.63	1.01	0.09	0.08	0.37
1978	1.43	0.73	12.91	14.41	2.37	1.98	0.80	0.22	0.06	1.30	1.83	0.43
1979	0.82	0.53	1.14	3.36	6.35	6.15	1.44	0.22	0.08	0.05	0.03	1.50
1980	1.15	2.38	2.59	7.61	18.50	11.91	1.57	0.57	0.30	0.10	0.65	1.08
1981	0.78	1.68	6.05	5.98	1.16	17.52	19.08	1.90	0.31	0.26	0.11	0.91
1982	1.78	1.76	0.51	0.55	0.27	1.16	1.33	0.38	0.07	0.04	0.03	0.06
1983	0.95	2.31	11.60	22.69	14.23	6.36	5.67	1.18	0.36	0.39	0.19	0.14
1984	2.40	4.03	1.62	13.89	44.63	32.95	2.89	0.28	0.05	0.04	0.02	0.02
1985	8.09	19.11	22.56	37.99	36.05	12.84	3.76	0.33	0.12	0.09	0.59	1.42
1986	3.82	7.39	4.04	4.41	4.47	6.05	6.06	0.59	0.31	0.22	2.31	31.39
1987	42.01	11.37	1.62	2.41	17.12	26.45	11.94	1.58	0.59	0.64	0.55	0.41
1988	1.27	2.27	14.39	15.28	22.80	22.08	4.53	3.32	0.77	0.34	0.09	0.02
1989	0.31	20.50	30.86	18.41	9.04	10.27	10.41	1.37	0.39	0.18	0.53	0.40
1990	0.53	0.17	3.62	6.75	6.83	4.09	0.40	0.08	0.07	0.04	0.02	0.99
1991	9.91	10.85	4.70	4.06	9.74	10.27	1.11	0.24	0.06	0.04	0.06	0.32
1992	0.27	0.14	0.11	0.79	1.95	2.47	1.37	0.22	0.04	0.02	0.09	0.35
1993	6.41	7.08	15.81	19.29	13.35	15.56	6.68	0.65	0.09	0.41	0.58	0.07
1994	0.23	0.08	0.78	6.13	6.48	15.95	16.21	2.16	1.98	0.83	0.08	0.12
1995	0.72	1.46	21.72	49.86	55.40	31.10	5.27	0.42	0.10	0.74	0.42	0.10

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1996	0.98	10.71	19.46	27.25	20.12	9.28	10.92	5.00	7.67	8.05	1.29	0.56
1997	1.14	1.48	0.25	6.35	34.17	38.82	11.88	1.93	0.50	0.14	0.25	0.22
1998	0.53	2.50	12.63	14.07	15.94	21.22	9.85	0.94	0.10	0.07	0.03	0.04
1999	1.35	2.26	17.01	44.57	43.99	29.01	15.37	9.39	2.14	0.20	0.06	0.89
2000	1.65	2.09	7.04	14.32	12.72	10.04	6.55	1.06	0.15	0.11	0.14	0.35
2001	3.04	12.91	23.68	17.52	4.78	19.97	21.38	1.98	1.19	2.60	4.17	1.26
2002	0.19	0.20	4.03	6.78	2.95	2.23	0.63	0.24	0.30	0.21	0.10	0.69
2003	0.46	0.43	0.96	10.89	11.63	4.36	3.13	0.30	0.09	1.59	1.46	2.59
2004	2.47	2.63	17.74	23.79	14.59	8.26	5.08	0.95	0.15	0.08	0.13	0.12
2005	1.06	2.17	1.18	9.07	21.76	13.84	3.55	1.60	0.59	0.14	2.37	7.85
2006	19.05	20.88	10.53	16.93	11.26	2.55	3.50	0.72	0.64	0.35	0.12	0.07
2007	2.62	3.23	1.02	2.58	5.91	14.24	15.96	5.57	1.28	0.52	0.11	0.20
2008	0.47	1.20	2.50	9.95	16.34	9.41	1.96	0.94	0.58	0.18	0.45	0.31
2009	10.16	11.44	1.38	17.18	27.61	11.02	1.06	0.23	0.35	0.28	0.07	0.04

**Table B1- 5 Simulated Natural Streamflow Time-Series (T33C.INC) for Quaternary T33C (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	1.21	0.74	1.11	1.39	1.42	4.52	4.42	1.66	0.29	0.20	0.08	0.25
1921	0.83	10.06	14.05	4.21	0.65	0.51	0.11	1.59	4.66	1.22	1.23	0.35
1922	0.47	8.01	8.77	8.82	22.57	18.54	4.64	0.44	0.12	6.24	6.83	0.66
1923	0.12	0.20	0.68	2.50	5.12	3.65	0.76	0.18	0.13	0.07	0.09	0.31
1924	0.66	1.24	11.16	11.15	3.75	21.81	22.36	3.73	0.35	0.10	0.06	0.16
1925	0.32	1.62	1.82	3.62	3.85	10.22	10.70	1.02	0.76	0.39	0.13	0.80
1926	1.57	1.18	4.14	4.59	1.99	24.64	25.39	2.30	0.22	0.14	0.18	0.12
1927	1.06	0.31	8.42	22.76	15.85	2.84	0.28	0.14	0.09	0.06	0.38	0.17
1928	0.47	0.84	1.54	1.63	1.22	12.25	12.97	1.23	1.42	2.66	0.70	1.64
1929	3.35	3.09	8.30	11.20	4.12	1.48	1.94	0.54	0.19	0.19	1.10	0.93
1930	0.98	0.19	0.58	16.00	21.96	14.63	8.96	1.27	0.09	2.66	2.89	0.28
1931	0.66	0.61	0.75	1.07	13.41	14.02	1.37	0.53	0.27	0.34	0.15	0.58
1932	0.98	1.98	8.44	6.97	0.74	2.23	2.29	0.26	0.09	0.09	0.07	0.09
1933	0.10	14.71	30.92	37.47	28.63	12.27	5.54	0.53	0.14	0.41	0.22	0.06
1934	1.10	2.08	9.16	8.64	1.37	1.84	3.12	5.09	3.01	0.59	1.15	0.37
1935	0.20	0.23	0.04	0.92	12.08	13.27	2.34	3.48	3.59	0.53	0.15	0.10
1936	1.12	18.15	19.54	4.51	22.14	24.78	5.92	0.57	0.08	0.07	0.05	0.12
1937	0.50	0.27	3.80	10.32	13.29	7.35	3.25	2.87	0.48	0.72	0.60	0.21
1938	0.68	0.60	4.84	12.46	26.04	19.94	1.85	0.59	0.38	0.53	0.45	8.13
1939	8.96	2.60	2.54	2.58	14.41	17.86	5.01	6.45	6.56	0.63	0.09	0.31
1940	1.66	1.47	5.82	11.96	9.76	3.72	1.89	0.35	0.11	0.10	0.10	0.08
1941	0.36	0.36	0.13	5.94	22.97	23.23	13.27	7.48	0.72	0.09	0.21	0.30
1942	1.77	3.39	17.85	19.42	3.82	4.67	7.70	3.83	1.10	0.72	6.27	6.87
1943	3.39	8.30	19.14	14.15	4.19	4.87	2.37	0.22	0.80	0.72	0.11	5.09
1944	5.62	0.68	0.06	1.96	14.39	24.53	12.87	1.22	0.11	0.07	0.05	0.05

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1945	0.74	0.18	0.38	1.37	3.55	7.01	5.19	1.79	0.29	0.13	0.07	0.05
1946	0.40	2.57	4.72	7.55	9.71	7.14	4.70	0.48	0.71	0.61	0.11	0.26
1947	0.56	6.23	12.37	14.87	15.57	13.98	7.81	0.75	0.09	0.07	0.05	0.04
1948	0.44	0.35	0.51	3.73	6.37	6.90	4.57	0.60	0.12	0.09	0.07	0.14
1949	0.23	0.38	1.54	2.23	5.55	18.60	14.75	1.54	0.29	0.24	2.28	2.48
1950	0.76	0.46	9.25	12.51	8.80	6.13	0.62	0.15	0.08	0.06	0.29	1.06
1951	2.74	3.00	0.29	4.74	17.20	13.59	3.24	0.67	0.26	0.20	0.09	0.32
1952	0.58	1.10	6.43	6.72	1.35	1.69	2.80	1.25	0.14	0.08	0.09	1.12
1953	1.95	1.26	2.91	4.48	4.11	7.34	5.44	3.37	3.07	0.63	0.12	0.38
1954	2.25	2.26	1.16	24.30	36.95	17.22	4.57	0.67	0.53	0.24	0.07	0.15
1955	1.05	1.89	2.19	1.40	9.57	17.90	9.94	0.95	0.29	0.11	0.06	0.15
1956	0.35	4.56	24.07	32.91	17.80	11.76	7.88	0.75	0.12	0.13	0.48	2.77
1957	6.06	3.61	3.28	11.62	9.97	2.69	2.49	0.98	0.18	0.09	0.06	0.06
1958	0.15	4.41	14.18	10.99	3.71	3.32	2.77	12.09	13.15	1.25	0.35	0.38
1959	0.45	1.04	2.38	1.91	1.11	0.62	1.70	0.74	0.12	0.05	0.10	0.57
1960	0.63	3.31	13.13	10.72	2.52	4.56	8.06	5.33	0.51	0.10	0.10	0.13
1961	0.09	1.98	7.63	7.46	7.25	12.42	7.53	0.72	0.10	0.07	0.08	0.07
1962	0.49	2.79	6.29	22.74	25.69	18.45	13.00	1.24	0.11	0.76	0.37	0.04
1963	2.18	6.55	6.84	10.12	8.26	5.45	6.60	2.05	4.93	5.21	0.50	0.41
1964	3.29	3.58	3.00	5.10	2.77	0.40	0.29	0.13	3.24	5.42	6.23	1.65
1965	1.60	1.84	1.44	10.71	14.50	4.10	0.39	1.33	0.73	0.11	0.29	0.52
1966	0.37	0.36	0.81	2.31	16.08	30.04	20.40	5.60	1.52	1.46	0.30	0.06
1967	0.26	0.85	0.69	0.55	1.37	2.54	3.93	0.62	0.12	0.08	0.14	0.35
1968	0.49	0.69	0.49	0.39	1.14	10.99	11.58	1.82	0.38	0.13	0.08	0.12
1969	1.73	1.89	3.72	4.98	4.93	3.86	0.37	0.23	0.44	0.19	0.84	1.18
1970	2.35	2.43	1.13	9.90	12.93	4.20	1.25	1.37	0.49	0.75	1.06	0.24
1971	3.41	3.73	0.73	4.82	14.16	13.95	4.77	0.50	0.18	0.10	0.05	0.10
1972	0.41	5.36	5.87	1.29	13.40	13.80	1.81	0.32	0.09	0.13	0.30	0.37
1973	0.67	2.66	4.07	18.68	30.40	24.66	12.65	2.46	0.85	0.28	0.11	0.06
1974	0.12	3.76	10.71	10.20	3.67	2.36	2.58	0.29	0.09	0.07	0.06	2.78
1975	3.04	0.95	21.27	42.35	35.71	44.03	32.17	2.87	0.54	0.18	0.09	0.78
1976	7.06	7.70	0.74	2.60	6.20	7.41	4.10	0.39	0.08	0.11	0.18	0.72
1977	2.32	2.26	1.02	7.53	7.94	7.85	12.77	6.30	0.60	0.10	0.09	0.25
1978	0.85	0.45	6.90	7.68	1.19	1.26	0.54	0.16	0.06	0.83	1.12	0.29
1979	0.55	0.36	0.68	1.82	3.82	3.23	0.57	0.17	0.09	0.06	0.04	0.99
1980	0.77	1.67	1.82	4.90	11.83	7.63	1.14	0.40	0.23	0.10	0.44	0.71
1981	0.53	1.06	3.84	3.81	0.75	10.63	11.58	1.33	0.26	0.23	0.11	0.58
1982	1.18	1.12	0.32	0.33	0.19	0.71	0.76	0.22	0.05	0.03	0.02	0.04
1983	0.56	1.39	6.83	13.58	8.60	4.22	3.83	0.83	0.25	0.28	0.16	0.10
1984	1.34	2.07	1.12	9.29	28.98	21.11	1.91	0.18	0.07	0.05	0.04	0.03
1985	4.55	11.58	14.43	23.19	21.58	7.95	2.31	0.22	0.12	0.09	0.35	0.88
1986	2.69	4.67	2.21	2.72	2.78	3.46	3.47	0.33	0.23	0.17	1.28	17.63
1987	24.14	6.96	0.97	1.36	9.71	15.81	7.68	1.14	0.43	0.42	0.36	0.28

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988	0.82	1.45	9.18	9.80	14.56	13.86	3.25	3.82	0.69	0.27	0.10	0.05
1989	0.25	12.15	17.82	10.56	5.50	5.22	5.22	0.79	0.26	0.14	0.34	0.27
1990	0.38	0.12	2.07	3.61	3.04	1.72	0.16	0.09	0.07	0.05	0.03	0.72
1991	5.72	6.23	3.14	2.83	5.55	5.81	0.73	0.19	0.08	0.05	0.06	0.23
1992	0.18	0.09	0.06	0.46	1.12	1.43	0.83	0.14	0.03	0.02	0.06	0.25
1993	3.61	3.99	10.11	12.39	9.07	9.94	3.75	0.36	0.10	0.29	0.42	0.07
1994	0.17	0.07	0.60	3.33	3.75	10.80	10.67	1.47	1.29	0.58	0.09	0.11
1995	0.47	0.93	13.76	30.89	33.81	19.09	3.29	0.26	0.09	0.50	0.29	0.08
1996	0.59	6.82	12.37	17.23	12.72	5.12	5.63	3.03	5.20	5.53	0.91	0.46
1997	0.83	0.92	0.18	4.26	21.45	24.64	8.06	1.38	0.36	0.13	0.20	0.17
1998	0.37	1.73	9.29	10.32	9.56	12.49	6.11	0.59	0.10	0.08	0.05	0.05
1999	0.91	1.45	10.44	28.44	28.69	18.49	9.59	5.87	1.41	0.17	0.08	0.56
2000	1.03	1.30	4.50	8.63	7.38	6.10	4.04	0.66	0.13	0.10	0.11	0.23
2001	1.86	7.94	15.70	11.97	3.11	11.71	12.52	1.19	0.72	1.62	2.78	0.81
2002	0.15	0.17	2.46	4.16	1.84	1.35	0.35	0.15	0.22	0.17	0.08	0.50
2003	0.31	0.26	0.61	6.96	7.37	2.60	2.12	0.20	0.10	0.93	0.85	1.64
2004	1.42	1.40	10.17	14.25	8.72	4.96	2.97	0.54	0.14	0.09	0.11	0.11
2005	0.72	1.45	1.08	5.23	12.62	8.28	3.77	1.36	0.45	0.13	1.49	4.83
2006	12.16	13.29	5.22	9.05	6.93	2.02	4.56	1.31	0.56	0.29	0.12	0.07
2007	1.82	2.15	0.68	1.45	3.39	9.11	11.50	4.77	0.85	0.38	0.12	0.16
2008	0.35	0.76	1.36	6.22	10.68	6.19	1.36	0.66	0.40	0.14	0.31	0.23
2009	5.89	6.64	0.86	10.49	15.41	5.26	0.63	0.18	0.25	0.20	0.07	0.05

**Table B1- 6 Simulated Natural Streamflow Time-Series (T33D.INC) for Quaternary T33D (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	1.28	0.80	1.14	0.86	1.64	3.30	4.46	1.27	0.42	0.35	0.15	0.33
1921	0.86	9.88	13.31	3.66	0.84	0.61	0.15	1.80	6.03	1.28	1.41	0.45
1922	0.48	6.97	7.62	7.90	22.43	17.76	3.15	0.29	0.18	5.16	5.64	0.55
1923	0.16	0.24	0.80	2.10	5.88	5.22	1.74	0.28	0.20	0.12	0.13	0.38
1924	0.67	1.32	9.71	10.12	3.63	24.55	24.86	4.08	0.75	0.16	0.11	0.19
1925	0.36	1.31	1.22	4.97	5.35	10.50	10.97	1.05	0.82	0.42	0.19	0.75
1926	1.79	1.55	4.54	4.84	2.90	27.65	27.48	2.56	0.23	0.21	0.23	0.17
1927	1.27	0.38	8.62	24.20	16.73	2.25	0.31	0.15	0.11	0.08	0.40	0.19
1928	0.49	0.91	1.24	1.08	1.60	13.15	13.99	1.34	1.49	2.83	0.79	2.23
1929	5.32	3.82	7.37	10.23	3.81	1.76	2.19	0.63	0.24	0.22	1.14	0.94
1930	0.96	0.21	0.65	14.98	20.35	13.29	8.48	1.94	0.17	1.87	1.95	0.18
1931	0.70	0.66	0.77	1.12	15.27	16.29	1.55	0.57	0.33	0.39	0.18	0.55
1932	0.92	1.55	6.43	6.02	0.78	2.22	1.41	0.25	0.08	0.08	0.07	0.08
1933	0.09	16.09	35.82	42.57	30.01	11.63	5.13	0.70	0.19	0.42	0.25	0.09
1934	1.26	2.31	9.57	9.58	1.40	2.31	3.37	3.38	2.59	0.70	1.36	0.45
1935	0.23	0.24	0.06	0.86	13.05	13.41	1.38	4.31	4.59	0.62	0.20	0.12
1936	1.06	18.41	20.05	4.36	22.06	25.79	6.82	0.65	0.13	0.11	0.08	0.13

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1937	0.43	0.28	3.34	8.67	12.62	7.92	3.71	2.81	0.55	0.75	0.68	0.26
1938	0.69	0.58	3.94	11.15	24.93	19.12	1.81	0.60	0.40	0.48	0.45	7.23
1939	7.93	2.19	1.55	2.16	13.37	16.63	4.74	7.34	7.58	0.73	0.14	0.39
1940	2.08	1.68	3.96	10.36	9.82	3.88	1.88	0.42	0.16	0.14	0.13	0.10
1941	0.37	0.38	0.13	7.02	25.09	24.41	15.68	9.91	0.95	0.13	0.22	0.29
1942	1.70	2.40	19.88	21.70	3.39	3.39	6.88	4.59	1.65	0.90	7.73	8.45
1943	3.86	8.67	22.54	16.66	3.86	6.13	2.19	0.27	1.00	0.83	0.15	3.88
1944	4.27	0.71	0.09	1.24	15.14	29.07	16.04	1.52	0.15	0.12	0.08	0.09
1945	0.67	0.19	0.39	0.87	2.45	6.06	4.58	2.48	0.43	0.19	0.12	0.09
1946	0.44	2.01	3.76	5.89	8.80	7.37	5.56	0.98	0.78	0.64	0.14	0.30
1947	0.60	4.51	10.43	15.04	14.89	13.44	8.37	0.80	0.13	0.10	0.07	0.06
1948	0.38	0.33	0.61	5.02	7.41	8.07	6.16	1.13	0.18	0.13	0.10	0.15
1949	0.24	0.42	1.53	1.88	4.67	19.78	16.65	1.99	0.34	0.29	2.73	2.97
1950	0.74	0.48	9.74	11.82	6.68	5.10	0.69	0.21	0.12	0.09	0.32	1.04
1951	3.04	1.84	0.18	6.40	21.81	16.55	2.89	0.73	0.33	0.26	0.13	0.37
1952	0.57	1.24	5.72	5.95	1.37	1.45	2.31	0.61	0.11	0.07	0.08	0.98
1953	1.95	1.35	1.84	2.66	3.32	6.31	4.33	4.02	4.17	0.72	0.17	0.46
1954	2.39	1.74	1.21	24.41	38.36	17.17	4.81	1.17	0.61	0.30	0.11	0.18
1955	1.00	1.92	1.53	1.44	10.21	17.64	9.15	1.01	0.34	0.16	0.10	0.17
1956	0.33	3.41	23.28	35.00	21.67	12.96	6.80	0.68	0.17	0.16	0.50	3.33
1957	6.88	3.90	2.80	9.88	8.41	2.29	2.48	1.11	0.23	0.12	0.08	0.07
1958	0.16	3.96	15.04	12.09	2.95	3.35	3.05	13.07	14.25	1.36	0.43	0.40
1959	0.45	1.26	1.73	1.23	1.24	0.65	1.84	0.98	0.17	0.06	0.12	0.59
1960	0.70	4.00	13.93	10.81	2.55	4.37	8.65	5.80	0.68	0.15	0.14	0.17
1961	0.11	1.53	6.37	6.39	6.61	12.19	7.68	0.74	0.16	0.11	0.11	0.09
1962	0.48	2.12	5.13	24.70	30.20	19.75	12.25	1.17	0.13	0.82	0.43	0.07
1963	1.20	2.80	4.69	9.85	8.13	6.04	6.90	2.18	3.61	3.80	0.36	0.44
1964	3.33	3.61	2.29	4.41	2.72	0.27	0.36	0.17	2.68	6.89	6.02	1.76
1965	1.56	2.03	0.80	13.12	16.92	4.07	0.39	1.30	0.73	0.14	0.32	0.53
1966	0.39	0.38	0.95	2.06	16.99	32.32	20.99	5.01	1.49	1.54	0.35	0.09
1967	0.24	0.77	0.78	0.58	1.28	2.98	4.85	0.79	0.14	0.10	0.15	0.40
1968	0.49	0.54	0.57	0.48	1.27	11.38	12.23	1.49	0.47	0.18	0.12	0.15
1969	2.03	1.85	2.83	3.46	3.54	3.02	0.29	0.26	0.45	0.21	0.84	1.28
1970	2.89	1.66	1.07	9.50	13.63	5.00	1.49	1.39	0.53	0.77	1.06	0.25
1971	2.24	2.44	0.84	4.58	15.35	15.94	5.52	0.84	0.25	0.15	0.09	0.14
1972	0.46	4.64	5.07	0.81	14.00	14.95	1.71	0.35	0.13	0.18	0.37	0.47
1973	0.65	2.59	3.66	17.71	30.55	26.66	13.99	3.21	1.28	0.37	0.17	0.10
1974	0.16	3.54	9.71	8.27	2.44	2.99	3.15	0.38	0.14	0.11	0.10	2.48
1975	2.70	0.95	21.59	45.37	39.88	51.06	37.86	3.40	0.60	0.22	0.12	0.86
1976	7.28	7.95	0.77	2.03	5.73	8.57	5.22	0.64	0.13	0.15	0.19	0.62
1977	2.05	1.54	1.17	6.55	6.96	9.88	15.32	6.69	0.64	0.14	0.12	0.30
1978	0.99	0.52	8.25	9.15	1.52	1.40	0.58	0.20	0.08	0.86	1.25	0.31
1979	0.53	0.35	0.85	1.67	3.33	3.86	0.52	0.20	0.11	0.08	0.06	0.98

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1980	0.78	1.31	1.08	4.07	10.59	7.11	1.36	0.48	0.28	0.14	0.48	0.76
1981	0.54	1.22	2.82	2.77	0.62	11.13	12.22	2.01	0.36	0.28	0.15	0.67
1982	1.18	1.22	0.39	0.40	0.20	0.80	0.97	0.29	0.06	0.04	0.02	0.05
1983	0.62	1.68	6.18	13.13	8.44	3.35	3.56	0.74	0.34	0.35	0.20	0.15
1984	1.66	2.38	0.64	8.01	28.41	21.86	2.04	0.19	0.10	0.08	0.06	0.05
1985	4.90	11.35	12.97	23.50	22.38	7.26	3.27	0.41	0.19	0.15	0.48	1.00
1986	2.88	3.79	2.07	2.20	2.23	3.53	3.60	0.34	0.31	0.23	1.53	21.60
1987	28.25	7.02	1.51	1.45	11.26	17.44	7.66	1.72	0.50	0.53	0.45	0.34
1988	0.89	1.65	8.36	8.83	14.31	14.37	3.34	2.44	0.67	0.33	0.14	0.07
1989	0.22	13.53	19.83	11.31	5.68	6.46	6.56	0.98	0.38	0.22	0.44	0.33
1990	0.38	0.15	1.90	3.67	4.13	2.62	0.25	0.12	0.10	0.07	0.05	0.65
1991	6.46	7.08	2.44	2.01	6.18	6.57	0.92	0.26	0.12	0.09	0.09	0.25
1992	0.21	0.12	0.10	0.59	1.44	1.80	0.98	0.17	0.04	0.02	0.07	0.22
1993	4.04	4.44	9.59	11.27	7.39	9.46	4.47	0.43	0.16	0.35	0.44	0.10
1994	0.18	0.08	0.55	3.35	3.56	9.37	9.78	1.76	1.40	0.63	0.13	0.14
1995	0.52	1.03	13.32	31.07	35.35	20.06	4.14	0.60	0.16	0.56	0.36	0.12
1996	0.70	6.00	10.97	16.14	12.16	6.06	7.12	3.64	4.75	5.05	1.18	0.44
1997	0.79	1.07	0.22	3.27	21.57	24.74	6.96	1.60	0.43	0.17	0.22	0.19
1998	0.38	1.41	6.07	6.89	9.77	13.67	6.20	0.59	0.16	0.12	0.08	0.07
1999	0.89	1.59	10.43	27.59	26.91	17.61	8.63	4.07	0.89	0.18	0.10	0.64
2000	1.17	1.52	3.19	8.01	8.09	6.67	4.81	0.77	0.19	0.14	0.15	0.30
2001	2.32	7.85	12.98	8.82	2.48	13.20	14.21	1.46	0.95	1.81	2.62	0.92
2002	0.19	0.16	2.00	3.21	1.35	1.59	0.53	0.21	0.21	0.15	0.08	0.42
2003	0.31	0.30	0.63	5.89	6.40	2.90	1.88	0.22	0.13	1.14	1.07	1.67
2004	1.76	1.94	10.97	14.51	9.20	5.75	3.04	0.74	0.19	0.13	0.15	0.12
2005	0.69	1.43	0.35	5.25	13.33	8.70	2.58	1.11	0.48	0.17	1.82	6.05
2006	11.61	13.28	7.48	11.29	7.16	2.22	2.57	0.62	0.50	0.30	0.13	0.09
2007	1.47	1.56	0.68	1.27	2.18	6.28	8.20	3.19	1.19	0.46	0.16	0.21
2008	0.34	0.84	1.33	5.05	8.61	5.12	1.57	0.68	0.47	0.20	0.35	0.24
2009	6.54	7.25	0.80	10.68	18.38	8.20	0.92	0.25	0.32	0.25	0.10	0.07

**Table B1- 7 Simulated Natural Streamflow Time-Series (T33E.INC) for Quaternary T33E (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	2.20	2.63	7.67	6.45	6.71	12.64	5.82	1.36	0.75	0.64	0.48	0.49
1921	1.74	22.49	18.31	6.30	2.44	1.12	0.43	4.61	2.65	1.03	1.35	0.69
1922	1.25	18.25	6.89	18.87	31.08	16.53	3.01	0.50	0.47	9.86	3.88	0.57
1923	0.43	0.66	5.77	10.68	12.11	7.10	1.50	0.54	0.50	0.42	0.42	0.50
1924	1.31	7.39	24.09	9.22	9.22	31.84	13.04	1.93	0.67	0.51	0.40	0.42
1925	0.49	8.51	5.55	11.50	7.01	19.95	6.52	0.71	0.88	0.80	0.55	2.15
1926	2.93	4.51	13.22	8.46	7.03	38.03	12.31	1.23	0.55	0.54	0.56	0.46
1927	3.85	1.57	18.71	31.31	14.01	4.19	0.81	0.51	0.46	0.41	0.56	0.49
1928	1.44	3.49	9.29	4.92	5.20	23.03	7.21	0.59	1.33	1.44	0.98	4.16

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1929	6.12	8.13	19.75	16.92	4.68	4.89	3.09	0.83	0.64	0.62	1.67	1.04
1930	2.18	0.81	5.50	32.18	22.45	18.75	6.78	1.21	0.53	5.36	2.17	0.47
1931	2.55	2.21	5.84	7.31	25.35	10.55	1.30	0.84	0.71	0.73	0.57	1.49
1932	1.73	10.08	19.30	5.58	2.91	6.96	2.55	0.60	0.43	0.41	0.38	0.37
1933	0.33	27.72	35.47	43.36	24.15	14.07	3.66	0.66	0.54	0.69	0.62	0.39
1934	5.00	9.99	19.84	10.55	4.16	6.16	6.86	3.24	1.97	1.18	1.77	0.74
1935	0.52	0.66	0.27	6.34	23.25	11.91	1.88	5.56	2.29	0.82	0.57	0.42
1936	4.59	33.51	12.45	10.99	36.54	19.52	3.09	0.46	0.40	0.38	0.34	0.37
1937	1.08	0.80	12.33	20.19	20.03	6.06	6.23	2.30	0.80	0.93	0.88	0.60
1938	2.03	2.21	14.67	22.01	36.89	12.32	1.16	0.83	0.79	0.86	0.82	15.80
1939	8.46	9.53	10.10	9.44	27.56	17.30	3.89	8.81	3.49	0.72	0.50	0.53
1940	4.31	6.25	17.36	20.50	14.66	5.83	2.45	0.75	0.53	0.51	0.47	0.40
1941	0.95	1.18	0.61	14.86	34.61	20.06	11.68	3.46	0.86	0.52	0.57	0.60
1942	6.06	10.91	31.45	18.83	4.52	12.29	9.06	2.42	1.12	1.02	10.03	4.85
1943	7.38	17.02	29.02	13.11	11.06	9.17	2.21	0.54	0.77	0.89	0.54	11.77
1944	6.61	1.69	0.30	9.10	25.61	26.13	6.38	0.60	0.49	0.43	0.37	0.33
1945	3.13	1.14	3.16	9.58	10.37	12.40	4.68	1.09	0.74	0.56	0.44	0.35
1946	1.15	10.98	12.25	17.55	15.35	10.28	3.93	0.80	0.84	0.90	0.55	0.53
1947	0.88	16.52	19.72	22.95	19.63	17.50	4.87	0.67	0.48	0.42	0.36	0.31
1948	1.68	1.19	3.40	11.99	12.36	11.40	3.55	0.75	0.51	0.45	0.40	0.40
1949	0.41	1.55	8.31	8.19	14.59	24.93	7.52	1.06	0.77	0.68	5.01	2.01
1950	1.92	1.45	20.34	16.84	16.81	5.85	0.74	0.55	0.44	0.40	0.53	1.47
1951	8.74	2.98	0.71	12.69	25.73	11.40	2.93	0.89	0.69	0.63	0.48	0.60
1952	0.98	6.64	17.12	10.54	6.37	5.44	4.69	1.37	0.54	0.44	0.43	3.37
1953	3.83	5.09	12.04	12.13	10.75	13.35	4.08	4.30	2.03	0.92	0.55	0.79
1954	6.42	6.75	7.89	43.88	34.66	15.69	3.88	0.90	0.86	0.70	0.45	0.45
1955	3.10	9.91	6.49	7.89	19.92	22.02	5.74	0.88	0.72	0.55	0.42	0.43
1956	0.55	14.06	39.44	35.16	17.00	15.90	5.46	0.92	0.56	0.54	0.70	6.85
1957	9.34	4.89	11.93	23.27	12.29	5.54	4.17	1.33	0.66	0.52	0.41	0.36
1958	0.38	13.27	23.96	11.93	10.42	5.83	3.73	19.04	6.62	1.23	0.78	0.68
1959	0.65	6.22	10.54	6.30	4.69	1.86	3.51	1.33	0.57	0.45	0.46	0.93
1960	1.00	11.21	24.37	10.19	8.40	9.81	8.79	2.57	0.64	0.49	0.45	0.44
1961	0.37	8.94	17.93	12.27	15.48	17.32	4.67	0.63	0.49	0.41	0.42	0.38
1962	1.66	11.19	14.65	36.56	20.90	23.99	7.37	0.93	0.51	1.11	0.70	0.37
1963	8.90	14.75	13.04	20.49	7.27	11.53	6.76	1.27	8.23	3.40	0.71	0.69
1964	9.22	3.31	10.74	12.81	6.94	1.36	0.51	0.49	6.28	3.67	2.27	1.28
1965	5.03	9.59	3.26	21.26	16.23	3.24	0.48	1.86	0.85	0.55	0.60	0.69
1966	0.58	1.36	6.63	9.48	28.82	30.77	13.03	2.51	1.27	1.31	0.79	0.43
1967	0.92	4.29	4.69	3.61	7.32	7.65	3.62	0.79	0.51	0.43	0.46	0.54
1968	0.76	3.47	3.05	2.33	5.59	21.38	7.04	1.02	0.78	0.54	0.41	0.39
1969	6.97	3.78	12.65	11.63	13.17	4.08	0.49	0.51	0.67	0.58	1.61	1.34
1970	7.74	4.12	7.15	22.57	16.12	4.96	1.39	1.10	0.88	0.95	1.09	0.67
1971	9.72	4.94	5.00	14.54	22.08	14.13	3.14	0.69	0.58	0.49	0.38	0.38

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1972	0.80	15.39	5.71	6.65	25.68	10.56	1.76	0.72	0.49	0.50	0.60	0.60
1973	1.41	10.52	10.80	34.59	30.77	25.43	7.56	1.84	1.12	0.78	0.55	0.40
1974	0.37	12.15	20.59	16.33	6.11	7.48	2.86	0.66	0.46	0.42	0.39	7.92
1975	2.87	5.85	39.29	47.56	34.80	49.23	14.36	2.03	0.93	0.66	0.49	2.47
1976	14.97	5.81	1.10	10.44	13.56	11.27	3.15	0.62	0.45	0.47	0.53	1.40
1977	4.79	6.58	6.91	18.99	10.11	14.46	11.34	2.78	0.61	0.49	0.44	0.49
1978	1.70	1.34	15.80	8.14	4.82	3.53	0.96	0.54	0.41	1.42	0.94	0.62
1979	1.28	1.17	5.48	9.18	11.69	7.00	1.48	0.49	0.40	0.36	0.31	3.79
1980	1.73	9.05	4.92	14.70	19.93	7.93	1.23	0.71	0.63	0.50	0.70	0.76
1981	0.87	6.38	13.17	8.27	3.08	20.38	8.19	0.81	0.67	0.65	0.51	1.30
1982	2.23	5.02	2.43	1.78	0.73	2.44	1.20	0.54	0.40	0.34	0.29	0.26
1983	1.68	7.80	16.79	22.19	7.54	10.53	4.32	0.80	0.63	0.64	0.54	0.42
1984	5.65	9.08	3.42	21.58	40.14	10.89	0.52	0.45	0.38	0.35	0.31	0.27
1985	10.95	19.84	22.32	33.13	19.93	9.50	2.31	0.59	0.50	0.47	0.57	1.01
1986	8.77	11.04	5.32	10.79	6.12	9.94	3.33	0.56	0.57	0.56	2.71	26.33
1987	18.77	7.33	4.62	8.40	19.61	17.85	5.14	1.16	0.85	0.81	0.75	0.63
1988	2.10	8.49	21.11	13.79	26.13	9.65	3.95	1.85	0.93	0.72	0.51	0.34
1989	0.95	24.31	20.41	17.84	4.89	10.51	4.29	0.78	0.66	0.56	0.62	0.59
1990	0.77	0.35	8.95	10.17	9.29	3.35	0.46	0.38	0.37	0.33	0.28	3.14
1991	12.41	5.87	11.01	4.49	13.43	4.94	0.67	0.55	0.40	0.35	0.35	0.42
1992	0.40	0.25	0.16	3.61	4.49	3.80	1.37	0.47	0.31	0.26	0.30	0.38
1993	9.72	5.65	22.58	15.88	18.55	12.58	2.71	0.52	0.44	0.58	0.69	0.41
1994	0.42	0.26	5.97	11.71	11.07	21.59	7.34	0.96	1.11	0.94	0.51	0.43
1995	1.01	4.50	28.14	37.23	34.75	13.62	2.25	0.65	0.50	0.70	0.66	0.43
1996	1.84	17.66	20.18	28.06	8.73	10.59	6.03	1.41	7.20	3.35	1.35	0.82
1997	1.81	3.82	1.44	13.71	33.61	21.34	4.46	1.03	0.79	0.58	0.59	0.53
1998	0.75	9.22	22.32	16.35	17.75	15.56	3.95	0.60	0.48	0.44	0.37	0.33
1999	3.95	7.01	23.20	39.28	28.12	19.68	7.00	2.32	1.21	0.64	0.46	1.49
2000	1.85	6.84	14.08	17.25	12.44	11.09	4.00	0.80	0.56	0.51	0.48	0.51
2001	6.49	17.70	24.54	15.83	4.28	21.01	7.08	0.97	0.92	1.23	2.09	1.05
2002	0.55	0.66	10.16	11.34	4.09	4.27	1.37	0.51	0.57	0.57	0.45	1.32
2003	0.59	0.98	4.71	18.12	8.48	8.42	2.73	0.51	0.42	1.22	0.81	4.12
2004	2.70	7.42	21.96	19.59	13.95	7.98	2.06	0.75	0.55	0.46	0.47	0.43
2005	2.45	8.29	2.90	13.91	19.65	9.32	2.81	1.08	0.86	0.59	4.02	5.08
2006	18.97	14.67	11.75	18.58	6.40	5.73	3.53	0.79	0.76	0.71	0.52	0.40
2007	7.95	6.56	4.38	8.48	9.86	16.28	9.87	2.19	0.97	0.81	0.54	0.49
2008	0.63	3.59	8.39	16.62	17.72	7.66	1.55	0.88	0.79	0.60	0.64	0.58
2009	13.13	8.25	3.98	22.63	17.08	4.69	0.74	0.58	0.60	0.60	0.44	0.35

Table B1- 8 Modelled Irrigation Requirement Time-Series (T33A.IRR) for Quaternary Catchment T33A, Based on WE2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 9 Irrigation Allocation Time-Series (T33B.IRR) for Quaternary Catchment T33B, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 10 Irrigation Allocation Time-Series (T33C.IRR) for Quaternary Catchment T33C, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 11 Irrigation Allocation Time-Series (T33D.IRR) for Quaternary Catchment T33D, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 12 Irrigation Allocation Time-Series (T33E.IRR) for Quaternary Catchment T33E, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 13 Modelled Impact of Commercial Forestry Time-Series (T33A.AFF) for Quaternary Catchment T33A

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 14 Forestry Allocation Time-Series (T33B.AFF) for Quaternary Catchment T33B, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.10	0.05	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 15 Forestry Allocation Time-Series (T33C.AFF) for Quaternary Catchment T33C, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.02	0.03	0.04	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.02	0.02	0.01	0.03	0.03	0.01	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.01	0.02	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.01
1939	0.01	0.00	0.00	0.00	0.02	0.03	0.01	0.01	0.01	0.00	0.00	0.00
1940	0.00	0.00	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.01	0.04	0.04	0.02	0.01	0.00	0.00	0.00	0.00
1942	0.00	0.01	0.03	0.04	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01
1943	0.00	0.01	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01
1944	0.01	0.00	0.00	0.00	0.03	0.05	0.03	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1945	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.01	0.03	0.03	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	0.01	0.01
1950	0.00	0.00	0.02	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.01	0.01	0.00	0.01	0.04	0.04	0.01	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.02	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.00	0.00
1954	0.01	0.01	0.00	0.07	0.10	0.05	0.01	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.01	0.01	0.00	0.03	0.05	0.03	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.01	0.07	0.10	0.05	0.03	0.02	0.00	0.00	0.00	0.00	0.01
1957	0.02	0.01	0.01	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.01	0.04	0.03	0.01	0.01	0.01	0.04	0.04	0.00	0.00	0.00
1959	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.01	0.04	0.04	0.01	0.02	0.03	0.02	0.00	0.00	0.00	0.00
1961	0.00	0.01	0.02	0.02	0.02	0.04	0.03	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.01	0.02	0.08	0.08	0.06	0.05	0.00	0.00	0.00	0.00	0.00
1963	0.01	0.02	0.02	0.04	0.03	0.02	0.02	0.01	0.02	0.02	0.00	0.00
1964	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.00
1965	0.01	0.01	0.00	0.04	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.01	0.06	0.11	0.07	0.02	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.04	0.05	0.00	0.00	0.00	0.00	0.00
1969	0.01	0.01	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.01	0.01	0.00	0.04	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.01	0.02	0.00	0.02	0.06	0.06	0.02	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.02	0.03	0.01	0.06	0.06	0.01	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.01	0.02	0.08	0.13	0.10	0.06	0.01	0.00	0.00	0.00	0.00
1974	0.00	0.02	0.05	0.05	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.01
1975	0.01	0.00	0.09	0.19	0.16	0.33	0.17	0.01	0.00	0.00	0.00	0.00
1976	0.03	0.04	0.00	0.01	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00
1977	0.01	0.01	0.00	0.03	0.04	0.04	0.06	0.03	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.03	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.01	0.01	0.02	0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.01	0.02	0.02	0.00	0.05	0.06	0.01	0.00	0.00	0.00	0.00
1982	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.01	0.03	0.07	0.05	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1984	0.01	0.01	0.01	0.05	0.15	0.11	0.01	0.00	0.00	0.00	0.00	0.00
1985	0.02	0.06	0.07	0.12	0.11	0.04	0.01	0.00	0.00	0.00	0.00	0.00
1986	0.01	0.02	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.01	0.10
1987	0.13	0.04	0.01	0.01	0.05	0.08	0.04	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988	0.00	0.01	0.05	0.05	0.08	0.08	0.01	0.01	0.00	0.00	0.00	0.00
1989	0.00	0.07	0.10	0.06	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.03	0.04	0.02	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.02	0.02	0.06	0.07	0.05	0.06	0.02	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.02	0.02	0.07	0.07	0.01	0.01	0.00	0.00	0.00
1995	0.00	0.01	0.08	0.18	0.20	0.11	0.02	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.04	0.08	0.11	0.08	0.03	0.03	0.01	0.03	0.03	0.00	0.00
1997	0.00	0.01	0.00	0.03	0.13	0.15	0.05	0.01	0.00	0.00	0.00	0.00
1998	0.00	0.01	0.06	0.06	0.06	0.08	0.04	0.00	0.00	0.00	0.00	0.00
1999	0.01	0.01	0.07	0.18	0.18	0.12	0.06	0.02	0.01	0.00	0.00	0.00
2000	0.01	0.01	0.03	0.06	0.05	0.04	0.02	0.00	0.00	0.00	0.00	0.00
2001	0.01	0.05	0.10	0.08	0.02	0.08	0.08	0.01	0.00	0.01	0.02	0.00
2002	0.00	0.00	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.05	0.05	0.02	0.01	0.00	0.00	0.01	0.01	0.01
2004	0.01	0.01	0.07	0.10	0.06	0.03	0.01	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.01	0.01	0.04	0.09	0.06	0.01	0.01	0.00	0.00	0.01	0.03
2006	0.08	0.09	0.04	0.07	0.05	0.01	0.02	0.00	0.00	0.00	0.00	0.00
2007	0.01	0.01	0.00	0.01	0.02	0.06	0.08	0.03	0.00	0.00	0.00	0.00
2008	0.00	0.01	0.01	0.04	0.08	0.05	0.01	0.00	0.00	0.00	0.00	0.00
2009	0.04	0.05	0.01	0.08	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 16 Forestry Allocation Time-Series (T33D.AFF) for Quaternary Catchment T33D, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.01	0.03	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.02	0.02	0.00	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1937	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.01
1939	0.01	0.00	0.00	0.00	0.02	0.02	0.00	0.01	0.01	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.01	0.03	0.03	0.02	0.01	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.03	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01
1943	0.00	0.01	0.03	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
1944	0.01	0.00	0.00	0.00	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.01	0.02	0.03	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.01	0.03	0.03	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.01	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.05	0.08	0.04	0.01	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.01	0.05	0.08	0.05	0.03	0.01	0.00	0.00	0.00	0.00	0.01
1957	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.01	0.03	0.03	0.01	0.01	0.01	0.03	0.04	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.01	0.03	0.03	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.02	0.02	0.02	0.03	0.02	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.01	0.01	0.06	0.08	0.05	0.03	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.01	0.01	0.03	0.02	0.02	0.02	0.00	0.01	0.01	0.00	0.00
1964	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.00
1965	0.00	0.01	0.00	0.04	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.01	0.05	0.09	0.06	0.01	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.00	0.00
1969	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.01	0.00	0.00	0.03	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.01	0.01	0.00	0.01	0.05	0.05	0.02	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.01	0.01	0.00	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.01	0.01	0.06	0.10	0.08	0.04	0.01	0.00	0.00	0.00	0.00
1974	0.00	0.01	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
1975	0.01	0.00	0.07	0.14	0.13	0.28	0.16	0.01	0.00	0.00	0.00	0.00
1976	0.02	0.03	0.00	0.01	0.02	0.03	0.02	0.00	0.00	0.00	0.00	0.00
1977	0.01	0.00	0.00	0.02	0.03	0.04	0.05	0.02	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.03	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1980	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.01	0.01	0.00	0.04	0.04	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.01	0.02	0.05	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1984	0.01	0.01	0.00	0.03	0.11	0.09	0.01	0.00	0.00	0.00	0.00	0.00
1985	0.02	0.04	0.05	0.09	0.09	0.03	0.01	0.00	0.00	0.00	0.00	0.00
1986	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.09
1987	0.11	0.03	0.00	0.01	0.04	0.07	0.03	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.01	0.03	0.04	0.06	0.06	0.01	0.01	0.00	0.00	0.00	0.00
1989	0.00	0.06	0.08	0.05	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.03	0.03	0.01	0.01	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.02	0.02	0.04	0.05	0.03	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.01	0.02	0.04	0.04	0.00	0.01	0.00	0.00	0.00
1995	0.00	0.00	0.06	0.14	0.16	0.09	0.01	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.03	0.05	0.08	0.06	0.03	0.03	0.01	0.02	0.02	0.00	0.00
1997	0.00	0.00	0.00	0.01	0.10	0.11	0.03	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.01	0.03	0.03	0.05	0.06	0.03	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.01	0.05	0.13	0.13	0.08	0.04	0.02	0.00	0.00	0.00	0.00
2000	0.01	0.01	0.01	0.04	0.03	0.02	0.02	0.00	0.00	0.00	0.00	0.00
2001	0.01	0.04	0.06	0.04	0.01	0.06	0.07	0.01	0.00	0.01	0.01	0.00
2002	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.01
2004	0.01	0.01	0.06	0.08	0.05	0.02	0.01	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.01	0.00	0.03	0.07	0.05	0.01	0.00	0.00	0.00	0.01	0.03
2006	0.06	0.07	0.04	0.06	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00
2007	0.01	0.01	0.00	0.01	0.01	0.03	0.04	0.01	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.01	0.03	0.05	0.03	0.01	0.00	0.00	0.00	0.00	0.00
2009	0.03	0.04	0.00	0.06	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00

Table B1- 17 Forestry Allocation Time-Series (T33E.AFF) for Quaternary Catchment T33E, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.02	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1929	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.04	0.04	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.02	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.02	0.04	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.06	0.08	0.08	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.02	0.02	0.04	0.02	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.02	0.06	0.02	0.00	0.02	0.00	0.00	0.00	0.00
1936	0.02	0.08	0.04	0.02	0.08	0.04	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.04	0.06	0.06	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.04	0.06	0.10	0.04	0.00	0.00	0.00	0.00	0.00	0.04
1939	0.02	0.02	0.02	0.02	0.08	0.06	0.02	0.02	0.02	0.00	0.00	0.00
1940	0.02	0.02	0.06	0.06	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.04	0.12	0.06	0.04	0.02	0.00	0.00	0.00	0.00
1942	0.02	0.04	0.10	0.06	0.02	0.04	0.04	0.00	0.00	0.00	0.04	0.02
1943	0.02	0.06	0.10	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.04
1944	0.02	0.00	0.00	0.04	0.10	0.10	0.02	0.00	0.00	0.00	0.00	0.00
1945	0.02	0.00	0.02	0.04	0.04	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.04	0.04	0.08	0.06	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.06	0.08	0.10	0.08	0.08	0.02	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.02	0.06	0.06	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.04	0.04	0.06	0.12	0.04	0.00	0.00	0.00	0.02	0.00
1950	0.00	0.00	0.10	0.08	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.04	0.02	0.00	0.06	0.12	0.06	0.02	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.04	0.08	0.06	0.04	0.02	0.02	0.00	0.00	0.00	0.00	0.02
1953	0.02	0.02	0.06	0.06	0.06	0.06	0.02	0.02	0.02	0.00	0.00	0.00
1954	0.04	0.04	0.04	0.22	0.18	0.08	0.02	0.00	0.00	0.00	0.00	0.00
1955	0.02	0.06	0.04	0.04	0.10	0.12	0.04	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.08	0.22	0.20	0.10	0.08	0.02	0.00	0.00	0.00	0.00	0.04
1957	0.06	0.02	0.06	0.14	0.08	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.08	0.14	0.08	0.06	0.04	0.02	0.12	0.04	0.00	0.00	0.00
1959	0.00	0.04	0.06	0.04	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.08	0.16	0.06	0.06	0.06	0.06	0.02	0.00	0.00	0.00	0.00
1961	0.00	0.06	0.12	0.08	0.10	0.12	0.02	0.00	0.00	0.00	0.00	0.00
1962	0.02	0.08	0.10	0.24	0.14	0.16	0.04	0.00	0.00	0.00	0.00	0.00
1963	0.06	0.10	0.08	0.14	0.04	0.08	0.04	0.00	0.06	0.02	0.00	0.00
1964	0.06	0.02	0.08	0.08	0.04	0.00	0.00	0.00	0.04	0.02	0.02	0.00
1965	0.04	0.06	0.02	0.14	0.12	0.02	0.00	0.02	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.04	0.06	0.20	0.22	0.10	0.02	0.00	0.00	0.00	0.00
1967	0.00	0.04	0.04	0.02	0.06	0.06	0.02	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.02	0.02	0.02	0.04	0.16	0.06	0.00	0.00	0.00	0.00	0.00
1969	0.06	0.02	0.10	0.08	0.10	0.04	0.00	0.00	0.00	0.00	0.02	0.00
1970	0.06	0.04	0.06	0.18	0.12	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1971	0.08	0.04	0.04	0.12	0.18	0.12	0.02	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1972	0.00	0.12	0.04	0.06	0.20	0.08	0.02	0.00	0.00	0.00	0.00	0.00
1973	0.02	0.08	0.08	0.28	0.26	0.20	0.06	0.02	0.00	0.00	0.00	0.00
1974	0.00	0.10	0.18	0.14	0.06	0.06	0.02	0.00	0.00	0.00	0.00	0.06
1975	0.02	0.06	0.34	0.40	0.30	0.42	0.12	0.02	0.00	0.00	0.00	0.02
1976	0.14	0.06	0.00	0.10	0.12	0.10	0.02	0.00	0.00	0.00	0.00	0.02
1977	0.04	0.06	0.06	0.16	0.10	0.12	0.10	0.02	0.00	0.00	0.00	0.00
1978	0.02	0.02	0.14	0.08	0.04	0.04	0.00	0.00	0.00	0.02	0.00	0.00
1979	0.02	0.02	0.06	0.08	0.10	0.06	0.02	0.00	0.00	0.00	0.00	0.04
1980	0.02	0.08	0.04	0.14	0.18	0.08	0.02	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.06	0.12	0.08	0.02	0.20	0.08	0.00	0.00	0.00	0.00	0.02
1982	0.02	0.04	0.02	0.02	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1983	0.02	0.08	0.16	0.22	0.08	0.10	0.04	0.00	0.00	0.00	0.00	0.00
1984	0.06	0.10	0.04	0.22	0.40	0.10	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.12	0.20	0.22	0.34	0.20	0.10	0.02	0.00	0.00	0.00	0.00	0.00
1986	0.10	0.12	0.06	0.12	0.06	0.10	0.04	0.00	0.00	0.00	0.02	0.26
1987	0.20	0.08	0.04	0.08	0.20	0.18	0.06	0.00	0.00	0.00	0.00	0.00
1988	0.02	0.10	0.22	0.14	0.28	0.10	0.04	0.02	0.00	0.00	0.00	0.00
1989	0.00	0.26	0.22	0.20	0.06	0.12	0.04	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.10	0.12	0.10	0.04	0.00	0.00	0.00	0.00	0.00	0.04
1991	0.14	0.06	0.12	0.04	0.14	0.06	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.04	0.06	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1993	0.12	0.06	0.26	0.18	0.20	0.14	0.02	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.06	0.14	0.12	0.24	0.08	0.00	0.02	0.00	0.00	0.00
1995	0.02	0.06	0.32	0.42	0.40	0.16	0.02	0.00	0.00	0.00	0.00	0.00
1996	0.02	0.20	0.24	0.32	0.10	0.12	0.08	0.02	0.08	0.04	0.00	0.00
1997	0.02	0.04	0.02	0.16	0.40	0.26	0.06	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.12	0.26	0.20	0.22	0.18	0.04	0.00	0.00	0.00	0.00	0.00
1999	0.04	0.08	0.28	0.48	0.34	0.24	0.08	0.02	0.02	0.00	0.00	0.02
2000	0.02	0.08	0.18	0.22	0.16	0.14	0.04	0.00	0.00	0.00	0.00	0.00
2001	0.08	0.22	0.30	0.20	0.06	0.26	0.08	0.00	0.00	0.02	0.02	0.02
2002	0.00	0.00	0.14	0.14	0.06	0.06	0.02	0.00	0.00	0.00	0.00	0.02
2003	0.00	0.02	0.06	0.24	0.12	0.10	0.04	0.00	0.00	0.02	0.00	0.06
2004	0.04	0.10	0.28	0.26	0.18	0.10	0.02	0.00	0.00	0.00	0.00	0.00
2005	0.04	0.12	0.04	0.18	0.26	0.12	0.04	0.02	0.00	0.00	0.06	0.06
2006	0.26	0.20	0.16	0.24	0.08	0.08	0.04	0.00	0.00	0.00	0.00	0.00
2007	0.10	0.08	0.06	0.12	0.14	0.22	0.14	0.02	0.00	0.00	0.00	0.00
2008	0.00	0.04	0.12	0.22	0.24	0.10	0.02	0.00	0.00	0.00	0.00	0.00
2009	0.18	0.12	0.06	0.32	0.24	0.06	0.00	0.00	0.00	0.00	0.00	0.00

Table B1-18 WRSM2000 Calibration Parameters for the Kinira River System

Module	POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
T33A	3	49	50	20	0	100	250	1.3	0.60	0	0.1
T33B	3	49	50	20	0	100	250	1.3	0.60	0	0.1
T33C	3	49	50	20	0	100	250	1.3	0.60	0	0.1
T33D	3	49	50	20	0	100	250	1.3	0.60	0	0.1
T33E	3	30	115	10	0	20	250	1.5	0.25	0	0.5
T33F	3	30	115	10	0	20	250	1.5	0.25	0	0.5
T33G	3	30	115	10	0	20	250	1.5	0.25	0	0.5

Where:

POW	Power of soil moisture/subsurface flow equation
SL	Soil moisture state when subsurface flow = 0
ST	Soil moisture capacity in mm
FT	Subsurface flow at soil moisture capacity
GW	Maximum groundwater flow in mm/month
ZMIN	Minimum catchment absorption in mm/month
ZMAX	Maximum catchment absorption in mm/month
PI	Interception storage in mm
TL	Lag of flow (excluding groundwater)
GL	Lag of groundwater flow in months
R	Coeff.in evaporation/soil moisture equation

APPENDIX B2

OBSERVED AND SIMULATED STREAMFLOWS TSITSA RIVER SYSTEM

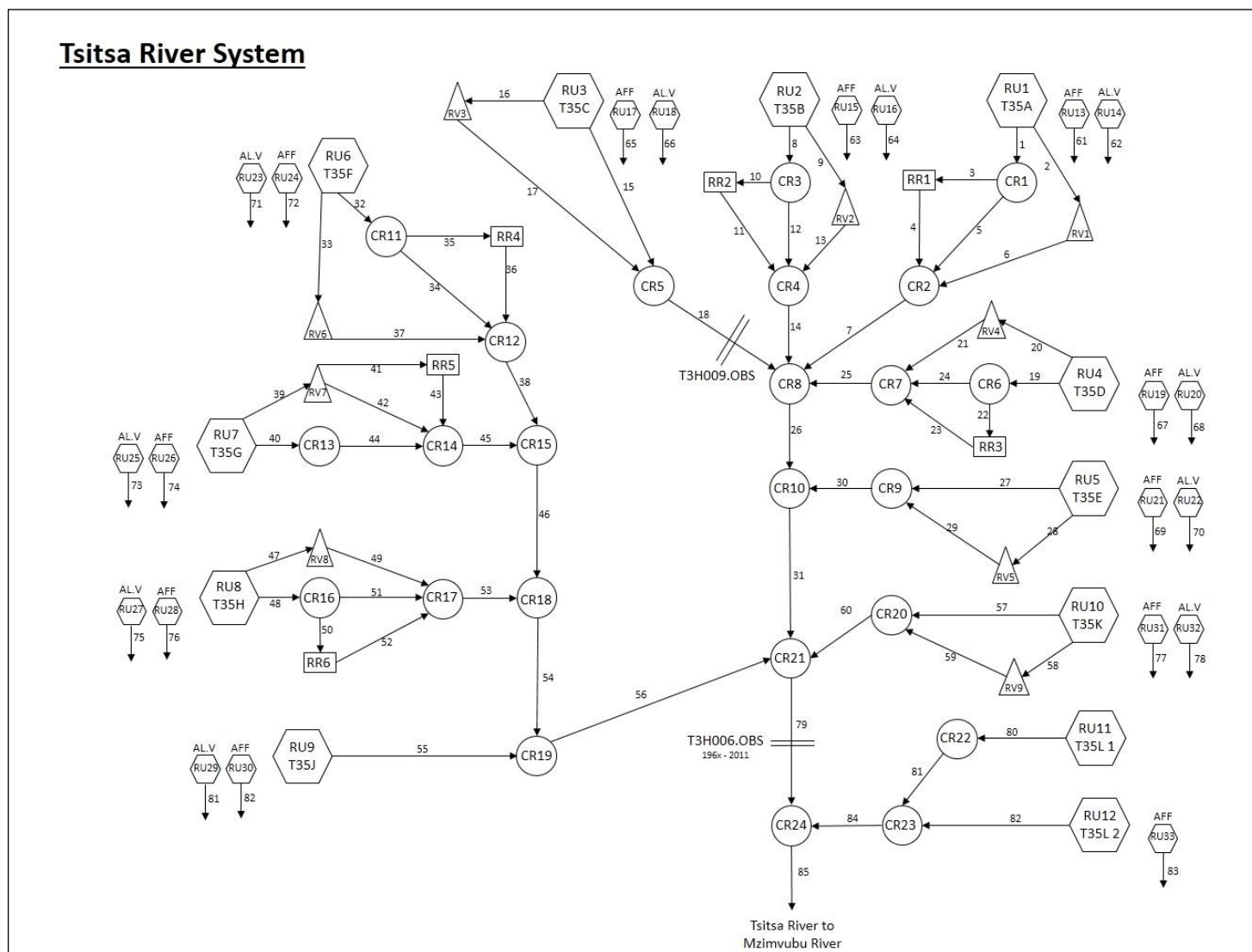


Figure B2- 1 Tsitsa River Catchment WRS2000 Systems Diagram

Table B2- 1 Observed Gauged Raw Stream Flow Data for Gauge T3H006 (1983 - 2003)

Year	Oct		Nov		Dec		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Total	
1983	5.09	#	45		87.1		153		45.1	#	122	#	53.9	#	17		15		9.53		5.52		4.53		563	+#
1984	11.6	#	26.7		28.9		137		174	#	83		18.6		6.52		4.29		3.47		1.66		2.09		498	#
1985	36		186		275		197		142		113		18.4		9.59		5.7		5.11		5.45		11.5		1005	
1986	20.3	#	145		74.8		83.5		41.1	#	57.1	#	16.7		5.3		4.71		3.68		5.57		59.5	+	517	+#
1987	256		116		98.1		99.1		528		438		143		37.4		25.1		13.8		7.43		41.3		1803	
1988	23.2	#	57.2		277		299		522		201		168		65.1		27.3		18.4		7.24		3.45		1668	#
1989	12.9		241		239		105		34.5		223		141		42.1		20.5		12.3		10.4		22.3		1104	
1990	16.2	#	10.4		18.4		32.2		81.6		42.3		6.61		3.67		4.33		3.97		2.58		3.67		226	#
1991	8.59		67.1		184		35.4	#	52.2	#	45.9		22.5		5.49		3.56		2.8		2.24		3.51		433	+#
1992	4.12		8.66		10.7		17.9		61.3		60.2		22.6		9.11		3.24		2.49		1.85		3.83		206	
1993	84.7		109		195		319		378		338		49.6		22	#	9.35	#	15.9		23.6		6.99		1552	#
1994	6.53		4.77	#	31.9		106		57.6		261		125		44.3		0.26		0		0		0.21		638	#
1995	0.31		3.87		126		295	+	179		51.9		3.99	+	0.84		0.04		0.06		0		0		661	+
1996	0		27		21.4		101		12.8		24.4		4.65		0.11		61.3	#	1.77		0.5		0		255	#
1997	3.75		1.79		2.81		22.2		187		140		20.1		2.18		0.13	#	2.6	#	10.9		6.88		401	#
1998	9.7		59.6		197		217	+	297	+	81.1		32		14.3		8.15		5.81		4.03		2.41		929	+
1999	20.1		16.9		180		434		306	+	430	+	213		91.5		31.9		16.2		10.5		22.7		1771	+
2000	13.7		37.7		78		101		198		140		65.9		25.9		10.4		7.76		4.85		15.1		698	
2001	20.6		194		279		96		70.6		133		22.4		11.9		12.6		24.8		107		130	+	1103	+
2002	19.2		13		42.7		70.7		53.2		60.2		23.9		14.4		6.9		4.67		4.54		9.81		323	
2003	3.87		12.3		11.4		78.1		145		160		68.9		14.8		6.86		8.81		7.94		72		590	

Table B2- 2 Observed Gauged Raw Stream Flow Data for Gauge T3H009 (1964 - 2009)

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total	
1964	18.3	6.62	5.83	8.29	14.29	1.95	4.72	1.35	5.87	3.68	2.61	3.21	76.7	+#
1965	5.49	13.34	2.83	15.48	29.63	4.77	1.1	0.92	0.6	0.3	0.33	1.03	75.82	
1966	0.36	2.94	7.93	9.29	34.99	22.62	27.05	4.43	3.15	1.42	0.81	0.48	115.48	
1967	0.83	4.52	2.26	1.49	2.03	3.31	2.69	0.69	0.5	0.47	0.27	0.53	19.59	
1968	1.47	5.49	6.57	1.85	4.8	29.91	10.06	1.96	0.97	0.61	0.52	0.34	64.55	
1969	5.51	2.72	9.75	7.21	11.32	2.56	0.61	0.41	0.44	0.28	7.16	7.66	55.65	
1970	29	3.22	4.7	6.66	23.84	8.31	12.31	4.44	1.13	1.11	3.25	1.17	99.13	
1971	6.82	7.1	9.79	26.26	57.98	28.92	5.21	1.46	0.77	0.47	0.33	0.24	145.36	
1972	0.73	5.03	1.25	2.01	15.2	8.83	12.55	2.3	0.83	0.58	0.77	0.46	50.53	
1973	1.89	3.89	6.44	30.46	46.91	56.62	18.66	4.7	1.99	0.98	1.05	0.61	174.19	
1974	0.42	4.78	9.52	6.84	8.33	21.13	2.46	1.18	0.79	0.47	0.29	3.11	59.31	
1975	1.4	1.6	24.53	50.59	43.55	57.7	10.29	12.52	3.23	1.66	0.95	1.7	209.72	
1976	30.95	9.94	3.13	2.39	10.68	9.67	6	0.86	0.55	0.4	0.29	2.1	76.96	
1977	2.91	8.25	8.85	19.93	8.5	11.81	13.04	3.54	1.31	0.55	0.81	2.79	82.3	
1978	7.73	7	19.64	6.14	7.12	7.68	1.98	0.76	0.52	1.75	1.55	1.5	63.38	
1979	1.68	3.05	8.59	9.19	6.55	11.25	1.86	0.72	0.33	0.27	0.15	1.36	36.38	
1980	2.23	4.3	16.57	11.09	45.58	7.19	1.58	1.49	2.18	0.69	1.53	3.11	97.56	
1981	0.99	4.47	11.93	8.32	6.86	17.38	5.62	2.32	1.64	1.22	0.6	0.76	62.11	
1982	1.67	11.6	1.67	0.85	1.43	1.72	2.1	0.46	0.28	0.18	0.22	0.12	22.29	
1983	1.98	5.75	14.73	21.95	9.49	18.65	15.38	2.51	1.16	0.91	0.63	0.76	93.91	
1984	0.81	2.81	2.16	14.81	37.81	7.65	1.4	0.59	0.39	0.25	0.08	0.26	117.99	
1985	8.06	23.38	25.43	24.16	12.25	5.98	1.16	0.51	0.3	0.25	0.4	0.68	102.56	
1986	4.91	16.19	5.42	11.15	11.47	11.75	2.83	0.75	0.53	0.49	0.59	56.23	122.32	
1987	23.59	11.83	6.06	3.65	63.81	27.37	10.18	2.82	1.63	1.04	0.68	4.71	157.37	
1988	3.82	8.39	24.32	14.08	53.37	24.96	14.76	5.98	1.95	1.05	0.54	0.33	143.38	
1989	1.62	30.38	24.51	18.24	3.67	26.35	8.25	1.95	0.98	0.77	0.99	2.05	109.8	
1990	3.56	0.92	1.77	3.38	24.23	6.95	2.11	0.81	0.38	0.39	0.22	0.25	44.96	
1991	10.05	10.52	16.97	3.96	7.95	4.5	2.17	0.56	0.31	0.26	0.24	0.44	57.92	
1992	0.86	1.3	1.57	2.25	8.07	6.43	1.61	0.89	0.5	0.31	0.2	0.23	24.22	
1993	13.1	14.3	23.52	43.68	60.19	34.79	3.28	1.19	0.59	1.28	1.08	0.4	197.41	
1994	0.61	0.77	2.06	20.56	3.61	31.77	9.86	2.75	1.33	0.95	0.52	0.38	62.89	
1995	1.3	7.52	32.54	57.65	41.17	17.44	4.98	1.5	0.72	0.61	0.48	0.33	152.53	

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1996	0.66	20.94	11.99	60.74	10.99	25.07	6.79	1.82	11.53	2.85	1.43	1.09	155.91
1997	4.75	5.17	5.77	11.94	54.78	27.63	5.68	3.33	1.09	0.7	0.66	0.51	122
1998	1.87	11.07	28.23	34.84	34.28	9.91	4.16	1.48	0.89	0.6	0.19 *	0.18	127.68
1999	3.1	3.3	27.4	54.41	34.64	53.83	18.07	7.95	1.92	0.92	0.6	2.5	208.63
2000	1.49	3.85	9.85	18.68	30.81	18.06	7.97	3.39	1.02	0.72	0.52	3.7	100.05
2001	3.31	37.44	26.51	10.66	10.09	13.18	5.67 *	2.73 *	1.03	1.55	13.69	12.99	132.45
2002	1.7	1.23	5.16	11.86	7.14	8.55	2.34	1.34	0.76	0.6	0.61	1.65	42.94
2003	0.69	2.97	2.76	11.41	29.48	22.92	7.47	1.64	0.74	0.84	0.74	7.3	88.96
2004	2.93	3.97	15.86	31.51	14.06	13.38	5.75	1.87	0.99	0.65	0.87	0.42	92.26
2005	1.6	5.16	1.21	14.49	42.5	13.2	9.53	9.79	1.76	0.99	8.56	5.87	114.66
2006	20.51	14.54	19.27	7.25	8.99	2.48	3.17	1.05	0.86	0.62	0.33	0.2	79.25
2007	3.22	3.64	12.77	19.73 +	19.17 *	16.23 *	10.24 *	3.16 *	4.03 +	1.64	1.13	0.67	#
2008	0.73	7.69	31.29	6.03	50.63	8.61	1.62	1.19	0.82	0.71	1.08	0.58	110.97
2009	9.01	10.25	11.2	32.83	13.94	7.5	8.47	1.74	1	0.68	0.43	0.25	97.3

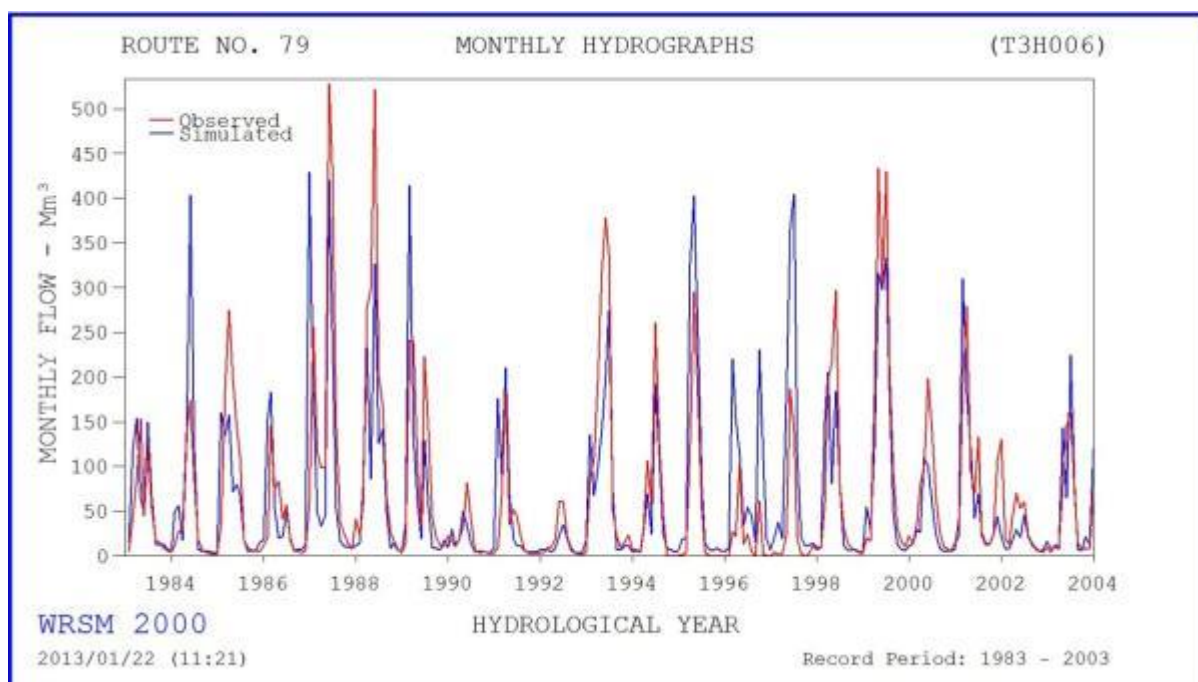


Figure B2- 2 Observed vs. Simulated Streamflow Monthly Hydrographs at Gauge T3H006

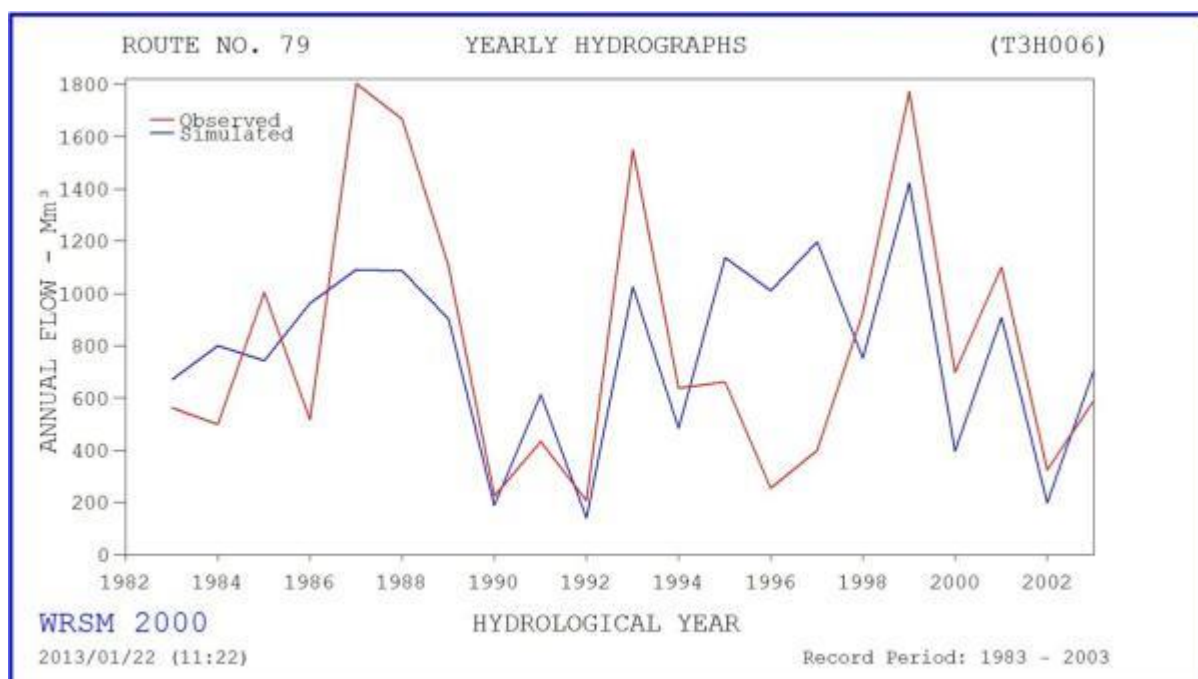


Figure B2- 3 Observed vs. Simulated Streamflow Annual Hydrographs at Gauge T3H006

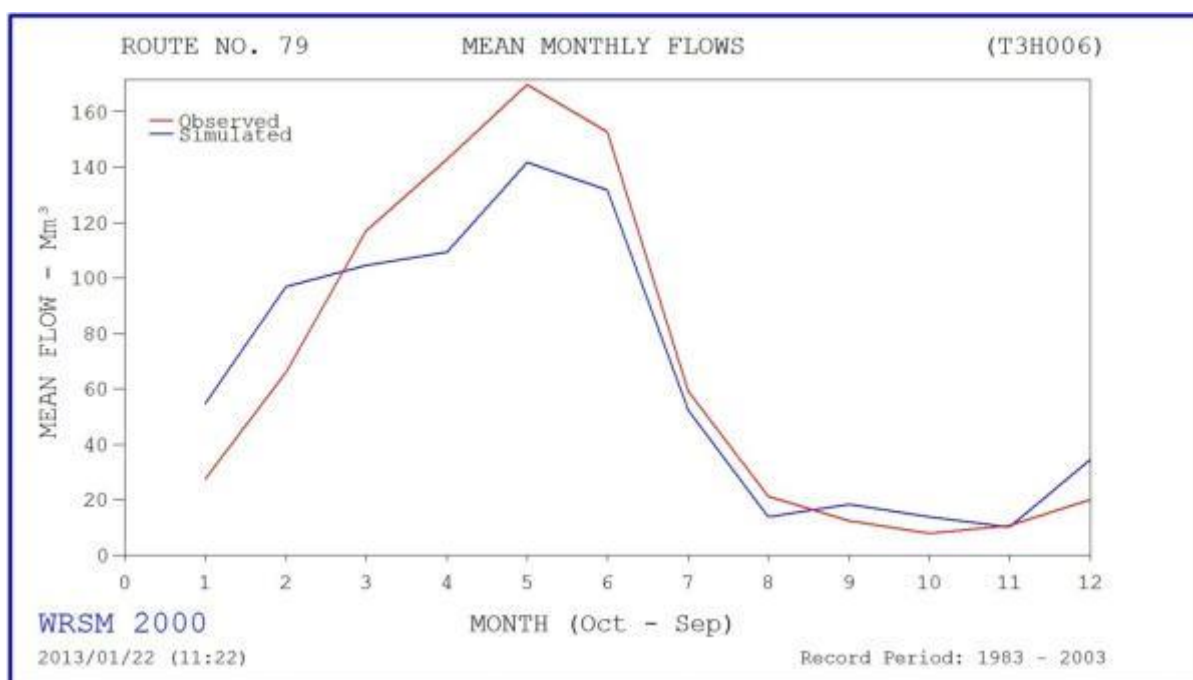


Figure B2- 4 Observed vs. Simulated Streamflow Mean Monthly Flows at Gauge T3H006

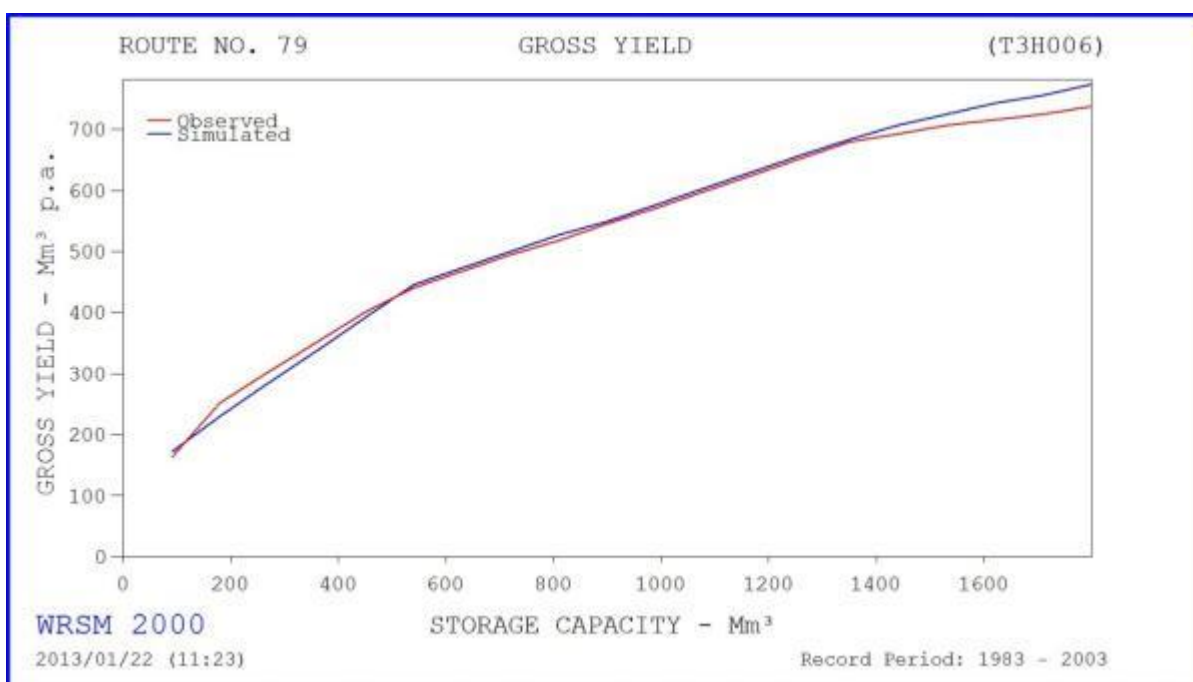


Figure B2- 5 Observed vs. Simulated Streamflow Goss Yield Comparison at Gauge T3H006

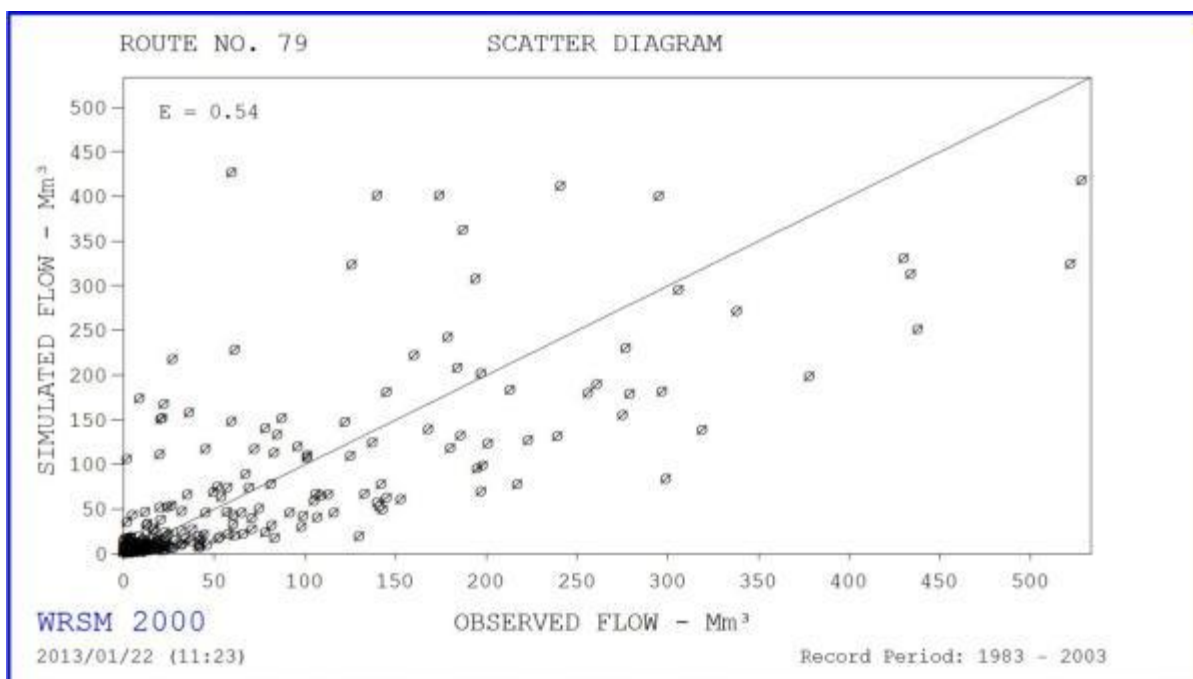


Figure B2- 6 Observed vs. Simulated Streamflow Scatter Diagram at Gauge T3H006

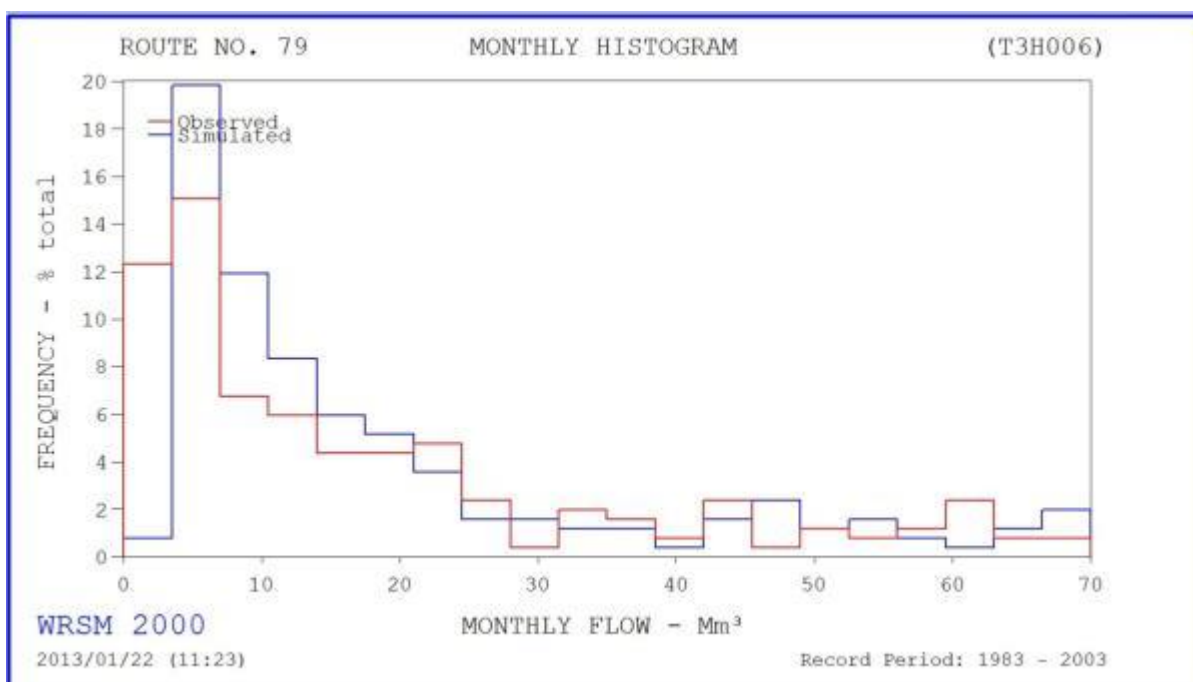


Figure B2- 7 Observed vs. Simulated Streamflow Monthly Histogram at Gauge T3H006

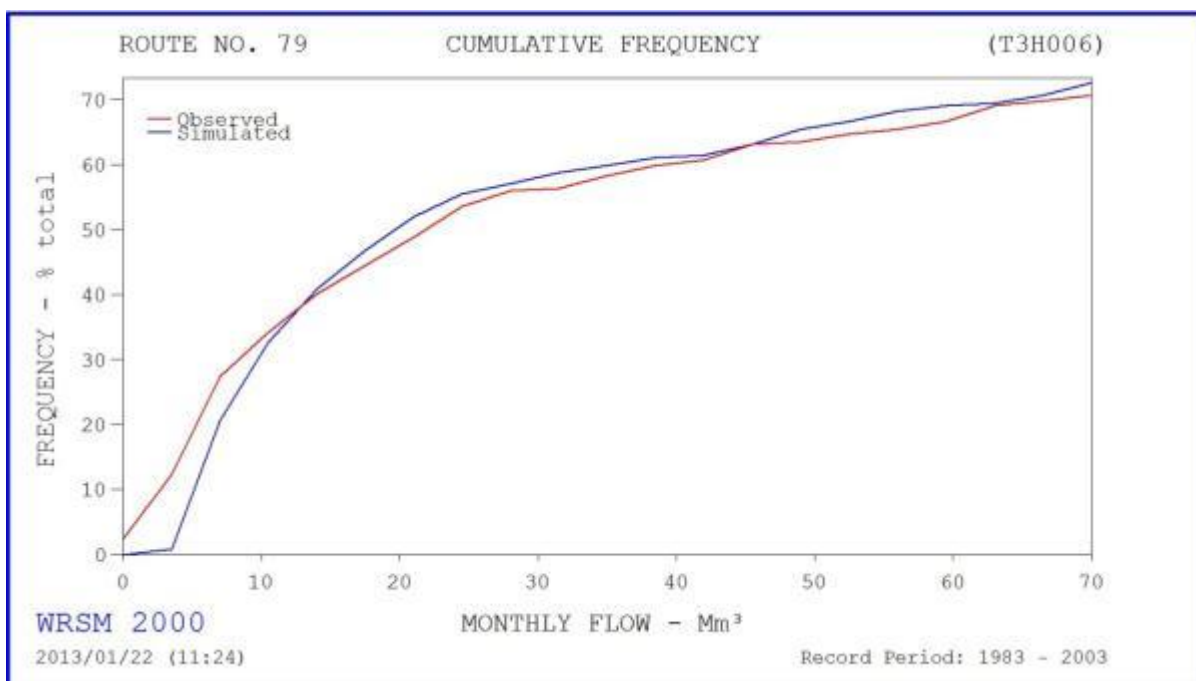


Figure B2- 8 Observed vs. Simulated Streamflow Cumulative Frequency at Gauge T2H005

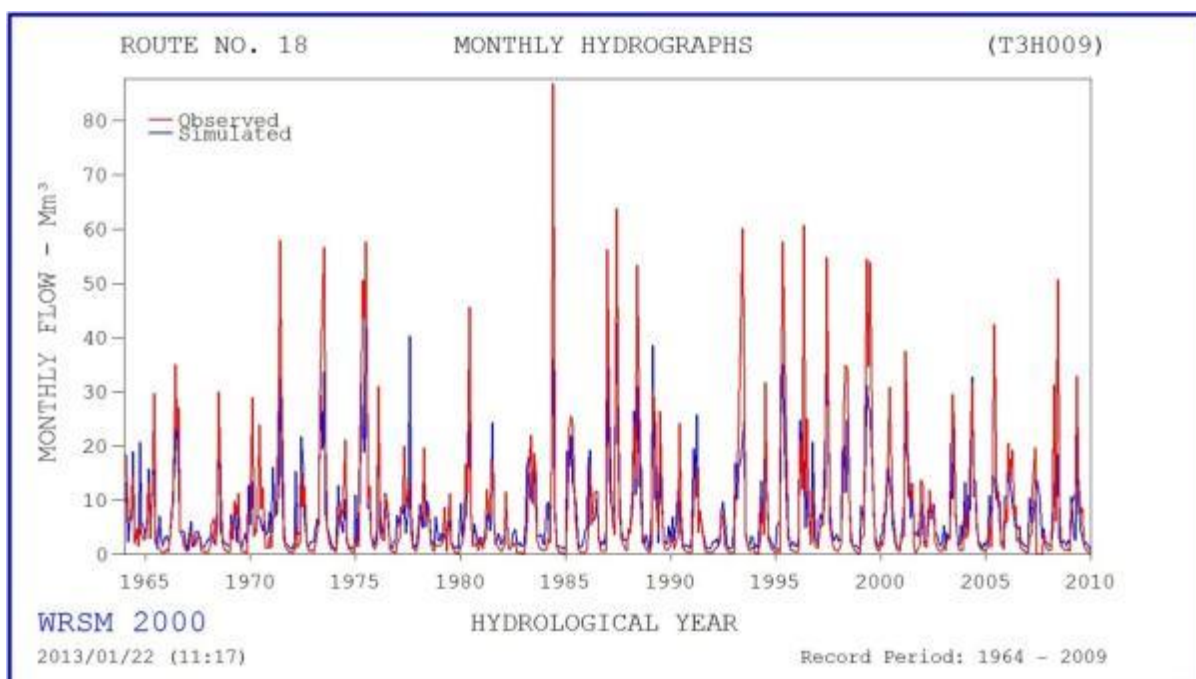


Figure B2- 9 Observed vs. Simulated Streamflow Monthly Hydrographs at Gauge T3H009

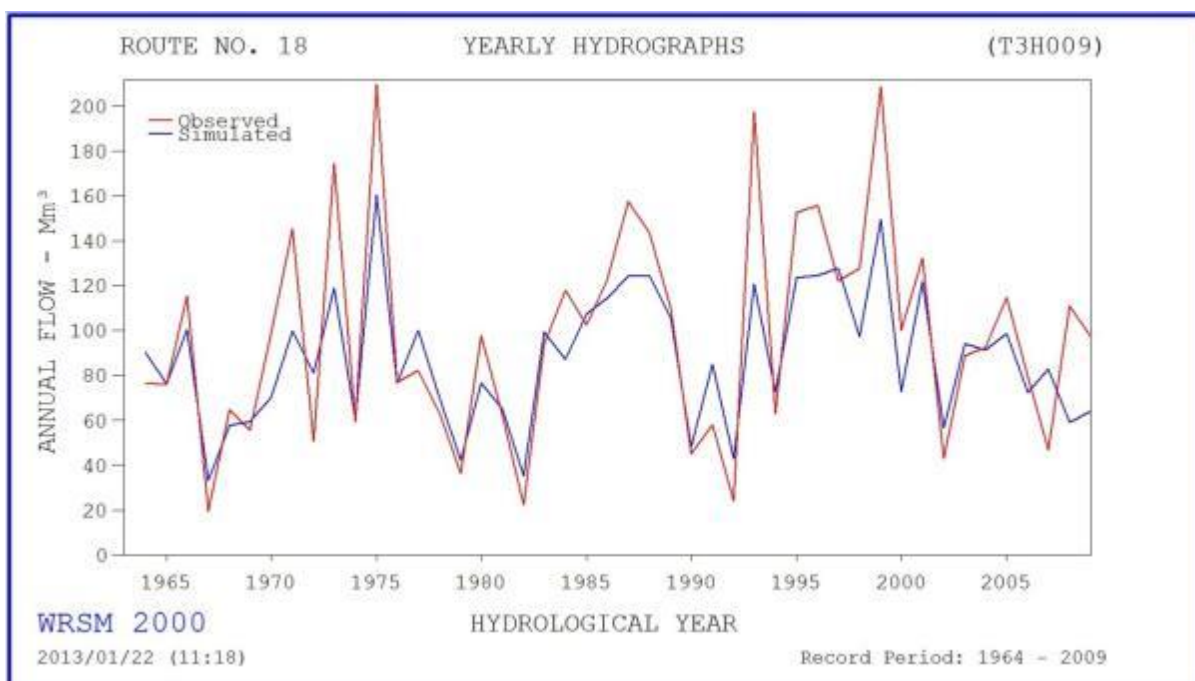


Figure B2- 10 Observed vs. Simulated Streamflow Annual Hydrographs at Gauge T3H009

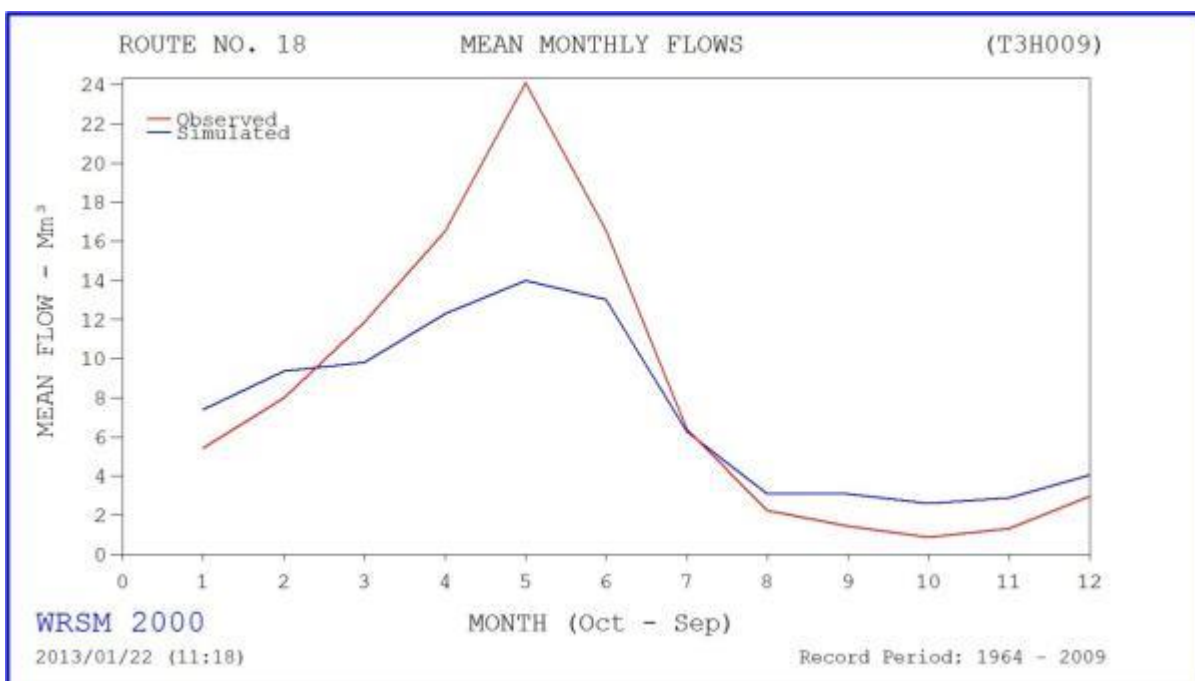


Figure B2- 11 Observed vs. Simulated Streamflow Mean Monthly Flows at Gauge T3H009

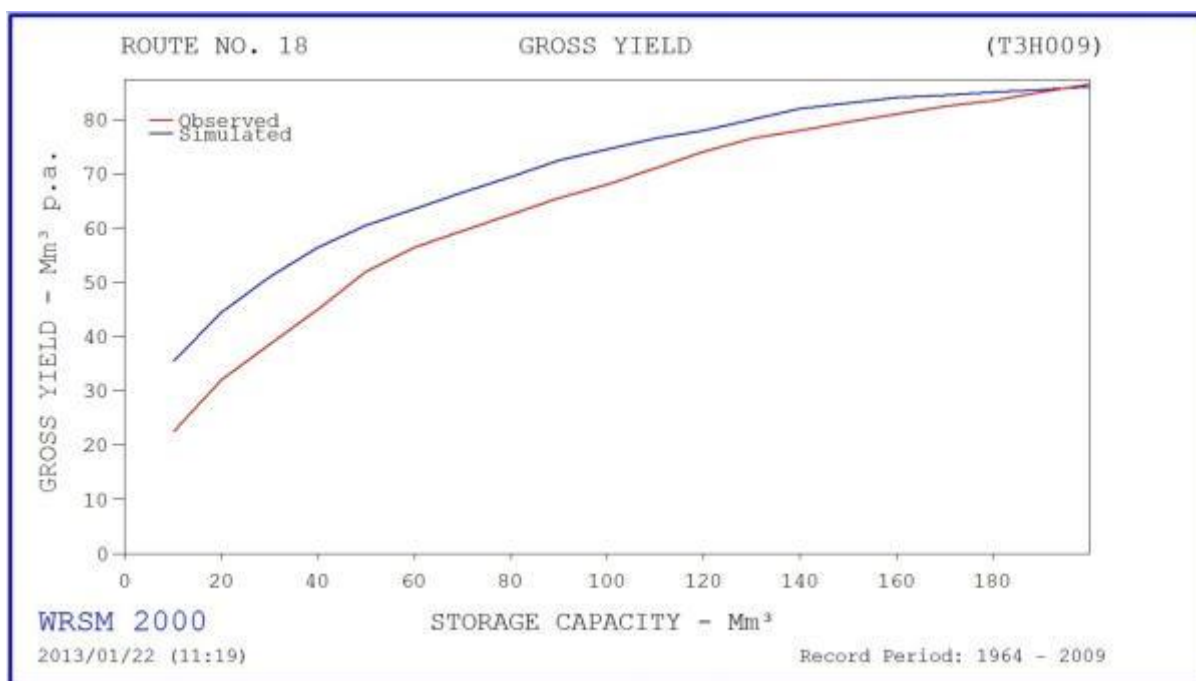


Figure B2- 12 Observed vs. Simulated Streamflow Gross Yield comparison at Gauge T3H009

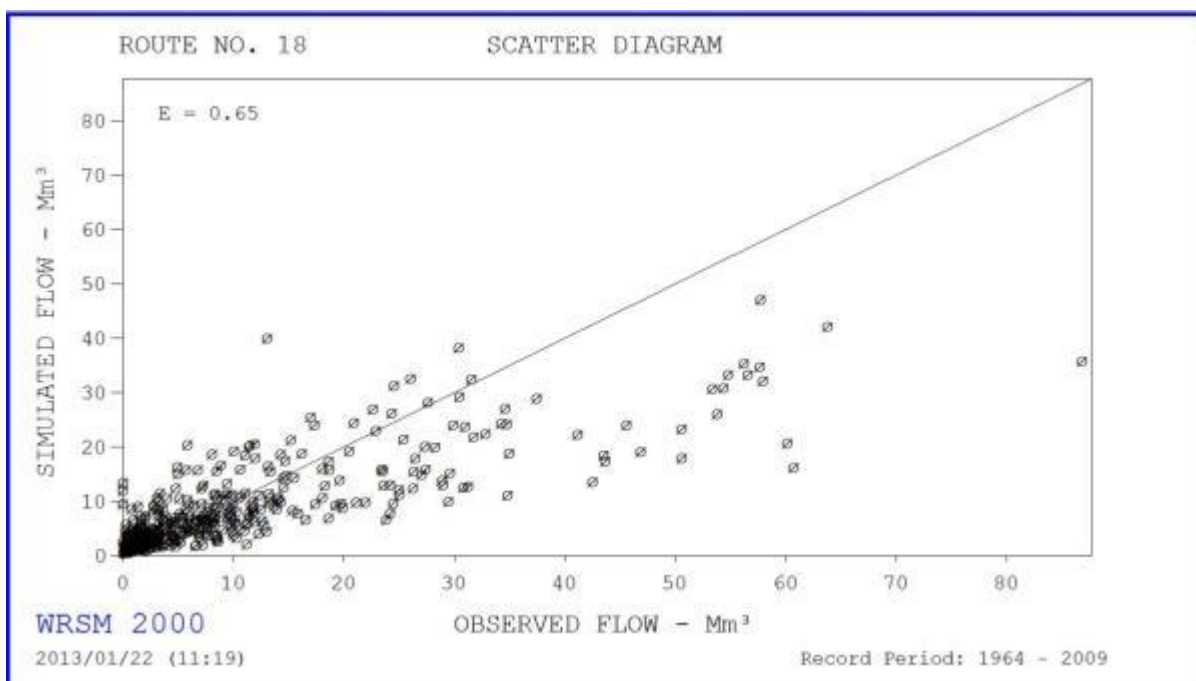


Figure B2- 13 Observed vs. Simulated Streamflow Scatter Diagram at Gauge T3H009

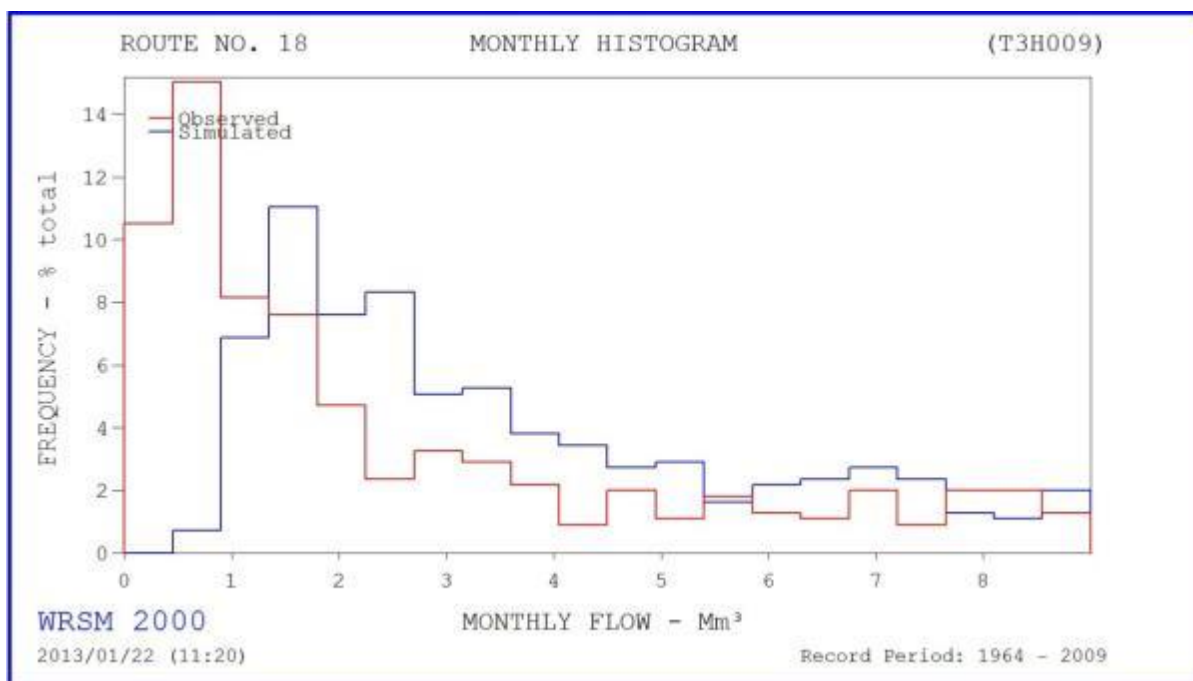


Figure B2- 14 Observed vs. Simulated Streamflow Monthly Histogram at Gauge T3H009

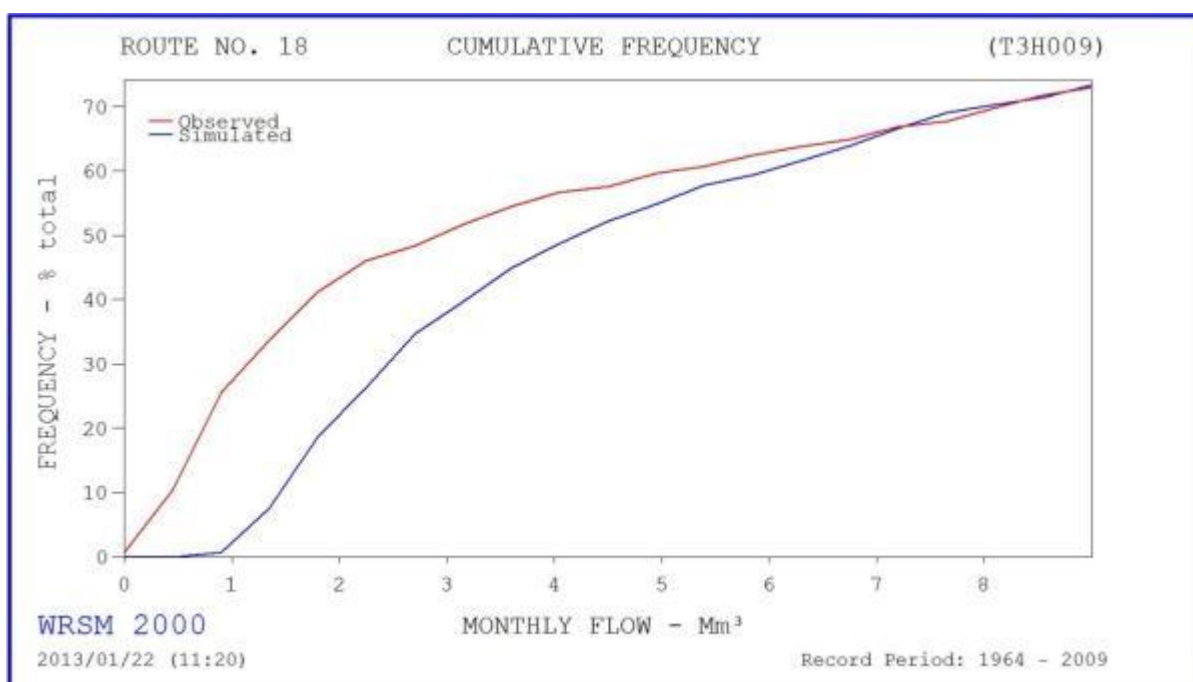


Figure B2- 15 Observed vs. Simulated Streamflow Cumulative Frequency at Gauge T3H009

Table B2- 3 Simulated Natural Streamflow Time-Series (T35A.INC) for Quaternary T35A (million m³)
1920 – 2009

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	1.17	0.71	0.97	1.31	1.25	9.14	4.80	1.11	0.44	0.38	0.30	0.44
1921	1.03	11.40	8.31	2.03	0.69	0.45	0.22	4.64	2.82	2.05	3.37	1.57
1922	1.11	19.51	6.59	17.90	21.71	9.32	1.71	0.46	0.50	12.96	4.99	0.47

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1923	0.48	0.43	1.06	1.27	4.67	3.17	0.81	0.39	0.45	0.38	0.44	0.63
1924	0.64	0.89	28.41	9.45	0.61	35.27	27.13	5.70	0.59	0.49	0.38	0.57
1925	0.42	1.13	0.74	0.75	1.07	11.47	4.09	0.77	1.47	0.97	0.38	0.98
1926	1.48	1.09	2.01	1.01	0.63	40.48	13.40	0.40	0.37	0.40	0.53	0.49
1927	0.94	0.50	15.60	23.51	7.04	1.20	0.56	0.53	0.48	0.41	0.74	0.46
1928	0.52	0.98	6.77	2.84	7.69	24.72	7.48	0.76	2.06	2.11	1.10	1.44
1929	10.64	6.93	8.79	13.87	4.16	10.29	4.72	0.80	0.64	0.64	1.27	0.91
1930	0.93	0.38	0.87	12.92	12.01	17.09	5.46	0.55	0.45	27.47	9.57	0.43
1931	0.78	1.04	1.48	1.01	18.10	6.55	0.42	0.56	0.55	0.70	0.46	5.13
1932	3.27	21.20	13.63	2.48	0.49	7.37	3.19	0.51	0.42	0.43	0.37	0.31
1933	0.28	28.57	23.87	46.50	14.23	14.03	5.11	0.52	0.55	2.97	1.48	0.33
1934	0.72	1.35	15.60	5.25	0.52	5.13	4.38	1.93	1.68	0.98	1.00	0.58
1935	0.53	0.29	0.12	0.24	26.31	9.50	0.62	4.66	2.22	0.93	0.52	0.45
1936	2.07	32.94	10.71	5.15	24.48	11.46	1.64	0.45	0.44	0.43	0.35	0.48
1937	0.70	0.35	0.65	8.64	14.02	4.58	12.55	4.62	0.76	0.94	0.93	0.43
1938	0.80	1.37	12.35	19.95	33.73	9.74	0.59	0.75	0.69	1.06	0.72	6.86
1939	3.74	1.57	0.78	0.81	7.03	3.34	0.96	1.58	1.10	0.45	0.35	0.59
1940	0.86	0.73	0.87	1.15	1.17	1.26	1.14	0.59	0.36	0.44	0.39	0.23
1941	0.51	0.45	0.18	0.87	8.33	13.18	4.71	1.24	0.58	0.37	0.65	0.73
1942	5.09	9.12	17.04	6.12	0.78	12.88	9.08	2.69	1.26	0.84	6.89	3.88
1943	4.96	12.04	13.57	4.29	1.11	8.05	3.00	0.47	0.85	0.83	0.42	7.79
1944	3.61	0.50	0.18	0.43	8.73	8.29	2.21	0.47	0.42	0.37	0.29	0.24
1945	1.87	0.80	0.42	14.44	5.78	4.40	2.31	1.16	0.66	0.44	0.34	0.26
1946	0.40	0.98	0.71	3.15	7.26	10.42	5.54	1.32	1.90	1.31	0.44	0.68
1947	0.76	17.66	20.61	13.97	18.87	9.04	2.08	0.75	0.52	0.46	0.35	0.30
1948	1.26	0.74	0.58	0.54	1.58	1.26	0.81	0.57	0.35	0.39	0.35	0.36
1949	0.38	0.50	0.76	1.29	19.60	17.34	4.47	2.58	1.31	0.65	1.97	1.14
1950	1.39	0.75	18.46	7.01	1.45	1.27	0.64	0.40	0.37	0.33	0.60	0.68
1951	6.04	2.15	0.25	0.67	14.34	5.25	0.85	0.55	0.50	0.55	0.39	0.63
1952	0.63	0.82	1.09	0.92	8.29	3.55	1.99	0.93	0.32	0.31	0.45	1.09
1953	1.75	1.90	1.65	1.52	4.33	11.56	3.84	2.82	2.21	0.94	0.36	0.55
1954	1.40	1.37	0.84	26.77	24.23	6.25	1.86	1.05	0.85	0.62	0.35	0.45
1955	0.76	1.43	0.92	0.22	4.18	18.04	5.83	0.57	0.80	0.55	0.32	0.51
1956	0.59	9.01	18.66	6.43	1.12	26.19	9.67	0.88	0.57	0.61	1.16	1.90
1957	2.04	0.98	0.76	18.67	7.17	1.01	1.66	1.09	0.46	0.46	0.33	0.35
1958	0.36	11.35	4.80	0.67	0.96	1.42	4.61	10.59	3.66	1.16	0.91	0.61
1959	0.47	1.12	1.34	0.91	1.99	1.25	1.13	0.78	0.39	0.40	0.53	1.08
1960	0.83	2.49	5.69	2.78	1.23	5.24	4.10	1.76	0.67	0.38	0.40	0.37
1961	0.30	3.78	2.92	1.42	9.86	10.72	3.52	0.77	0.45	0.37	0.40	0.29
1962	0.82	9.82	6.41	24.89	11.43	33.32	11.26	0.90	0.49	0.94	0.55	0.29
1963	7.48	16.48	4.95	1.94	0.97	8.58	4.41	0.95	9.76	4.06	0.54	0.79
1964	6.94	2.54	0.69	0.89	11.77	4.10	0.63	0.52	20.12	7.55	1.30	0.74
1965	1.21	8.56	2.99	5.92	8.58	2.44	0.34	1.99	1.26	0.44	0.64	0.72

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1966	0.50	0.52	0.82	2.35	12.78	25.23	13.34	2.84	1.13	1.13	0.57	0.30
1967	0.55	1.01	0.41	0.19	0.61	0.78	0.73	0.41	0.24	0.28	0.45	0.50
1968	0.61	0.70	0.37	0.20	1.00	20.44	6.88	0.64	0.51	0.46	0.36	0.30
1969	1.28	0.90	1.20	0.55	1.16	0.63	0.19	0.40	0.81	0.61	8.59	3.65
1970	7.89	2.98	0.50	0.90	1.21	1.21	1.00	1.53	1.16	1.05	2.62	1.38
1971	11.26	4.44	1.18	3.77	29.96	13.29	1.66	0.52	0.51	0.44	0.33	0.27
1972	0.43	8.57	3.07	0.48	16.88	15.28	4.22	0.68	0.44	0.50	0.57	0.51
1973	0.86	1.17	0.89	25.32	17.96	35.37	11.20	1.74	1.06	0.64	0.46	0.29
1974	0.33	4.89	2.34	0.82	0.67	3.20	1.50	0.32	0.28	0.32	0.26	5.03
1975	1.95	1.13	26.97	23.34	16.24	53.81	16.92	3.34	1.66	0.72	0.52	0.90
1976	25.64	8.61	0.45	0.72	3.44	2.29	1.20	0.53	0.34	0.54	0.56	1.47
1977	1.43	1.63	1.35	1.37	0.83	1.39	48.20	16.12	0.52	0.43	0.52	1.07
1978	2.69	1.40	5.68	2.30	2.10	1.89	0.81	0.47	0.38	1.54	1.10	0.52
1979	0.74	0.49	0.41	0.60	0.78	1.15	0.68	0.29	0.23	0.29	0.22	3.19
1980	1.52	0.90	1.03	2.86	20.10	6.92	0.44	1.26	1.08	0.52	0.67	0.40
1981	0.26	0.39	0.84	1.18	0.84	20.60	7.22	0.47	0.65	0.93	0.51	0.45
1982	0.68	2.08	0.77	0.13	0.20	0.59	0.93	0.63	0.36	0.45	0.32	0.32
1983	0.90	9.58	11.37	3.84	1.77	12.60	5.34	1.00	0.91	1.00	0.58	0.40
1984	2.57	2.26	0.78	7.90	35.82	11.13	0.53	0.41	0.39	0.39	0.29	0.33
1985	15.26	11.53	15.38	6.30	3.85	2.74	0.86	0.41	0.39	0.50	1.03	1.25
1986	12.32	14.85	4.19	0.87	1.26	3.31	1.45	0.41	0.56	0.48	0.91	40.70
1987	15.86	2.32	1.41	1.43	42.01	24.10	4.46	1.23	0.85	0.73	0.69	0.83
1988	0.95	4.22	20.30	7.28	29.06	10.82	11.41	4.28	0.64	1.03	0.56	0.30
1989	1.15	38.36	13.03	2.88	1.02	10.65	4.62	0.73	0.63	0.53	1.19	0.77
1990	1.33	0.72	0.69	2.83	1.93	0.89	0.33	0.30	0.36	0.31	0.25	0.56
1991	15.96	6.47	19.44	6.69	1.27	0.93	0.75	0.41	0.32	0.31	0.31	0.47
1992	0.44	0.48	0.27	0.41	1.06	2.42	1.56	0.60	0.26	0.24	0.29	0.96
1993	12.49	5.23	7.93	10.80	16.56	27.07	7.67	0.53	0.56	0.89	0.84	0.34
1994	0.43	0.26	1.02	4.64	1.83	18.29	8.56	1.49	0.70	0.53	0.34	0.43
1995	0.97	1.12	29.33	38.21	22.53	5.68	0.90	0.61	0.52	0.68	0.47	0.37
1996	0.59	20.47	13.79	8.87	2.74	5.02	2.97	0.98	21.48	8.90	1.56	0.56
1997	1.21	1.51	0.98	14.51	34.19	35.67	9.58	1.72	0.87	0.92	1.01	0.66
1998	0.66	13.26	15.93	5.13	19.01	7.37	0.78	0.50	0.50	0.50	0.37	0.29
1999	3.06	1.86	9.10	28.85	28.92	31.50	16.83	4.24	1.04	0.66	0.45	0.78
2000	0.94	1.38	1.31	8.05	6.27	3.90	1.70	0.58	0.40	0.41	0.34	0.55
2001	1.98	27.37	15.68	9.14	3.15	5.34	2.23	1.09	1.00	1.66	4.13	2.13
2002	0.57	0.46	1.02	1.42	1.27	2.16	1.28	0.88	0.66	0.40	0.46	1.13
2003	0.65	0.64	0.46	13.76	5.68	20.49	7.37	0.62	0.51	1.48	1.06	9.79
2004	3.82	3.00	1.85	30.54	10.90	3.90	1.81	0.75	0.52	0.42	0.55	0.40
2005	0.59	3.70	1.50	6.91	7.84	3.68	5.35	2.74	0.86	0.58	6.10	5.52
2006	19.42	9.15	2.33	1.24	0.96	0.91	1.22	0.64	0.56	0.47	0.35	0.29
2007	4.53	2.46	0.96	1.61	6.86	6.35	4.12	1.41	1.24	0.90	0.53	0.38
2008	0.34	0.63	3.97	1.92	12.57	4.28	0.39	0.57	0.62	0.41	0.57	0.47

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2009	5.02	2.06	0.35	16.78	6.40	0.94	0.76	0.46	0.55	0.47	0.30	0.20

**Table B2- 4 Simulated Natural Streamflow Time-Series (T35B.INC) for Quaternary T35B (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	1.04	0.62	0.81	1.11	1.10	8.13	4.51	1.03	0.45	0.38	0.31	0.42
1921	0.83	9.84	7.04	1.69	0.60	0.42	0.23	3.75	2.35	1.88	3.58	1.55
1922	0.92	15.96	5.44	14.49	17.91	8.19	1.58	0.48	0.51	10.14	4.04	0.47
1923	0.46	0.42	0.89	1.07	3.37	3.23	0.94	0.37	0.42	0.36	0.40	0.56
1924	0.53	0.74	24.07	8.02	0.51	30.77	22.82	4.71	0.52	0.44	0.35	0.51
1925	0.38	0.90	0.60	0.65	0.89	9.60	3.45	0.69	1.27	0.81	0.32	0.81
1926	1.22	0.89	1.70	0.86	0.56	33.49	11.10	0.36	0.34	0.35	0.46	0.43
1927	0.76	0.41	13.93	20.67	6.12	1.00	0.47	0.47	0.43	0.36	0.63	0.37
1928	0.44	0.76	6.92	2.82	6.80	20.96	6.33	0.68	1.76	1.67	0.88	1.18
1929	8.71	5.85	8.17	12.93	3.86	8.40	3.93	0.69	0.59	0.59	1.10	0.75
1930	0.79	0.30	0.65	10.75	10.83	14.51	4.59	0.50	0.41	23.50	8.20	0.40
1931	0.68	0.83	1.27	0.85	14.37	5.29	0.40	0.51	0.49	0.62	0.41	4.23
1932	2.69	17.16	10.87	1.94	0.44	5.92	2.63	0.46	0.38	0.38	0.33	0.29
1933	0.26	23.82	19.86	40.15	12.32	11.93	4.40	0.52	0.54	2.56	1.26	0.35
1934	0.68	1.10	12.01	4.10	0.50	4.29	3.65	1.51	1.33	0.76	0.87	0.48
1935	0.46	0.27	0.13	0.19	22.21	7.88	0.44	3.73	1.79	0.80	0.43	0.39
1936	1.34	26.52	8.68	4.08	20.11	10.44	1.70	0.43	0.42	0.41	0.35	0.44
1937	0.61	0.28	0.44	6.40	12.29	4.11	10.94	4.03	0.66	0.82	0.82	0.39
1938	0.66	1.06	9.58	16.49	26.30	7.57	0.48	0.66	0.62	0.90	0.62	5.35
1939	2.99	1.24	0.58	0.62	4.96	2.41	0.72	1.27	0.89	0.38	0.31	0.49
1940	0.67	0.51	0.68	0.94	0.97	1.05	0.96	0.50	0.30	0.38	0.33	0.19
1941	0.36	0.32	0.14	0.68	8.13	11.33	3.95	1.03	0.48	0.32	0.56	0.61
1942	4.05	4.92	12.71	4.85	0.67	11.14	7.46	2.18	1.06	0.70	5.35	3.10
1943	3.96	9.91	10.30	3.26	0.79	6.23	2.32	0.44	0.75	0.72	0.39	4.46
1944	2.33	0.40	0.19	0.31	6.75	7.16	1.98	0.41	0.37	0.33	0.26	0.22
1945	1.16	0.54	0.34	12.33	4.86	3.14	1.76	1.00	0.56	0.38	0.30	0.23
1946	0.34	0.74	0.51	2.79	7.17	9.76	4.83	1.09	1.34	1.01	0.36	0.59
1947	0.65	13.98	17.86	12.15	16.11	7.69	1.72	0.72	0.52	0.45	0.36	0.32
1948	0.96	0.57	0.48	0.45	1.14	1.03	0.67	0.49	0.31	0.35	0.31	0.31
1949	0.30	0.35	0.64	1.04	15.90	13.77	3.56	2.23	1.12	0.54	1.44	0.88
1950	1.23	0.66	15.95	6.04	1.28	1.09	0.53	0.35	0.33	0.30	0.51	0.56
1951	4.99	1.80	0.21	0.53	12.22	4.49	0.73	0.47	0.43	0.48	0.34	0.56
1952	0.53	0.78	1.01	0.83	7.96	3.29	1.86	0.84	0.29	0.28	0.38	0.91
1953	1.44	1.56	1.34	1.28	3.80	9.70	3.21	2.18	1.79	0.79	0.31	0.46
1954	1.11	1.13	0.71	22.77	20.51	5.36	1.64	0.91	0.73	0.54	0.32	0.39
1955	0.64	1.19	0.83	0.21	3.76	14.95	4.83	0.50	0.68	0.47	0.29	0.45
1956	0.51	7.38	16.30	5.69	0.94	22.34	8.24	0.76	0.50	0.54	1.00	1.61
1957	1.73	0.82	0.63	16.32	6.19	0.82	1.37	0.91	0.41	0.41	0.30	0.31
1958	0.32	9.45	3.99	0.55	0.86	1.30	4.03	8.16	2.84	0.95	0.76	0.51

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1959	0.40	0.95	1.12	0.81	1.67	1.00	0.88	0.63	0.33	0.35	0.45	0.89
1960	0.67	1.76	4.45	2.21	0.94	4.62	3.90	1.61	0.56	0.33	0.35	0.32
1961	0.26	3.27	2.52	1.18	8.45	8.98	2.99	0.66	0.39	0.32	0.35	0.26
1962	0.64	8.49	5.91	22.30	9.61	28.01	9.52	0.60	0.48	0.85	0.53	0.31
1963	6.20	13.99	4.28	1.29	0.68	7.12	3.72	0.80	7.86	3.34	0.48	0.69
1964	5.61	2.04	0.61	0.78	11.82	4.09	0.59	0.48	16.88	6.34	1.10	0.65
1965	0.96	6.95	2.47	5.54	7.42	2.06	0.32	1.29	1.01	0.40	0.57	0.63
1966	0.42	0.43	0.70	2.42	10.61	20.23	11.03	2.41	0.96	0.96	0.49	0.27
1967	0.47	0.78	0.32	0.18	0.47	0.62	0.59	0.33	0.22	0.24	0.37	0.38
1968	0.49	0.57	0.30	0.17	0.82	17.08	5.76	0.52	0.43	0.39	0.31	0.26
1969	1.05	0.72	1.05	0.46	0.92	0.49	0.16	0.33	0.65	0.49	7.59	3.17
1970	5.90	2.25	0.40	0.75	0.97	0.97	0.85	1.30	0.95	0.84	1.68	0.95
1971	9.20	3.65	0.96	3.15	24.87	10.72	1.26	0.44	0.44	0.38	0.29	0.24
1972	0.38	7.12	2.56	0.39	13.61	11.28	3.17	0.61	0.39	0.43	0.47	0.43
1973	0.68	0.92	0.70	20.31	14.77	31.77	10.00	1.12	0.91	0.57	0.42	0.29
1974	0.31	4.87	2.30	0.71	0.57	3.01	1.37	0.31	0.27	0.30	0.24	4.15
1975	1.63	0.95	22.56	18.14	11.84	45.17	14.35	2.52	1.31	0.69	0.52	0.83
1976	20.79	7.07	0.43	0.56	3.70	2.18	1.05	0.47	0.34	0.51	0.52	1.21
1977	1.14	1.37	1.10	1.19	0.69	1.26	36.12	12.09	0.45	0.37	0.46	0.91
1978	2.13	1.11	4.94	1.99	2.20	1.79	0.71	0.42	0.34	1.52	0.99	0.43
1979	0.60	0.40	0.36	0.49	0.65	0.93	0.54	0.23	0.20	0.25	0.19	2.41
1980	1.19	0.74	0.88	2.64	17.34	5.94	0.38	1.07	0.90	0.42	0.59	0.35
1981	0.23	0.33	0.69	0.92	0.70	17.19	6.03	0.40	0.55	0.80	0.43	0.39
1982	0.55	1.83	0.68	0.13	0.18	0.50	0.81	0.53	0.30	0.39	0.27	0.27
1983	0.76	8.14	9.52	3.22	1.43	10.18	4.36	0.84	0.77	0.85	0.50	0.34
1984	2.06	1.82	0.63	5.87	29.74	9.32	0.45	0.36	0.35	0.34	0.27	0.30
1985	13.04	10.28	14.36	6.88	3.27	1.99	0.71	0.37	0.36	0.45	0.89	1.04
1986	9.91	12.58	3.60	0.71	1.13	3.08	1.31	0.37	0.49	0.43	0.78	32.86
1987	12.66	1.83	1.16	1.19	37.13	20.51	3.63	1.07	0.76	0.66	0.61	0.75
1988	0.82	3.31	18.29	6.59	24.09	9.50	9.00	3.30	0.62	0.91	0.54	0.33
1989	0.88	32.18	11.02	2.86	1.00	8.88	3.93	0.64	0.58	0.50	1.05	0.64
1990	1.11	0.59	0.54	3.29	1.98	0.78	0.28	0.28	0.33	0.28	0.23	0.45
1991	13.48	5.47	17.75	6.07	1.20	0.86	0.65	0.37	0.29	0.28	0.29	0.41
1992	0.37	0.40	0.23	0.34	0.98	2.84	1.60	0.51	0.24	0.22	0.26	0.80
1993	11.10	4.64	7.26	9.77	14.34	23.24	6.60	0.51	0.53	0.82	0.77	0.35
1994	0.40	0.27	0.85	4.98	1.93	16.32	7.32	1.18	0.61	0.48	0.32	0.39
1995	0.80	0.97	25.11	32.23	19.70	5.04	0.77	0.55	0.47	0.60	0.44	0.35
1996	0.53	17.93	12.87	8.68	2.60	4.88	2.69	0.79	17.49	7.28	1.06	0.53
1997	1.10	1.28	0.85	12.73	29.21	29.04	7.78	1.44	0.79	0.82	0.92	0.62
1998	0.63	11.76	13.11	4.46	18.77	7.09	0.64	0.49	0.50	0.49	0.38	0.30
1999	2.41	1.51	7.53	24.55	25.74	26.23	13.66	3.49	0.97	0.63	0.45	0.75
2000	0.85	1.13	1.12	7.38	5.81	4.19	1.70	0.54	0.39	0.40	0.33	0.52
2001	1.95	22.68	13.60	8.23	2.77	4.90	2.01	0.95	0.88	1.47	4.37	2.11
2002	0.48	0.42	1.03	1.29	1.12	2.09	1.17	0.78	0.59	0.36	0.41	0.97

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2003	0.54	0.53	0.37	12.97	5.34	17.22	6.22	0.55	0.46	1.28	0.89	7.98
2004	3.18	3.79	2.08	25.17	9.03	3.93	1.79	0.69	0.47	0.39	0.50	0.37
2005	0.54	2.81	1.13	7.26	7.60	3.55	4.81	2.37	0.72	0.51	5.55	4.65
2006	16.66	7.88	1.93	1.12	0.85	0.80	1.04	0.54	0.50	0.43	0.33	0.28
2007	4.04	2.18	0.89	2.15	6.43	6.57	3.96	1.21	1.09	0.76	0.49	0.37
2008	0.31	0.53	5.27	2.34	11.93	4.05	0.36	0.50	0.56	0.39	0.54	0.43
2009	4.47	1.86	0.33	15.51	5.89	0.84	0.71	0.44	0.47	0.41	0.27	0.20

Table B2- 5 Simulated Natural Streamflow Time-Series (T35C.INC) for Quaternary T35C (million m³) 1920 – 2009

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	6.13	3.55	7.98	9.73	7.61	16.93	11.15	3.68	1.77	1.44	1.15	2.34
1921	6.03	19.29	16.30	5.56	5.05	2.44	0.98	11.67	6.86	7.50	9.48	4.25
1922	6.16	25.43	5.31	25.65	25.16	14.84	3.03	1.61	2.01	18.21	4.38	1.83
1923	2.17	2.35	8.84	8.82	12.84	11.60	2.10	2.09	2.33	1.85	2.40	3.63
1924	3.48	6.03	34.42	6.65	4.52	34.99	24.28	4.56	1.92	1.51	1.13	2.64
1925	2.03	8.21	4.25	6.54	7.02	18.32	3.76	4.00	6.39	3.02	1.57	5.53
1926	7.10	5.66	11.54	5.10	4.85	38.45	5.65	1.64	1.46	1.67	2.71	2.73
1927	5.35	1.88	24.07	28.87	10.63	6.16	2.44	2.57	2.18	1.80	3.79	2.12
1928	2.98	6.52	17.29	7.93	16.08	25.61	3.67	3.76	8.10	6.69	3.57	7.24
1929	17.01	14.17	18.28	22.37	3.96	17.13	8.75	2.73	2.48	2.54	5.58	3.64
1930	4.88	1.12	7.03	21.75	18.95	22.02	5.63	1.86	1.44	28.64	5.18	1.26
1931	4.30	6.57	10.33	6.33	24.04	6.95	1.66	2.86	2.44	3.36	2.09	11.89
1932	10.26	26.82	18.91	2.63	3.44	14.95	5.48	1.93	1.55	1.75	1.59	1.51
1933	1.51	33.03	26.67	48.94	10.38	19.78	4.14	1.84	2.06	8.22	2.57	1.15
1934	4.70	7.98	23.91	4.44	4.29	13.20	11.17	6.07	6.41	2.93	4.52	2.38
1935	2.86	1.66	0.49	2.51	31.39	9.44	2.12	9.71	3.48	4.20	1.93	2.30
1936	9.26	36.33	5.80	14.81	29.29	15.65	2.77	1.55	1.53	1.54	1.32	2.43
1937	3.79	1.51	5.68	17.60	21.03	7.96	18.61	3.95	3.25	4.05	4.18	1.86
1938	5.03	8.47	20.78	26.29	34.33	6.69	1.91	3.16	2.73	4.60	2.90	13.33
1939	9.81	7.68	4.11	6.82	14.42	8.16	4.17	7.08	3.39	1.80	1.60	3.28
1940	4.59	3.73	6.64	8.61	7.26	7.25	5.14	2.32	2.03	2.53	2.30	1.43
1941	3.09	2.49	1.08	7.95	17.24	19.27	9.44	4.77	2.17	1.47	3.32	3.84
1942	12.30	15.54	23.85	13.29	3.82	19.60	13.85	6.56	4.79	3.04	12.49	9.17
1943	11.91	19.42	20.40	9.52	6.43	15.46	2.96	1.71	3.70	3.32	1.60	13.30
1944	7.16	1.46	0.62	4.26	16.45	15.14	2.84	2.25	1.86	1.60	1.26	1.18
1945	8.98	1.64	3.90	23.02	10.44	12.12	6.36	5.20	2.49	1.95	1.58	1.28
1946	2.45	6.64	4.19	12.83	16.27	17.86	11.74	2.73	8.44	3.74	1.61	3.57
1947	4.02	23.54	25.91	21.10	24.59	14.18	5.45	2.97	1.87	1.65	1.22	1.19
1948	7.55	2.66	4.95	4.31	9.61	5.95	3.77	3.06	1.83	2.23	2.05	2.32
1949	2.45	3.34	6.47	9.96	25.37	19.74	6.84	9.04	3.31	2.77	8.20	3.43
1950	8.18	3.03	26.71	11.58	8.61	6.47	2.80	1.88	1.70	1.51	3.18	3.64
1951	13.08	2.09	2.50	5.95	21.61	6.51	4.24	2.56	2.43	2.76	1.97	3.69
1952	3.37	5.98	8.44	6.58	16.87	7.60	9.36	2.62	1.47	1.37	2.39	5.93

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
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Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1953	8.61	10.28	10.00	10.04	13.02	18.33	4.02	9.21	6.99	2.88	1.30	2.80
1954	7.92	7.37	5.43	33.19	25.67	10.72	8.81	3.68	3.71	2.40	1.25	2.20
1955	4.25	9.12	5.63	0.91	12.67	23.71	4.44	2.79	3.79	2.29	1.35	2.85
1956	3.41	17.35	25.63	13.36	5.99	26.86	9.56	3.42	1.99	2.48	5.27	8.52
1957	8.72	3.95	6.16	27.14	10.90	4.89	8.49	3.72	1.81	2.01	1.40	1.83
1958	2.14	18.62	10.98	3.71	7.16	8.32	11.80	15.21	3.61	4.62	3.65	2.98
1959	2.48	8.21	8.78	6.47	10.58	5.22	5.68	3.35	1.97	2.17	3.10	5.69
1960	3.47	10.71	15.19	11.03	6.76	13.50	11.21	6.06	2.40	1.58	1.97	2.10
1961	1.80	12.60	12.69	8.40	18.07	16.63	7.31	3.21	1.74	1.34	1.76	1.39
1962	5.24	18.04	14.94	32.61	14.80	32.59	7.61	2.24	1.57	4.29	2.01	0.93
1963	14.47	22.53	4.98	11.29	3.88	15.99	10.47	2.56	14.44	4.41	1.93	3.73
1964	14.08	2.35	6.63	7.06	20.26	3.42	3.41	2.41	21.81	5.85	5.42	3.17
1965	6.90	16.80	3.09	15.74	16.56	2.15	1.36	7.54	3.27	1.71	3.22	3.78
1966	2.74	3.65	6.72	12.54	20.40	28.56	15.85	4.66	4.71	4.38	2.14	0.95
1967	3.08	6.56	1.56	1.92	4.62	4.52	3.72	1.83	1.32	1.53	2.66	2.99
1968	3.49	4.65	2.30	1.86	8.02	25.90	4.33	3.33	2.35	2.27	1.87	1.73
1969	8.05	3.80	9.65	2.54	8.67	1.92	1.20	2.56	4.32	2.46	13.49	5.74
1970	14.20	4.17	4.24	7.68	7.56	6.27	4.61	6.75	3.93	4.72	8.36	3.80
1971	17.21	7.55	8.23	13.82	34.26	14.98	3.03	1.97	1.99	1.63	1.16	1.04
1972	2.41	16.63	3.86	4.50	23.28	18.09	7.17	2.85	1.59	2.07	2.68	2.61
1973	4.97	7.08	5.89	31.54	20.61	35.12	7.42	5.58	3.92	2.27	1.68	0.90
1974	1.46	13.94	7.78	6.23	4.45	11.11	3.43	1.57	1.32	1.64	1.33	11.93
1975	2.33	8.35	33.58	25.17	20.14	49.12	8.68	9.41	3.94	2.69	1.97	4.54
1976	25.50	4.75	3.31	6.17	12.42	8.90	5.11	1.89	1.34	2.74	2.96	7.80
1977	5.63	9.60	8.20	10.02	4.30	9.00	42.19	6.86	2.01	1.51	2.40	5.63
1978	10.12	5.26	15.50	5.58	10.78	9.13	3.19	2.47	1.83	7.57	3.18	2.68
1979	4.32	2.50	3.76	5.22	5.45	6.82	2.64	1.61	1.35	1.68	1.36	10.34
1980	3.57	6.09	7.71	13.14	26.22	7.41	2.18	6.10	3.60	2.11	3.58	2.12
1981	1.55	3.09	7.27	8.57	4.87	26.29	5.91	2.17	3.10	4.37	2.05	2.55
1982	3.83	10.76	1.86	1.29	1.57	4.19	5.05	2.58	2.00	2.69	1.69	2.14
1983	5.73	17.64	19.34	11.19	10.40	19.18	9.32	3.76	4.03	4.27	2.52	1.94
1984	9.92	10.58	3.40	16.70	38.54	6.31	2.29	1.49	1.51	1.50	1.08	1.63
1985	20.83	17.52	23.60	14.59	12.55	10.59	2.80	1.40	1.40	2.24	5.00	5.53
1986	18.20	20.71	6.77	6.90	8.45	11.38	3.84	1.75	2.83	2.15	4.51	37.79
1987	14.20	10.21	8.52	10.07	45.27	21.73	6.80	5.03	3.15	2.96	3.01	4.10
1988	4.76	12.73	28.78	12.01	33.39	13.35	17.18	3.77	2.34	4.25	1.91	0.93
1989	7.19	41.11	10.75	12.99	2.29	17.62	7.92	2.79	2.66	2.10	5.79	2.72
1990	7.77	2.65	5.75	13.27	9.10	4.31	1.49	1.81	2.06	1.65	1.39	3.23
1991	21.48	11.85	28.03	7.21	9.05	4.44	3.82	1.76	1.29	1.22	1.46	2.71
1992	2.68	3.29	1.92	4.03	8.32	10.86	6.02	2.13	1.37	1.21	1.70	5.54
1993	18.40	11.05	17.73	19.53	22.99	26.05	3.83	1.83	2.08	3.92	3.70	1.31
1994	2.13	1.34	8.80	15.27	4.27	24.51	12.51	4.15	2.95	2.17	1.29	2.19
1995	5.89	6.83	35.77	37.65	24.45	10.71	3.58	2.39	1.92	2.81	1.90	1.72
1996	3.28	27.25	20.07	18.27	5.42	12.97	8.64	3.65	22.39	9.64	3.65	2.23

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1997	7.49	8.50	6.16	23.22	36.26	30.12	9.35	5.42	2.96	3.67	4.42	2.96
1998	3.42	21.08	22.34	12.82	27.12	10.62	2.71	1.81	1.92	1.96	1.42	1.14
1999	10.22	7.09	18.19	33.96	29.62	28.01	17.48	7.54	3.78	2.30	1.50	3.90
2000	4.53	8.52	8.61	18.09	14.39	12.37	5.79	2.49	1.60	1.77	1.54	3.12
2001	9.86	31.92	19.99	18.19	7.42	13.29	4.19	4.91	3.96	6.83	10.35	5.70
2002	2.40	2.93	9.38	10.04	7.42	10.48	4.82	4.48	3.14	1.94	2.60	6.13
2003	2.16	4.62	3.22	23.00	11.53	25.74	7.18	2.53	2.08	6.09	3.03	14.87
2004	4.94	12.35	9.33	35.95	11.73	12.28	5.05	3.19	1.90	1.45	2.53	1.90
2005	3.65	12.41	3.57	16.76	15.70	11.31	12.85	6.83	3.24	2.32	12.07	11.61
2006	21.22	14.06	10.88	8.38	5.85	5.29	5.99	2.11	2.72	2.09	1.71	1.58
2007	12.03	8.16	6.84	11.64	15.76	13.85	10.90	3.61	5.61	2.87	2.54	2.01
2008	1.97	4.80	14.97	7.85	20.79	3.05	1.82	2.90	3.09	1.93	3.15	2.67
2009	12.29	4.15	2.97	25.68	10.00	4.90	4.05	2.32	2.85	2.24	1.49	1.08

**Table B2- 6 Simulated Natural Streamflow Time-Series (T35D.INC) for Quaternary T35D) (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.95	0.58	0.75	0.98	1.01	7.19	3.96	0.91	0.40	0.34	0.28	0.37
1921	0.76	9.13	6.61	1.60	0.56	0.39	0.21	3.28	2.09	1.74	3.43	1.47
1922	0.83	14.77	5.03	13.12	16.25	7.50	1.46	0.42	0.45	8.94	3.57	0.42
1923	0.41	0.39	0.85	1.04	3.55	3.02	0.83	0.34	0.37	0.32	0.36	0.51
1924	0.49	0.70	22.35	7.45	0.47	26.46	21.34	4.61	0.47	0.39	0.31	0.46
1925	0.35	0.82	0.55	0.61	0.84	9.01	3.22	0.63	1.15	0.74	0.29	0.76
1926	1.13	0.82	1.76	0.87	0.50	29.79	9.88	0.32	0.30	0.31	0.41	0.39
1927	0.74	0.40	12.66	18.83	5.62	0.94	0.43	0.42	0.38	0.33	0.57	0.34
1928	0.40	0.72	6.33	2.61	6.76	18.58	5.54	0.61	1.56	1.55	0.81	1.08
1929	7.98	5.69	7.92	11.91	3.52	8.04	3.72	0.64	0.54	0.54	0.99	0.69
1930	0.75	0.29	0.65	10.20	9.71	13.21	4.21	0.45	0.37	20.61	7.21	0.36
1931	0.61	0.77	1.24	0.79	13.35	4.94	0.38	0.47	0.45	0.56	0.38	3.95
1932	2.50	15.33	10.23	1.92	0.42	5.70	2.50	0.42	0.34	0.35	0.30	0.27
1933	0.24	21.41	17.77	35.48	10.91	11.12	4.09	0.47	0.47	2.14	1.09	0.31
1934	0.61	1.07	11.02	3.76	0.46	3.82	3.29	1.38	1.22	0.70	0.79	0.45
1935	0.42	0.25	0.12	0.18	19.63	7.02	0.42	3.30	1.60	0.72	0.39	0.36
1936	1.49	24.13	7.88	3.91	17.91	9.25	1.51	0.38	0.38	0.37	0.31	0.40
1937	0.57	0.26	0.43	6.65	11.58	3.79	9.65	3.57	0.60	0.75	0.75	0.36
1938	0.60	0.95	9.30	15.54	23.88	6.83	0.43	0.59	0.56	0.82	0.57	4.81
1939	2.71	1.19	0.59	0.58	5.33	2.49	0.69	1.17	0.81	0.35	0.28	0.44
1940	0.62	0.49	0.68	0.91	0.93	1.00	0.89	0.46	0.28	0.34	0.30	0.18
1941	0.33	0.30	0.13	0.67	7.58	10.42	3.59	0.92	0.43	0.29	0.51	0.57
1942	3.94	5.14	12.24	4.63	0.60	10.25	6.95	2.03	0.97	0.65	4.90	2.82
1943	3.97	9.30	9.94	3.16	0.77	5.81	2.16	0.41	0.68	0.66	0.36	4.24
1944	2.20	0.37	0.18	0.29	6.66	6.91	1.88	0.38	0.34	0.30	0.24	0.20
1945	1.14	0.49	0.31	11.49	4.54	3.15	1.71	0.91	0.51	0.34	0.27	0.21
1946	0.31	0.69	0.49	3.01	6.82	8.65	4.24	0.97	1.21	1.01	0.37	0.53

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1947	0.60	13.02	16.54	11.41	14.96	7.19	1.62	0.66	0.47	0.41	0.33	0.29
1948	0.91	0.54	0.45	0.44	1.07	0.99	0.63	0.45	0.29	0.32	0.28	0.28
1949	0.28	0.33	0.62	1.00	14.97	13.28	3.42	2.15	1.06	0.50	1.52	0.87
1950	1.10	0.60	14.46	5.52	1.23	1.05	0.51	0.33	0.30	0.28	0.47	0.53
1951	4.93	1.77	0.20	0.52	11.33	4.15	0.67	0.44	0.39	0.44	0.31	0.51
1952	0.50	0.74	0.96	0.79	7.72	3.17	1.96	0.86	0.27	0.25	0.35	0.81
1953	1.36	1.48	1.24	1.24	4.03	9.17	2.99	1.98	1.62	0.73	0.29	0.43
1954	1.02	1.06	0.68	21.04	19.01	4.99	1.50	0.83	0.66	0.49	0.29	0.36
1955	0.60	1.10	0.77	0.20	3.65	13.60	4.37	0.46	0.61	0.43	0.26	0.41
1956	0.47	6.64	15.41	5.60	0.96	21.14	7.78	0.70	0.45	0.49	0.91	1.49
1957	1.52	0.75	0.60	15.04	5.72	0.78	1.26	0.76	0.37	0.37	0.27	0.28
1958	0.30	9.20	3.88	0.54	0.81	1.18	3.81	7.50	2.60	0.87	0.70	0.46
1959	0.37	0.87	1.09	0.77	1.76	1.01	0.85	0.60	0.31	0.32	0.41	0.81
1960	0.63	2.18	5.01	2.33	0.92	4.10	3.80	1.56	0.50	0.31	0.32	0.30
1961	0.25	3.21	2.56	1.17	7.99	8.58	2.85	0.62	0.36	0.30	0.32	0.24
1962	0.59	7.80	5.82	20.30	9.29	25.58	8.63	0.55	0.44	0.76	0.49	0.28
1963	6.06	13.46	4.09	1.76	0.82	6.53	3.34	0.64	6.69	2.90	0.44	0.63
1964	5.33	1.95	0.56	0.72	10.92	3.78	0.53	0.43	15.00	5.65	1.02	0.60
1965	0.87	6.56	2.34	5.48	7.20	1.98	0.29	1.12	0.90	0.37	0.52	0.58
1966	0.40	0.40	0.68	2.52	9.82	17.67	10.22	2.35	0.86	0.87	0.45	0.25
1967	0.44	0.75	0.31	0.17	0.44	0.58	0.55	0.31	0.20	0.22	0.33	0.34
1968	0.46	0.54	0.28	0.16	0.76	15.73	5.30	0.48	0.40	0.35	0.28	0.23
1969	0.98	0.68	0.99	0.45	0.87	0.46	0.14	0.30	0.58	0.44	6.89	2.87
1970	5.88	2.23	0.37	0.72	0.93	0.94	0.80	1.19	0.87	0.76	1.84	0.99
1971	8.44	3.33	0.91	2.95	22.35	10.03	1.28	0.41	0.40	0.35	0.27	0.22
1972	0.34	6.70	2.40	0.36	13.02	10.84	3.02	0.56	0.36	0.39	0.43	0.40
1973	0.63	0.85	0.66	18.89	13.99	28.11	8.82	1.01	0.83	0.52	0.38	0.26
1974	0.28	4.50	2.13	0.68	0.55	3.10	1.37	0.28	0.25	0.27	0.22	3.81
1975	1.50	0.86	19.91	16.65	10.88	39.28	12.48	2.39	1.22	0.61	0.46	0.74
1976	18.81	6.39	0.39	0.55	3.59	2.06	0.96	0.43	0.31	0.45	0.47	1.12
1977	1.07	1.29	0.98	1.06	0.64	1.07	32.39	10.87	0.41	0.34	0.41	0.82
1978	2.26	1.11	4.74	1.90	2.19	1.69	0.65	0.38	0.31	1.20	0.84	0.39
1979	0.54	0.37	0.35	0.47	0.62	0.88	0.50	0.21	0.18	0.22	0.17	2.14
1980	1.07	0.70	0.84	2.80	15.85	5.37	0.35	0.91	0.79	0.38	0.52	0.31
1981	0.21	0.31	0.61	0.87	0.67	15.42	5.42	0.37	0.50	0.72	0.39	0.35
1982	0.51	2.05	0.76	0.12	0.17	0.46	0.72	0.47	0.27	0.35	0.24	0.24
1983	0.70	7.61	9.42	3.18	1.58	9.66	4.09	0.78	0.71	0.78	0.46	0.32
1984	2.11	1.76	0.60	6.34	27.43	8.50	0.42	0.33	0.32	0.31	0.24	0.27
1985	11.71	9.47	13.33	6.31	3.24	1.90	0.60	0.34	0.33	0.41	0.81	0.95
1986	9.05	11.67	3.39	0.71	1.06	3.00	1.26	0.34	0.44	0.39	0.71	29.77
1987	11.90	1.85	1.07	1.12	33.26	19.00	3.49	0.98	0.69	0.60	0.57	0.68
1988	0.76	3.33	16.84	6.05	21.55	8.57	8.25	3.02	0.55	0.82	0.48	0.29
1989	0.81	28.42	9.76	3.04	1.06	8.72	3.77	0.58	0.52	0.45	0.95	0.59
1990	1.02	0.56	0.52	3.23	1.92	0.75	0.27	0.26	0.30	0.26	0.21	0.40

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1991	12.42	5.05	15.99	5.49	1.27	0.80	0.59	0.34	0.26	0.25	0.26	0.37
1992	0.35	0.37	0.22	0.32	0.91	3.03	1.61	0.47	0.22	0.20	0.24	0.74
1993	10.06	4.22	6.65	9.76	13.12	20.70	5.89	0.45	0.48	0.74	0.70	0.32
1994	0.37	0.25	0.81	4.87	1.86	14.73	6.74	1.11	0.56	0.44	0.29	0.36
1995	0.74	0.90	23.21	29.58	17.83	4.55	0.72	0.51	0.43	0.54	0.40	0.32
1996	0.48	16.31	11.80	8.43	2.55	4.46	2.43	0.71	15.23	6.40	0.98	0.48
1997	1.04	1.24	0.82	11.92	26.00	25.05	6.72	1.30	0.70	0.72	0.81	0.55
1998	0.56	10.71	12.27	4.48	16.27	6.17	0.59	0.44	0.44	0.44	0.34	0.27
1999	2.45	1.49	7.57	23.03	24.52	23.93	12.28	3.17	0.89	0.56	0.40	0.66
2000	0.79	1.05	1.06	6.99	5.48	3.91	1.55	0.48	0.35	0.36	0.30	0.47
2001	1.79	20.79	12.67	7.82	2.63	4.59	1.87	0.86	0.80	1.31	4.04	1.96
2002	0.45	0.40	0.94	1.19	1.05	2.06	1.13	0.73	0.54	0.34	0.38	0.89
2003	0.51	0.49	0.36	12.01	5.39	15.33	5.50	0.50	0.41	1.14	0.81	7.21
2004	2.88	3.56	1.95	23.04	8.27	3.84	1.71	0.62	0.43	0.35	0.45	0.34
2005	0.50	2.71	1.10	6.99	7.36	3.53	4.62	2.20	0.66	0.47	4.97	4.22
2006	14.99	7.50	1.95	1.08	0.81	0.74	0.97	0.50	0.46	0.40	0.31	0.26
2007	3.79	2.05	0.84	2.35	6.81	6.64	4.23	1.28	0.99	0.69	0.46	0.34
2008	0.29	0.50	5.11	2.25	10.71	3.65	0.31	0.45	0.51	0.36	0.48	0.39
2009	4.36	1.80	0.30	13.70	5.28	0.80	0.66	0.39	0.42	0.37	0.25	0.18

**Table B2- 7 Simulated Natural Streamflow Time-Series (T35E.INC) for Quaternary T35E (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	2.88	1.65	3.34	4.68	2.61	17.12	10.19	2.10	0.65	0.57	0.48	0.70
1921	3.95	22.84	21.12	5.48	1.25	0.80	0.43	9.75	4.95	2.34	5.27	2.29
1922	2.24	36.46	12.14	34.92	40.65	19.25	3.66	0.66	0.72	24.44	8.85	0.71
1923	0.88	0.97	6.28	7.56	18.67	9.16	1.47	0.73	0.75	0.61	0.80	1.16
1924	1.15	1.87	48.48	16.22	1.09	42.96	50.02	12.36	0.80	0.67	0.55	0.82
1925	0.67	6.12	2.77	1.49	3.89	23.83	7.97	1.14	2.21	1.32	0.56	2.05
1926	3.54	2.24	9.07	3.66	0.98	62.47	20.67	0.58	0.54	0.60	0.76	0.80
1927	3.15	1.38	25.25	38.93	15.34	3.19	0.87	0.80	0.70	0.59	1.18	0.70
1928	0.91	5.21	12.71	5.02	19.23	40.79	11.52	1.11	4.94	3.14	1.23	5.50
1929	22.01	19.48	18.47	23.46	6.78	23.22	10.38	1.32	0.93	0.92	2.04	1.48
1930	1.82	0.81	6.73	29.54	22.62	31.92	9.93	0.83	0.68	37.83	13.08	0.66
1931	1.37	3.74	6.45	3.05	36.70	12.97	0.69	0.90	0.88	1.08	0.76	13.04
1932	13.52	40.83	33.07	7.24	1.05	20.73	7.80	0.81	0.67	0.69	0.62	0.57
1933	0.56	48.48	44.83	70.09	21.04	27.16	9.50	0.77	0.80	7.07	2.92	0.56
1934	1.19	7.01	37.53	12.08	1.03	13.29	11.61	4.27	3.65	1.68	1.58	0.92
1935	1.11	0.65	0.34	0.58	41.66	23.09	3.64	9.06	3.78	1.37	0.73	0.79
1936	10.91	61.07	19.19	17.22	42.83	18.54	2.49	0.68	0.67	0.64	0.55	0.81
1937	1.45	0.72	8.08	29.67	29.30	8.18	21.29	7.61	1.13	1.43	1.44	0.69
1938	1.46	7.02	32.72	43.07	63.88	17.88	1.12	1.11	1.02	1.76	1.22	16.72
1939	12.14	7.70	3.20	4.65	23.25	16.58	4.28	5.79	2.47	0.77	0.66	1.16
1940	1.83	3.66	4.18	6.82	5.06	5.89	2.80	0.81	0.69	0.73	0.71	0.49

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1941	1.42	1.33	0.55	7.66	14.91	26.09	10.00	1.96	0.79	0.55	1.03	1.28
1942	14.42	38.04	44.58	24.38	5.20	24.17	21.03	5.76	1.96	1.28	15.82	10.00
1943	14.10	27.26	34.59	12.01	10.80	22.90	7.12	0.73	1.40	1.35	0.67	27.56
1944	11.25	1.07	0.43	2.50	23.74	20.58	4.90	0.85	0.72	0.61	0.49	0.46
1945	10.88	3.95	1.00	28.53	17.55	17.54	6.44	1.90	0.97	0.71	0.57	0.49
1946	0.81	6.36	3.21	12.40	14.82	17.69	11.93	2.89	6.40	2.92	0.67	1.21
1947	1.45	35.58	37.63	29.75	36.08	20.07	4.87	1.05	0.72	0.67	0.55	0.51
1948	9.79	3.86	1.11	1.22	10.99	5.66	1.61	0.95	0.59	0.65	0.59	0.74
1949	0.81	2.40	2.46	9.51	40.03	37.21	9.49	8.36	3.32	0.95	7.94	3.34
1950	3.08	1.41	32.97	15.47	3.53	2.27	1.03	0.71	0.58	0.52	0.99	1.41
1951	15.65	5.32	0.56	4.33	27.11	9.44	1.41	0.96	0.80	0.87	0.60	1.00
1952	1.09	1.13	2.63	1.84	15.48	7.35	7.54	2.74	0.50	0.47	0.73	1.97
1953	8.84	10.97	11.12	9.67	15.12	25.07	7.61	8.89	4.59	1.19	0.63	1.10
1954	7.81	4.15	1.61	45.37	44.17	13.67	5.73	2.03	1.23	0.89	0.57	0.84
1955	1.59	6.21	2.61	0.36	11.73	35.34	10.74	0.89	1.26	0.84	0.53	0.87
1956	1.14	20.54	36.01	17.01	3.51	47.95	19.45	1.87	0.79	0.88	1.83	6.01
1957	7.01	2.62	1.81	33.83	18.49	3.56	8.27	3.30	0.73	0.75	0.58	0.67
1958	0.79	25.46	16.05	3.18	1.49	2.29	11.50	23.23	7.19	1.88	1.50	1.09
1959	0.92	4.75	6.82	2.68	9.22	4.46	5.36	2.29	0.68	0.72	0.94	2.31
1960	1.54	13.89	22.82	18.12	8.84	11.97	10.85	3.77	1.00	0.69	0.71	0.75
1961	0.66	13.13	13.49	6.81	22.59	23.94	7.22	1.32	0.78	0.63	0.69	0.54
1962	3.58	20.10	16.60	39.27	25.22	54.70	17.44	1.37	0.72	1.41	0.83	0.49
1963	19.75	34.46	9.73	15.40	6.01	19.20	11.90	2.28	16.18	6.41	0.83	1.32
1964	18.59	6.52	1.29	1.64	16.24	5.74	1.03	0.82	31.48	11.53	2.13	1.19
1965	5.21	22.10	7.20	15.13	22.55	6.20	0.64	7.79	3.33	0.73	1.03	1.26
1966	1.13	1.15	2.77	9.08	27.03	44.27	26.44	5.84	1.65	1.60	0.84	0.51
1967	1.04	5.94	2.13	0.56	1.72	1.64	1.49	0.73	0.41	0.46	0.69	0.91
1968	1.31	1.59	0.89	0.44	7.07	38.30	12.13	1.17	0.79	0.66	0.52	0.53
1969	7.61	3.39	6.12	2.57	9.38	3.52	0.43	0.79	1.52	0.94	14.87	6.18
1970	21.16	7.81	1.13	4.65	6.36	4.65	2.00	3.80	2.01	1.60	9.47	3.91
1971	20.67	7.99	4.90	12.46	50.09	27.82	4.74	0.82	0.76	0.66	0.53	0.46
1972	0.75	19.51	6.90	0.99	36.83	35.21	8.92	0.95	0.63	0.76	0.99	0.93
1973	2.07	4.65	2.78	49.69	37.74	47.50	15.41	2.51	1.65	0.93	0.70	0.49
1974	0.59	10.17	4.50	1.71	1.43	9.37	3.70	0.55	0.48	0.51	0.42	12.80
1975	4.60	5.06	43.60	47.03	35.88	72.93	22.12	9.77	3.84	0.98	0.76	1.51
1976	43.84	14.56	0.97	5.77	8.55	6.10	2.09	0.71	0.58	0.83	0.86	7.90
1977	4.18	7.55	6.10	4.79	2.11	3.48	87.92	29.50	0.90	0.67	0.85	1.87
1978	10.75	4.49	15.95	6.18	6.42	4.23	1.12	0.80	0.65	4.59	2.21	0.75
1979	1.33	0.91	0.85	1.55	1.82	4.82	1.98	0.48	0.39	0.46	0.37	11.11
1980	4.36	3.39	3.37	12.76	35.89	11.36	0.71	3.12	1.79	0.74	0.85	0.57
1981	0.49	0.67	3.38	8.13	3.26	36.42	12.64	0.76	0.93	1.31	0.68	0.73
1982	1.43	10.11	3.49	0.39	0.43	1.10	1.47	0.87	0.52	0.62	0.41	0.51
1983	2.04	20.28	29.79	12.77	9.38	26.21	12.11	2.16	1.34	1.47	0.90	0.66
1984	10.00	11.81	3.48	27.38	64.28	18.54	0.98	0.70	0.64	0.62	0.50	0.55

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1985	24.34	21.99	25.07	8.84	13.71	12.94	3.38	0.69	0.65	0.76	1.67	2.25
1986	25.13	30.80	8.91	4.46	2.82	8.54	3.33	0.70	0.92	0.78	1.57	66.23
1987	32.62	12.07	7.66	8.85	57.77	41.91	9.19	2.08	1.27	1.07	1.11	1.28
1988	1.80	15.16	36.66	13.97	46.90	17.87	22.61	8.03	0.95	1.67	0.88	0.51
1989	8.02	58.98	19.28	11.39	4.03	24.97	9.83	1.24	0.94	0.81	2.13	1.19
1990	5.60	2.37	2.71	7.30	5.99	2.08	0.60	0.55	0.58	0.50	0.43	0.95
1991	28.84	16.79	30.33	10.16	1.99	1.25	1.28	0.65	0.49	0.46	0.44	0.81
1992	0.88	0.88	0.53	0.96	2.66	6.10	3.01	0.80	0.38	0.35	0.43	2.68
1993	20.13	10.51	15.00	25.60	30.58	40.21	10.94	0.73	0.82	1.25	1.18	0.57
1994	0.83	0.54	5.98	10.89	3.69	28.94	19.07	3.97	1.09	0.83	0.53	0.74
1995	2.50	2.17	51.75	62.87	36.45	12.49	2.40	0.92	0.77	0.96	0.68	0.59
1996	1.04	33.88	23.57	19.08	5.97	8.57	6.92	1.98	32.74	16.19	2.59	0.91
1997	4.04	8.03	3.29	27.57	51.69	55.24	15.26	2.65	1.30	1.37	1.50	1.09
1998	1.10	23.67	35.73	14.78	19.71	11.50	2.25	0.74	0.76	0.75	0.58	0.50
1999	11.67	5.37	23.24	51.98	50.56	53.20	29.79	7.21	1.48	0.93	0.67	1.14
2000	1.77	5.76	4.10	17.88	16.40	8.54	2.78	0.96	0.65	0.65	0.57	0.84
2001	5.96	49.47	30.76	20.76	6.86	11.35	4.33	1.78	1.49	2.27	5.80	2.85
2002	0.99	0.94	1.33	4.85	2.90	7.85	3.53	1.43	1.02	0.63	0.74	1.94
2003	1.03	1.24	1.07	21.97	11.94	35.32	12.00	0.84	0.70	3.05	1.61	19.69
2004	7.20	4.44	2.70	52.53	20.62	9.85	3.60	1.01	0.73	0.60	0.78	0.63
2005	0.98	14.89	5.45	9.72	14.96	10.30	14.10	5.65	1.27	0.90	8.99	11.60
2006	31.75	21.14	12.61	4.16	1.49	1.33	1.93	0.96	0.89	0.73	0.56	0.50
2007	10.81	5.19	1.42	5.14	19.88	12.62	11.35	3.71	1.81	1.17	0.74	0.59
2008	0.63	1.15	6.01	2.83	18.08	6.21	0.56	0.94	0.94	0.57	0.68	0.71
2009	11.65	4.33	0.45	22.72	10.19	1.87	1.02	0.61	0.91	0.74	0.42	0.30

**Table B2- 8 Simulated Natural Streamflow Time-Series (T35F.INC) for Quaternary T35F (million m³)
1920 -2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	1.11	0.72	0.82	1.16	1.04	8.21	4.65	1.01	0.48	0.42	0.35	0.46
1921	0.90	9.58	7.35	1.81	0.57	0.44	0.25	4.22	2.46	1.59	2.64	1.20
1922	0.92	15.53	5.28	14.75	17.85	8.17	1.56	0.46	0.49	10.96	4.26	0.46
1923	0.47	0.44	0.87	1.04	4.23	3.39	0.87	0.38	0.43	0.36	0.41	0.55
1924	0.53	0.73	22.18	7.40	0.49	27.68	21.45	4.55	0.49	0.42	0.34	0.49
1925	0.38	0.96	0.64	0.63	0.88	9.35	3.34	0.63	1.21	0.77	0.31	0.74
1926	1.17	0.91	1.89	0.89	0.54	31.93	10.58	0.35	0.33	0.34	0.45	0.43
1927	0.71	0.39	12.21	18.80	5.64	0.97	0.46	0.45	0.41	0.35	0.61	0.36
1928	0.44	0.81	5.97	2.45	6.31	20.57	6.23	0.63	1.61	1.55	0.79	1.16
1929	9.16	6.36	6.92	11.19	3.39	8.34	3.83	0.66	0.58	0.57	1.08	0.76
1930	0.78	0.29	0.64	10.90	11.03	14.41	4.51	0.48	0.40	21.63	7.55	0.39
1931	0.69	0.88	1.17	0.81	14.42	5.20	0.38	0.49	0.48	0.60	0.42	4.48
1932	3.18	17.06	11.47	2.17	0.43	6.61	2.80	0.45	0.38	0.39	0.34	0.29
1933	0.27	23.36	20.71	38.44	11.65	11.25	4.14	0.50	0.53	2.95	1.35	0.35
1934	0.67	0.99	14.33	4.86	0.50	5.02	4.11	1.63	1.44	0.78	0.84	0.48
1935	0.48	0.29	0.15	0.20	21.34	7.75	0.50	4.26	1.93	0.78	0.42	0.39
1936	2.03	26.91	8.73	4.99	20.17	9.83	1.50	0.43	0.42	0.41	0.35	0.45
1937	0.64	0.29	0.61	7.31	11.89	3.87	10.76	3.96	0.65	0.79	0.79	0.39
1938	0.69	1.22	10.67	16.92	27.60	7.94	0.48	0.68	0.62	0.91	0.64	6.23
1939	3.30	1.18	0.57	0.73	5.40	2.72	0.82	1.32	0.89	0.39	0.32	0.53
1940	0.73	0.61	0.68	0.96	1.00	1.12	0.96	0.47	0.31	0.37	0.33	0.20
1941	0.46	0.41	0.16	0.71	6.91	11.18	4.00	1.03	0.48	0.30	0.53	0.60
1942	4.42	8.53	14.45	6.01	0.97	10.33	7.70	2.26	1.04	0.70	5.89	3.27
1943	4.27	10.34	11.77	3.74	0.97	7.60	2.77	0.46	0.77	0.76	0.42	7.44
1944	3.38	0.42	0.23	0.37	7.31	7.10	1.88	0.44	0.39	0.35	0.28	0.25
1945	2.01	0.80	0.35	11.71	4.75	4.22	2.09	0.98	0.53	0.38	0.30	0.24
1946	0.36	0.82	0.59	2.65	5.97	9.14	5.02	1.16	2.05	1.21	0.35	0.59
1947	0.66	13.77	16.54	12.23	15.55	7.62	1.75	0.67	0.49	0.44	0.36	0.32
1948	1.01	0.61	0.48	0.43	1.65	1.12	0.65	0.48	0.31	0.35	0.31	0.32
1949	0.33	0.46	0.65	1.09	15.58	13.30	3.44	2.48	1.17	0.53	1.71	0.94
1950	1.13	0.64	15.38	5.81	1.08	0.98	0.51	0.35	0.32	0.29	0.50	0.56
1951	4.84	1.74	0.22	0.55	11.59	4.27	0.69	0.46	0.41	0.45	0.33	0.53
1952	0.51	0.63	0.89	0.73	6.49	2.80	1.87	0.83	0.28	0.26	0.37	0.89
1953	1.43	1.82	1.40	1.20	3.71	9.47	3.12	2.70	1.90	0.73	0.30	0.46
1954	1.18	1.16	0.69	20.72	19.31	5.07	1.67	0.84	0.70	0.51	0.31	0.39
1955	0.65	1.18	0.76	0.18	3.60	15.25	4.92	0.49	0.65	0.46	0.28	0.44
1956	0.51	8.29	14.90	5.33	0.93	20.29	7.54	0.72	0.48	0.51	0.96	1.51
1957	1.64	0.81	0.65	15.47	5.95	0.84	1.37	0.78	0.39	0.40	0.30	0.31
1958	0.32	8.69	3.73	0.54	0.74	1.16	4.24	8.85	3.00	0.94	0.75	0.52
1959	0.41	0.94	1.07	0.75	2.01	1.17	0.93	0.62	0.32	0.34	0.45	0.88
1960	0.66	2.09	4.59	2.29	1.04	5.04	3.73	1.49	0.55	0.33	0.34	0.33
1961	0.27	3.65	3.20	1.36	8.65	8.84	2.83	0.62	0.38	0.32	0.35	0.26

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1962	0.69	8.46	5.48	19.86	8.78	25.63	8.70	0.57	0.46	0.83	0.52	0.31
1963	6.39	13.02	3.94	2.13	0.97	7.33	4.00	0.78	7.98	3.33	0.48	0.68
1964	6.36	2.30	0.58	0.75	9.13	3.23	0.56	0.48	15.97	6.01	1.08	0.62
1965	1.00	7.75	2.73	4.89	7.52	2.16	0.33	2.38	1.25	0.40	0.57	0.63
1966	0.45	0.43	0.67	2.36	10.71	21.38	10.77	2.16	0.93	0.93	0.48	0.27
1967	0.47	0.81	0.33	0.20	0.49	0.65	0.61	0.33	0.22	0.25	0.37	0.42
1968	0.53	0.60	0.32	0.17	0.87	16.73	5.62	0.52	0.41	0.38	0.31	0.26
1969	1.08	0.76	1.01	0.45	1.02	0.49	0.16	0.34	0.67	0.49	6.93	2.97
1970	6.26	2.38	0.43	0.77	1.02	0.97	0.81	1.24	0.90	0.83	1.89	1.00
1971	8.59	3.44	0.92	3.80	24.10	10.54	1.30	0.43	0.43	0.38	0.29	0.25
1972	0.39	7.07	2.59	0.41	13.58	11.77	3.23	0.56	0.38	0.43	0.49	0.44
1973	0.71	0.99	0.77	20.30	14.61	28.31	8.95	1.17	0.90	0.55	0.41	0.29
1974	0.32	4.34	2.02	0.66	0.56	2.43	1.13	0.30	0.26	0.29	0.24	4.52
1975	1.74	0.93	22.25	18.84	12.96	42.50	13.36	2.92	1.39	0.65	0.50	0.82
1976	20.19	6.85	0.47	0.60	3.03	1.91	0.93	0.43	0.33	0.49	0.51	1.19
1977	1.14	1.31	1.11	1.17	0.69	1.14	37.46	12.54	0.44	0.36	0.45	0.91
1978	2.54	1.28	5.09	2.07	1.84	1.53	0.63	0.41	0.33	1.93	1.10	0.41
1979	0.62	0.41	0.34	0.50	0.66	0.94	0.55	0.23	0.20	0.24	0.19	3.48
1980	1.54	0.73	0.86	3.06	16.47	5.62	0.37	1.14	0.94	0.42	0.56	0.34
1981	0.23	0.31	0.78	1.01	0.70	17.12	5.98	0.39	0.53	0.75	0.40	0.38
1982	0.57	1.93	0.70	0.14	0.18	0.48	0.78	0.50	0.29	0.38	0.25	0.27
1983	0.74	8.00	9.65	3.19	1.89	9.85	4.14	0.79	0.73	0.82	0.48	0.34
1984	2.36	2.07	0.64	6.37	28.42	8.83	0.45	0.36	0.35	0.34	0.27	0.30
1985	11.95	9.52	11.95	5.08	3.72	2.93	0.86	0.37	0.35	0.44	0.87	1.04
1986	10.30	12.55	3.56	0.70	1.01	2.88	1.22	0.37	0.49	0.42	0.76	31.34
1987	12.44	1.85	1.12	1.21	32.89	18.95	3.51	1.05	0.73	0.64	0.60	0.72
1988	0.81	3.97	17.09	6.03	23.31	8.91	9.29	3.42	0.60	0.90	0.53	0.34
1989	0.96	31.03	10.55	2.92	1.03	8.74	3.84	0.62	0.56	0.48	1.01	0.62
1990	1.09	0.60	0.58	2.63	1.68	0.71	0.26	0.28	0.32	0.28	0.23	0.46
1991	12.72	5.29	15.62	5.39	0.96	0.72	0.65	0.36	0.29	0.27	0.27	0.40
1992	0.38	0.39	0.22	0.34	0.90	1.85	1.22	0.47	0.22	0.21	0.25	0.77
1993	10.18	4.27	6.54	8.83	13.81	21.22	5.95	0.47	0.50	0.75	0.74	0.34
1994	0.40	0.26	0.83	4.07	1.64	14.60	7.38	1.35	0.58	0.45	0.31	0.38
1995	0.80	0.95	23.81	29.61	18.08	4.73	0.72	0.52	0.45	0.57	0.42	0.34
1996	0.53	16.71	11.46	7.41	2.26	3.92	2.38	0.81	17.04	7.13	1.06	0.51
1997	1.00	1.24	0.79	11.67	27.27	29.38	8.00	1.19	0.77	0.81	0.92	0.62
1998	0.63	11.03	13.62	4.40	15.97	6.21	0.63	0.48	0.49	0.48	0.38	0.32
1999	2.74	1.57	7.41	22.35	22.21	24.70	13.30	3.31	0.95	0.64	0.48	0.75
2000	0.88	1.11	1.06	7.01	6.04	3.74	1.50	0.57	0.40	0.40	0.34	0.50
2001	2.20	22.25	12.89	7.66	2.58	4.53	1.84	0.93	0.83	1.40	3.33	1.66
2002	0.46	0.42	0.86	1.15	1.00	2.30	1.21	0.73	0.55	0.35	0.40	0.88
2003	0.50	0.50	0.38	10.80	4.42	16.38	5.87	0.49	0.42	1.20	0.84	8.29
2004	3.21	2.55	1.51	23.90	8.59	3.67	1.63	0.63	0.44	0.37	0.47	0.36
2005	0.53	3.85	1.50	4.62	5.89	3.11	4.92	2.39	0.70	0.49	4.48	4.43

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2006	15.89	7.70	1.91	0.96	0.73	0.75	0.96	0.48	0.49	0.42	0.32	0.28
2007	3.87	2.04	0.77	1.30	5.52	4.51	2.84	1.01	1.00	0.69	0.43	0.32
2008	0.30	0.49	3.38	1.61	10.09	3.45	0.35	0.47	0.50	0.35	0.46	0.39
2009	3.86	1.60	0.29	13.35	5.09	0.75	0.62	0.41	0.48	0.40	0.26	0.19

**Table B2- 9 Simulated Natural Streamflow Time-Series (T35G.INC) for Quaternary T35G (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	1.76	1.15	1.27	5.14	3.05	12.81	6.69	1.39	0.79	0.70	0.59	0.75
1921	1.43	13.98	10.17	2.84	1.33	0.78	0.43	6.40	3.79	2.34	2.90	1.49
1922	1.41	23.12	7.88	29.04	33.54	13.66	2.35	0.74	0.79	17.32	6.74	0.75
1923	0.75	0.70	1.30	3.36	10.30	6.05	1.24	0.64	0.73	0.62	0.69	0.89
1924	0.86	1.10	33.11	11.38	1.17	41.64	32.91	7.14	0.81	0.69	0.57	0.78
1925	0.61	1.48	0.99	1.50	2.07	14.52	5.16	0.98	1.89	1.21	0.52	1.14
1926	1.75	1.39	2.10	1.43	1.33	49.69	16.43	0.57	0.53	0.56	0.71	0.68
1927	1.09	0.59	16.93	34.51	11.12	1.76	0.75	0.73	0.68	0.59	0.98	0.59
1928	0.71	1.27	7.82	3.80	13.29	33.29	9.78	1.00	2.58	2.58	1.30	1.79
1929	13.83	9.43	8.89	21.92	7.13	12.70	5.81	1.06	0.94	0.93	1.72	1.23
1930	1.22	0.45	0.93	23.34	22.89	23.55	7.04	0.79	0.67	32.76	11.52	0.65
1931	1.10	1.39	1.70	1.74	26.89	9.48	0.62	0.80	0.80	0.98	0.69	6.59
1932	4.87	26.03	17.14	3.33	0.96	10.77	4.47	0.73	0.62	0.64	0.57	0.49
1933	0.45	36.21	32.23	67.52	21.02	17.34	6.34	0.82	0.86	4.40	2.05	0.58
1934	1.05	1.41	23.47	8.23	1.17	8.24	6.04	2.42	2.33	1.25	1.33	0.77
1935	0.79	0.48	0.26	0.73	37.63	13.61	0.85	6.48	2.96	1.25	0.68	0.63
1936	2.94	41.93	13.64	13.74	37.52	15.99	2.12	0.72	0.70	0.69	0.59	0.76
1937	1.06	0.48	1.06	17.81	24.15	7.20	16.30	6.09	1.07	1.29	1.27	0.65
1938	1.12	1.97	16.53	33.33	50.68	14.13	0.80	1.05	0.99	1.48	1.06	9.68
1939	5.17	1.79	0.87	2.36	11.87	5.48	1.39	2.15	1.41	0.67	0.56	0.90
1940	1.20	1.01	1.03	3.44	2.64	2.08	1.55	0.72	0.54	0.62	0.56	0.36
1941	0.79	0.69	0.27	2.69	13.61	18.11	6.25	1.62	0.75	0.52	0.86	0.96
1942	6.45	14.42	22.46	15.03	3.79	15.63	11.47	3.36	1.68	1.16	9.02	5.04
1943	6.16	15.32	18.03	7.07	2.51	12.98	4.64	0.78	1.26	1.27	0.71	12.98
1944	5.78	0.66	0.40	1.06	15.58	11.98	2.78	0.75	0.68	0.60	0.49	0.43
1945	3.15	1.24	0.53	23.80	11.05	7.09	3.19	1.56	0.86	0.65	0.51	0.42
1946	0.61	1.28	0.93	8.27	13.02	14.52	7.14	1.61	3.03	1.85	0.60	0.97
1947	1.05	20.24	23.80	24.68	29.71	12.59	2.57	1.06	0.80	0.74	0.61	0.54
1948	1.58	0.96	0.70	1.01	5.33	2.74	1.03	0.80	0.53	0.59	0.53	0.55
1949	0.56	0.79	1.00	5.55	28.80	21.07	5.22	3.56	1.73	0.87	2.28	1.35
1950	1.70	0.97	23.06	10.74	2.65	1.68	0.81	0.60	0.54	0.49	0.81	0.91
1951	6.69	2.46	0.35	1.41	22.08	7.94	1.07	0.74	0.67	0.74	0.53	0.85
1952	0.78	0.89	1.26	1.55	13.08	5.34	2.46	1.12	0.47	0.44	0.61	1.37
1953	2.21	2.52	2.06	4.25	8.96	15.02	4.74	4.10	2.91	1.15	0.51	0.76
1954	1.86	1.79	1.03	38.01	35.56	9.07	2.60	1.32	1.14	0.84	0.52	0.64
1955	1.04	1.78	1.10	0.33	8.01	24.98	7.83	0.79	1.04	0.74	0.47	0.71

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1956	0.81	12.75	21.40	11.89	3.18	31.43	11.68	1.17	0.79	0.86	1.54	2.32
1957	2.47	1.23	0.99	30.43	12.84	1.83	2.05	1.32	0.66	0.68	0.51	0.54
1958	0.54	12.01	5.30	1.11	1.62	2.00	6.25	13.64	4.71	1.51	1.21	0.85
1959	0.66	1.42	1.59	1.62	5.96	2.87	1.51	0.99	0.56	0.58	0.75	1.37
1960	1.02	2.77	6.11	7.78	3.55	8.08	5.36	2.17	0.88	0.56	0.58	0.56
1961	0.45	5.30	4.39	2.52	17.23	14.50	4.27	1.00	0.64	0.54	0.58	0.44
1962	1.11	12.44	7.23	36.26	17.79	39.40	13.14	0.91	0.75	1.34	0.84	0.51
1963	9.69	19.00	5.80	8.22	3.51	11.37	5.90	1.09	12.17	5.11	0.79	1.10
1964	9.83	3.54	0.87	1.70	16.69	5.84	0.91	0.81	24.31	9.25	1.72	1.00
1965	1.57	11.70	4.12	12.14	16.68	4.59	0.59	3.95	2.04	0.69	0.93	1.01
1966	0.77	0.72	1.00	7.97	21.62	35.19	16.08	3.05	1.50	1.50	0.81	0.48
1967	0.78	1.25	0.51	0.51	1.20	1.22	1.00	0.52	0.39	0.43	0.61	0.71
1968	0.85	0.92	0.50	0.45	2.87	26.12	8.63	0.85	0.67	0.63	0.52	0.44
1969	1.70	1.18	1.49	0.91	4.25	1.75	0.29	0.57	1.10	0.77	10.02	4.42
1970	9.15	3.55	0.68	2.21	2.42	1.77	1.28	1.91	1.39	1.32	2.45	1.39
1971	11.96	4.89	1.33	11.23	43.29	17.21	1.86	0.70	0.72	0.64	0.50	0.43
1972	0.65	9.95	3.73	1.05	25.72	19.29	4.85	0.89	0.62	0.70	0.81	0.71
1973	1.14	1.55	1.22	38.67	28.57	43.96	13.59	1.87	1.45	0.90	0.69	0.48
1974	0.53	5.71	2.68	1.51	1.42	3.21	1.49	0.48	0.43	0.47	0.39	6.79
1975	2.64	1.42	33.70	35.41	25.65	66.45	20.52	4.18	2.05	1.04	0.81	1.31
1976	30.61	10.42	0.76	1.52	7.14	3.83	1.40	0.71	0.57	0.81	0.85	1.85
1977	1.74	1.92	1.64	4.65	2.32	1.84	59.25	19.87	0.76	0.62	0.75	1.46
1978	3.62	1.85	7.03	3.32	5.04	3.08	0.95	0.68	0.57	2.93	1.69	0.66
1979	1.00	0.64	0.51	1.26	1.61	1.71	0.88	0.40	0.35	0.41	0.33	5.69
1980	2.51	1.12	1.29	10.01	31.02	9.96	0.62	1.82	1.51	0.69	0.89	0.56
1981	0.40	0.51	1.23	3.44	2.03	27.15	9.46	0.66	0.83	1.17	0.62	0.62
1982	0.94	2.41	0.85	0.34	0.46	0.83	1.19	0.76	0.47	0.61	0.40	0.44
1983	1.12	11.38	13.98	7.12	5.93	15.51	6.26	1.21	1.18	1.31	0.79	0.56
1984	3.29	2.83	0.94	16.06	50.46	15.14	0.76	0.61	0.59	0.57	0.46	0.49
1985	17.26	13.30	15.85	10.40	9.94	5.56	1.30	0.63	0.62	0.75	1.41	1.67
1986	15.44	18.62	5.36	1.64	2.25	4.24	1.75	0.63	0.81	0.70	1.22	47.99
1987	18.62	2.64	1.67	5.71	54.79	29.88	5.30	1.68	1.19	1.05	1.00	1.16
1988	1.29	5.83	25.44	10.68	40.47	14.78	14.82	5.48	0.99	1.44	0.88	0.58
1989	1.52	47.42	16.08	9.27	3.42	13.66	5.94	1.03	0.94	0.81	1.62	0.95
1990	1.67	0.92	0.89	8.00	4.35	1.34	0.49	0.50	0.56	0.49	0.41	0.75
1991	18.85	7.87	23.15	8.47	2.03	1.32	1.06	0.61	0.49	0.47	0.46	0.65
1992	0.63	0.58	0.33	0.89	2.22	2.37	1.75	0.76	0.37	0.34	0.41	1.19
1993	14.67	6.23	8.45	18.74	26.92	32.86	8.88	0.75	0.80	1.18	1.18	0.55
1994	0.65	0.43	1.23	10.88	4.32	21.96	11.08	2.05	0.95	0.76	0.52	0.63
1995	1.27	1.45	36.61	51.87	33.34	8.47	1.14	0.85	0.75	0.93	0.69	0.58
1996	0.87	25.19	16.14	16.27	5.63	5.11	3.34	1.30	25.86	11.02	1.72	0.84
1997	1.53	1.91	1.18	23.70	47.96	47.32	12.62	1.84	1.21	1.29	1.48	1.00
1998	1.00	16.15	20.46	10.07	27.82	10.35	1.03	0.81	0.82	0.81	0.65	0.55
1999	3.80	2.23	10.46	40.28	39.57	38.92	19.65	4.83	1.50	1.03	0.78	1.18

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2000	1.39	1.66	1.56	16.44	14.40	6.29	2.14	0.97	0.69	0.68	0.59	0.82
2001	3.05	34.15	18.53	16.61	6.16	6.73	2.67	1.50	1.34	2.21	4.00	2.14
2002	0.75	0.67	1.22	4.13	2.69	3.72	1.86	1.16	0.90	0.59	0.66	1.33
2003	0.75	0.75	0.57	21.52	8.84	24.77	8.84	0.79	0.68	1.87	1.29	12.66
2004	4.94	2.51	1.77	43.55	16.00	5.48	2.37	0.99	0.71	0.59	0.76	0.59
2005	0.86	5.77	2.24	10.14	12.41	5.13	7.31	3.66	1.15	0.80	5.55	5.61
2006	23.84	11.09	2.64	2.00	1.67	1.28	1.46	0.72	0.80	0.69	0.53	0.47
2007	5.25	2.87	1.10	5.08	12.53	6.42	3.00	1.26	1.56	1.06	0.68	0.52
2008	0.50	0.71	3.67	2.41	18.46	6.25	0.56	0.76	0.80	0.56	0.70	0.60
2009	4.93	2.12	0.42	25.45	9.82	1.37	0.95	0.66	0.80	0.67	0.43	0.31

**Table B2- 10 Simulated Natural Streamflow Time-Series (T35H.INC) for Quaternary T35H (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	3.89	2.01	5.25	8.99	3.93	21.83	13.95	2.96	0.86	0.76	0.65	0.90
1921	4.10	24.33	21.84	5.68	1.28	0.99	0.56	11.73	5.90	2.37	3.67	1.87
1922	3.50	34.81	11.58	35.89	42.90	23.42	4.92	0.83	0.88	28.48	10.38	0.90
1923	1.01	1.10	5.29	5.70	17.80	14.11	3.25	0.85	1.00	0.79	0.90	1.20
1924	1.36	1.89	46.03	15.44	1.19	49.58	44.15	9.91	0.89	0.74	0.62	0.91
1925	0.79	8.75	3.99	1.70	3.92	22.33	7.55	1.14	2.73	1.64	0.63	1.46
1926	4.21	2.83	8.33	3.39	1.54	63.03	20.87	0.69	0.63	0.66	0.86	0.89
1927	1.59	0.94	23.75	39.77	13.31	2.54	1.02	0.87	0.77	0.67	1.20	0.78
1928	1.07	5.06	15.55	5.74	15.64	48.42	14.42	1.20	5.75	3.57	1.39	5.85
1929	24.45	21.83	17.36	24.19	7.20	20.21	9.75	1.43	1.18	1.15	3.15	1.96
1930	1.80	0.69	2.55	29.92	32.15	36.63	10.65	0.92	0.76	39.84	13.83	0.72
1931	1.59	4.97	5.16	2.57	34.95	12.02	0.68	0.94	0.96	1.20	0.87	13.52
1932	15.31	42.68	33.99	7.42	0.95	21.11	8.13	0.90	0.77	0.80	0.71	0.63
1933	0.62	53.43	56.34	83.67	24.40	25.19	9.09	0.91	0.97	8.73	3.51	0.68
1934	1.44	1.83	48.87	16.42	1.26	19.16	15.32	5.52	4.66	2.01	1.70	1.05
1935	1.25	0.77	0.40	0.50	45.19	23.58	3.39	11.41	4.68	1.59	0.86	0.81
1936	10.59	62.91	19.78	21.47	50.22	24.59	3.98	0.86	0.81	0.78	0.69	1.01
1937	1.69	0.81	11.05	25.79	31.25	9.48	26.31	9.37	1.31	1.64	1.66	0.85
1938	2.68	13.33	35.19	45.96	69.50	19.58	1.43	1.39	1.24	2.03	1.46	20.02
1939	16.92	5.99	1.70	9.04	19.47	17.84	5.35	6.92	2.91	0.90	0.79	1.56
1940	2.24	2.91	2.03	6.54	5.51	8.57	3.83	0.93	0.80	0.84	0.79	0.59
1941	3.22	2.04	0.63	5.04	15.95	28.73	14.01	3.42	0.98	0.64	1.07	1.37
1942	14.88	38.55	43.81	28.17	6.64	22.28	20.79	5.92	2.23	1.51	16.80	12.36
1943	13.98	28.11	37.59	14.54	11.20	28.08	8.98	0.88	1.60	1.77	0.87	31.28
1944	13.74	1.51	0.54	2.68	22.55	20.21	4.95	0.99	0.85	0.73	0.60	0.58
1945	12.55	4.60	1.11	27.32	18.32	18.99	6.99	2.24	1.17	0.86	0.66	0.57
1946	0.96	6.32	3.31	9.29	13.82	22.41	15.08	3.49	9.12	4.02	0.79	1.41
1947	1.70	31.23	35.90	32.53	36.61	20.82	5.14	1.17	0.86	0.82	0.68	0.63
1948	7.42	3.18	1.18	1.11	11.23	5.12	1.65	1.09	0.66	0.74	0.70	0.80
1949	0.95	4.06	2.53	9.78	36.88	30.21	8.01	8.93	3.52	1.07	7.05	3.07

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1950	4.82	2.29	36.83	16.69	2.83	1.98	1.18	0.81	0.65	0.58	1.05	1.37
1951	12.74	4.47	0.58	2.40	27.56	9.97	1.44	0.93	0.78	0.88	0.62	1.16
1952	1.16	1.02	2.65	1.73	13.95	6.22	6.63	2.53	0.55	0.51	0.76	3.02
1953	7.72	11.46	11.06	6.06	11.88	23.74	7.38	10.71	5.46	1.33	0.67	1.09
1954	9.33	5.91	1.90	41.04	42.15	12.48	10.42	3.89	1.55	1.09	0.66	0.89
1955	1.66	7.76	3.30	0.43	10.99	39.50	12.30	1.02	1.35	0.94	0.60	0.96
1956	1.25	27.83	33.43	16.07	3.61	38.12	14.97	1.48	0.90	0.99	2.05	5.80
1957	7.57	2.89	2.72	35.50	19.87	4.07	7.71	3.07	0.78	0.85	0.66	0.74
1958	0.81	19.06	12.12	2.56	1.44	4.51	13.37	24.38	7.54	2.02	1.73	1.30
1959	1.01	6.00	5.11	2.15	10.33	5.43	3.24	1.49	0.71	0.73	1.03	2.63
1960	1.64	9.91	16.23	15.55	8.09	17.81	12.07	4.01	1.23	0.76	0.80	0.85
1961	0.70	14.76	16.72	7.10	24.65	24.41	7.06	1.35	0.84	0.69	0.77	0.62
1962	4.36	23.90	16.13	39.47	20.41	46.20	15.27	1.17	0.83	1.72	1.05	0.61
1963	18.32	30.09	8.66	13.49	5.43	19.95	14.09	2.98	20.18	7.86	0.97	1.49
1964	20.83	7.31	2.21	2.13	14.46	5.15	1.19	1.14	32.44	12.12	2.34	1.31
1965	6.75	24.53	7.93	13.41	22.41	6.37	0.79	10.69	4.40	0.85	1.21	1.39
1966	1.33	1.32	1.95	9.50	28.64	55.55	26.01	4.49	1.94	1.95	0.99	0.58
1967	1.06	4.14	1.53	0.65	1.50	1.87	1.70	0.81	0.48	0.54	0.79	1.29
1968	1.54	1.66	1.10	0.52	6.75	39.19	12.50	1.15	0.81	0.78	0.68	0.60
1969	7.45	3.49	4.97	2.07	10.46	3.96	0.46	0.90	1.74	1.07	14.75	6.54
1970	17.90	6.80	1.46	4.79	7.13	3.43	1.80	4.50	2.21	1.91	7.31	3.17
1971	17.80	7.40	3.02	17.41	53.37	26.41	4.12	0.84	0.88	0.78	0.60	0.55
1972	1.00	19.30	7.29	1.44	34.06	31.61	8.04	1.01	0.70	0.86	1.12	0.96
1973	2.36	6.34	4.64	47.79	37.43	52.69	16.47	2.82	1.74	1.06	0.83	0.59
1974	0.72	11.91	5.03	1.63	1.57	5.60	2.40	0.62	0.53	0.57	0.49	14.64
1975	5.26	6.33	51.75	47.66	36.01	83.47	25.52	10.40	4.08	1.14	0.93	1.80
1976	42.78	14.36	1.44	2.68	7.35	7.99	2.74	0.80	0.66	0.96	1.13	6.35
1977	3.65	5.93	6.06	6.95	2.81	4.27	81.82	27.31	0.94	0.74	0.94	2.88
1978	10.46	4.75	16.95	6.71	6.54	4.31	1.22	0.95	0.76	8.44	3.65	0.94
1979	1.76	1.18	0.89	1.61	1.89	4.20	1.85	0.57	0.46	0.53	0.44	16.25
1980	6.19	2.24	3.09	14.68	38.60	12.46	0.85	8.68	3.81	0.84	1.11	0.74
1981	0.56	0.81	8.58	8.22	2.86	40.51	13.99	0.88	1.07	1.44	0.78	0.83
1982	1.60	8.84	3.10	0.43	0.47	1.09	1.67	1.01	0.60	0.81	0.51	0.65
1983	1.70	20.75	28.12	11.37	10.48	23.78	10.21	1.84	1.44	1.65	1.00	0.72
1984	9.69	11.55	3.40	21.39	59.34	17.62	1.04	0.77	0.71	0.67	0.55	0.61
1985	24.23	22.77	22.02	9.08	15.78	15.06	3.93	0.77	0.73	0.89	1.90	2.57
1986	26.16	32.20	9.09	1.85	2.38	8.30	3.30	0.83	1.09	0.89	1.61	60.44
1987	28.80	8.44	5.42	9.66	58.22	39.06	8.37	2.35	1.50	1.29	1.27	1.57
1988	1.95	16.72	40.21	14.04	49.77	20.92	24.36	8.43	1.07	1.73	0.99	0.64
1989	8.06	64.06	21.02	12.22	4.35	22.31	9.19	1.23	1.07	0.92	1.99	1.26
1990	6.27	2.64	3.04	7.56	4.66	1.67	0.65	0.64	0.66	0.56	0.50	1.07
1991	27.47	19.00	34.68	11.31	1.61	1.36	1.61	0.78	0.57	0.54	0.52	0.84
1992	0.94	0.93	0.59	1.00	4.53	4.04	2.22	0.88	0.42	0.38	0.48	1.61
1993	22.11	12.86	16.49	21.08	33.80	41.77	11.02	0.81	0.88	1.34	1.52	0.66

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994	0.86	0.59	5.46	11.51	4.23	27.85	20.32	4.59	1.08	0.85	0.59	0.76
1995	3.01	3.43	52.99	60.31	39.04	15.11	2.93	0.95	0.82	1.03	0.77	0.69
1996	1.30	38.12	28.49	18.98	5.69	7.19	10.20	3.45	34.23	19.85	3.76	1.02
1997	1.90	8.30	3.52	26.52	56.65	67.55	19.86	2.61	1.31	1.46	1.94	1.25
1998	1.32	26.52	37.91	13.65	27.40	13.88	2.17	0.88	0.91	0.91	0.72	0.66
1999	9.87	4.80	21.04	44.94	40.01	49.69	29.48	7.18	1.67	1.08	0.79	1.39
2000	1.97	6.07	4.69	18.96	20.81	11.89	4.86	1.42	0.82	0.79	0.70	0.99
2001	10.18	51.41	30.94	19.69	6.31	11.84	4.57	2.08	1.68	4.89	5.01	2.26
2002	1.01	1.02	1.78	4.83	2.75	10.61	4.47	1.50	1.10	0.70	0.84	1.69
2003	0.96	1.16	1.12	20.92	8.12	35.21	12.28	0.85	0.71	4.08	2.02	22.23
2004	8.12	4.61	2.81	49.82	20.96	12.90	4.82	1.19	0.82	0.68	0.91	0.78
2005	1.32	17.25	6.16	4.66	11.48	9.28	15.55	6.56	1.57	1.00	6.45	9.40
2006	35.37	21.16	9.54	3.03	1.40	1.66	1.97	0.89	1.06	0.88	0.66	0.64
2007	10.88	5.13	1.58	3.40	13.42	5.85	4.50	1.97	1.93	1.28	0.70	0.58
2008	0.69	1.01	5.84	2.82	18.59	6.35	0.65	0.89	0.88	0.59	0.66	0.68
2009	8.72	3.40	0.59	25.88	9.85	1.55	1.09	0.83	1.18	0.91	0.50	0.36

**Table B2- 11 Simulated Natural Streamflow Time-Series (T35J.INC) for Quaternary T35J (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	2.67	1.24	3.11	4.78	2.31	9.04	5.92	1.28	0.25	0.21	0.18	0.29
1921	2.99	11.35	11.00	2.90	0.64	0.42	0.18	4.85	2.34	0.92	2.02	0.94
1922	2.31	16.33	5.32	16.35	19.03	10.11	2.08	0.23	0.25	11.82	4.18	0.43
1923	0.37	0.45	4.31	5.08	9.90	5.86	1.16	0.28	0.31	0.24	0.32	0.49
1924	0.58	1.70	20.46	6.79	0.55	18.02	21.83	5.44	0.49	0.22	0.18	0.30
1925	0.26	4.55	1.97	1.55	2.73	11.08	3.59	0.57	1.30	0.70	0.23	0.94
1926	2.40	2.16	5.10	1.91	0.59	26.84	8.90	0.53	0.21	0.23	0.32	0.36
1927	1.64	0.73	10.58	17.09	7.16	2.19	0.60	0.33	0.29	0.24	0.50	0.33
1928	0.47	4.14	7.22	2.62	8.64	19.61	5.58	0.66	2.71	1.57	0.54	3.35
1929	11.31	10.63	7.85	10.42	3.01	10.35	5.04	0.76	0.35	0.34	1.63	0.94
1930	1.30	0.50	2.47	13.85	12.46	15.42	4.52	0.45	0.21	15.96	5.48	0.43
1931	0.95	3.08	3.46	2.16	16.14	5.50	0.43	0.33	0.33	0.42	0.30	6.39
1932	7.75	19.45	16.42	3.60	0.50	10.77	3.89	0.42	0.22	0.24	0.21	0.19
1933	0.21	22.31	23.15	33.67	10.51	11.90	4.01	0.40	0.28	3.39	1.40	0.20
1934	0.53	2.58	20.41	6.70	0.77	7.86	6.39	3.09	2.65	0.98	0.61	0.38
1935	0.52	0.33	0.13	0.23	19.14	12.44	2.22	4.91	1.98	0.60	0.33	0.32
1936	5.80	28.47	8.90	9.73	20.11	9.42	1.49	0.24	0.22	0.21	0.18	0.33
1937	1.10	0.50	7.18	15.07	14.27	4.34	10.77	3.68	0.56	0.59	0.60	0.28
1938	1.97	6.43	17.01	20.97	29.42	8.15	0.61	0.46	0.39	0.76	0.59	8.98
1939	7.61	4.25	1.98	4.84	10.26	9.97	2.88	3.59	1.47	0.27	0.23	0.55
1940	1.73	3.35	2.61	4.68	4.03	5.09	1.98	0.36	0.30	0.31	0.30	0.23
1941	2.54	1.39	0.36	4.40	7.20	12.86	6.25	1.42	0.36	0.22	0.43	0.59
1942	7.14	20.00	21.94	14.39	3.32	10.84	10.32	2.78	0.92	0.53	7.74	5.84
1943	7.06	13.73	17.50	7.66	7.69	13.08	3.74	0.37	0.57	0.61	0.26	14.82

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1944	7.30	1.02	0.16	2.77	11.47	10.12	2.44	0.36	0.28	0.23	0.18	0.18
1945	6.06	2.14	0.77	12.64	9.73	10.06	3.48	0.89	0.41	0.27	0.20	0.18
1946	0.37	4.40	2.39	5.72	6.73	9.33	6.65	1.59	3.20	1.46	0.26	0.56
1947	0.74	15.36	16.72	15.00	16.84	9.90	2.42	0.38	0.24	0.23	0.18	0.17
1948	5.41	2.10	0.61	0.62	6.00	3.30	0.97	0.44	0.25	0.28	0.27	0.35
1949	0.45	3.93	2.68	6.14	18.06	15.36	4.39	4.37	1.64	0.38	3.77	1.59
1950	2.23	1.03	15.90	7.99	1.48	1.82	0.80	0.30	0.22	0.19	0.41	0.64
1951	7.02	2.37	0.31	3.21	12.49	4.27	0.84	0.41	0.32	0.36	0.25	0.46
1952	0.55	0.49	1.88	1.06	6.51	3.92	4.23	1.43	0.23	0.21	0.33	1.63
1953	4.89	6.71	6.69	5.10	7.47	11.52	3.36	4.75	2.34	0.55	0.21	0.45
1954	5.22	3.70	1.23	18.62	19.43	7.05	4.64	1.57	0.51	0.34	0.19	0.32
1955	1.13	4.13	1.61	0.15	5.70	17.44	5.28	0.58	0.51	0.34	0.20	0.37
1956	0.55	11.32	15.96	8.55	1.97	20.05	9.03	1.10	0.27	0.32	0.81	2.75
1957	4.07	1.61	2.39	16.43	10.04	2.18	4.35	1.70	0.25	0.28	0.21	0.27
1958	0.34	10.46	7.82	1.77	0.68	1.95	6.47	11.11	3.27	1.10	0.72	0.49
1959	0.41	3.52	4.23	1.53	5.33	3.46	3.55	1.31	0.28	0.29	0.41	1.83
1960	1.01	6.48	10.43	10.12	6.12	7.49	5.72	1.95	0.48	0.24	0.26	0.30
1961	0.27	7.43	8.57	4.15	11.52	10.97	3.06	0.54	0.26	0.20	0.24	0.19
1962	3.00	10.57	8.16	17.23	10.11	22.27	7.16	0.59	0.23	0.57	0.37	0.16
1963	9.38	14.96	4.14	8.57	3.24	9.54	6.71	1.40	7.40	2.82	0.34	0.54
1964	10.11	3.41	1.67	1.59	6.36	2.19	0.44	0.38	13.59	4.98	1.17	0.52
1965	3.61	12.11	3.75	6.80	11.42	3.11	0.31	4.79	1.94	0.27	0.41	0.54
1966	0.58	0.67	2.26	5.59	13.10	22.08	11.93	2.37	0.71	0.67	0.32	0.17
1967	0.44	3.86	1.40	0.30	1.61	1.26	0.83	0.38	0.19	0.21	0.31	0.52
1968	0.78	1.33	0.72	0.28	4.99	18.13	5.58	0.60	0.36	0.32	0.26	0.27
1969	4.71	2.05	3.93	1.62	6.22	2.27	0.23	0.40	0.79	0.47	6.60	3.04
1970	9.27	3.51	0.80	3.64	4.72	2.91	1.14	2.32	1.08	0.72	3.60	1.53
1971	8.32	3.54	2.43	7.51	22.59	12.05	2.02	0.27	0.27	0.23	0.17	0.16
1972	0.32	9.00	3.31	0.63	16.52	14.33	3.47	0.46	0.22	0.29	0.45	0.38
1973	2.12	4.28	3.45	22.18	16.96	20.94	7.92	1.81	0.75	0.34	0.25	0.16
1974	0.23	5.43	2.21	1.84	1.09	3.77	1.52	0.24	0.20	0.21	0.18	6.63
1975	2.34	3.66	21.13	21.15	15.83	31.05	9.42	4.67	1.83	0.34	0.27	0.99
1976	18.67	6.15	1.14	3.95	4.45	3.77	1.23	0.25	0.20	0.31	0.38	4.26
1977	2.10	3.66	4.44	4.02	1.50	2.14	37.05	12.45	0.70	0.24	0.33	1.83
1978	6.00	2.43	8.38	3.23	3.24	2.30	0.61	0.33	0.26	3.42	1.48	0.35
1979	0.99	0.58	0.47	1.80	1.90	2.67	1.02	0.25	0.20	0.22	0.19	7.10
1980	2.69	2.35	2.75	7.97	16.70	5.24	0.48	2.85	1.30	0.31	0.38	0.27
1981	0.22	0.33	4.69	5.37	1.80	17.63	6.12	0.59	0.40	0.57	0.30	0.33
1982	1.36	5.24	1.73	0.21	0.22	0.58	0.76	0.43	0.25	0.30	0.20	0.27
1983	1.56	9.84	14.34	6.25	5.87	12.19	5.92	1.16	0.54	0.65	0.38	0.26
1984	5.17	6.67	1.97	12.22	28.19	8.15	0.68	0.24	0.21	0.20	0.16	0.19
1985	10.16	10.41	10.43	3.79	7.76	7.83	2.05	0.23	0.22	0.27	0.69	1.53
1986	11.89	15.02	5.01	2.93	1.91	4.31	1.67	0.28	0.38	0.30	0.64	27.07
1987	14.18	5.73	4.60	6.18	24.65	17.79	3.88	1.08	0.55	0.41	0.44	0.54

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988	1.06	7.95	17.88	6.61	21.26	9.11	11.43	3.77	0.46	0.63	0.35	0.17
1989	4.94	27.35	8.77	6.36	2.25	10.89	4.39	0.51	0.32	0.27	1.42	0.71
1990	3.45	1.48	2.48	4.33	3.17	1.08	0.28	0.23	0.24	0.21	0.19	0.43
1991	12.67	9.41	14.72	4.86	0.74	0.55	0.66	0.34	0.19	0.18	0.17	0.34
1992	0.44	0.46	0.30	0.54	2.28	2.60	1.21	0.38	0.17	0.16	0.20	1.67
1993	9.43	6.02	7.44	11.80	14.73	16.83	4.37	0.39	0.27	0.45	0.50	0.21
1994	0.34	0.23	3.69	5.73	1.88	12.90	9.89	2.20	0.41	0.31	0.20	0.29
1995	2.26	2.30	23.72	25.86	16.28	7.13	1.52	0.32	0.26	0.34	0.24	0.22
1996	0.48	15.49	11.32	8.86	2.70	3.35	4.57	1.50	14.34	8.41	1.58	0.33
1997	1.95	5.63	2.16	12.32	22.77	26.86	8.80	1.21	0.45	0.54	0.71	0.48
1998	0.49	11.28	17.78	7.39	10.06	6.37	1.33	0.25	0.26	0.27	0.20	0.18
1999	5.66	2.88	10.49	21.58	20.53	22.59	12.89	3.01	0.64	0.33	0.22	0.45
2000	1.10	3.31	2.96	9.24	9.51	4.95	1.81	0.51	0.24	0.23	0.21	0.34
2001	3.96	22.79	14.44	9.92	3.53	5.55	2.07	0.80	0.61	1.73	2.20	1.05
2002	0.43	0.46	1.14	2.67	1.70	4.78	1.99	0.67	0.45	0.27	0.32	1.06
2003	0.54	0.64	0.59	9.12	4.79	15.63	5.29	0.53	0.26	1.86	0.88	9.60
2004	3.45	2.10	1.58	22.00	9.82	5.78	2.00	0.39	0.26	0.20	0.29	0.26
2005	0.50	9.15	3.21	2.14	5.56	4.92	7.70	2.98	0.58	0.33	2.92	5.26
2006	14.79	10.34	6.07	1.95	0.62	0.57	0.74	0.35	0.33	0.28	0.20	0.20
2007	5.17	2.58	0.78	2.18	8.85	4.29	3.93	1.42	0.76	0.52	0.27	0.23
2008	0.30	0.55	3.04	1.37	7.95	2.73	0.27	0.41	0.39	0.24	0.26	0.30
2009	4.74	1.77	0.26	9.69	4.81	1.01	0.48	0.31	0.46	0.37	0.20	0.15

**Table B2- 12 Simulated Natural Streamflow Time-Series (T35K.INC) for Quaternary T35K (million m³)
1920 – 2009**

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	1.77	1.26	1.45	2.46	1.55	11.64	6.10	1.42	0.70	0.60	0.50	0.76
1921	1.90	13.55	13.47	3.74	0.87	0.66	0.40	7.13	4.13	1.82	2.35	1.51
1922	1.79	27.15	9.13	27.77	30.95	10.80	1.61	0.73	0.77	22.50	8.46	0.79
1923	0.89	0.77	1.60	1.90	12.30	5.40	0.76	0.63	0.69	0.59	0.76	0.94
1924	1.00	1.30	29.45	9.91	0.85	39.94	33.39	7.55	0.85	0.71	0.58	0.75
1925	0.60	2.66	1.43	0.93	1.42	14.97	5.41	0.97	1.93	1.31	0.56	1.21
1926	2.31	1.86	4.60	1.94	0.71	54.36	18.05	0.57	0.54	0.60	0.82	0.82
1927	1.33	0.71	13.83	22.96	7.40	1.77	0.91	0.81	0.72	0.62	1.10	0.68
1928	0.82	1.88	3.16	1.56	7.28	32.44	10.16	0.90	2.47	2.61	1.41	2.21
1929	16.88	9.69	5.17	10.10	3.40	15.97	7.02	1.09	0.96	0.94	1.89	1.48
1930	1.40	0.57	1.21	12.76	9.45	19.12	6.65	0.75	0.63	33.74	11.89	0.62
1931	1.26	1.80	1.68	1.21	28.43	9.98	0.56	0.76	0.82	1.06	0.76	6.66
1932	5.38	32.59	23.30	4.63	0.69	12.01	4.87	0.72	0.64	0.67	0.58	0.50
1933	0.49	35.04	32.67	56.98	17.42	16.13	6.00	0.85	0.91	4.17	2.08	0.60
1934	1.11	1.95	27.12	9.28	0.78	7.81	7.21	3.77	3.54	1.90	1.45	0.88
1935	0.94	0.56	0.28	0.44	36.32	19.13	2.97	7.63	3.48	1.46	0.80	0.71
1936	5.68	51.13	16.37	9.56	33.50	11.72	1.00	0.75	0.74	0.72	0.61	0.83
1937	1.28	0.60	3.34	17.42	14.66	4.54	16.53	6.21	1.14	1.33	1.31	0.69

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1938	1.40	4.89	21.19	25.59	53.00	15.84	0.92	1.23	1.12	1.78	1.30	13.80
1939	7.57	2.63	1.46	1.65	11.30	9.06	2.83	3.15	1.84	0.79	0.66	1.08
1940	1.54	1.95	1.48	1.92	1.97	1.98	1.68	0.84	0.61	0.67	0.61	0.42
1941	1.45	1.24	0.47	1.58	3.84	16.38	6.68	1.84	0.94	0.53	0.85	1.05
1942	7.15	35.57	35.78	13.94	2.62	15.11	13.93	4.29	1.91	1.38	12.20	6.53
1943	7.90	19.24	25.00	7.82	6.62	15.82	5.24	0.82	1.41	1.51	0.78	26.74
1944	10.57	0.96	0.43	1.02	13.31	10.32	2.56	0.87	0.76	0.64	0.50	0.45
1945	6.23	2.43	0.71	15.05	7.56	11.11	4.81	1.60	0.91	0.70	0.53	0.45
1946	0.72	2.28	1.71	2.54	3.57	9.45	8.98	2.67	6.05	3.16	0.70	1.12
1947	1.25	29.50	21.19	15.64	22.97	13.05	3.43	1.03	0.78	0.76	0.62	0.55
1948	6.34	2.71	0.81	0.71	6.83	3.57	1.38	0.92	0.59	0.67	0.62	0.70
1949	0.74	1.62	1.47	3.49	28.14	24.65	6.52	3.50	1.80	1.03	4.00	2.04
1950	1.50	0.82	21.13	8.12	1.24	1.51	0.98	0.66	0.53	0.48	0.94	1.18
1951	8.32	2.99	0.37	1.14	15.04	5.72	1.17	0.81	0.70	0.78	0.55	0.82
1952	0.82	0.62	0.95	0.95	4.48	2.75	2.40	1.27	0.44	0.41	0.66	1.52
1953	2.57	3.28	2.58	1.93	4.89	14.15	4.81	5.29	3.57	1.34	0.53	0.86
1954	4.15	2.57	1.06	28.32	28.75	7.66	2.09	1.29	1.17	0.85	0.51	0.72
1955	1.28	2.14	1.05	0.21	3.47	25.60	8.50	0.80	1.25	0.86	0.49	0.71
1956	0.92	14.38	19.16	7.45	1.56	27.44	10.62	1.24	0.80	0.85	1.58	2.44
1957	2.70	1.40	1.14	20.13	8.42	1.40	2.24	1.32	0.62	0.68	0.51	0.53
1958	0.61	12.90	5.85	0.99	0.91	1.36	6.35	19.43	6.61	1.94	1.59	1.08
1959	0.85	1.61	1.88	1.02	3.56	2.30	2.14	1.33	0.56	0.63	0.88	1.83
1960	1.40	3.98	8.46	6.60	3.00	7.22	4.16	2.04	1.02	0.58	0.58	0.58
1961	0.50	5.31	5.14	2.37	11.53	11.66	3.73	1.06	0.69	0.54	0.63	0.44
1962	1.44	12.05	5.65	23.29	11.48	42.10	14.51	1.02	0.77	1.46	0.91	0.51
1963	9.24	18.53	5.75	4.92	2.29	13.58	7.61	1.55	13.68	5.80	0.85	1.18
1964	12.98	4.72	0.78	1.01	3.95	1.54	0.78	0.77	25.46	9.87	1.96	1.06
1965	2.58	15.28	5.25	3.46	10.91	3.63	0.54	6.96	3.32	0.74	0.96	1.09
1966	0.91	0.85	1.05	1.81	19.31	41.97	18.31	3.24	1.72	1.68	0.87	0.48
1967	0.88	1.74	0.71	0.36	1.04	1.33	1.27	0.67	0.39	0.46	0.75	0.94
1968	1.19	1.31	0.79	0.29	2.06	25.27	8.50	0.99	0.75	0.66	0.55	0.53
1969	2.19	1.52	1.52	0.83	4.57	1.92	0.32	0.69	1.49	1.04	8.72	4.39
1970	14.50	5.50	0.92	1.21	1.82	1.88	1.51	2.19	1.76	1.71	4.70	2.37
1971	16.37	6.65	1.67	5.97	40.36	17.46	2.17	0.82	0.80	0.69	0.52	0.44
1972	0.70	10.61	4.14	0.73	22.25	21.90	5.91	0.83	0.62	0.77	1.03	0.85
1973	1.64	2.30	1.67	35.64	21.26	31.71	11.11	2.87	1.91	1.03	0.74	0.51
1974	0.61	3.15	1.58	0.93	0.90	2.05	1.35	0.50	0.41	0.45	0.37	7.52
1975	2.93	1.64	38.61	38.41	32.01	67.64	20.42	5.10	2.41	1.12	0.85	1.51
1976	37.71	12.65	1.00	1.40	1.96	2.28	1.39	0.65	0.54	0.78	0.84	2.83
1977	2.44	2.15	2.22	2.14	1.40	1.67	84.92	28.61	0.86	0.66	0.81	1.65
1978	5.73	3.02	8.88	3.71	1.80	2.07	1.00	0.71	0.60	2.81	1.80	0.72
1979	1.13	0.73	0.46	0.78	1.33	1.88	1.21	0.55	0.38	0.47	0.37	7.24
1980	3.10	1.41	1.38	2.60	21.86	7.97	0.67	1.88	1.67	0.83	0.91	0.56
1981	0.41	0.46	1.74	2.83	1.37	28.80	10.17	0.73	0.91	1.29	0.71	0.65

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1982	1.22	2.23	0.83	0.23	0.26	0.85	1.34	0.94	0.55	0.63	0.44	0.54
1983	1.28	11.44	13.45	4.57	2.38	15.38	6.71	1.41	1.24	1.41	0.87	0.59
1984	4.13	7.04	2.39	11.56	47.86	14.99	0.92	0.67	0.61	0.60	0.47	0.49
1985	17.62	12.60	11.28	4.17	9.16	9.51	2.79	0.68	0.64	0.74	1.57	2.05
1986	19.90	19.93	5.45	1.20	1.20	3.21	1.62	0.65	0.80	0.70	1.33	62.21
1987	25.09	3.65	2.05	2.04	41.84	26.54	5.59	1.93	1.33	1.13	1.10	1.23
1988	1.69	6.79	17.39	6.34	43.84	15.56	17.46	6.62	1.08	1.90	1.04	0.57
1989	4.14	53.33	17.53	1.53	0.68	8.98	4.56	1.06	0.91	0.79	1.65	1.10
1990	1.82	1.10	1.06	1.64	1.62	0.90	0.42	0.46	0.57	0.49	0.40	1.09
1991	19.07	8.03	17.77	6.45	0.90	0.76	1.08	0.62	0.47	0.45	0.42	0.73
1992	0.76	0.68	0.35	0.53	1.00	1.33	1.36	0.75	0.34	0.32	0.38	1.55
1993	13.37	5.70	8.82	10.65	19.94	29.90	8.40	0.79	0.84	1.16	1.13	0.53
1994	0.70	0.42	1.23	1.71	0.98	19.38	12.36	2.93	1.09	0.80	0.49	0.68
1995	1.41	1.37	33.82	43.82	24.59	6.57	1.13	0.82	0.75	1.04	0.72	0.57
1996	0.89	18.00	10.78	3.44	1.26	2.64	3.44	1.73	36.22	15.67	2.27	0.89
1997	1.43	2.00	1.19	14.75	41.51	64.41	18.58	3.19	2.04	2.42	2.15	1.48
1998	1.21	13.28	23.48	7.78	8.87	4.64	1.16	0.81	0.82	0.81	0.67	0.54
1999	5.77	3.08	12.21	32.97	24.01	40.72	25.45	6.10	1.46	1.13	0.85	1.19
2000	1.53	2.06	1.62	7.85	6.78	2.96	1.68	0.92	0.60	0.59	0.52	0.70
2001	2.02	36.79	18.47	10.14	3.81	5.38	2.34	1.55	1.42	2.11	2.77	1.83
2002	0.86	0.71	0.65	1.41	1.43	2.20	1.59	1.12	0.91	0.59	0.65	1.50
2003	0.92	0.96	0.72	6.61	3.16	25.75	9.20	0.73	0.62	1.88	1.41	14.64
2004	5.50	1.23	1.14	39.84	14.26	2.21	1.29	0.92	0.69	0.56	0.71	0.56
2005	0.78	10.93	4.12	1.26	3.60	2.89	6.56	3.57	1.25	0.85	5.41	11.11
2006	23.74	11.03	3.24	1.24	1.00	1.11	1.60	0.87	0.87	0.74	0.55	0.48
2007	4.73	2.74	0.89	1.05	5.58	3.23	3.11	1.57	1.58	1.21	0.59	0.44
2008	0.54	0.85	1.05	0.71	8.62	3.16	0.49	0.83	0.79	0.51	0.62	0.62
2009	4.34	1.87	0.37	11.94	4.85	0.99	0.70	0.50	0.87	0.75	0.41	0.26

Table B2- 13 Simulated Natural Streamflow Time-Series (T35L1.INC) for Quaternary T35L1 (million m³) 1920 – 2009

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.47	0.37	0.47	3.90	1.58	5.96	3.51	0.72	0.13	0.10	0.07	0.17
1921	0.93	4.26	5.41	1.64	0.42	0.31	0.12	2.47	1.23	0.45	0.64	0.42
1922	0.71	7.74	2.54	10.43	11.19	5.45	1.10	0.10	0.11	6.43	2.30	0.14
1923	0.16	0.14	0.85	1.79	5.36	2.63	0.47	0.12	0.13	0.10	0.15	0.20
1924	0.28	0.37	7.41	2.56	0.44	14.34	9.34	1.70	0.14	0.10	0.07	0.12
1925	0.10	1.56	0.68	0.41	0.80	6.22	2.10	0.23	0.49	0.36	0.14	0.30
1926	1.26	0.73	2.56	1.08	0.37	16.95	5.63	0.11	0.10	0.11	0.18	0.20
1927	0.33	0.18	4.70	8.80	3.07	1.63	0.64	0.20	0.16	0.12	0.26	0.18
1928	0.23	0.90	1.65	0.74	3.46	11.71	3.52	0.20	0.83	0.71	0.36	1.04
1929	5.29	3.19	1.93	5.43	1.77	6.51	2.58	0.32	0.18	0.17	0.47	0.42
1930	0.38	0.15	0.29	5.19	4.68	7.42	2.32	0.15	0.10	9.27	3.20	0.10
1931	0.35	0.54	0.46	0.50	9.59	3.37	0.17	0.15	0.16	0.23	0.17	2.16
1932	1.86	9.57	7.39	1.50	0.18	5.29	1.92	0.14	0.10	0.10	0.08	0.07
1933	0.08	9.15	9.56	17.84	5.96	6.27	2.12	0.13	0.14	1.50	0.66	0.10
1934	0.28	0.87	7.45	2.59	0.30	4.47	3.63	1.64	1.24	0.53	0.31	0.20
1935	0.21	0.13	0.04	0.26	12.33	8.49	1.57	2.13	0.92	0.35	0.21	0.13
1936	2.07	14.03	4.40	5.00	11.62	5.05	0.74	0.10	0.10	0.09	0.07	0.15
1937	0.31	0.17	1.54	7.13	5.91	2.45	5.65	1.89	0.24	0.28	0.28	0.15
1938	0.41	2.36	6.36	8.78	16.19	4.81	0.30	0.26	0.21	0.39	0.32	4.47
1939	2.77	0.90	0.39	1.85	4.30	4.64	1.41	1.51	0.71	0.16	0.12	0.25
1940	0.42	0.61	0.40	2.47	1.78	1.29	0.70	0.26	0.14	0.15	0.13	0.09
1941	0.52	0.37	0.14	2.16	2.78	7.07	2.55	0.56	0.26	0.11	0.19	0.25
1942	2.39	10.64	10.58	6.27	1.56	6.37	5.34	1.38	0.44	0.30	3.72	2.41
1943	2.58	6.25	7.72	3.05	3.67	6.90	2.03	0.12	0.28	0.32	0.16	7.68
1944	3.00	0.28	0.05	1.00	5.01	5.23	1.35	0.18	0.14	0.11	0.07	0.06
1945	2.21	0.79	0.22	6.29	4.21	5.79	2.05	0.43	0.23	0.14	0.09	0.07
1946	0.17	1.36	0.76	2.64	3.07	5.57	4.55	1.12	2.48	1.09	0.18	0.30
1947	0.37	8.90	6.51	7.00	8.55	6.49	1.75	0.23	0.11	0.11	0.07	0.06
1948	2.43	0.96	0.26	0.32	4.07	2.16	0.61	0.27	0.13	0.14	0.13	0.16
1949	0.20	0.68	0.47	3.36	9.72	8.94	2.38	1.45	0.64	0.23	1.43	0.67
1950	0.42	0.24	6.20	3.02	0.66	1.26	0.59	0.15	0.10	0.08	0.21	0.29
1951	2.78	0.94	0.10	0.93	5.46	2.05	0.47	0.25	0.15	0.16	0.11	0.20
1952	0.21	0.16	0.25	0.43	2.60	1.93	1.19	0.41	0.10	0.09	0.16	0.42
1953	1.03	1.64	1.30	1.42	2.86	6.36	1.96	1.98	1.12	0.35	0.12	0.19
1954	1.87	0.95	0.32	9.36	9.86	2.75	0.72	0.37	0.26	0.17	0.08	0.13
1955	0.33	1.16	0.46	0.07	2.22	9.44	2.95	0.18	0.32	0.22	0.10	0.14
1956	0.23	4.67	5.62	4.56	1.34	8.25	3.14	0.38	0.15	0.15	0.35	0.78
1957	0.88	0.40	0.33	7.55	4.20	0.95	1.24	0.54	0.12	0.14	0.09	0.10
1958	0.13	3.77	1.88	0.45	0.41	1.03	2.67	5.94	1.87	0.52	0.46	0.30
1959	0.22	0.66	0.57	0.41	2.75	1.48	0.82	0.37	0.12	0.13	0.21	0.62
1960	0.40	1.30	2.83	4.00	2.32	4.54	1.86	0.57	0.28	0.12	0.11	0.11
1961	0.10	2.02	2.54	1.77	4.67	5.32	1.53	0.25	0.14	0.09	0.12	0.08

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1962	0.38	4.01	2.28	8.50	4.93	13.86	4.67	0.31	0.12	0.31	0.23	0.08
1963	2.44	5.02	1.50	3.09	1.33	6.39	3.82	0.73	3.99	1.56	0.17	0.24
1964	4.12	1.40	0.22	0.62	2.33	0.87	0.23	0.18	6.95	2.64	0.50	0.28
1965	1.52	5.29	1.65	2.56	5.24	1.53	0.11	2.12	0.93	0.16	0.20	0.25
1966	0.22	0.23	0.28	2.04	7.58	14.72	6.25	0.98	0.42	0.41	0.21	0.07
1967	0.21	0.52	0.20	0.15	0.44	0.75	0.50	0.20	0.08	0.09	0.19	0.26
1968	0.33	0.40	0.26	0.14	2.27	8.92	2.77	0.24	0.18	0.14	0.11	0.11
1969	1.03	0.57	0.44	0.35	3.14	1.19	0.12	0.19	0.42	0.29	2.67	1.32
1970	4.44	1.62	0.30	0.80	1.37	1.31	0.66	0.69	0.47	0.47	1.54	0.72
1971	5.40	2.18	0.52	4.34	13.47	7.10	1.19	0.15	0.14	0.11	0.07	0.05
1972	0.15	3.59	1.36	0.36	6.98	8.09	2.14	0.18	0.10	0.14	0.22	0.19
1973	0.64	1.15	0.60	11.43	7.43	10.91	3.65	1.40	0.70	0.21	0.11	0.06
1974	0.09	1.51	0.64	0.41	0.43	2.39	0.96	0.14	0.08	0.09	0.07	2.49
1975	0.91	0.88	11.62	13.44	12.02	21.31	6.26	1.80	0.78	0.20	0.13	0.38
1976	10.65	3.51	0.33	1.05	1.70	2.35	0.86	0.15	0.09	0.15	0.18	1.15
1977	0.81	0.69	1.42	2.90	1.18	1.81	22.41	7.39	0.26	0.11	0.15	0.43
1978	2.19	1.11	3.66	1.55	1.71	2.23	0.73	0.17	0.13	1.39	0.67	0.18
1979	0.32	0.21	0.13	0.32	1.02	1.77	0.72	0.17	0.09	0.11	0.08	2.54
1980	1.01	0.38	0.39	2.49	7.89	3.20	0.42	1.02	0.57	0.19	0.23	0.15
1981	0.09	0.11	1.63	3.29	1.13	10.10	3.51	0.19	0.22	0.33	0.19	0.14
1982	0.34	0.98	0.33	0.11	0.11	0.48	0.54	0.31	0.16	0.15	0.11	0.15
1983	0.36	3.95	4.18	2.45	2.34	6.64	2.56	0.39	0.29	0.35	0.22	0.12
1984	1.58	3.26	1.01	4.58	14.60	4.60	0.38	0.12	0.10	0.09	0.06	0.07
1985	5.38	4.50	4.17	2.26	4.74	5.93	1.64	0.12	0.10	0.13	0.37	0.57
1986	6.32	6.26	1.57	0.68	0.58	3.12	1.21	0.15	0.17	0.13	0.33	16.65
1987	7.24	1.51	0.69	2.15	12.66	9.11	2.01	0.48	0.32	0.22	0.21	0.27
1988	0.48	2.42	4.93	2.48	14.23	5.68	5.72	1.92	0.19	0.44	0.28	0.08
1989	1.70	15.45	4.99	1.26	0.52	3.25	1.54	0.33	0.18	0.14	0.40	0.31
1990	0.62	0.33	0.28	1.78	0.97	0.38	0.17	0.09	0.13	0.11	0.09	0.33
1991	5.46	2.71	5.54	2.07	0.41	0.33	0.39	0.21	0.09	0.08	0.07	0.17
1992	0.20	0.20	0.10	0.24	0.40	0.54	0.50	0.23	0.09	0.07	0.08	0.60
1993	4.21	1.72	3.94	5.45	8.03	11.02	2.96	0.15	0.15	0.22	0.23	0.11
1994	0.14	0.09	0.33	1.26	0.62	7.61	4.95	1.04	0.27	0.18	0.08	0.14
1995	0.39	0.38	8.51	13.55	9.18	3.99	0.86	0.14	0.12	0.21	0.15	0.10
1996	0.20	4.57	3.65	2.45	0.85	2.99	2.57	0.79	10.90	4.86	0.68	0.18
1997	0.33	0.52	0.33	6.12	13.84	22.17	6.44	1.21	0.71	0.99	0.71	0.44
1998	0.34	4.06	7.25	3.37	4.61	3.23	0.82	0.15	0.14	0.13	0.11	0.08
1999	2.09	0.99	3.93	10.96	7.15	13.44	8.82	1.90	0.30	0.22	0.15	0.26
2000	0.38	1.03	0.58	4.57	4.22	2.23	0.83	0.27	0.12	0.11	0.09	0.14
2001	1.02	9.72	5.93	5.89	2.05	3.85	1.44	0.39	0.36	0.56	0.75	0.53
2002	0.25	0.20	0.19	1.71	0.95	2.46	1.02	0.30	0.24	0.15	0.15	0.43
2003	0.26	0.28	0.21	3.61	1.52	9.23	3.23	0.19	0.13	0.53	0.36	4.39
2004	1.58	0.35	0.35	12.94	5.22	1.67	0.66	0.21	0.14	0.10	0.14	0.11
2005	0.19	4.31	1.54	0.88	2.40	2.71	2.63	1.06	0.33	0.20	2.25	4.74

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2006	7.07	3.65	1.54	0.61	0.47	0.58	0.64	0.30	0.20	0.16	0.10	0.09
2007	1.86	0.93	0.26	0.52	2.49	2.00	1.51	0.55	0.44	0.34	0.16	0.09
2008	0.14	0.26	0.27	0.29	4.45	1.56	0.19	0.23	0.20	0.12	0.15	0.17
2009	1.66	0.65	0.13	5.95	2.25	0.47	0.30	0.14	0.22	0.20	0.10	0.05

Table B2- 14 Simulated Natural Streamflow Time-Series (T35L2.INC) for Quaternary T35L2 (million m³) 1920 – 2009

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.67	0.52	0.68	3.40	1.42	5.99	3.95	0.94	0.20	0.15	0.12	0.25
1921	1.33	6.08	7.71	2.17	0.37	0.24	0.09	3.39	1.72	0.65	0.92	0.60
1922	1.02	11.03	3.63	12.48	13.60	5.22	0.88	0.15	0.17	9.18	3.29	0.21
1923	0.25	0.20	1.23	1.00	5.70	2.32	0.30	0.16	0.18	0.14	0.22	0.29
1924	0.40	0.53	10.56	3.53	0.41	17.50	12.01	2.32	0.21	0.16	0.11	0.18
1925	0.14	2.23	0.98	0.42	0.60	6.55	2.27	0.32	0.70	0.51	0.20	0.43
1926	1.80	1.04	3.65	1.39	0.32	21.25	7.04	0.16	0.15	0.16	0.27	0.29
1927	0.47	0.26	6.70	10.17	3.09	0.81	0.42	0.28	0.23	0.18	0.37	0.26
1928	0.34	1.29	2.36	0.89	3.39	13.63	4.17	0.29	1.18	1.01	0.51	1.50
1929	7.55	4.56	2.76	5.55	1.76	6.95	2.87	0.42	0.27	0.26	0.68	0.61
1930	0.56	0.22	0.43	5.17	4.62	7.79	2.51	0.20	0.15	13.21	4.56	0.15
1931	0.49	0.78	0.67	0.51	11.74	4.02	0.14	0.21	0.23	0.33	0.25	3.09
1932	2.65	13.63	10.52	2.09	0.16	5.22	1.96	0.18	0.14	0.15	0.13	0.10
1933	0.11	13.03	13.62	22.79	6.93	6.59	2.32	0.19	0.21	2.15	0.96	0.14
1934	0.41	1.25	10.61	3.53	0.25	4.09	4.15	2.24	1.77	0.75	0.44	0.28
1935	0.29	0.19	0.05	0.23	15.63	9.19	1.50	2.97	1.30	0.50	0.29	0.19
1936	2.96	19.99	6.28	5.04	14.25	4.88	0.41	0.16	0.15	0.14	0.12	0.21
1937	0.45	0.25	2.20	7.84	6.28	1.86	7.50	2.65	0.35	0.41	0.41	0.22
1938	0.60	3.37	9.06	10.16	20.60	6.11	0.26	0.37	0.31	0.56	0.46	6.38
1939	3.96	1.30	0.56	1.02	4.21	4.08	1.29	2.10	1.00	0.23	0.18	0.36
1940	0.61	0.88	0.59	1.69	1.09	0.74	0.67	0.35	0.19	0.21	0.19	0.13
1941	0.74	0.53	0.20	1.39	2.23	7.33	2.84	0.78	0.40	0.16	0.27	0.37
1942	3.41	15.17	15.08	6.74	1.41	6.60	6.50	1.88	0.63	0.43	5.30	3.44
1943	3.67	8.91	11.01	3.22	3.69	7.12	2.14	0.18	0.40	0.46	0.23	10.95
1944	4.28	0.40	0.07	0.45	5.58	4.91	1.22	0.25	0.21	0.16	0.11	0.10
1945	3.16	1.14	0.31	6.69	4.05	5.60	2.14	0.60	0.32	0.20	0.14	0.11
1946	0.24	1.95	1.09	1.86	2.55	5.31	5.44	1.50	3.54	1.57	0.25	0.42
1947	0.53	12.69	9.28	7.70	9.93	6.55	1.74	0.30	0.17	0.16	0.12	0.10
1948	3.47	1.37	0.38	0.32	4.21	1.84	0.57	0.36	0.18	0.20	0.19	0.23
1949	0.28	0.97	0.67	2.73	11.59	9.85	2.58	2.01	0.90	0.33	2.05	0.96
1950	0.60	0.34	8.84	3.33	0.49	0.63	0.42	0.20	0.14	0.12	0.30	0.41
1951	3.97	1.35	0.14	0.46	6.20	2.30	0.48	0.31	0.21	0.23	0.16	0.28
1952	0.30	0.23	0.36	0.41	2.22	1.22	1.22	0.54	0.14	0.12	0.22	0.59
1953	1.47	2.33	1.85	0.90	2.61	6.40	2.02	2.78	1.60	0.50	0.17	0.28
1954	2.67	1.36	0.45	10.92	11.72	3.07	0.77	0.49	0.38	0.25	0.12	0.20
1955	0.48	1.66	0.67	0.07	2.03	10.59	3.37	0.26	0.46	0.31	0.14	0.21

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1956	0.34	6.66	8.01	4.42	1.14	9.16	3.58	0.53	0.22	0.23	0.51	1.12
1957	1.27	0.57	0.48	8.39	4.09	0.78	1.29	0.63	0.17	0.19	0.13	0.14
1958	0.18	5.38	2.69	0.51	0.37	0.57	3.33	8.41	2.66	0.74	0.65	0.43
1959	0.31	0.95	0.82	0.43	2.47	1.23	0.83	0.46	0.17	0.19	0.30	0.89
1960	0.57	1.86	4.03	3.64	1.65	4.00	1.89	0.79	0.39	0.17	0.17	0.17
1961	0.15	2.88	3.62	1.38	5.07	5.04	1.46	0.35	0.21	0.14	0.19	0.12
1962	0.55	5.72	3.25	9.72	5.02	16.74	5.74	0.47	0.17	0.45	0.33	0.11
1963	3.48	7.15	2.14	2.48	1.14	6.59	4.37	0.95	5.68	2.23	0.24	0.36
1964	5.87	2.00	0.31	0.48	2.06	0.78	0.24	0.24	9.89	3.76	0.72	0.40
1965	2.17	7.54	2.36	1.88	5.49	1.69	0.14	2.97	1.32	0.23	0.30	0.37
1966	0.32	0.34	0.41	1.20	8.71	17.87	7.75	1.31	0.61	0.59	0.30	0.10
1967	0.30	0.75	0.30	0.13	0.42	0.56	0.50	0.26	0.11	0.13	0.27	0.36
1968	0.48	0.58	0.38	0.14	2.01	9.85	3.13	0.33	0.25	0.20	0.17	0.17
1969	1.47	0.82	0.64	0.37	3.00	1.12	0.10	0.25	0.59	0.41	3.80	1.88
1970	6.33	2.32	0.43	0.53	0.86	0.74	0.62	0.93	0.67	0.67	2.19	1.02
1971	7.70	3.11	0.74	3.99	16.79	7.45	1.00	0.21	0.20	0.16	0.10	0.08
1972	0.22	5.12	1.94	0.35	8.19	8.62	2.27	0.24	0.15	0.21	0.33	0.27
1973	0.91	1.65	0.87	13.77	8.37	12.58	4.33	1.94	0.98	0.29	0.17	0.09
1974	0.14	2.16	0.92	0.40	0.38	1.39	0.68	0.18	0.11	0.12	0.09	3.54
1975	1.30	1.26	16.56	16.65	14.71	27.10	7.96	2.51	1.11	0.29	0.20	0.54
1976	15.17	5.01	0.46	0.61	1.21	1.30	0.60	0.19	0.12	0.21	0.25	1.63
1977	1.16	0.99	2.03	2.27	0.93	0.78	30.87	10.38	0.49	0.17	0.23	0.62
1978	3.13	1.59	5.22	2.02	1.35	1.17	0.42	0.23	0.18	1.98	0.95	0.26
1979	0.47	0.31	0.19	0.29	0.59	0.78	0.48	0.22	0.12	0.15	0.12	3.62
1980	1.44	0.55	0.56	1.70	9.10	3.28	0.30	1.40	0.80	0.27	0.34	0.22
1981	0.13	0.16	2.33	2.74	0.88	11.76	4.10	0.25	0.31	0.48	0.28	0.21
1982	0.50	1.40	0.48	0.08	0.08	0.37	0.60	0.41	0.23	0.21	0.16	0.21
1983	0.51	5.64	5.96	1.92	1.71	6.76	2.71	0.49	0.42	0.51	0.31	0.18
1984	2.26	4.64	1.45	4.36	18.40	5.80	0.34	0.17	0.15	0.13	0.09	0.11
1985	7.67	6.41	5.95	2.05	5.15	5.84	1.61	0.18	0.15	0.19	0.54	0.82
1986	9.00	8.92	2.24	0.48	0.51	2.28	0.98	0.19	0.23	0.19	0.46	23.72
1987	10.32	2.16	0.99	1.32	15.79	10.10	2.09	0.67	0.46	0.32	0.31	0.39
1988	0.70	3.46	7.03	2.43	18.44	6.50	7.59	2.69	0.28	0.63	0.40	0.12
1989	2.44	22.02	7.11	0.58	0.27	2.65	1.49	0.45	0.26	0.20	0.57	0.44
1990	0.89	0.48	0.41	0.92	0.68	0.32	0.14	0.12	0.18	0.16	0.12	0.47
1991	7.79	3.86	7.89	2.75	0.35	0.25	0.41	0.26	0.13	0.12	0.11	0.25
1992	0.29	0.28	0.15	0.21	0.37	0.44	0.49	0.28	0.12	0.09	0.11	0.86
1993	5.99	2.45	5.62	5.56	9.21	12.71	3.39	0.22	0.22	0.33	0.34	0.15
1994	0.19	0.13	0.48	0.64	0.41	8.33	5.98	1.40	0.38	0.25	0.13	0.21
1995	0.56	0.54	12.13	16.79	10.77	3.35	0.56	0.20	0.18	0.31	0.21	0.14
1996	0.29	6.51	5.20	1.85	0.54	2.18	2.72	1.03	15.53	6.93	0.97	0.25
1997	0.46	0.75	0.49	6.48	17.32	28.30	8.19	1.67	0.99	1.41	1.01	0.63
1998	0.48	5.78	10.34	3.30	4.93	2.49	0.52	0.22	0.21	0.20	0.17	0.12
1999	2.98	1.42	5.60	13.14	7.99	16.11	11.37	2.61	0.44	0.31	0.22	0.37

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2000	0.55	1.48	0.84	4.37	4.03	1.46	0.70	0.37	0.17	0.16	0.14	0.21
2001	1.45	13.85	8.45	6.20	2.05	3.17	1.29	0.55	0.51	0.79	1.08	0.75
2002	0.36	0.29	0.28	0.87	0.67	1.44	0.74	0.40	0.34	0.22	0.21	0.60
2003	0.37	0.41	0.31	3.07	1.34	10.44	3.68	0.25	0.19	0.76	0.51	6.26
2004	2.26	0.49	0.50	15.89	5.71	0.83	0.49	0.30	0.20	0.14	0.20	0.16
2005	0.28	6.14	2.21	0.51	2.09	1.72	2.86	1.40	0.48	0.29	3.21	6.75
2006	10.08	5.20	2.20	0.71	0.42	0.48	0.67	0.37	0.28	0.23	0.15	0.13
2007	2.66	1.32	0.37	0.42	2.27	1.26	1.65	0.74	0.62	0.48	0.22	0.13
2008	0.20	0.37	0.39	0.28	4.79	1.66	0.20	0.32	0.28	0.18	0.22	0.24
2009	2.36	0.93	0.18	6.29	2.36	0.38	0.27	0.16	0.30	0.28	0.15	0.07

Table B2- 15 Irrigation allocation Time-Series (T35A.IRR) for Quaternary Catchment T35A, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1941	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1944	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1945	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1946	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00
1947	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
1948	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.01
1949	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1950	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
1951	0.00	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.01
1952	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00
1953	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01
1954	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01
1955	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01
1956	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00
1957	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01
1958	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01
1959	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01
1960	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01
1961	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01
1962	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01
1963	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01
1964	0.00	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01
1965	0.01	0.00	0.02	0.01	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.01
1966	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01
1967	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1968	0.01	0.01	0.02	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
1969	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.01
1970	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01
1971	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1972	0.01	0.00	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
1973	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.02
1974	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
1975	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01
1976	0.00	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1977	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01
1978	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
1979	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00
1980	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.01	0.02
1981	0.02	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.01
1982	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01
1983	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.02
1984	0.01	0.01	0.02	0.01	0.00	0.02	0.01	0.01	0.01	0.01	0.02	0.02
1985	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1986	0.00	0.00	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00
1987	0.01	0.01	0.02	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01
1988	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.02	0.02
1989	0.01	0.00	0.02	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02
1990	0.01	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.01
1991	0.00	0.01	0.00	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.01
1992	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
1993	0.00	0.01	0.01	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.01	0.02

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994	0.02	0.02	0.02	0.01	0.02	0.00	0.00	0.01	0.01	0.01	0.02	0.02
1995	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02
1996	0.02	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.01	0.02	0.02
1997	0.01	0.01	0.02	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02
1998	0.02	0.00	0.01	0.01	0.00	0.01	0.02	0.01	0.01	0.01	0.02	0.02
1999	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.01
2000	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01
2001	0.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2002	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.01
2003	0.02	0.02	0.03	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.02	0.00
2004	0.02	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02
2005	0.02	0.01	0.03	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01
2006	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.02
2007	0.01	0.02	0.02	0.02	0.01	0.01	0.00	0.02	0.00	0.02	0.02	0.02
2008	0.02	0.02	0.01	0.02	0.00	0.03	0.02	0.01	0.01	0.02	0.02	0.02
2009	0.01	0.02	0.03	0.00	0.02	0.02	0.01	0.02	0.01	0.02	0.02	0.03

Table B2- 16 Irrigation allocation Time-Series (T35B.IRR) for Quaternary Catchment T35B, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
1924	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01
1925	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.01	0.00
1926	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
1927	0.01	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1928	0.01	0.01	0.01	0.02	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.01
1929	0.00	0.01	0.01	0.00	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.02
1930	0.01	0.03	0.02	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.02	0.02
1931	0.02	0.02	0.02	0.02	0.00	0.02	0.02	0.01	0.01	0.01	0.02	0.01
1932	0.01	0.00	0.01	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02
1933	0.03	0.00	0.01	0.00	0.02	0.00	0.02	0.02	0.01	0.00	0.03	0.03
1934	0.02	0.02	0.01	0.04	0.02	0.01	0.00	0.01	0.01	0.02	0.01	0.03
1935	0.03	0.04	0.05	0.03	0.00	0.02	0.02	0.00	0.02	0.01	0.03	0.02
1936	0.02	0.00	0.04	0.02	0.00	0.01	0.03	0.02	0.02	0.02	0.03	0.03
1937	0.03	0.04	0.04	0.01	0.00	0.02	0.00	0.02	0.01	0.02	0.02	0.04
1938	0.02	0.03	0.01	0.00	0.00	0.03	0.03	0.02	0.02	0.01	0.03	0.01
1939	0.02	0.03	0.05	0.04	0.01	0.03	0.02	0.01	0.02	0.03	0.04	0.03
1940	0.03	0.04	0.04	0.03	0.03	0.03	0.02	0.03	0.02	0.03	0.04	0.04
1941	0.03	0.05	0.06	0.03	0.01	0.01	0.01	0.02	0.03	0.03	0.03	0.03
1942	0.02	0.02	0.01	0.03	0.04	0.00	0.00	0.02	0.02	0.03	0.01	0.02

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1943	0.02	0.01	0.02	0.04	0.04	0.01	0.04	0.03	0.02	0.03	0.05	0.01
1944	0.03	0.06	0.07	0.05	0.01	0.02	0.04	0.03	0.03	0.04	0.05	0.05
1945	0.02	0.07	0.06	0.01	0.03	0.02	0.02	0.02	0.03	0.04	0.05	0.05
1946	0.05	0.04	0.06	0.03	0.02	0.01	0.01	0.04	0.00	0.04	0.05	0.03
1947	0.04	0.00	0.01	0.02	0.00	0.03	0.02	0.03	0.04	0.04	0.06	0.06
1948	0.03	0.06	0.06	0.06	0.03	0.04	0.03	0.03	0.04	0.04	0.05	0.05
1949	0.06	0.06	0.06	0.04	0.00	0.01	0.02	0.01	0.04	0.03	0.02	0.05
1950	0.03	0.07	0.00	0.05	0.04	0.04	0.04	0.04	0.04	0.05	0.04	0.05
1951	0.02	0.09	0.08	0.06	0.00	0.05	0.03	0.04	0.03	0.04	0.06	0.04
1952	0.06	0.05	0.06	0.06	0.01	0.05	0.01	0.05	0.04	0.05	0.05	0.03
1953	0.04	0.04	0.06	0.05	0.03	0.01	0.05	0.01	0.02	0.05	0.07	0.05
1954	0.04	0.05	0.07	0.00	0.00	0.04	0.02	0.04	0.03	0.05	0.07	0.06
1955	0.05	0.05	0.08	0.10	0.03	0.00	0.05	0.04	0.03	0.05	0.07	0.05
1956	0.06	0.02	0.01	0.05	0.06	0.00	0.02	0.05	0.05	0.04	0.04	0.03
1957	0.04	0.07	0.08	0.00	0.05	0.06	0.02	0.05	0.05	0.05	0.08	0.07
1958	0.08	0.01	0.07	0.09	0.05	0.05	0.00	0.00	0.05	0.03	0.06	0.06
1959	0.08	0.05	0.07	0.07	0.03	0.06	0.02	0.04	0.04	0.05	0.06	0.04
1960	0.07	0.05	0.04	0.05	0.05	0.02	0.00	0.02	0.05	0.05	0.07	0.08
1961	0.09	0.04	0.05	0.06	0.01	0.02	0.02	0.05	0.05	0.06	0.07	0.09
1962	0.06	0.02	0.05	0.00	0.03	0.00	0.03	0.07	0.06	0.03	0.09	0.10
1963	0.02	0.01	0.11	0.05	0.07	0.01	0.01	0.06	0.00	0.05	0.07	0.05
1964	0.02	0.11	0.08	0.07	0.00	0.09	0.03	0.06	0.00	0.04	0.04	0.07
1965	0.04	0.02	0.12	0.03	0.02	0.12	0.06	0.00	0.05	0.06	0.05	0.06
1966	0.08	0.08	0.08	0.05	0.00	0.00	0.00	0.04	0.02	0.04	0.08	0.10
1967	0.06	0.06	0.13	0.11	0.07	0.07	0.04	0.07	0.05	0.06	0.06	0.07
1968	0.07	0.08	0.12	0.11	0.05	0.00	0.06	0.04	0.05	0.05	0.08	0.08
1969	0.04	0.09	0.07	0.12	0.05	0.11	0.07	0.04	0.02	0.07	0.00	0.06
1970	0.02	0.10	0.10	0.08	0.06	0.06	0.04	0.01	0.05	0.03	0.03	0.08
1971	0.00	0.08	0.09	0.05	0.00	0.04	0.07	0.06	0.05	0.07	0.10	0.10
1972	0.08	0.02	0.13	0.10	0.00	0.02	0.03	0.06	0.06	0.06	0.08	0.08
1973	0.06	0.07	0.11	0.00	0.01	0.00	0.05	0.03	0.04	0.07	0.09	0.12
1974	0.10	0.03	0.10	0.10	0.08	0.04	0.06	0.08	0.06	0.07	0.10	0.02
1975	0.13	0.06	0.00	0.01	0.01	0.00	0.05	0.00	0.06	0.06	0.10	0.05
1976	0.00	0.12	0.13	0.10	0.04	0.06	0.04	0.08	0.07	0.05	0.08	0.04
1977	0.07	0.06	0.10	0.08	0.09	0.05	0.00	0.07	0.07	0.08	0.08	0.05
1978	0.05	0.10	0.05	0.12	0.05	0.06	0.07	0.06	0.07	0.01	0.10	0.09
1979	0.08	0.12	0.13	0.11	0.08	0.07	0.08	0.08	0.07	0.07	0.11	0.03
1980	0.11	0.09	0.11	0.06	0.00	0.09	0.09	0.02	0.06	0.08	0.07	0.11
1981	0.12	0.11	0.11	0.09	0.09	0.00	0.06	0.08	0.04	0.05	0.12	0.09
1982	0.09	0.06	0.18	0.11	0.12	0.09	0.04	0.08	0.06	0.06	0.12	0.10
1983	0.07	0.02	0.05	0.09	0.06	0.01	0.03	0.07	0.04	0.06	0.11	0.11
1984	0.05	0.07	0.15	0.04	0.00	0.12	0.08	0.10	0.07	0.09	0.13	0.11
1985	0.00	0.04	0.02	0.07	0.06	0.07	0.09	0.10	0.07	0.07	0.06	0.07

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1986	0.01	0.02	0.14	0.11	0.08	0.06	0.08	0.10	0.05	0.09	0.06	0.00
1987	0.06	0.08	0.12	0.09	0.00	0.02	0.05	0.05	0.06	0.07	0.10	0.08
1988	0.09	0.06	0.00	0.10	0.00	0.07	0.00	0.09	0.07	0.05	0.14	0.15
1989	0.07	0.00	0.13	0.07	0.16	0.01	0.04	0.09	0.06	0.10	0.05	0.13
1990	0.07	0.15	0.14	0.07	0.08	0.11	0.12	0.08	0.07	0.10	0.13	0.09
1991	0.00	0.09	0.00	0.14	0.07	0.11	0.06	0.11	0.09	0.10	0.12	0.10
1992	0.13	0.13	0.18	0.14	0.08	0.06	0.05	0.10	0.09	0.10	0.12	0.06
1993	0.01	0.09	0.06	0.04	0.00	0.00	0.12	0.09	0.08	0.05	0.10	0.16
1994	0.13	0.17	0.12	0.06	0.13	0.00	0.02	0.08	0.07	0.10	0.15	0.11
1995	0.09	0.11	0.00	0.00	0.00	0.08	0.09	0.09	0.09	0.08	0.14	0.13
1996	0.11	0.00	0.06	0.05	0.13	0.05	0.03	0.09	0.00	0.03	0.13	0.13
1997	0.07	0.10	0.15	0.01	0.00	0.00	0.04	0.05	0.08	0.07	0.09	0.13
1998	0.12	0.00	0.05	0.10	0.00	0.09	0.11	0.10	0.08	0.10	0.15	0.16
1999	0.06	0.12	0.06	0.00	0.00	0.00	0.00	0.04	0.08	0.10	0.15	0.08
2000	0.11	0.10	0.14	0.05	0.06	0.07	0.06	0.11	0.10	0.10	0.15	0.10
2001	0.07	0.00	0.07	0.06	0.11	0.05	0.09	0.05	0.07	0.03	0.04	0.10
2002	0.17	0.15	0.12	0.12	0.11	0.08	0.07	0.06	0.08	0.12	0.12	0.07
2003	0.18	0.13	0.20	0.01	0.09	0.00	0.06	0.11	0.09	0.03	0.15	0.01
2004	0.14	0.07	0.14	0.00	0.10	0.07	0.07	0.09	0.11	0.12	0.12	0.16
2005	0.12	0.08	0.21	0.05	0.05	0.08	0.01	0.05	0.09	0.11	0.01	0.05
2006	0.00	0.08	0.13	0.14	0.12	0.12	0.05	0.14	0.07	0.13	0.15	0.17
2007	0.05	0.12	0.17	0.10	0.05	0.06	0.02	0.11	0.02	0.13	0.13	0.16
2008	0.17	0.14	0.08	0.15	0.00	0.22	0.11	0.09	0.08	0.13	0.11	0.15
2009	0.05	0.17	0.21	0.00	0.11	0.14	0.07	0.12	0.07	0.13	0.17	0.17

Table B2- 17 Irrigation Allocation Time-Series (T35C.IRR) for Quaternary Catchment T35C, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT

WATER RESOURCES

[illegible]

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 18 Irrigation Allocation Time-Series (T35D.IRR) for Quaternary Catchment T35D, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
1928	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00
1929	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01
1930	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01
1931	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.00
1932	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
1933	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01
1934	0.01	0.01	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.01
1935	0.01	0.02	0.02	0.02	0.00	0.01	0.01	0.00	0.01	0.00	0.01	0.01
1936	0.01	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
1937	0.01	0.02	0.02	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02
1938	0.01	0.01	0.00	0.00	0.00	0.02	0.02	0.01	0.01	0.00	0.01	0.00
1939	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01
1940	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02
1941	0.02	0.02	0.03	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
1942	0.01	0.01	0.00	0.02	0.02	0.00	0.00	0.01	0.01	0.01	0.00	0.01
1943	0.01	0.00	0.01	0.02	0.02	0.01	0.02	0.01	0.00	0.01	0.02	0.00
1944	0.02	0.03	0.03	0.03	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.02
1945	0.01	0.03	0.03	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.02
1946	0.02	0.02	0.03	0.02	0.01	0.01	0.01	0.02	0.00	0.01	0.02	0.01
1947	0.02	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.02	0.02
1948	0.01	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.02	0.01	0.02	0.02
1949	0.03	0.02	0.03	0.03	0.00	0.01	0.01	0.00	0.02	0.01	0.00	0.02
1950	0.01	0.03	0.00	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02
1951	0.01	0.04	0.04	0.03	0.00	0.03	0.02	0.02	0.01	0.01	0.02	0.02
1952	0.03	0.02	0.03	0.03	0.01	0.02	0.01	0.02	0.02	0.02	0.02	0.01
1953	0.02	0.02	0.03	0.03	0.02	0.01	0.02	0.00	0.00	0.02	0.03	0.02
1954	0.02	0.02	0.03	0.00	0.00	0.02	0.01	0.02	0.01	0.02	0.03	0.02
1955	0.02	0.02	0.04	0.06	0.01	0.00	0.03	0.02	0.01	0.02	0.03	0.02
1956	0.03	0.01	0.00	0.03	0.03	0.00	0.01	0.02	0.02	0.02	0.01	0.01
1957	0.02	0.03	0.04	0.00	0.03	0.03	0.01	0.02	0.02	0.02	0.03	0.03
1958	0.03	0.00	0.03	0.05	0.03	0.02	0.01	0.00	0.02	0.01	0.02	0.03
1959	0.04	0.02	0.03	0.04	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02
1960	0.03	0.02	0.02	0.03	0.03	0.02	0.01	0.01	0.02	0.02	0.03	0.03
1961	0.04	0.01	0.03	0.04	0.01	0.01	0.02	0.02	0.02	0.03	0.03	0.04

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1962	0.02	0.01	0.02	0.00	0.02	0.00	0.02	0.03	0.02	0.01	0.04	0.04
1963	0.01	0.00	0.05	0.03	0.04	0.01	0.01	0.03	0.00	0.02	0.03	0.02
1964	0.01	0.05	0.04	0.05	0.00	0.05	0.02	0.03	0.00	0.02	0.02	0.03
1965	0.02	0.01	0.06	0.02	0.02	0.06	0.04	0.00	0.02	0.03	0.02	0.03
1966	0.04	0.04	0.04	0.03	0.01	0.00	0.01	0.02	0.01	0.02	0.04	0.05
1967	0.03	0.03	0.07	0.06	0.04	0.04	0.03	0.03	0.03	0.03	0.03	0.03
1968	0.04	0.04	0.06	0.06	0.03	0.00	0.04	0.02	0.02	0.02	0.04	0.04
1969	0.02	0.04	0.04	0.07	0.03	0.06	0.05	0.02	0.01	0.03	0.00	0.03
1970	0.01	0.05	0.05	0.05	0.04	0.03	0.03	0.01	0.02	0.01	0.01	0.04
1971	0.00	0.04	0.04	0.04	0.00	0.02	0.04	0.03	0.02	0.03	0.04	0.05
1972	0.04	0.01	0.07	0.06	0.00	0.01	0.02	0.03	0.03	0.03	0.03	0.04
1973	0.03	0.04	0.05	0.00	0.01	0.00	0.03	0.01	0.02	0.03	0.04	0.06
1974	0.05	0.01	0.05	0.06	0.05	0.02	0.04	0.04	0.03	0.03	0.04	0.01
1975	0.07	0.03	0.00	0.02	0.02	0.00	0.03	0.00	0.03	0.03	0.04	0.02
1976	0.00	0.06	0.06	0.06	0.03	0.03	0.03	0.04	0.03	0.02	0.04	0.02
1977	0.04	0.03	0.05	0.05	0.06	0.03	0.00	0.03	0.03	0.04	0.03	0.02
1978	0.02	0.05	0.03	0.07	0.03	0.03	0.05	0.03	0.03	0.00	0.04	0.04
1979	0.04	0.06	0.06	0.07	0.05	0.04	0.05	0.04	0.03	0.03	0.05	0.01
1980	0.05	0.04	0.05	0.04	0.00	0.05	0.05	0.01	0.03	0.03	0.03	0.05
1981	0.06	0.05	0.06	0.06	0.06	0.00	0.04	0.04	0.02	0.02	0.05	0.04
1982	0.04	0.03	0.09	0.09	0.07	0.05	0.03	0.04	0.03	0.03	0.05	0.05
1983	0.03	0.01	0.02	0.05	0.04	0.01	0.02	0.03	0.01	0.02	0.05	0.05
1984	0.02	0.03	0.08	0.03	0.00	0.06	0.05	0.05	0.03	0.04	0.06	0.05
1985	0.00	0.02	0.01	0.05	0.04	0.04	0.06	0.05	0.03	0.03	0.02	0.03
1986	0.00	0.01	0.07	0.07	0.05	0.03	0.05	0.05	0.02	0.04	0.02	0.00
1987	0.03	0.04	0.06	0.06	0.00	0.01	0.03	0.02	0.03	0.03	0.04	0.04
1988	0.04	0.03	0.00	0.06	0.00	0.04	0.00	0.04	0.03	0.02	0.06	0.07
1989	0.03	0.00	0.07	0.05	0.09	0.01	0.03	0.05	0.02	0.04	0.01	0.06
1990	0.03	0.07	0.07	0.05	0.05	0.06	0.07	0.04	0.03	0.04	0.06	0.04
1991	0.00	0.04	0.00	0.08	0.04	0.06	0.04	0.05	0.04	0.04	0.05	0.05
1992	0.06	0.06	0.09	0.08	0.05	0.03	0.03	0.05	0.04	0.04	0.05	0.03
1993	0.00	0.04	0.03	0.03	0.01	0.00	0.07	0.04	0.03	0.02	0.04	0.08
1994	0.06	0.08	0.06	0.04	0.08	0.00	0.02	0.04	0.03	0.04	0.06	0.05
1995	0.04	0.05	0.00	0.00	0.01	0.04	0.05	0.04	0.04	0.03	0.06	0.06
1996	0.05	0.00	0.03	0.04	0.07	0.03	0.03	0.04	0.00	0.01	0.05	0.06
1997	0.03	0.05	0.08	0.02	0.00	0.00	0.03	0.02	0.04	0.03	0.04	0.06
1998	0.06	0.00	0.02	0.06	0.00	0.05	0.07	0.05	0.04	0.04	0.06	0.08
1999	0.03	0.05	0.03	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.07	0.04
2000	0.05	0.05	0.07	0.04	0.04	0.04	0.04	0.05	0.04	0.04	0.06	0.05
2001	0.03	0.00	0.03	0.04	0.07	0.03	0.06	0.02	0.03	0.01	0.01	0.04
2002	0.08	0.07	0.06	0.07	0.06	0.04	0.05	0.03	0.04	0.05	0.05	0.03
2003	0.09	0.06	0.10	0.02	0.05	0.00	0.04	0.05	0.04	0.00	0.06	0.00
2004	0.07	0.03	0.07	0.00	0.06	0.04	0.05	0.04	0.05	0.05	0.05	0.08
2005	0.06	0.03	0.10	0.04	0.03	0.04	0.01	0.02	0.04	0.04	0.00	0.02

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2006	0.00	0.04	0.06	0.08	0.07	0.06	0.04	0.07	0.03	0.05	0.06	0.08
2007	0.02	0.06	0.08	0.06	0.03	0.03	0.02	0.05	0.00	0.05	0.05	0.07
2008	0.08	0.06	0.04	0.09	0.01	0.11	0.07	0.04	0.03	0.05	0.04	0.07
2009	0.02	0.08	0.10	0.01	0.07	0.07	0.05	0.06	0.03	0.05	0.07	0.09

Table B2- 19 Irrigation Allocation Time-Series (T35E.IRR) for Quaternary Catchment T35E, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 20 Irrigation Allocation Time-Series (T35F.IRR) for Quaternary Catchment T35F, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1981	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1984	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1989	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1996	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1997	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
1999	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
2001	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2005	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
2008	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01

Table B2- 21 Irrigation Allocation Time-Series (T35G.IRR) for Quaternary Catchment T35G, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.01	0.00	0.01	0.02	0.01	0.02	0.02	0.00	0.00	0.01	0.01	0.01
1922	0.02	0.00	0.04	0.00	0.00	0.01	0.03	0.02	0.02	0.00	0.03	0.03
1923	0.05	0.05	0.04	0.04	0.02	0.03	0.04	0.03	0.03	0.04	0.04	0.04
1924	0.05	0.05	0.00	0.08	0.05	0.00	0.00	0.04	0.04	0.05	0.07	0.05
1925	0.09	0.05	0.10	0.08	0.06	0.02	0.06	0.04	0.01	0.06	0.08	0.04
1926	0.05	0.07	0.07	0.10	0.07	0.00	0.07	0.07	0.07	0.07	0.08	0.07
1927	0.07	0.13	0.02	0.00	0.07	0.07	0.08	0.06	0.06	0.08	0.06	0.11
1928	0.09	0.09	0.06	0.12	0.03	0.00	0.12	0.04	0.00	0.04	0.10	0.05
1929	0.02	0.06	0.07	0.03	0.15	0.02	0.04	0.10	0.06	0.09	0.05	0.11
1930	0.11	0.12	0.15	0.02	0.03	0.00	0.08	0.12	0.10	0.00	0.16	0.16
1931	0.11	0.13	0.15	0.17	0.00	0.15	0.15	0.08	0.10	0.08	0.17	0.03
1932	0.09	0.00	0.09	0.27	0.16	0.04	0.09	0.15	0.12	0.11	0.09	0.07
1933	0.07	0.00	0.03	0.00	0.16	0.01	0.14	0.15	0.11	0.01	0.21	0.16
1934	0.15	0.16	0.01	0.27	0.18	0.07	0.03	0.07	0.03	0.17	0.11	0.20
1935	0.13	0.07	0.03	0.12	0.00	0.15	0.19	0.00	0.14	0.09	0.19	0.10
1936	0.11	0.00	0.34	0.10	0.00	0.11	0.21	0.19	0.12	0.11	0.09	0.12
1937	0.17	0.07	0.17	0.09	0.03	0.20	0.00	0.19	0.11	0.13	0.18	0.19
1938	0.18	0.17	0.07	0.01	0.00	0.27	0.22	0.13	0.16	0.10	0.25	0.04
1939	0.14	0.22	0.23	0.24	0.09	0.17	0.14	0.03	0.17	0.20	0.09	0.14
1940	0.18	0.15	0.15	0.25	0.21	0.19	0.12	0.21	0.07	0.09	0.08	0.05
1941	0.12	0.11	0.04	0.27	0.08	0.05	0.07	0.14	0.22	0.08	0.14	0.14
1942	0.11	0.07	0.07	0.20	0.33	0.02	0.01	0.12	0.11	0.22	0.03	0.14
1943	0.15	0.06	0.12	0.30	0.24	0.07	0.29	0.24	0.10	0.22	0.17	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1944	0.24	0.23	0.05	0.16	0.07	0.14	0.29	0.23	0.11	0.08	0.07	0.06
1945	0.17	0.33	0.07	0.05	0.24	0.16	0.14	0.14	0.25	0.10	0.07	0.06
1946	0.09	0.20	0.14	0.24	0.14	0.10	0.05	0.33	0.00	0.28	0.22	0.14
1947	0.16	0.00	0.09	0.12	0.00	0.19	0.18	0.28	0.14	0.10	0.08	0.08
1948	0.21	0.18	0.10	0.15	0.23	0.33	0.21	0.21	0.07	0.08	0.07	0.07
1949	0.07	0.11	0.15	0.33	0.00	0.10	0.17	0.03	0.30	0.25	0.13	0.37
1950	0.25	0.17	0.00	0.39	0.32	0.33	0.20	0.08	0.07	0.06	0.12	0.13
1951	0.16	0.56	0.04	0.22	0.01	0.40	0.22	0.21	0.09	0.10	0.07	0.12
1952	0.11	0.13	0.19	0.23	0.13	0.35	0.07	0.34	0.06	0.05	0.08	0.21
1953	0.27	0.31	0.43	0.40	0.22	0.10	0.34	0.00	0.11	0.35	0.07	0.11
1954	0.27	0.30	0.14	0.00	0.00	0.33	0.09	0.33	0.18	0.14	0.07	0.09
1955	0.15	0.28	0.16	0.04	0.21	0.00	0.39	0.30	0.14	0.10	0.06	0.10
1956	0.11	0.11	0.13	0.39	0.46	0.00	0.16	0.36	0.10	0.12	0.24	0.23
1957	0.31	0.38	0.14	0.00	0.36	0.47	0.09	0.37	0.11	0.08	0.06	0.07
1958	0.07	0.11	0.52	0.36	0.24	0.31	0.03	0.00	0.40	0.17	0.38	0.11
1959	0.08	0.21	0.24	0.24	0.31	0.47	0.18	0.35	0.06	0.07	0.09	0.20
1960	0.14	0.34	0.38	0.44	0.44	0.22	0.09	0.22	0.34	0.06	0.07	0.07
1961	0.05	0.27	0.46	0.57	0.09	0.20	0.23	0.36	0.08	0.06	0.08	0.05
1962	0.17	0.15	0.46	0.00	0.33	0.00	0.32	0.35	0.09	0.19	0.12	0.06
1963	0.13	0.09	0.86	0.40	0.62	0.14	0.11	0.40	0.00	0.46	0.34	0.15
1964	0.17	0.80	0.12	0.24	0.11	0.81	0.30	0.15	0.00	0.37	0.37	0.26
1965	0.23	0.18	0.89	0.31	0.19	0.97	0.07	0.03	0.42	0.22	0.12	0.14
1966	0.10	0.09	0.14	0.45	0.05	0.00	0.03	0.41	0.20	0.38	0.19	0.05
1967	0.11	0.18	0.05	0.05	0.17	0.17	0.14	0.06	0.03	0.05	0.08	0.10
1968	0.12	0.12	0.05	0.04	0.44	0.00	0.57	0.33	0.12	0.07	0.05	0.05
1969	0.26	0.17	0.22	0.12	0.41	0.50	0.02	0.06	0.15	0.10	0.05	0.49
1970	0.21	0.79	0.10	0.32	0.36	0.26	0.17	0.14	0.33	0.18	0.25	0.31
1971	0.11	0.66	0.46	0.42	0.00	0.38	0.55	0.08	0.09	0.07	0.06	0.05
1972	0.09	0.22	0.87	0.13	0.00	0.20	0.32	0.39	0.07	0.08	0.10	0.09
1973	0.15	0.23	0.16	0.00	0.16	0.00	0.36	0.23	0.39	0.20	0.08	0.05
1974	0.07	0.35	0.70	0.21	0.20	0.43	0.26	0.04	0.04	0.05	0.04	0.16
1975	0.70	0.20	0.00	0.12	0.12	0.00	0.46	0.02	0.51	0.22	0.10	0.18
1976	0.00	1.03	0.39	0.21	0.42	0.53	0.40	0.15	0.05	0.09	0.11	0.28
1977	0.25	0.28	0.23	0.68	0.36	0.26	0.00	0.56	0.40	0.07	0.09	0.21
1978	0.42	0.40	0.49	0.81	0.48	0.57	0.29	0.06	0.05	0.07	0.56	0.07
1979	0.12	0.06	0.04	0.17	0.22	0.23	0.11	0.02	0.03	0.04	0.03	0.20
1980	0.70	0.15	0.17	0.53	0.00	0.73	0.38	0.10	0.34	0.07	0.10	0.06
1981	0.03	0.05	0.16	0.52	0.28	0.00	0.52	0.40	0.09	0.15	0.06	0.07
1982	0.12	0.35	0.10	0.02	0.04	0.09	0.15	0.08	0.04	0.07	0.04	0.05
1983	0.15	0.25	0.43	0.78	0.53	0.14	0.24	0.54	0.14	0.16	0.09	0.06
1984	0.43	0.49	0.11	0.35	0.00	1.03	0.48	0.06	0.05	0.06	0.04	0.06
1985	0.00	0.39	0.35	0.72	0.43	0.53	0.60	0.05	0.06	0.08	0.19	0.23
1986	0.09	0.20	1.14	0.34	0.31	0.52	0.34	0.05	0.08	0.07	0.15	0.00
1987	0.51	0.70	0.40	0.77	0.00	0.23	0.42	0.38	0.45	0.12	0.12	0.15

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988	0.17	0.46	0.02	0.89	0.00	0.61	0.00	0.75	0.57	0.22	0.09	0.05
1989	0.21	0.00	1.17	0.64	1.01	0.11	0.36	0.63	0.10	0.08	0.22	0.12
1990	0.23	0.11	0.10	0.69	0.72	0.61	0.02	0.03	0.05	0.04	0.04	0.09
1991	0.00	0.70	0.07	1.17	0.73	0.27	0.11	0.05	0.03	0.03	0.04	0.07
1992	0.07	0.06	0.01	0.10	0.31	0.33	0.23	0.08	0.01	0.01	0.03	0.16
1993	0.14	0.77	0.58	0.42	0.01	0.00	1.02	0.68	0.08	0.14	0.15	0.05
1994	0.07	0.04	0.16	0.64	1.08	0.00	0.12	0.67	0.44	0.07	0.04	0.06
1995	0.16	0.19	0.00	0.00	0.08	0.69	0.77	0.30	0.07	0.10	0.07	0.06
1996	0.11	0.00	0.62	0.53	1.04	0.52	0.24	0.72	0.00	0.24	1.06	0.38
1997	0.18	0.25	0.13	0.16	0.00	0.00	0.36	0.49	0.68	0.57	0.38	0.11
1998	0.11	0.10	0.36	0.91	0.00	0.74	0.93	0.65	0.07	0.08	0.06	0.05
1999	0.51	0.35	0.52	0.00	0.00	0.00	0.00	0.37	0.65	0.88	0.25	0.14
2000	0.17	0.22	0.19	0.47	0.49	0.64	0.45	0.87	0.50	0.05	0.04	0.09
2001	0.44	0.00	0.67	0.56	0.96	0.50	0.77	0.36	0.58	0.22	0.40	0.86
2002	0.06	0.05	0.13	0.59	0.36	0.53	0.23	0.11	0.08	0.03	0.05	0.16
2003	0.07	0.08	0.04	0.24	0.85	0.00	0.61	0.95	0.61	0.23	0.15	0.04
2004	1.18	0.72	0.78	0.00	0.85	0.59	0.65	0.77	0.44	0.03	0.07	0.05
2005	0.09	0.58	0.54	0.70	0.52	0.73	0.04	0.40	0.74	0.89	0.22	0.43
2006	0.00	0.70	1.12	0.95	0.19	0.14	0.16	0.05	0.06	0.06	0.04	0.03
2007	0.49	0.67	0.12	0.73	0.44	0.71	0.22	0.90	0.17	0.79	0.05	0.03
2008	0.04	0.06	0.52	0.31	0.14	1.72	0.60	0.05	0.06	0.04	0.06	0.05
2009	0.52	0.46	0.02	0.08	0.96	1.13	0.55	0.03	0.06	0.04	0.02	0.01

Table B2- 22 Irrigation Allocation time-Series (T35H.IRR) for Quaternary Catchment T35H, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 23 Irrigation Allocation Time-Series (T35J.IRR) for Quaternary Catchment T335J, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 24 Irrigation Allocation Time-Series (T35K.IRR) for quaternary Catchment t35K, Basedon WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 25 Irrigation Allocation Time-Series (T35L.IRR) for Quaternary Catchment T35K, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 26 Irrigation Allocation Time-Series (T35L2.IRR) for Quaternary Catchment T35L2, Based on WR2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 27 Forestry Allocation Time-Series (T35A.AFF) for quaternary Catchment T35A, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.04	0.01	0.03	0.04	0.02	0.00	0.00	0.00	0.03	0.01	0.00
1923	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.11	0.04	0.00	0.14	0.11	0.02	0.00	0.00	0.00	0.00
1925	0.00	0.01	0.00	0.00	0.00	0.06	0.02	0.00	0.01	0.00	0.00	0.00
1926	0.01	0.01	0.01	0.01	0.00	0.25	0.09	0.00	0.00	0.00	0.00	0.00
1927	0.01	0.00	0.11	0.17	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.01	0.05	0.02	0.06	0.20	0.06	0.00	0.01	0.02	0.01	0.01
1929	0.09	0.06	0.08	0.12	0.03	0.09	0.04	0.01	0.00	0.00	0.01	0.01
1930	0.01	0.00	0.01	0.12	0.12	0.17	0.05	0.00	0.00	0.27	0.09	0.00
1931	0.01	0.01	0.01	0.01	0.19	0.07	0.00	0.00	0.00	0.01	0.00	0.06
1932	0.04	0.25	0.16	0.03	0.00	0.09	0.04	0.01	0.00	0.00	0.00	0.00
1933	0.00	0.36	0.31	0.63	0.20	0.18	0.06	0.00	0.00	0.04	0.02	0.00
1934	0.01	0.02	0.21	0.07	0.01	0.07	0.06	0.02	0.02	0.01	0.01	0.01
1935	0.01	0.00	0.00	0.00	0.38	0.14	0.01	0.07	0.03	0.01	0.01	0.01
1936	0.03	0.53	0.18	0.08	0.38	0.19	0.02	0.00	0.00	0.00	0.00	0.01
1937	0.01	0.01	0.01	0.14	0.23	0.07	0.21	0.07	0.01	0.01	0.01	0.01

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1938	0.01	0.02	0.22	0.35	0.61	0.18	0.01	0.01	0.01	0.01	0.01	0.12
1939	0.07	0.03	0.01	0.01	0.13	0.06	0.02	0.03	0.02	0.01	0.00	0.01
1940	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00
1941	0.01	0.01	0.00	0.02	0.17	0.27	0.10	0.02	0.01	0.01	0.01	0.01
1942	0.11	0.20	0.37	0.13	0.02	0.27	0.20	0.06	0.02	0.01	0.15	0.08
1943	0.11	0.28	0.31	0.09	0.02	0.18	0.06	0.01	0.01	0.01	0.01	0.17
1944	0.08	0.01	0.00	0.01	0.20	0.19	0.05	0.01	0.01	0.01	0.00	0.00
1945	0.05	0.02	0.01	0.35	0.14	0.11	0.05	0.03	0.02	0.01	0.01	0.00
1946	0.01	0.02	0.02	0.08	0.18	0.27	0.15	0.03	0.05	0.03	0.01	0.01
1947	0.02	0.46	0.55	0.37	0.51	0.24	0.05	0.02	0.01	0.01	0.00	0.00
1948	0.03	0.02	0.01	0.01	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.01
1949	0.01	0.01	0.02	0.04	0.54	0.50	0.13	0.07	0.04	0.01	0.05	0.03
1950	0.04	0.02	0.53	0.20	0.04	0.03	0.02	0.01	0.01	0.01	0.01	0.02
1951	0.18	0.06	0.01	0.02	0.43	0.16	0.02	0.02	0.01	0.01	0.01	0.02
1952	0.02	0.02	0.03	0.03	0.26	0.11	0.06	0.03	0.01	0.01	0.01	0.03
1953	0.05	0.06	0.05	0.05	0.14	0.38	0.12	0.09	0.07	0.03	0.01	0.01
1954	0.04	0.04	0.03	0.88	0.80	0.21	0.06	0.03	0.02	0.02	0.01	0.01
1955	0.02	0.05	0.03	0.01	0.14	0.62	0.21	0.01	0.02	0.02	0.01	0.01
1956	0.02	0.32	0.65	0.23	0.04	0.95	0.36	0.03	0.01	0.01	0.03	0.06
1957	0.07	0.03	0.03	0.66	0.27	0.03	0.06	0.04	0.01	0.01	0.01	0.01
1958	0.01	0.42	0.18	0.02	0.03	0.05	0.17	0.40	0.14	0.04	0.03	0.02
1959	0.01	0.04	0.05	0.03	0.07	0.04	0.04	0.03	0.01	0.01	0.02	0.04
1960	0.03	0.10	0.22	0.11	0.05	0.21	0.17	0.07	0.02	0.01	0.01	0.01
1961	0.01	0.15	0.12	0.05	0.39	0.44	0.15	0.03	0.01	0.01	0.01	0.01
1962	0.03	0.40	0.26	1.04	0.48	1.43	0.49	0.02	0.01	0.03	0.02	0.01
1963	0.31	0.69	0.21	0.08	0.04	0.36	0.19	0.04	0.41	0.16	0.02	0.03
1964	0.30	0.10	0.03	0.04	0.50	0.17	0.02	0.02	0.86	0.33	0.06	0.03
1965	0.05	0.37	0.13	0.26	0.37	0.10	0.01	0.08	0.05	0.02	0.02	0.03
1966	0.02	0.02	0.03	0.11	0.58	1.12	0.61	0.13	0.05	0.04	0.02	0.01
1967	0.02	0.04	0.02	0.01	0.03	0.03	0.03	0.02	0.01	0.01	0.02	0.02
1968	0.03	0.03	0.02	0.01	0.05	0.96	0.33	0.03	0.02	0.02	0.01	0.01
1969	0.06	0.04	0.06	0.02	0.05	0.03	0.01	0.02	0.04	0.03	0.41	0.17
1970	0.39	0.14	0.02	0.04	0.06	0.06	0.05	0.07	0.05	0.05	0.14	0.06
1971	0.57	0.23	0.06	0.18	1.53	0.68	0.08	0.01	0.01	0.01	0.01	0.01
1972	0.02	0.43	0.15	0.02	0.85	0.78	0.22	0.04	0.01	0.01	0.02	0.02
1973	0.04	0.06	0.04	1.31	0.93	1.94	0.63	0.06	0.05	0.03	0.01	0.01
1974	0.01	0.26	0.12	0.04	0.03	0.17	0.07	0.02	0.01	0.01	0.01	0.27
1975	0.10	0.06	1.46	1.25	0.88	3.05	0.99	0.18	0.09	0.03	0.02	0.04
1976	1.43	0.49	0.02	0.04	0.18	0.12	0.06	0.03	0.01	0.02	0.02	0.08
1977	0.08	0.09	0.07	0.07	0.04	0.07	2.78	0.96	0.02	0.01	0.02	0.05
1978	0.15	0.07	0.32	0.12	0.11	0.10	0.04	0.02	0.02	0.08	0.06	0.03
1979	0.04	0.03	0.02	0.03	0.04	0.07	0.04	0.02	0.01	0.01	0.01	0.19
1980	0.09	0.05	0.06	0.17	1.17	0.41	0.02	0.07	0.06	0.03	0.03	0.02
1981	0.01	0.02	0.05	0.07	0.05	1.22	0.44	0.02	0.03	0.05	0.03	0.02

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1982	0.04	0.12	0.04	0.01	0.01	0.03	0.06	0.04	0.02	0.03	0.02	0.02
1983	0.05	0.60	0.71	0.24	0.10	0.78	0.33	0.07	0.04	0.05	0.03	0.02
1984	0.16	0.14	0.05	0.49	2.30	0.74	0.02	0.01	0.01	0.01	0.01	0.01
1985	0.97	0.75	0.98	0.40	0.24	0.17	0.05	0.01	0.01	0.02	0.06	0.07
1986	0.80	0.96	0.27	0.05	0.08	0.21	0.09	0.02	0.03	0.02	0.05	2.70
1987	1.08	0.15	0.09	0.09	2.85	1.62	0.28	0.08	0.05	0.03	0.03	0.04
1988	0.06	0.28	1.35	0.49	1.96	0.75	0.77	0.28	0.04	0.05	0.03	0.01
1989	0.07	2.66	0.93	0.18	0.06	0.71	0.31	0.05	0.03	0.02	0.07	0.05
1990	0.09	0.05	0.04	0.19	0.13	0.06	0.02	0.01	0.02	0.02	0.01	0.04
1991	1.10	0.47	1.36	0.47	0.08	0.06	0.05	0.03	0.01	0.01	0.01	0.03
1992	0.03	0.03	0.02	0.03	0.07	0.17	0.11	0.04	0.02	0.01	0.02	0.07
1993	0.89	0.38	0.57	0.77	1.19	1.98	0.58	0.02	0.02	0.05	0.05	0.02
1994	0.02	0.01	0.07	0.34	0.13	1.31	0.64	0.11	0.05	0.03	0.02	0.02
1995	0.07	0.08	2.16	2.85	1.67	0.42	0.07	0.03	0.02	0.03	0.03	0.02
1996	0.04	1.50	1.03	0.67	0.20	0.37	0.22	0.08	1.58	0.68	0.11	0.03
1997	0.09	0.11	0.07	1.09	2.67	2.80	0.77	0.10	0.06	0.05	0.06	0.04
1998	0.04	1.01	1.21	0.39	1.46	0.57	0.05	0.02	0.02	0.02	0.02	0.01
1999	0.23	0.14	0.71	2.27	2.27	2.50	1.33	0.33	0.08	0.04	0.02	0.05
2000	0.07	0.10	0.10	0.63	0.50	0.31	0.13	0.04	0.02	0.02	0.02	0.04
2001	0.15	2.21	1.27	0.73	0.24	0.42	0.18	0.07	0.07	0.12	0.33	0.17
2002	0.04	0.03	0.08	0.11	0.10	0.17	0.10	0.07	0.05	0.03	0.03	0.09
2003	0.05	0.05	0.03	1.10	0.47	1.69	0.62	0.04	0.03	0.11	0.08	0.80
2004	0.31	0.25	0.14	2.54	0.92	0.31	0.15	0.05	0.03	0.02	0.03	0.02
2005	0.04	0.31	0.12	0.57	0.66	0.31	0.45	0.22	0.08	0.04	0.51	0.47
2006	1.70	0.80	0.19	0.10	0.08	0.07	0.10	0.05	0.04	0.03	0.02	0.02
2007	0.39	0.21	0.08	0.13	0.59	0.55	0.36	0.12	0.11	0.07	0.04	0.02
2008	0.02	0.05	0.34	0.16	1.08	0.37	0.02	0.04	0.04	0.03	0.04	0.04
2009	0.45	0.18	0.03	1.45	0.56	0.08	0.06	0.04	0.04	0.03	0.02	0.01

Table B2- 28 Forestry Allocation Time-Series (T35B.AFF) for quaternary Catchment T35B, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.02	0.01	0.02	0.03	0.01	0.00	0.00	0.00	0.01	0.01	0.00
1923	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.07	0.02	0.00	0.09	0.07	0.01	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.01	0.00	0.00	0.14	0.05	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.07	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.04	0.02	0.04	0.12	0.04	0.00	0.01	0.01	0.00	0.01
1929	0.06	0.04	0.05	0.08	0.02	0.05	0.02	0.00	0.00	0.00	0.01	0.00
1930	0.01	0.00	0.00	0.08	0.08	0.10	0.03	0.00	0.00	0.17	0.06	0.00
1931	0.00	0.01	0.01	0.01	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.03
1932	0.02	0.15	0.09	0.02	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.22	0.19	0.37	0.12	0.11	0.04	0.00	0.00	0.02	0.01	0.00
1934	0.01	0.01	0.12	0.04	0.00	0.04	0.04	0.01	0.01	0.01	0.01	0.00
1935	0.00	0.00	0.00	0.00	0.24	0.09	0.00	0.04	0.02	0.01	0.00	0.00
1936	0.01	0.30	0.10	0.05	0.23	0.12	0.02	0.00	0.00	0.00	0.00	0.00
1937	0.01	0.00	0.01	0.08	0.15	0.05	0.13	0.05	0.01	0.01	0.01	0.00
1938	0.01	0.01	0.13	0.21	0.34	0.10	0.00	0.01	0.01	0.01	0.01	0.07
1939	0.04	0.02	0.01	0.01	0.07	0.03	0.01	0.02	0.01	0.00	0.00	0.01
1940	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
1941	0.01	0.00	0.00	0.01	0.13	0.17	0.06	0.02	0.01	0.00	0.01	0.01
1942	0.07	0.08	0.20	0.08	0.01	0.18	0.12	0.03	0.01	0.01	0.08	0.05
1943	0.06	0.17	0.17	0.05	0.01	0.10	0.04	0.00	0.01	0.01	0.00	0.07
1944	0.04	0.01	0.00	0.01	0.12	0.13	0.03	0.00	0.00	0.00	0.00	0.00
1945	0.02	0.01	0.01	0.22	0.09	0.06	0.03	0.02	0.01	0.01	0.00	0.00
1946	0.01	0.01	0.01	0.05	0.14	0.18	0.09	0.02	0.02	0.02	0.01	0.01
1947	0.01	0.27	0.35	0.24	0.31	0.15	0.03	0.01	0.01	0.00	0.00	0.00
1948	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
1949	0.01	0.01	0.01	0.02	0.33	0.29	0.07	0.04	0.02	0.01	0.03	0.02
1950	0.03	0.01	0.34	0.13	0.03	0.02	0.01	0.01	0.00	0.00	0.01	0.01
1951	0.11	0.04	0.00	0.01	0.28	0.10	0.02	0.01	0.01	0.01	0.01	0.01
1952	0.01	0.02	0.02	0.02	0.19	0.08	0.04	0.02	0.01	0.00	0.01	0.02
1953	0.03	0.04	0.03	0.03	0.09	0.23	0.08	0.05	0.04	0.02	0.01	0.01
1954	0.03	0.03	0.02	0.55	0.50	0.13	0.04	0.02	0.01	0.01	0.00	0.01
1955	0.01	0.03	0.02	0.01	0.10	0.38	0.12	0.01	0.01	0.01	0.01	0.01
1956	0.01	0.19	0.42	0.15	0.02	0.57	0.21	0.02	0.01	0.01	0.02	0.04
1957	0.04	0.02	0.02	0.43	0.17	0.02	0.03	0.02	0.01	0.01	0.00	0.01
1958	0.01	0.26	0.11	0.01	0.02	0.03	0.11	0.23	0.08	0.02	0.02	0.01
1959	0.01	0.03	0.03	0.02	0.05	0.03	0.02	0.02	0.01	0.01	0.01	0.02
1960	0.02	0.05	0.13	0.06	0.03	0.14	0.11	0.04	0.02	0.01	0.01	0.01
1961	0.01	0.10	0.08	0.03	0.25	0.27	0.09	0.02	0.01	0.01	0.01	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1962	0.02	0.26	0.18	0.67	0.29	0.84	0.29	0.01	0.01	0.02	0.01	0.00
1963	0.19	0.43	0.13	0.04	0.02	0.22	0.11	0.02	0.25	0.10	0.01	0.02
1964	0.18	0.06	0.02	0.02	0.38	0.13	0.01	0.01	0.53	0.20	0.03	0.02
1965	0.03	0.23	0.08	0.18	0.24	0.06	0.00	0.04	0.03	0.01	0.01	0.02
1966	0.01	0.01	0.02	0.08	0.36	0.67	0.37	0.08	0.02	0.03	0.01	0.00
1967	0.01	0.03	0.01	0.00	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
1968	0.02	0.02	0.01	0.01	0.03	0.59	0.20	0.02	0.01	0.01	0.01	0.01
1969	0.04	0.02	0.04	0.02	0.03	0.02	0.01	0.01	0.02	0.02	0.27	0.11
1970	0.22	0.08	0.01	0.03	0.03	0.03	0.03	0.05	0.03	0.03	0.06	0.03
1971	0.34	0.13	0.03	0.12	0.90	0.40	0.04	0.01	0.01	0.01	0.01	0.00
1972	0.01	0.27	0.10	0.01	0.51	0.43	0.12	0.02	0.01	0.01	0.01	0.01
1973	0.02	0.03	0.03	0.77	0.57	1.19	0.38	0.03	0.03	0.02	0.01	0.00
1974	0.01	0.19	0.09	0.03	0.02	0.12	0.05	0.01	0.01	0.01	0.01	0.17
1975	0.06	0.04	0.89	0.72	0.47	1.77	0.57	0.10	0.05	0.02	0.01	0.03
1976	0.83	0.29	0.01	0.02	0.15	0.08	0.04	0.02	0.01	0.01	0.02	0.05
1977	0.04	0.05	0.04	0.05	0.03	0.05	1.46	0.50	0.01	0.01	0.01	0.03
1978	0.09	0.04	0.21	0.08	0.09	0.07	0.03	0.01	0.01	0.06	0.04	0.02
1979	0.02	0.02	0.01	0.02	0.03	0.04	0.02	0.01	0.01	0.01	0.01	0.11
1980	0.05	0.03	0.04	0.12	0.75	0.26	0.02	0.04	0.04	0.02	0.02	0.01
1981	0.01	0.01	0.03	0.04	0.03	0.76	0.27	0.02	0.02	0.03	0.02	0.01
1982	0.02	0.08	0.03	0.00	0.01	0.02	0.04	0.02	0.01	0.02	0.01	0.01
1983	0.03	0.38	0.44	0.15	0.06	0.47	0.20	0.04	0.03	0.03	0.02	0.01
1984	0.09	0.08	0.03	0.28	1.35	0.43	0.01	0.01	0.01	0.01	0.01	0.01
1985	0.61	0.49	0.67	0.32	0.15	0.09	0.03	0.01	0.01	0.01	0.03	0.05
1986	0.48	0.60	0.17	0.03	0.05	0.14	0.06	0.01	0.02	0.01	0.03	1.54
1987	0.61	0.08	0.05	0.06	1.76	0.98	0.17	0.04	0.03	0.02	0.02	0.03
1988	0.04	0.16	0.89	0.32	1.17	0.47	0.44	0.16	0.02	0.03	0.02	0.01
1989	0.04	1.57	0.55	0.14	0.05	0.44	0.19	0.03	0.02	0.01	0.05	0.03
1990	0.05	0.03	0.03	0.17	0.10	0.04	0.01	0.01	0.01	0.01	0.01	0.02
1991	0.69	0.28	0.91	0.31	0.06	0.04	0.03	0.02	0.01	0.01	0.01	0.02
1992	0.02	0.02	0.01	0.02	0.05	0.15	0.08	0.03	0.01	0.01	0.01	0.04
1993	0.59	0.25	0.39	0.52	0.76	1.21	0.35	0.01	0.01	0.03	0.03	0.01
1994	0.01	0.01	0.04	0.27	0.10	0.87	0.39	0.06	0.02	0.02	0.01	0.01
1995	0.04	0.05	1.34	1.71	1.06	0.27	0.04	0.02	0.01	0.02	0.02	0.01
1996	0.02	0.98	0.71	0.48	0.14	0.26	0.14	0.04	0.95	0.40	0.06	0.02
1997	0.06	0.07	0.05	0.71	1.60	1.59	0.43	0.06	0.03	0.03	0.04	0.03
1998	0.03	0.66	0.74	0.25	1.05	0.40	0.03	0.01	0.01	0.01	0.01	0.01
1999	0.13	0.08	0.43	1.38	1.45	1.47	0.78	0.19	0.05	0.02	0.01	0.03
2000	0.04	0.06	0.06	0.43	0.34	0.24	0.09	0.03	0.01	0.01	0.01	0.02
2001	0.11	1.31	0.80	0.48	0.16	0.28	0.11	0.04	0.04	0.08	0.25	0.12
2002	0.03	0.02	0.06	0.07	0.06	0.12	0.07	0.04	0.03	0.02	0.02	0.06
2003	0.03	0.03	0.02	0.78	0.33	1.03	0.37	0.03	0.02	0.07	0.05	0.48
2004	0.19	0.23	0.12	1.51	0.55	0.23	0.10	0.03	0.02	0.01	0.02	0.01
2005	0.03	0.17	0.07	0.45	0.47	0.22	0.29	0.14	0.04	0.02	0.34	0.28

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2006	1.03	0.49	0.11	0.07	0.05	0.05	0.06	0.03	0.02	0.02	0.01	0.01
2007	0.26	0.13	0.05	0.13	0.41	0.42	0.25	0.07	0.06	0.05	0.03	0.02
2008	0.01	0.03	0.34	0.15	0.76	0.26	0.01	0.02	0.03	0.02	0.03	0.02
2009	0.29	0.12	0.02	1.00	0.38	0.05	0.04	0.03	0.02	0.02	0.01	0.01

Table B2- 29 Forestry Allocation Time-Series (T35C.AFF) for Quaternary Catchment T35C, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00
1922	0.01	0.04	0.01	0.04	0.05	0.03	0.01	0.00	0.00	0.03	0.02	0.00
1923	0.00	0.00	0.01	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.01
1924	0.01	0.01	0.13	0.03	0.01	0.16	0.12	0.04	0.01	0.01	0.00	0.01
1925	0.00	0.02	0.01	0.01	0.01	0.06	0.03	0.01	0.02	0.02	0.01	0.02
1926	0.03	0.02	0.04	0.01	0.01	0.25	0.06	0.01	0.01	0.01	0.01	0.01
1927	0.02	0.01	0.12	0.19	0.07	0.03	0.01	0.01	0.01	0.01	0.02	0.01
1928	0.01	0.02	0.09	0.04	0.08	0.23	0.06	0.02	0.05	0.06	0.03	0.04
1929	0.13	0.11	0.13	0.16	0.03	0.10	0.08	0.03	0.02	0.02	0.04	0.03
1930	0.03	0.01	0.02	0.15	0.15	0.22	0.08	0.02	0.01	0.24	0.10	0.02
1931	0.02	0.03	0.06	0.03	0.20	0.08	0.02	0.01	0.02	0.02	0.02	0.08
1932	0.11	0.31	0.20	0.03	0.01	0.10	0.06	0.02	0.01	0.01	0.01	0.01
1933	0.01	0.42	0.35	0.82	0.17	0.22	0.08	0.02	0.02	0.07	0.05	0.01
1934	0.03	0.05	0.26	0.05	0.02	0.10	0.13	0.09	0.08	0.05	0.05	0.03
1935	0.02	0.01	0.00	0.01	0.40	0.15	0.04	0.09	0.07	0.06	0.03	0.02
1936	0.08	0.64	0.13	0.13	0.44	0.26	0.07	0.02	0.01	0.01	0.01	0.02
1937	0.03	0.01	0.03	0.18	0.28	0.13	0.27	0.13	0.05	0.05	0.05	0.02
1938	0.04	0.08	0.27	0.42	0.68	0.18	0.03	0.03	0.03	0.05	0.04	0.17
1939	0.17	0.10	0.03	0.04	0.15	0.11	0.06	0.10	0.07	0.04	0.02	0.03
1940	0.05	0.03	0.05	0.07	0.06	0.08	0.07	0.04	0.03	0.03	0.03	0.02
1941	0.03	0.02	0.01	0.06	0.22	0.35	0.22	0.11	0.05	0.03	0.04	0.05
1942	0.17	0.26	0.45	0.22	0.05	0.30	0.30	0.18	0.11	0.07	0.21	0.21
1943	0.23	0.38	0.40	0.15	0.07	0.23	0.09	0.03	0.05	0.06	0.03	0.20
1944	0.16	0.04	0.00	0.02	0.21	0.28	0.10	0.04	0.03	0.03	0.02	0.01
1945	0.11	0.03	0.03	0.40	0.19	0.21	0.14	0.11	0.07	0.04	0.03	0.02
1946	0.02	0.07	0.04	0.16	0.28	0.39	0.31	0.12	0.14	0.12	0.05	0.05
1947	0.06	0.51	0.66	0.49	0.61	0.38	0.16	0.07	0.04	0.03	0.02	0.01
1948	0.10	0.04	0.04	0.03	0.11	0.09	0.07	0.06	0.04	0.04	0.04	0.03
1949	0.03	0.03	0.07	0.12	0.59	0.56	0.25	0.24	0.14	0.07	0.18	0.11
1950	0.15	0.06	0.65	0.25	0.14	0.11	0.06	0.03	0.03	0.03	0.05	0.06
1951	0.26	0.07	0.02	0.05	0.45	0.19	0.10	0.06	0.05	0.06	0.04	0.07
1952	0.06	0.08	0.12	0.08	0.32	0.19	0.22	0.11	0.04	0.03	0.04	0.11
1953	0.20	0.22	0.18	0.16	0.25	0.48	0.18	0.24	0.25	0.13	0.05	0.05
1954	0.15	0.15	0.08	1.05	0.86	0.37	0.26	0.14	0.10	0.07	0.04	0.03
1955	0.07	0.16	0.09	0.01	0.19	0.71	0.25	0.08	0.09	0.07	0.04	0.05

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1956	0.06	0.41	0.82	0.37	0.12	1.03	0.48	0.16	0.07	0.06	0.13	0.24
1957	0.26	0.10	0.08	0.81	0.33	0.12	0.20	0.13	0.07	0.05	0.04	0.03
1958	0.03	0.46	0.28	0.06	0.10	0.16	0.33	0.58	0.28	0.17	0.13	0.07
1959	0.04	0.14	0.16	0.10	0.19	0.12	0.14	0.10	0.06	0.06	0.07	0.14
1960	0.10	0.23	0.39	0.26	0.14	0.34	0.39	0.27	0.12	0.06	0.05	0.04
1961	0.03	0.27	0.31	0.17	0.49	0.58	0.32	0.14	0.07	0.04	0.04	0.03
1962	0.10	0.53	0.46	1.35	0.58	1.54	0.45	0.11	0.05	0.10	0.08	0.03
1963	0.36	0.86	0.20	0.23	0.08	0.42	0.41	0.16	0.49	0.35	0.11	0.10
1964	0.43	0.12	0.10	0.11	0.60	0.17	0.08	0.07	0.91	0.58	0.27	0.12
1965	0.18	0.54	0.12	0.39	0.51	0.12	0.02	0.16	0.16	0.08	0.09	0.10
1966	0.07	0.06	0.11	0.28	0.69	1.35	0.88	0.34	0.20	0.18	0.10	0.03
1967	0.06	0.13	0.03	0.02	0.05	0.08	0.09	0.06	0.04	0.04	0.06	0.07
1968	0.09	0.09	0.03	0.02	0.13	1.04	0.35	0.13	0.09	0.08	0.06	0.04
1969	0.20	0.11	0.21	0.05	0.15	0.06	0.02	0.04	0.11	0.10	0.56	0.38
1970	0.56	0.20	0.07	0.14	0.15	0.16	0.15	0.26	0.20	0.20	0.36	0.20
1971	0.65	0.33	0.21	0.38	1.77	0.85	0.22	0.07	0.06	0.06	0.04	0.02
1972	0.05	0.54	0.14	0.07	0.85	0.86	0.43	0.17	0.08	0.07	0.08	0.07
1973	0.13	0.19	0.13	1.50	1.00	2.30	0.59	0.26	0.20	0.12	0.07	0.03
1974	0.02	0.40	0.23	0.13	0.08	0.31	0.17	0.07	0.05	0.04	0.04	0.38
1975	0.16	0.21	1.79	1.32	0.99	3.89	0.78	0.44	0.28	0.15	0.09	0.15
1976	1.54	0.43	0.08	0.11	0.34	0.32	0.23	0.11	0.06	0.08	0.10	0.27
1977	0.25	0.32	0.23	0.27	0.11	0.25	3.06	0.73	0.15	0.08	0.08	0.19
1978	0.41	0.21	0.54	0.17	0.29	0.33	0.15	0.09	0.07	0.28	0.22	0.10
1979	0.14	0.07	0.06	0.09	0.10	0.18	0.10	0.06	0.05	0.05	0.04	0.35
1980	0.21	0.17	0.20	0.41	1.39	0.50	0.12	0.21	0.21	0.12	0.14	0.09
1981	0.04	0.05	0.16	0.21	0.12	1.32	0.53	0.15	0.12	0.18	0.12	0.08
1982	0.12	0.36	0.07	0.02	0.01	0.07	0.16	0.13	0.09	0.11	0.08	0.07
1983	0.18	0.78	0.96	0.47	0.37	0.94	0.63	0.27	0.20	0.21	0.14	0.07
1984	0.34	0.44	0.12	0.61	2.66	0.65	0.11	0.05	0.05	0.05	0.04	0.04
1985	1.00	1.05	1.37	0.72	0.54	0.49	0.18	0.07	0.05	0.06	0.18	0.27
1986	0.97	1.28	0.37	0.18	0.24	0.45	0.23	0.09	0.10	0.10	0.20	2.99
1987	1.14	0.54	0.31	0.32	3.51	1.74	0.60	0.32	0.20	0.16	0.14	0.17
1988	0.20	0.52	1.80	0.65	2.29	1.02	1.10	0.47	0.17	0.20	0.13	0.04
1989	0.22	3.24	0.83	0.52	0.10	0.74	0.53	0.22	0.14	0.11	0.27	0.17
1990	0.30	0.12	0.13	0.46	0.34	0.18	0.06	0.05	0.07	0.07	0.06	0.11
1991	1.21	0.78	1.84	0.44	0.30	0.18	0.15	0.10	0.06	0.05	0.05	0.09
1992	0.08	0.08	0.03	0.07	0.22	0.45	0.36	0.17	0.08	0.07	0.07	0.22
1993	1.11	0.72	0.94	1.08	1.46	2.36	0.62	0.12	0.09	0.17	0.19	0.08
1994	0.06	0.03	0.25	0.63	0.19	1.46	1.03	0.43	0.21	0.14	0.08	0.07
1995	0.22	0.26	2.72	3.22	1.93	0.82	0.27	0.13	0.10	0.12	0.10	0.06
1996	0.11	1.77	1.35	1.07	0.30	0.59	0.56	0.30	1.75	1.37	0.46	0.13
1997	0.30	0.38	0.21	1.31	3.05	3.20	1.15	0.47	0.25	0.22	0.25	0.16
1998	0.14	1.21	1.50	0.72	1.94	0.88	0.23	0.09	0.08	0.09	0.07	0.04
1999	0.41	0.35	0.96	2.71	2.57	2.95	1.79	0.88	0.38	0.19	0.10	0.17

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2000	0.22	0.35	0.33	0.93	0.81	0.76	0.45	0.20	0.11	0.09	0.07	0.12
2001	0.47	2.68	1.56	1.15	0.42	0.70	0.34	0.29	0.27	0.46	0.81	0.50
2002	0.16	0.08	0.32	0.38	0.28	0.50	0.33	0.27	0.22	0.14	0.13	0.31
2003	0.15	0.14	0.08	1.33	0.69	1.96	0.84	0.25	0.13	0.34	0.27	0.97
2004	0.51	0.65	0.44	3.05	0.96	0.74	0.41	0.22	0.14	0.09	0.12	0.09
2005	0.14	0.59	0.17	0.81	0.91	0.75	0.93	0.68	0.33	0.18	0.80	1.02
2006	2.17	1.27	0.63	0.35	0.21	0.21	0.31	0.18	0.14	0.14	0.10	0.06
2007	0.58	0.48	0.28	0.49	0.87	0.95	0.87	0.40	0.41	0.30	0.17	0.10
2008	0.06	0.15	0.73	0.35	1.29	0.33	0.07	0.11	0.16	0.14	0.17	0.14
2009	0.66	0.29	0.09	1.72	0.68	0.28	0.22	0.15	0.15	0.15	0.10	0.05

Table B2- 30 Forestry Allocation Time-Series (T35D.AFF) for Quaternary Catchment T35D, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.02	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.05	0.02	0.00	0.06	0.05	0.01	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.01	0.00	0.00	0.10	0.04	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.05	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.03	0.01	0.03	0.09	0.03	0.00	0.01	0.01	0.00	0.00
1929	0.04	0.03	0.04	0.06	0.02	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.06	0.06	0.08	0.02	0.00	0.00	0.12	0.04	0.00
1931	0.00	0.00	0.01	0.00	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.03
1932	0.02	0.11	0.07	0.01	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.16	0.14	0.27	0.08	0.09	0.03	0.00	0.00	0.02	0.01	0.00
1934	0.00	0.01	0.09	0.03	0.00	0.03	0.03	0.01	0.01	0.01	0.01	0.00
1935	0.00	0.00	0.00	0.00	0.17	0.06	0.00	0.03	0.01	0.01	0.00	0.00
1936	0.01	0.23	0.08	0.04	0.17	0.09	0.01	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.07	0.12	0.04	0.10	0.04	0.00	0.01	0.01	0.00
1938	0.01	0.01	0.10	0.17	0.25	0.07	0.00	0.00	0.00	0.01	0.01	0.05
1939	0.03	0.01	0.01	0.01	0.06	0.03	0.01	0.01	0.01	0.00	0.00	0.00
1940	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.01	0.10	0.13	0.05	0.01	0.01	0.00	0.01	0.01
1942	0.05	0.07	0.16	0.06	0.01	0.14	0.09	0.03	0.01	0.01	0.06	0.04
1943	0.05	0.13	0.14	0.04	0.01	0.08	0.03	0.00	0.01	0.01	0.00	0.06
1944	0.03	0.01	0.00	0.00	0.10	0.10	0.03	0.00	0.00	0.00	0.00	0.00
1945	0.02	0.01	0.00	0.17	0.07	0.05	0.02	0.01	0.01	0.00	0.00	0.00
1946	0.00	0.01	0.01	0.05	0.11	0.14	0.07	0.01	0.02	0.02	0.01	0.01
1947	0.01	0.21	0.27	0.18	0.24	0.12	0.03	0.01	0.00	0.00	0.00	0.00
1948	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00
1949	0.00	0.01	0.01	0.02	0.26	0.23	0.06	0.04	0.02	0.01	0.03	0.01

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1950	0.02	0.01	0.26	0.10	0.02	0.02	0.01	0.00	0.00	0.00	0.01	0.01
1951	0.09	0.03	0.00	0.01	0.21	0.08	0.01	0.01	0.01	0.01	0.00	0.01
1952	0.01	0.01	0.02	0.01	0.15	0.06	0.04	0.02	0.00	0.00	0.00	0.01
1953	0.03	0.03	0.02	0.02	0.08	0.18	0.06	0.04	0.03	0.01	0.00	0.01
1954	0.02	0.02	0.01	0.42	0.38	0.10	0.03	0.02	0.01	0.01	0.00	0.00
1955	0.01	0.02	0.02	0.00	0.08	0.28	0.09	0.01	0.01	0.01	0.00	0.01
1956	0.01	0.15	0.33	0.12	0.02	0.45	0.17	0.01	0.01	0.01	0.02	0.03
1957	0.03	0.02	0.01	0.33	0.13	0.02	0.03	0.02	0.01	0.00	0.00	0.00
1958	0.00	0.21	0.09	0.01	0.02	0.03	0.09	0.17	0.06	0.02	0.01	0.01
1959	0.01	0.02	0.02	0.02	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.02
1960	0.01	0.05	0.12	0.06	0.02	0.10	0.09	0.04	0.01	0.01	0.00	0.00
1961	0.00	0.08	0.06	0.03	0.20	0.21	0.07	0.01	0.01	0.00	0.00	0.00
1962	0.01	0.20	0.15	0.50	0.23	0.63	0.22	0.01	0.00	0.01	0.01	0.00
1963	0.16	0.35	0.10	0.04	0.02	0.17	0.08	0.02	0.17	0.07	0.01	0.01
1964	0.14	0.05	0.01	0.02	0.29	0.10	0.01	0.01	0.39	0.15	0.02	0.01
1965	0.02	0.18	0.06	0.15	0.19	0.05	0.00	0.03	0.02	0.01	0.01	0.01
1966	0.01	0.01	0.02	0.07	0.27	0.48	0.28	0.06	0.02	0.02	0.01	0.00
1967	0.01	0.02	0.01	0.00	0.01	0.02	0.01	0.01	0.00	0.00	0.01	0.01
1968	0.01	0.02	0.01	0.00	0.02	0.45	0.16	0.01	0.01	0.01	0.01	0.01
1969	0.03	0.02	0.03	0.01	0.02	0.01	0.00	0.01	0.02	0.01	0.21	0.09
1970	0.18	0.07	0.01	0.02	0.03	0.03	0.02	0.03	0.03	0.02	0.05	0.03
1971	0.26	0.10	0.03	0.09	0.67	0.31	0.04	0.01	0.01	0.01	0.00	0.00
1972	0.01	0.21	0.07	0.01	0.41	0.34	0.09	0.02	0.01	0.01	0.01	0.01
1973	0.02	0.03	0.02	0.59	0.44	0.87	0.28	0.03	0.02	0.01	0.01	0.00
1974	0.00	0.15	0.07	0.02	0.02	0.10	0.04	0.01	0.00	0.01	0.00	0.13
1975	0.05	0.03	0.65	0.54	0.36	1.32	0.41	0.08	0.04	0.01	0.01	0.02
1976	0.62	0.21	0.01	0.02	0.12	0.07	0.03	0.01	0.01	0.01	0.01	0.04
1977	0.03	0.04	0.03	0.03	0.02	0.04	1.09	0.37	0.01	0.01	0.01	0.02
1978	0.08	0.04	0.17	0.06	0.07	0.06	0.02	0.01	0.01	0.04	0.03	0.01
1979	0.02	0.01	0.01	0.02	0.02	0.03	0.02	0.01	0.00	0.01	0.01	0.08
1980	0.04	0.02	0.03	0.10	0.57	0.20	0.01	0.03	0.03	0.01	0.02	0.01
1981	0.01	0.01	0.02	0.03	0.02	0.56	0.20	0.01	0.01	0.02	0.01	0.01
1982	0.02	0.08	0.03	0.00	0.01	0.02	0.03	0.02	0.01	0.01	0.01	0.01
1983	0.03	0.29	0.36	0.12	0.06	0.37	0.15	0.03	0.02	0.02	0.02	0.01
1984	0.08	0.07	0.02	0.25	1.03	0.33	0.01	0.01	0.01	0.01	0.00	0.01
1985	0.46	0.37	0.52	0.25	0.12	0.07	0.02	0.01	0.01	0.01	0.03	0.03
1986	0.36	0.46	0.13	0.03	0.04	0.12	0.05	0.01	0.01	0.01	0.02	1.15
1987	0.47	0.07	0.04	0.04	1.30	0.75	0.13	0.03	0.02	0.02	0.01	0.02
1988	0.03	0.13	0.68	0.25	0.87	0.35	0.33	0.12	0.01	0.02	0.01	0.01
1989	0.03	1.15	0.40	0.12	0.04	0.36	0.15	0.02	0.01	0.01	0.03	0.02
1990	0.04	0.02	0.02	0.14	0.08	0.03	0.01	0.01	0.01	0.01	0.01	0.02
1991	0.53	0.22	0.68	0.23	0.05	0.03	0.02	0.01	0.01	0.01	0.01	0.01
1992	0.01	0.02	0.01	0.01	0.04	0.13	0.07	0.02	0.01	0.01	0.01	0.03
1993	0.44	0.19	0.29	0.43	0.57	0.89	0.26	0.01	0.01	0.02	0.02	0.01

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994	0.01	0.01	0.03	0.22	0.08	0.65	0.30	0.05	0.02	0.01	0.01	0.01
1995	0.03	0.04	1.03	1.30	0.79	0.20	0.03	0.01	0.01	0.02	0.01	0.01
1996	0.02	0.74	0.54	0.38	0.11	0.20	0.11	0.03	0.69	0.29	0.04	0.02
1997	0.04	0.05	0.04	0.55	1.18	1.14	0.31	0.04	0.03	0.02	0.03	0.02
1998	0.02	0.50	0.57	0.21	0.75	0.29	0.03	0.01	0.01	0.01	0.01	0.01
1999	0.11	0.07	0.36	1.07	1.14	1.11	0.58	0.14	0.04	0.02	0.01	0.02
2000	0.03	0.05	0.05	0.34	0.26	0.19	0.07	0.02	0.01	0.01	0.01	0.02
2001	0.08	1.00	0.61	0.38	0.12	0.22	0.09	0.03	0.03	0.06	0.19	0.09
2002	0.02	0.01	0.04	0.06	0.05	0.10	0.05	0.03	0.02	0.01	0.01	0.04
2003	0.02	0.02	0.02	0.60	0.27	0.76	0.27	0.02	0.01	0.05	0.04	0.36
2004	0.14	0.18	0.09	1.14	0.42	0.19	0.08	0.02	0.01	0.01	0.01	0.01
2005	0.02	0.14	0.05	0.36	0.38	0.18	0.23	0.11	0.03	0.02	0.25	0.21
2006	0.77	0.39	0.10	0.05	0.04	0.04	0.05	0.02	0.02	0.01	0.01	0.01
2007	0.20	0.11	0.04	0.12	0.36	0.35	0.22	0.06	0.04	0.03	0.02	0.01
2008	0.01	0.03	0.27	0.12	0.57	0.19	0.01	0.02	0.02	0.01	0.02	0.02
2009	0.24	0.09	0.02	0.73	0.28	0.04	0.03	0.02	0.02	0.01	0.01	0.01

Table B2- 31 Forestry Allocation Time-Series (T35E.AFF) for Quaternary Catchment T35E, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.03	0.01	0.00	0.03	0.03	0.01	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.07	0.02	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.02	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.01	0.05	0.02	0.00	0.00	0.00	0.00	0.00
1929	0.03	0.01	0.01	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.03	0.02	0.04	0.01	0.00	0.00	0.06	0.02	0.00
1931	0.00	0.00	0.00	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.01
1932	0.01	0.08	0.05	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.10	0.09	0.16	0.05	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.08	0.03	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.09	0.04	0.00	0.01	0.00	0.00	0.00	0.00
1936	0.00	0.19	0.06	0.01	0.10	0.04	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.06	0.05	0.01	0.04	0.02	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.08	0.11	0.21	0.06	0.00	0.00	0.00	0.00	0.00	0.02
1939	0.01	0.01	0.00	0.00	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.01	0.06	0.02	0.00	0.00	0.00	0.00	0.00
1942	0.02	0.12	0.15	0.05	0.00	0.05	0.04	0.01	0.00	0.00	0.04	0.02

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1943	0.03	0.07	0.09	0.03	0.01	0.06	0.02	0.00	0.00	0.00	0.00	0.08
1944	0.03	0.00	0.00	0.00	0.05	0.04	0.01	0.00	0.00	0.00	0.00	0.00
1945	0.01	0.00	0.00	0.07	0.03	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.01	0.01	0.03	0.02	0.01	0.01	0.01	0.00	0.00
1947	0.00	0.14	0.13	0.08	0.13	0.05	0.01	0.00	0.00	0.00	0.00	0.00
1948	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.01	0.19	0.16	0.04	0.01	0.01	0.00	0.01	0.01
1950	0.01	0.00	0.12	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.03	0.01	0.00	0.00	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
1953	0.01	0.02	0.01	0.01	0.03	0.09	0.03	0.01	0.02	0.01	0.00	0.00
1954	0.01	0.01	0.00	0.25	0.23	0.05	0.01	0.01	0.00	0.00	0.00	0.00
1955	0.00	0.01	0.00	0.00	0.01	0.19	0.07	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.06	0.17	0.06	0.01	0.30	0.11	0.01	0.00	0.00	0.00	0.01
1957	0.01	0.01	0.00	0.18	0.07	0.01	0.01	0.01	0.00	0.00	0.00	0.00
1958	0.00	0.10	0.04	0.00	0.00	0.00	0.02	0.12	0.04	0.01	0.01	0.00
1959	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01
1960	0.00	0.02	0.06	0.03	0.01	0.02	0.02	0.01	0.01	0.00	0.00	0.00
1961	0.00	0.01	0.02	0.01	0.10	0.09	0.03	0.01	0.00	0.00	0.00	0.00
1962	0.00	0.08	0.04	0.25	0.11	0.42	0.14	0.00	0.00	0.00	0.00	0.00
1963	0.07	0.20	0.06	0.01	0.01	0.07	0.03	0.01	0.07	0.03	0.00	0.00
1964	0.07	0.02	0.00	0.00	0.03	0.01	0.00	0.00	0.20	0.08	0.01	0.01
1965	0.01	0.10	0.03	0.01	0.09	0.03	0.00	0.01	0.01	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.01	0.15	0.33	0.16	0.03	0.01	0.01	0.00	0.00
1967	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.01	0.30	0.10	0.00	0.00	0.00	0.00	0.00
1969	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.07	0.03
1970	0.12	0.04	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02
1971	0.11	0.04	0.01	0.01	0.45	0.18	0.02	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.07	0.03	0.00	0.28	0.24	0.06	0.01	0.00	0.00	0.00	0.00
1973	0.01	0.01	0.01	0.44	0.26	0.41	0.14	0.01	0.01	0.00	0.00	0.00
1974	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.05
1975	0.02	0.01	0.39	0.39	0.25	0.94	0.24	0.02	0.02	0.01	0.00	0.00
1976	0.42	0.14	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01
1977	0.02	0.02	0.01	0.01	0.01	0.01	1.50	0.36	0.01	0.00	0.00	0.01
1978	0.02	0.01	0.04	0.02	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.03
1980	0.02	0.01	0.01	0.02	0.33	0.11	0.00	0.01	0.01	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.01	0.01	0.34	0.12	0.00	0.00	0.01	0.00	0.00
1982	0.01	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
1983	0.01	0.12	0.19	0.06	0.02	0.23	0.09	0.01	0.01	0.01	0.00	0.00
1984	0.02	0.03	0.01	0.17	0.84	0.22	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.17	0.11	0.14	0.05	0.03	0.03	0.01	0.00	0.00	0.00	0.01	0.01
1986	0.23	0.25	0.06	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.01	1.03

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1987	0.33	0.03	0.02	0.02	0.72	0.45	0.08	0.01	0.01	0.00	0.00	0.00
1988	0.01	0.05	0.33	0.11	0.55	0.19	0.21	0.08	0.00	0.01	0.01	0.00
1989	0.01	0.76	0.26	0.02	0.01	0.17	0.07	0.01	0.00	0.00	0.01	0.01
1990	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.29	0.11	0.29	0.10	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.01
1993	0.16	0.07	0.05	0.15	0.24	0.44	0.13	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.01	0.02	0.01	0.26	0.12	0.02	0.01	0.00	0.00	0.00
1995	0.01	0.01	0.66	0.80	0.36	0.07	0.01	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.37	0.15	0.09	0.03	0.02	0.03	0.02	0.39	0.17	0.03	0.01
1997	0.01	0.02	0.01	0.22	0.63	0.79	0.20	0.02	0.01	0.01	0.01	0.01
1998	0.00	0.18	0.32	0.10	0.13	0.06	0.01	0.00	0.00	0.00	0.00	0.00
1999	0.02	0.02	0.18	0.64	0.65	1.09	0.33	0.07	0.02	0.01	0.00	0.00
2000	0.01	0.02	0.01	0.09	0.05	0.03	0.02	0.01	0.00	0.00	0.00	0.00
2001	0.01	0.71	0.30	0.09	0.03	0.03	0.02	0.01	0.01	0.02	0.03	0.02
2002	0.01	0.00	0.00	0.01	0.01	0.02	0.02	0.01	0.01	0.00	0.00	0.01
2003	0.01	0.00	0.00	0.13	0.06	0.47	0.17	0.01	0.00	0.01	0.01	0.16
2004	0.06	0.01	0.01	0.75	0.26	0.03	0.02	0.01	0.00	0.00	0.00	0.00
2005	0.00	0.05	0.02	0.01	0.05	0.04	0.10	0.05	0.01	0.01	0.03	0.08
2006	0.43	0.17	0.03	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
2007	0.02	0.02	0.01	0.01	0.14	0.07	0.06	0.02	0.01	0.01	0.00	0.00
2008	0.00	0.00	0.01	0.01	0.10	0.03	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.03	0.02	0.00	0.14	0.06	0.01	0.01	0.00	0.00	0.00	0.00	0.00

Table B2- 32 Forestry Allocation Time-Series (T35F.AFF) for Quaternary Catchment T35F, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.04	0.01	0.02	0.04	0.01	0.00	0.00	0.00	0.02	0.01	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.12	0.04	0.00	0.21	0.14	0.03	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.00	0.00
1926	0.01	0.00	0.01	0.00	0.00	0.38	0.13	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.04	0.13	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.01	0.01	0.02	0.29	0.10	0.00	0.01	0.02	0.01	0.01
1929	0.05	0.03	0.03	0.06	0.02	0.02	0.02	0.01	0.00	0.00	0.01	0.01
1930	0.01	0.00	0.00	0.03	0.06	0.16	0.05	0.00	0.00	0.38	0.14	0.01
1931	0.00	0.01	0.01	0.00	0.14	0.05	0.00	0.00	0.00	0.00	0.00	0.02
1932	0.03	0.31	0.13	0.01	0.00	0.02	0.02	0.01	0.00	0.00	0.00	0.00
1933	0.00	0.45	0.32	1.00	0.32	0.10	0.04	0.00	0.00	0.02	0.02	0.00
1934	0.00	0.01	0.17	0.06	0.00	0.02	0.04	0.03	0.03	0.02	0.01	0.01
1935	0.00	0.00	0.00	0.00	0.41	0.15	0.01	0.02	0.02	0.02	0.01	0.00
1936	0.02	0.85	0.28	0.02	0.47	0.19	0.02	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1937	0.01	0.00	0.00	0.03	0.14	0.06	0.16	0.07	0.01	0.01	0.01	0.01
1938	0.01	0.02	0.08	0.26	0.87	0.27	0.01	0.00	0.01	0.01	0.01	0.04
1939	0.06	0.03	0.01	0.01	0.03	0.03	0.02	0.03	0.02	0.01	0.00	0.01
1940	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.00
1941	0.01	0.00	0.00	0.00	0.04	0.20	0.10	0.03	0.02	0.01	0.01	0.01
1942	0.04	0.08	0.33	0.13	0.01	0.10	0.09	0.06	0.04	0.02	0.07	0.09
1943	0.08	0.19	0.12	0.04	0.02	0.06	0.04	0.01	0.01	0.01	0.01	0.08
1944	0.06	0.01	0.00	0.00	0.04	0.08	0.04	0.01	0.01	0.01	0.00	0.00
1945	0.02	0.01	0.00	0.10	0.06	0.05	0.05	0.03	0.02	0.01	0.01	0.00
1946	0.00	0.01	0.01	0.02	0.06	0.14	0.10	0.04	0.04	0.04	0.02	0.01
1947	0.01	0.33	0.39	0.16	0.51	0.22	0.05	0.02	0.01	0.01	0.00	0.00
1948	0.02	0.01	0.00	0.00	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01
1949	0.01	0.01	0.01	0.02	0.48	0.31	0.08	0.07	0.05	0.02	0.05	0.03
1950	0.03	0.02	0.39	0.15	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
1951	0.06	0.03	0.00	0.00	0.18	0.08	0.02	0.01	0.01	0.01	0.01	0.01
1952	0.01	0.01	0.01	0.01	0.06	0.05	0.06	0.03	0.01	0.01	0.01	0.02
1953	0.05	0.05	0.04	0.03	0.05	0.19	0.08	0.06	0.09	0.05	0.01	0.01
1954	0.03	0.03	0.01	0.88	0.74	0.19	0.06	0.04	0.03	0.02	0.01	0.01
1955	0.01	0.03	0.02	0.00	0.03	0.65	0.23	0.02	0.02	0.02	0.01	0.01
1956	0.01	0.08	0.52	0.20	0.02	1.06	0.41	0.04	0.02	0.01	0.03	0.06
1957	0.07	0.03	0.01	0.50	0.20	0.03	0.04	0.04	0.02	0.01	0.01	0.01
1958	0.00	0.08	0.07	0.02	0.01	0.03	0.08	0.40	0.17	0.05	0.04	0.02
1959	0.01	0.02	0.02	0.01	0.03	0.03	0.03	0.03	0.01	0.01	0.01	0.03
1960	0.02	0.04	0.07	0.06	0.03	0.08	0.12	0.09	0.04	0.02	0.01	0.01
1961	0.00	0.04	0.06	0.03	0.10	0.18	0.12	0.05	0.02	0.01	0.01	0.01
1962	0.02	0.11	0.11	1.21	0.46	2.16	0.75	0.03	0.01	0.02	0.02	0.01
1963	0.08	0.55	0.19	0.03	0.02	0.09	0.14	0.07	0.18	0.13	0.04	0.02
1964	0.10	0.05	0.01	0.01	0.11	0.06	0.02	0.01	0.98	0.42	0.08	0.03
1965	0.04	0.12	0.05	0.05	0.12	0.05	0.01	0.04	0.05	0.02	0.02	0.02
1966	0.01	0.01	0.01	0.04	0.28	1.56	0.63	0.12	0.06	0.05	0.03	0.01
1967	0.01	0.02	0.01	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.02
1968	0.02	0.02	0.01	0.00	0.02	0.99	0.35	0.02	0.02	0.02	0.01	0.01
1969	0.04	0.03	0.03	0.01	0.02	0.01	0.00	0.01	0.03	0.03	0.16	0.16
1970	0.17	0.08	0.02	0.01	0.03	0.03	0.03	0.06	0.06	0.05	0.11	0.07
1971	0.16	0.12	0.04	0.06	2.23	0.84	0.06	0.02	0.01	0.01	0.01	0.00
1972	0.01	0.10	0.05	0.01	0.51	0.34	0.15	0.06	0.02	0.01	0.02	0.01
1973	0.03	0.03	0.02	1.34	0.60	3.17	1.09	0.07	0.05	0.03	0.01	0.01
1974	0.00	0.06	0.05	0.02	0.01	0.05	0.04	0.02	0.01	0.01	0.01	0.11
1975	0.07	0.04	1.78	1.07	0.44	5.18	1.75	0.12	0.10	0.05	0.02	0.03
1976	1.91	0.66	0.01	0.01	0.05	0.07	0.06	0.03	0.01	0.02	0.02	0.06
1977	0.07	0.06	0.04	0.04	0.02	0.04	4.72	1.64	0.04	0.02	0.02	0.04
1978	0.10	0.06	0.09	0.04	0.05	0.07	0.04	0.02	0.01	0.07	0.07	0.03
1979	0.03	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.08
1980	0.07	0.03	0.03	0.06	1.22	0.44	0.02	0.05	0.06	0.03	0.03	0.02

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1981	0.01	0.01	0.02	0.03	0.02	1.26	0.47	0.03	0.02	0.04	0.03	0.02
1982	0.02	0.06	0.02	0.00	0.00	0.01	0.03	0.03	0.02	0.02	0.02	0.01
1983	0.03	0.16	0.24	0.13	0.08	0.42	0.23	0.08	0.05	0.05	0.03	0.01
1984	0.07	0.10	0.04	0.09	3.52	1.19	0.02	0.01	0.01	0.01	0.01	0.01
1985	0.58	0.36	0.58	0.24	0.11	0.13	0.06	0.02	0.01	0.01	0.04	0.07
1986	0.51	0.59	0.17	0.02	0.03	0.09	0.06	0.02	0.02	0.02	0.04	4.39
1987	1.62	0.14	0.06	0.05	4.44	1.82	0.19	0.08	0.05	0.04	0.03	0.03
1988	0.04	0.10	1.42	0.51	2.74	1.01	0.56	0.24	0.04	0.05	0.03	0.01
1989	0.04	4.29	1.46	0.07	0.03	0.16	0.18	0.08	0.03	0.02	0.07	0.05
1990	0.06	0.03	0.02	0.05	0.06	0.04	0.01	0.01	0.01	0.01	0.01	0.02
1991	0.85	0.38	1.29	0.44	0.04	0.03	0.03	0.02	0.01	0.01	0.01	0.02
1992	0.02	0.01	0.00	0.00	0.03	0.08	0.09	0.04	0.02	0.01	0.01	0.04
1993	0.52	0.26	0.17	0.23	1.10	2.55	0.77	0.02	0.02	0.04	0.04	0.02
1994	0.01	0.00	0.02	0.09	0.05	1.08	0.53	0.14	0.06	0.03	0.02	0.01
1995	0.04	0.05	2.70	3.74	1.65	0.33	0.07	0.03	0.02	0.03	0.02	0.01
1996	0.02	1.45	0.65	0.22	0.09	0.12	0.16	0.10	2.10	0.97	0.18	0.05
1997	0.05	0.07	0.04	0.38	3.56	4.37	1.19	0.11	0.07	0.05	0.06	0.04
1998	0.03	0.44	0.59	0.21	1.45	0.57	0.06	0.02	0.02	0.02	0.01	0.01
1999	0.08	0.08	0.17	2.87	2.59	3.40	1.29	0.26	0.12	0.05	0.02	0.03
2000	0.04	0.06	0.05	0.15	0.21	0.21	0.14	0.06	0.02	0.02	0.01	0.02
2001	0.10	3.24	1.24	0.24	0.12	0.15	0.10	0.07	0.07	0.13	0.27	0.18
2002	0.05	0.01	0.03	0.05	0.05	0.10	0.09	0.06	0.05	0.03	0.03	0.06
2003	0.04	0.02	0.01	0.19	0.18	1.90	0.70	0.05	0.03	0.08	0.07	0.27
2004	0.20	0.13	0.08	3.03	1.08	0.15	0.11	0.06	0.03	0.02	0.02	0.02
2005	0.02	0.11	0.05	0.09	0.19	0.20	0.28	0.26	0.13	0.05	0.21	0.37
2006	2.49	0.96	0.13	0.06	0.03	0.03	0.06	0.04	0.03	0.03	0.02	0.01
2007	0.12	0.12	0.05	0.05	0.17	0.23	0.25	0.14	0.11	0.09	0.04	0.02
2008	0.01	0.02	0.08	0.06	0.25	0.13	0.02	0.02	0.03	0.03	0.03	0.03
2009	0.13	0.08	0.02	0.66	0.28	0.05	0.04	0.03	0.03	0.03	0.02	0.01

Table B2- 33 Forestry Allocation Time-Series (T35G.AFF) for Quaternary Catchment T35G, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.02	0.01	0.03	0.04	0.01	0.00	0.00	0.00	0.01	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.07	0.03	0.00	0.13	0.09	0.02	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.25	0.09	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.01	0.17	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.01	0.01	0.02	0.21	0.07	0.00	0.01	0.01	0.01	0.01
1929	0.02	0.03	0.02	0.10	0.03	0.02	0.02	0.01	0.00	0.00	0.01	0.01
1930	0.00	0.00	0.00	0.07	0.09	0.12	0.04	0.00	0.00	0.20	0.08	0.01
1931	0.00	0.00	0.01	0.01	0.15	0.06	0.00	0.00	0.00	0.00	0.00	0.01
1932	0.02	0.20	0.08	0.01	0.00	0.02	0.02	0.01	0.00	0.00	0.00	0.00
1933	0.00	0.26	0.21	0.82	0.27	0.07	0.03	0.00	0.00	0.01	0.01	0.00
1934	0.00	0.01	0.11	0.04	0.01	0.02	0.03	0.03	0.02	0.02	0.01	0.01
1935	0.00	0.00	0.00	0.00	0.33	0.13	0.01	0.02	0.02	0.01	0.01	0.00
1936	0.01	0.54	0.18	0.02	0.47	0.18	0.02	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.03	0.23	0.09	0.09	0.04	0.01	0.01	0.01	0.01
1938	0.01	0.01	0.04	0.43	0.82	0.24	0.01	0.00	0.01	0.01	0.01	0.03
1939	0.04	0.03	0.01	0.01	0.04	0.04	0.02	0.02	0.02	0.01	0.00	0.00
1940	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.01	0.04	0.17	0.08	0.03	0.01	0.01	0.01	0.01
1942	0.03	0.06	0.23	0.11	0.03	0.05	0.08	0.06	0.03	0.02	0.04	0.06
1943	0.06	0.11	0.08	0.05	0.04	0.06	0.03	0.01	0.01	0.01	0.01	0.04
1944	0.05	0.02	0.00	0.00	0.04	0.07	0.04	0.01	0.01	0.00	0.00	0.00
1945	0.01	0.01	0.00	0.16	0.09	0.05	0.04	0.03	0.02	0.01	0.00	0.00
1946	0.00	0.01	0.01	0.02	0.06	0.13	0.08	0.03	0.03	0.03	0.01	0.01
1947	0.01	0.15	0.21	0.29	0.50	0.19	0.04	0.02	0.01	0.00	0.00	0.00
1948	0.01	0.01	0.00	0.01	0.02	0.03	0.02	0.01	0.01	0.01	0.01	0.00
1949	0.00	0.01	0.01	0.02	0.52	0.27	0.06	0.05	0.04	0.02	0.03	0.03
1950	0.02	0.01	0.18	0.10	0.04	0.03	0.01	0.01	0.00	0.00	0.01	0.01
1951	0.04	0.02	0.00	0.01	0.24	0.10	0.02	0.01	0.01	0.01	0.01	0.01
1952	0.01	0.01	0.01	0.01	0.06	0.06	0.05	0.03	0.01	0.01	0.01	0.02
1953	0.03	0.04	0.03	0.03	0.06	0.16	0.07	0.04	0.06	0.04	0.01	0.01
1954	0.02	0.02	0.01	0.78	0.77	0.21	0.05	0.04	0.02	0.01	0.01	0.00
1955	0.01	0.02	0.01	0.00	0.03	0.47	0.18	0.02	0.01	0.01	0.01	0.01
1956	0.01	0.05	0.27	0.14	0.05	0.74	0.29	0.04	0.01	0.01	0.02	0.04
1957	0.05	0.03	0.01	0.55	0.24	0.04	0.04	0.03	0.01	0.01	0.01	0.00
1958	0.00	0.05	0.05	0.02	0.02	0.03	0.06	0.23	0.11	0.04	0.03	0.02
1959	0.01	0.02	0.02	0.02	0.05	0.04	0.03	0.02	0.01	0.01	0.01	0.02
1960	0.02	0.03	0.05	0.07	0.06	0.08	0.09	0.07	0.04	0.01	0.01	0.01
1961	0.00	0.03	0.04	0.04	0.24	0.17	0.09	0.04	0.02	0.01	0.01	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1962	0.01	0.07	0.07	1.18	0.46	1.46	0.52	0.02	0.01	0.01	0.01	0.01
1963	0.05	0.28	0.10	0.04	0.04	0.07	0.10	0.05	0.10	0.11	0.04	0.02
1964	0.07	0.04	0.01	0.02	0.13	0.06	0.01	0.01	0.49	0.24	0.07	0.03
1965	0.03	0.08	0.04	0.05	0.20	0.08	0.01	0.02	0.03	0.02	0.01	0.02
1966	0.01	0.01	0.01	0.04	0.46	1.21	0.46	0.09	0.05	0.04	0.02	0.01
1967	0.01	0.02	0.01	0.00	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01
1968	0.01	0.01	0.01	0.00	0.03	0.69	0.26	0.02	0.02	0.01	0.01	0.01
1969	0.03	0.02	0.02	0.01	0.04	0.02	0.01	0.01	0.02	0.02	0.09	0.10
1970	0.11	0.06	0.02	0.02	0.05	0.04	0.03	0.05	0.04	0.04	0.07	0.05
1971	0.10	0.08	0.03	0.07	1.89	0.71	0.06	0.02	0.01	0.01	0.01	0.00
1972	0.01	0.06	0.03	0.02	0.59	0.32	0.12	0.05	0.02	0.01	0.01	0.01
1973	0.02	0.03	0.02	1.29	0.81	1.98	0.67	0.06	0.05	0.03	0.01	0.00
1974	0.00	0.04	0.03	0.03	0.03	0.05	0.04	0.02	0.01	0.01	0.01	0.05
1975	0.04	0.03	1.06	1.16	0.76	3.58	1.18	0.09	0.07	0.04	0.02	0.02
1976	1.03	0.37	0.01	0.02	0.07	0.08	0.05	0.02	0.01	0.01	0.02	0.04
1977	0.05	0.05	0.03	0.05	0.04	0.05	3.13	1.10	0.04	0.01	0.01	0.03
1978	0.07	0.05	0.06	0.05	0.07	0.07	0.04	0.02	0.01	0.04	0.04	0.02
1979	0.02	0.01	0.01	0.01	0.03	0.04	0.03	0.01	0.01	0.01	0.01	0.05
1980	0.05	0.03	0.02	0.08	1.32	0.48	0.03	0.03	0.04	0.03	0.02	0.01
1981	0.01	0.00	0.01	0.04	0.04	0.89	0.34	0.03	0.02	0.03	0.02	0.01
1982	0.02	0.04	0.02	0.00	0.00	0.01	0.02	0.02	0.01	0.02	0.01	0.01
1983	0.02	0.10	0.16	0.14	0.13	0.36	0.19	0.07	0.04	0.04	0.03	0.01
1984	0.04	0.07	0.03	0.10	2.89	0.99	0.02	0.01	0.01	0.01	0.01	0.01
1985	0.13	0.20	0.28	0.17	0.16	0.15	0.07	0.02	0.01	0.01	0.03	0.05
1986	0.20	0.34	0.12	0.04	0.06	0.09	0.06	0.02	0.02	0.02	0.03	2.67
1987	1.02	0.11	0.05	0.07	3.36	1.38	0.16	0.07	0.04	0.03	0.02	0.03
1988	0.03	0.07	0.83	0.35	2.33	0.86	0.34	0.16	0.04	0.04	0.03	0.01
1989	0.03	2.63	0.91	0.09	0.05	0.12	0.13	0.06	0.03	0.02	0.04	0.03
1990	0.04	0.03	0.01	0.07	0.10	0.06	0.02	0.01	0.01	0.01	0.01	0.01
1991	0.33	0.20	0.74	0.28	0.07	0.05	0.03	0.02	0.01	0.01	0.01	0.01
1992	0.01	0.01	0.00	0.01	0.04	0.08	0.07	0.04	0.02	0.01	0.01	0.03
1993	0.16	0.16	0.13	0.48	1.12	1.69	0.49	0.02	0.01	0.02	0.03	0.02
1994	0.01	0.00	0.02	0.10	0.08	0.68	0.36	0.12	0.05	0.03	0.01	0.01
1995	0.03	0.04	1.67	3.10	1.75	0.40	0.07	0.03	0.02	0.02	0.02	0.01
1996	0.01	0.75	0.37	0.33	0.15	0.10	0.12	0.08	1.23	0.62	0.15	0.04
1997	0.04	0.06	0.03	0.60	2.98	3.19	0.85	0.10	0.05	0.04	0.04	0.03
1998	0.02	0.14	0.51	0.26	1.46	0.57	0.06	0.02	0.01	0.01	0.01	0.01
1999	0.05	0.06	0.11	2.50	2.48	2.48	0.85	0.23	0.12	0.05	0.02	0.02
2000	0.03	0.05	0.04	0.16	0.26	0.23	0.13	0.06	0.02	0.01	0.01	0.01
2001	0.06	1.90	0.75	0.39	0.19	0.13	0.09	0.06	0.05	0.09	0.16	0.12
2002	0.04	0.01	0.02	0.06	0.08	0.10	0.08	0.05	0.04	0.03	0.02	0.04
2003	0.03	0.02	0.01	0.35	0.22	1.29	0.49	0.05	0.02	0.05	0.05	0.16
2004	0.13	0.09	0.06	2.76	1.03	0.16	0.10	0.05	0.02	0.01	0.02	0.01
2005	0.02	0.08	0.04	0.09	0.21	0.20	0.21	0.19	0.11	0.05	0.11	0.21

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2006	1.44	0.59	0.11	0.07	0.06	0.05	0.05	0.03	0.02	0.02	0.01	0.01
2007	0.07	0.08	0.04	0.07	0.19	0.21	0.18	0.11	0.08	0.06	0.03	0.02
2008	0.01	0.01	0.05	0.06	0.47	0.19	0.02	0.02	0.02	0.02	0.02	0.02
2009	0.08	0.05	0.01	0.70	0.33	0.08	0.04	0.03	0.03	0.03	0.02	0.01

Table B2- 34 Forestry Allocation Time-Series (T35H.AFF) for quaternary Catchment T35H, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.01	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1956	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.02	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.02	0.02	0.01	0.14	0.01	0.00	0.00	0.00	0.00	0.00
1976	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.01	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06
1987	0.01	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.02	0.01	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00
1997	0.00	0.00	0.00	0.01	0.03	0.11	0.01	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.02	0.02	0.04	0.01	0.00	0.00	0.00	0.00	0.00

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.01
2004	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
2006	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 35 Forestry Allocation Time-Series (T35J.AFF) for Quaternary Catchment T35J, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.02	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.01	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.05	0.02	0.00	0.04	0.05	0.01	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.01	0.00	0.00	0.10	0.03	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.03	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.02	0.01	0.03	0.09	0.03	0.00	0.00	0.00	0.00	0.00
1929	0.06	0.05	0.02	0.04	0.01	0.03	0.02	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.07	0.06	0.08	0.03	0.00	0.00	0.07	0.03	0.00
1931	0.00	0.00	0.01	0.00	0.10	0.04	0.00	0.00	0.00	0.00	0.00	0.01
1932	0.03	0.14	0.11	0.02	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.15	0.17	0.29	0.08	0.08	0.03	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.16	0.06	0.00	0.03	0.03	0.01	0.01	0.01	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.14	0.08	0.02	0.01	0.01	0.00	0.00	0.00
1936	0.01	0.29	0.09	0.05	0.18	0.07	0.01	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.02	0.12	0.12	0.03	0.10	0.04	0.00	0.00	0.00	0.00
1938	0.00	0.03	0.16	0.21	0.34	0.10	0.00	0.00	0.00	0.00	0.00	0.06
1939	0.06	0.02	0.01	0.01	0.08	0.08	0.03	0.01	0.01	0.00	0.00	0.00
1940	0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.00	0.00	0.00	0.00
1941	0.00	0.01	0.00	0.01	0.04	0.14	0.05	0.01	0.01	0.00	0.00	0.00
1942	0.05	0.25	0.28	0.16	0.03	0.10	0.11	0.03	0.01	0.01	0.07	0.05
1943	0.07	0.17	0.22	0.07	0.07	0.16	0.05	0.00	0.00	0.00	0.00	0.16
1944	0.07	0.01	0.00	0.00	0.11	0.11	0.03	0.00	0.00	0.00	0.00	0.00
1945	0.01	0.01	0.00	0.14	0.09	0.11	0.04	0.01	0.01	0.00	0.00	0.00
1946	0.00	0.01	0.01	0.03	0.04	0.10	0.07	0.02	0.01	0.01	0.01	0.00
1947	0.01	0.22	0.24	0.21	0.25	0.12	0.03	0.01	0.00	0.00	0.00	0.00
1948	0.01	0.01	0.01	0.00	0.03	0.02	0.01	0.01	0.00	0.00	0.00	0.00
1949	0.00	0.01	0.01	0.05	0.29	0.25	0.06	0.05	0.02	0.01	0.01	0.01

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1950	0.01	0.01	0.24	0.09	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
1951	0.06	0.02	0.00	0.01	0.18	0.07	0.01	0.01	0.00	0.00	0.00	0.00
1952	0.01	0.00	0.01	0.01	0.05	0.03	0.04	0.02	0.00	0.00	0.00	0.01
1953	0.04	0.07	0.06	0.03	0.09	0.19	0.06	0.03	0.03	0.01	0.01	0.00
1954	0.02	0.02	0.01	0.35	0.37	0.10	0.06	0.03	0.01	0.01	0.00	0.00
1955	0.01	0.02	0.01	0.00	0.01	0.34	0.12	0.01	0.01	0.00	0.00	0.00
1956	0.01	0.17	0.29	0.11	0.02	0.41	0.16	0.02	0.01	0.00	0.01	0.02
1957	0.04	0.02	0.01	0.33	0.16	0.03	0.03	0.02	0.01	0.00	0.00	0.00
1958	0.00	0.14	0.08	0.02	0.01	0.01	0.09	0.24	0.08	0.01	0.01	0.01
1959	0.01	0.01	0.02	0.01	0.04	0.03	0.03	0.02	0.01	0.00	0.00	0.01
1960	0.01	0.07	0.16	0.16	0.06	0.11	0.08	0.03	0.01	0.01	0.00	0.00
1961	0.00	0.06	0.10	0.04	0.24	0.21	0.06	0.01	0.01	0.00	0.00	0.00
1962	0.01	0.20	0.12	0.38	0.18	0.58	0.20	0.01	0.00	0.01	0.01	0.00
1963	0.11	0.32	0.10	0.11	0.04	0.17	0.10	0.02	0.12	0.06	0.01	0.01
1964	0.18	0.07	0.01	0.01	0.07	0.03	0.01	0.01	0.27	0.11	0.02	0.02
1965	0.02	0.29	0.10	0.05	0.21	0.07	0.00	0.02	0.02	0.01	0.01	0.01
1966	0.01	0.01	0.01	0.04	0.29	0.62	0.30	0.06	0.02	0.01	0.01	0.00
1967	0.00	0.02	0.01	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.01
1968	0.01	0.01	0.01	0.00	0.02	0.50	0.18	0.01	0.01	0.01	0.00	0.00
1969	0.02	0.02	0.02	0.02	0.06	0.03	0.00	0.00	0.01	0.01	0.08	0.05
1970	0.25	0.10	0.01	0.02	0.04	0.03	0.02	0.03	0.02	0.02	0.04	0.03
1971	0.18	0.08	0.02	0.12	0.67	0.31	0.04	0.01	0.00	0.00	0.00	0.00
1972	0.00	0.13	0.05	0.01	0.44	0.38	0.10	0.01	0.01	0.00	0.01	0.01
1973	0.01	0.03	0.03	0.71	0.50	0.67	0.22	0.04	0.03	0.01	0.01	0.00
1974	0.00	0.02	0.02	0.02	0.01	0.03	0.02	0.01	0.00	0.00	0.00	0.05
1975	0.02	0.02	0.67	0.67	0.47	1.14	0.35	0.08	0.04	0.01	0.01	0.01
1976	0.61	0.21	0.01	0.02	0.03	0.04	0.03	0.01	0.00	0.00	0.01	0.02
1977	0.03	0.04	0.04	0.03	0.02	0.02	1.50	0.50	0.02	0.01	0.00	0.01
1978	0.11	0.05	0.19	0.07	0.02	0.03	0.02	0.01	0.00	0.02	0.02	0.01
1979	0.01	0.01	0.01	0.01	0.02	0.03	0.02	0.01	0.00	0.00	0.00	0.07
1980	0.04	0.02	0.03	0.17	0.54	0.18	0.01	0.02	0.02	0.01	0.01	0.01
1981	0.00	0.00	0.02	0.04	0.03	0.60	0.22	0.01	0.01	0.01	0.01	0.01
1982	0.01	0.06	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00
1983	0.01	0.26	0.45	0.14	0.10	0.39	0.15	0.03	0.02	0.02	0.01	0.01
1984	0.03	0.14	0.05	0.32	1.11	0.34	0.01	0.01	0.00	0.00	0.00	0.00
1985	0.20	0.27	0.29	0.09	0.18	0.18	0.05	0.01	0.00	0.00	0.01	0.03
1986	0.42	0.54	0.16	0.03	0.03	0.05	0.03	0.01	0.01	0.01	0.01	1.16
1987	0.53	0.12	0.05	0.11	1.03	0.69	0.15	0.03	0.02	0.01	0.01	0.01
1988	0.02	0.20	0.66	0.22	0.87	0.32	0.45	0.16	0.01	0.01	0.01	0.00
1989	0.02	1.22	0.41	0.09	0.03	0.28	0.12	0.02	0.01	0.01	0.02	0.02
1990	0.03	0.02	0.02	0.03	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.01
1991	0.40	0.26	0.54	0.18	0.02	0.01	0.02	0.01	0.00	0.00	0.00	0.00
1992	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.02	0.01	0.00	0.00	0.01
1993	0.30	0.13	0.20	0.38	0.55	0.70	0.19	0.01	0.00	0.01	0.01	0.01

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1994	0.01	0.00	0.02	0.06	0.03	0.46	0.34	0.08	0.02	0.01	0.00	0.00
1995	0.02	0.03	1.09	1.17	0.66	0.19	0.04	0.01	0.01	0.01	0.01	0.00
1996	0.01	0.58	0.35	0.23	0.07	0.03	0.10	0.05	0.60	0.35	0.07	0.02
1997	0.02	0.10	0.05	0.41	1.00	1.35	0.38	0.05	0.03	0.02	0.02	0.02
1998	0.01	0.36	0.73	0.23	0.37	0.17	0.03	0.01	0.00	0.00	0.00	0.00
1999	0.03	0.04	0.40	0.97	0.94	1.10	0.57	0.13	0.03	0.02	0.01	0.01
2000	0.02	0.04	0.04	0.30	0.30	0.10	0.05	0.03	0.01	0.01	0.00	0.01
2001	0.03	1.15	0.61	0.31	0.10	0.13	0.06	0.03	0.02	0.03	0.06	0.04
2002	0.02	0.01	0.02	0.03	0.03	0.09	0.05	0.03	0.02	0.01	0.01	0.02
2003	0.02	0.01	0.01	0.24	0.11	0.75	0.27	0.02	0.01	0.02	0.02	0.31
2004	0.12	0.03	0.03	1.08	0.39	0.17	0.07	0.02	0.01	0.00	0.00	0.00
2005	0.01	0.26	0.10	0.02	0.09	0.07	0.34	0.15	0.04	0.02	0.03	0.16
2006	0.75	0.43	0.12	0.04	0.02	0.02	0.02	0.02	0.01	0.01	0.00	0.00
2007	0.03	0.05	0.03	0.03	0.30	0.13	0.09	0.05	0.03	0.02	0.01	0.01
2008	0.00	0.01	0.03	0.02	0.21	0.08	0.01	0.01	0.01	0.01	0.01	0.01
2009	0.03	0.03	0.01	0.24	0.11	0.03	0.02	0.01	0.01	0.01	0.01	0.00

Table B2- 36 Forestry Allocation Time-Series (T35K.AFF) for Quaternary Catchment T35K, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.01	0.00	0.00	0.03	0.02	0.01	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.07	0.02	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1929	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.00	0.05	0.02	0.00
1931	0.00	0.00	0.00	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.01	0.07	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.06	0.05	0.16	0.05	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.04	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.07	0.03	0.01	0.01	0.01	0.00	0.00	0.00
1936	0.00	0.18	0.06	0.00	0.08	0.03	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00
1938	0.00	0.00	0.03	0.04	0.20	0.07	0.00	0.00	0.00	0.00	0.00	0.01
1939	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.01	0.00	0.00	0.00	0.00
1942	0.01	0.15	0.12	0.03	0.00	0.01	0.02	0.02	0.01	0.01	0.01	0.02
1943	0.02	0.05	0.05	0.02	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.09

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1944	0.04	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1945	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.00
1947	0.00	0.10	0.05	0.02	0.08	0.04	0.01	0.01	0.00	0.00	0.00	0.00
1948	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.10	0.08	0.02	0.01	0.01	0.01	0.01	0.01
1950	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.01	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00
1953	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.00	0.00
1954	0.01	0.01	0.00	0.09	0.10	0.03	0.01	0.01	0.00	0.00	0.00	0.00
1955	0.00	0.01	0.00	0.00	0.00	0.11	0.04	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.02	0.04	0.02	0.01	0.11	0.05	0.01	0.00	0.00	0.01	0.01
1957	0.01	0.01	0.00	0.02	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00
1958	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.11	0.05	0.01	0.01	0.01
1959	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01
1960	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.00	0.00	0.00
1961	0.00	0.01	0.01	0.01	0.02	0.03	0.02	0.01	0.00	0.00	0.00	0.00
1962	0.00	0.02	0.02	0.09	0.04	0.38	0.14	0.01	0.00	0.00	0.00	0.00
1963	0.01	0.05	0.02	0.01	0.01	0.02	0.03	0.02	0.03	0.03	0.01	0.01
1964	0.02	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.12	0.06	0.02	0.01
1965	0.01	0.03	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.04	0.36	0.15	0.02	0.01	0.01	0.01	0.00
1967	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.01	0.00	0.00	0.00	0.00	0.13	0.05	0.01	0.00	0.00	0.00	0.00
1969	0.01	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.02	0.03
1970	0.05	0.02	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.02
1971	0.04	0.02	0.01	0.01	0.39	0.15	0.02	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.02	0.01	0.00	0.06	0.08	0.03	0.01	0.00	0.00	0.00	0.00
1973	0.01	0.01	0.01	0.26	0.11	0.33	0.12	0.03	0.02	0.01	0.00	0.00
1974	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.02
1975	0.01	0.01	0.33	0.30	0.24	0.92	0.29	0.03	0.02	0.01	0.00	0.01
1976	0.39	0.14	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
1977	0.02	0.01	0.01	0.01	0.01	0.01	1.30	0.43	0.01	0.00	0.00	0.01
1978	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.01
1979	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.02
1980	0.02	0.01	0.01	0.01	0.11	0.05	0.01	0.01	0.01	0.01	0.01	0.00
1981	0.00	0.00	0.01	0.01	0.01	0.20	0.08	0.01	0.01	0.01	0.01	0.00
1982	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00
1983	0.01	0.03	0.04	0.02	0.02	0.04	0.05	0.02	0.01	0.01	0.01	0.00
1984	0.01	0.03	0.01	0.02	0.64	0.22	0.01	0.00	0.00	0.00	0.00	0.00
1985	0.03	0.05	0.05	0.02	0.02	0.04	0.02	0.01	0.00	0.00	0.01	0.02
1986	0.12	0.09	0.03	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.99
1987	0.36	0.04	0.02	0.01	0.48	0.21	0.04	0.02	0.01	0.01	0.01	0.01

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1988	0.01	0.02	0.05	0.03	0.59	0.21	0.09	0.05	0.01	0.01	0.01	0.00
1989	0.01	0.82	0.28	0.01	0.00	0.02	0.03	0.01	0.01	0.01	0.01	0.01
1990	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01
1991	0.09	0.05	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.01
1993	0.04	0.04	0.03	0.04	0.13	0.32	0.10	0.01	0.00	0.01	0.01	0.00
1994	0.00	0.00	0.00	0.01	0.00	0.04	0.08	0.05	0.02	0.01	0.00	0.00
1995	0.01	0.01	0.33	0.51	0.18	0.05	0.02	0.01	0.00	0.01	0.00	0.00
1996	0.00	0.04	0.05	0.03	0.01	0.01	0.03	0.02	0.52	0.24	0.05	0.01
1997	0.01	0.01	0.01	0.03	0.62	1.21	0.36	0.03	0.03	0.03	0.03	0.02
1998	0.01	0.03	0.17	0.07	0.03	0.03	0.02	0.01	0.00	0.00	0.00	0.00
1999	0.02	0.02	0.03	0.38	0.17	0.72	0.35	0.07	0.02	0.01	0.01	0.01
2000	0.01	0.01	0.01	0.02	0.03	0.03	0.02	0.01	0.01	0.00	0.00	0.00
2001	0.01	0.50	0.19	0.04	0.02	0.03	0.02	0.01	0.01	0.02	0.03	0.02
2002	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
2003	0.01	0.01	0.00	0.01	0.01	0.24	0.10	0.01	0.01	0.01	0.01	0.05
2004	0.04	0.01	0.01	0.49	0.18	0.02	0.01	0.01	0.01	0.00	0.00	0.00
2005	0.00	0.03	0.02	0.01	0.01	0.02	0.04	0.04	0.03	0.01	0.03	0.08
2006	0.37	0.15	0.03	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00
2007	0.02	0.02	0.01	0.00	0.02	0.02	0.03	0.02	0.02	0.02	0.01	0.00
2008	0.00	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01
2009	0.02	0.01	0.00	0.02	0.02	0.01	0.01	0.00	0.01	0.01	0.00	0.00

Table B2- 37 Forestry Allocation Time-Series (T35L1,AFF) for Quaternary Catchment T35L1, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1929	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1931	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1932	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1934	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1936	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1938	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1939	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1940	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1942	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1943	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1944	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1945	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1947	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1948	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1950	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1953	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1954	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1955	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1956	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1957	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1958	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1959	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1960	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1961	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1962	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1963	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1964	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1965	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1966	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1967	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1973	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1975	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1976	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1977	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1978	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1979	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1980	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1981	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1982	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1991	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1992	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2005	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2006	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2007	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2008	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2009	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B2- 38 Forestry Allocation Time-Series (T35L2.AFF) for quaternary Catchment T35L2, Based on WARMS

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1920	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1921	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1922	0.00	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00
1923	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1924	0.00	0.00	0.02	0.01	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00
1925	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1926	0.00	0.00	0.01	0.00	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00
1927	0.00	0.00	0.02	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1928	0.00	0.00	0.01	0.00	0.01	0.04	0.01	0.00	0.00	0.00	0.00	0.00
1929	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1930	0.00	0.00	0.00	0.02	0.02	0.03	0.01	0.00	0.00	0.05	0.02	0.00
1931	0.00	0.00	0.00	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.01
1932	0.01	0.06	0.05	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1933	0.00	0.06	0.06	0.10	0.03	0.03	0.01	0.00	0.00	0.01	0.00	0.00
1934	0.00	0.01	0.05	0.02	0.00	0.02	0.02	0.01	0.01	0.00	0.00	0.00
1935	0.00	0.00	0.00	0.00	0.08	0.05	0.01	0.02	0.01	0.00	0.00	0.00
1936	0.02	0.11	0.04	0.03	0.08	0.03	0.00	0.00	0.00	0.00	0.00	0.00
1937	0.00	0.00	0.01	0.05	0.04	0.01	0.05	0.02	0.00	0.00	0.00	0.00
1938	0.00	0.02	0.06	0.07	0.13	0.04	0.00	0.00	0.00	0.00	0.00	0.04
1939	0.03	0.01	0.00	0.01	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.00
1940	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1941	0.01	0.00	0.00	0.01	0.02	0.06	0.02	0.01	0.00	0.00	0.00	0.00
1942	0.03	0.12	0.12	0.05	0.01	0.05	0.05	0.01	0.00	0.00	0.04	0.03
1943	0.03	0.07	0.09	0.03	0.03	0.06	0.02	0.00	0.00	0.00	0.00	0.09
1944	0.04	0.00	0.00	0.00	0.05	0.04	0.01	0.00	0.00	0.00	0.00	0.00
1945	0.03	0.01	0.00	0.06	0.04	0.05	0.02	0.00	0.00	0.00	0.00	0.00
1946	0.00	0.02	0.01	0.02	0.02	0.05	0.05	0.01	0.03	0.01	0.00	0.00
1947	0.00	0.12	0.09	0.07	0.10	0.06	0.02	0.00	0.00	0.00	0.00	0.00
1948	0.04	0.01	0.00	0.00	0.04	0.02	0.01	0.00	0.00	0.00	0.00	0.00
1949	0.00	0.01	0.01	0.03	0.12	0.10	0.03	0.02	0.01	0.00	0.02	0.01
1950	0.01	0.00	0.10	0.04	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
1951	0.05	0.02	0.00	0.01	0.07	0.03	0.01	0.00	0.00	0.00	0.00	0.00
1952	0.00	0.00	0.00	0.00	0.03	0.01	0.01	0.01	0.00	0.00	0.00	0.01
1953	0.02	0.03	0.02	0.01	0.03	0.08	0.02	0.03	0.02	0.01	0.00	0.00
1954	0.03	0.02	0.01	0.13	0.14	0.04	0.01	0.01	0.00	0.00	0.00	0.00
1955	0.01	0.02	0.01	0.00	0.03	0.13	0.04	0.00	0.01	0.00	0.00	0.00
1956	0.00	0.09	0.10	0.06	0.01	0.12	0.05	0.01	0.00	0.00	0.01	0.01
1957	0.02	0.01	0.01	0.11	0.06	0.01	0.02	0.01	0.00	0.00	0.00	0.00
1958	0.00	0.07	0.04	0.01	0.00	0.01	0.05	0.11	0.04	0.01	0.01	0.01
1959	0.00	0.01	0.01	0.01	0.04	0.02	0.01	0.01	0.00	0.00	0.00	0.01
1960	0.01	0.03	0.06	0.05	0.02	0.06	0.03	0.01	0.01	0.00	0.00	0.00
1961	0.00	0.04	0.05	0.02	0.08	0.08	0.02	0.00	0.00	0.00	0.00	0.00

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT
WATER RESOURCES

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1962	0.01	0.09	0.05	0.15	0.08	0.25	0.09	0.01	0.00	0.01	0.00	0.00
1963	0.06	0.11	0.03	0.04	0.02	0.10	0.07	0.01	0.09	0.03	0.00	0.01
1964	0.09	0.03	0.00	0.01	0.03	0.01	0.00	0.00	0.16	0.06	0.01	0.01
1965	0.04	0.12	0.04	0.03	0.09	0.03	0.00	0.05	0.02	0.00	0.00	0.01
1966	0.01	0.01	0.01	0.02	0.14	0.29	0.13	0.02	0.01	0.01	0.00	0.00
1967	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.01
1968	0.01	0.01	0.01	0.00	0.04	0.17	0.06	0.01	0.00	0.00	0.00	0.00
1969	0.03	0.01	0.01	0.01	0.05	0.02	0.00	0.00	0.01	0.01	0.07	0.03
1970	0.11	0.04	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.04	0.02
1971	0.14	0.06	0.01	0.07	0.30	0.14	0.02	0.00	0.00	0.00	0.00	0.00
1972	0.00	0.10	0.04	0.01	0.15	0.16	0.04	0.00	0.00	0.00	0.01	0.00
1973	0.02	0.03	0.02	0.26	0.16	0.24	0.08	0.04	0.02	0.01	0.00	0.00
1974	0.00	0.04	0.02	0.01	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.07
1975	0.03	0.03	0.32	0.32	0.29	0.52	0.16	0.05	0.02	0.01	0.00	0.01
1976	0.30	0.10	0.01	0.01	0.02	0.03	0.01	0.00	0.00	0.00	0.00	0.03
1977	0.02	0.02	0.04	0.05	0.02	0.02	0.62	0.21	0.01	0.00	0.00	0.01
1978	0.07	0.03	0.11	0.04	0.03	0.02	0.01	0.00	0.00	0.04	0.02	0.01
1979	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.08
1980	0.03	0.01	0.01	0.04	0.20	0.07	0.01	0.03	0.02	0.01	0.01	0.00
1981	0.00	0.00	0.05	0.06	0.02	0.26	0.09	0.01	0.01	0.01	0.01	0.00
1982	0.01	0.03	0.01	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00
1983	0.01	0.13	0.14	0.04	0.04	0.15	0.06	0.01	0.01	0.01	0.01	0.00
1984	0.05	0.11	0.03	0.10	0.42	0.13	0.01	0.00	0.00	0.00	0.00	0.00
1985	0.18	0.15	0.14	0.05	0.12	0.14	0.04	0.00	0.00	0.00	0.01	0.02
1986	0.21	0.21	0.05	0.01	0.01	0.06	0.02	0.00	0.00	0.00	0.01	0.55
1987	0.24	0.05	0.02	0.03	0.37	0.24	0.05	0.02	0.01	0.01	0.01	0.01
1988	0.02	0.09	0.17	0.06	0.44	0.16	0.19	0.07	0.01	0.01	0.01	0.00
1989	0.06	0.53	0.18	0.01	0.01	0.07	0.04	0.01	0.01	0.00	0.01	0.01
1990	0.02	0.01	0.01	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.01
1991	0.20	0.10	0.20	0.07	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01
1992	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.02
1993	0.16	0.07	0.15	0.15	0.24	0.33	0.09	0.00	0.00	0.01	0.01	0.00
1994	0.00	0.00	0.01	0.02	0.01	0.22	0.16	0.04	0.01	0.01	0.00	0.01
1995	0.01	0.01	0.32	0.44	0.29	0.09	0.01	0.00	0.00	0.01	0.01	0.00
1996	0.01	0.18	0.14	0.05	0.01	0.06	0.08	0.03	0.42	0.19	0.03	0.01
1997	0.01	0.02	0.01	0.18	0.47	0.76	0.23	0.05	0.03	0.04	0.03	0.02
1998	0.01	0.16	0.29	0.09	0.14	0.07	0.01	0.01	0.00	0.00	0.00	0.00
1999	0.09	0.04	0.16	0.37	0.23	0.45	0.32	0.07	0.01	0.01	0.01	0.01
2000	0.02	0.04	0.02	0.13	0.12	0.04	0.02	0.01	0.00	0.00	0.00	0.01
2001	0.04	0.40	0.25	0.18	0.06	0.09	0.04	0.01	0.01	0.02	0.03	0.02
2002	0.01	0.01	0.01	0.03	0.02	0.04	0.02	0.01	0.01	0.01	0.01	0.02
2003	0.01	0.01	0.01	0.09	0.04	0.31	0.11	0.01	0.00	0.02	0.01	0.19
2004	0.07	0.01	0.01	0.47	0.17	0.02	0.01	0.01	0.01	0.00	0.01	0.00
2005	0.01	0.19	0.07	0.01	0.07	0.05	0.09	0.04	0.01	0.01	0.10	0.21

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
2006	0.31	0.16	0.07	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.00	0.00
2007	0.09	0.04	0.01	0.01	0.07	0.04	0.05	0.02	0.02	0.01	0.01	0.00
2008	0.01	0.01	0.01	0.01	0.15	0.05	0.01	0.01	0.01	0.01	0.01	0.01
2009	0.08	0.03	0.01	0.20	0.08	0.01	0.01	0.00	0.01	0.01	0.00	0.00

Table B2- 39 WRMSM2000 Calibration parameters for the Tsitsa River System

Module	POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
T35A	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35B	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35C	3	55	90	99.9	0	100	100	0.1	0.40	0	0.0
T35D	3	0	50	50.0	0	999	999	2.5	0.25	0	0.5
T35E	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35F	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35G	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35H	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35J	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35K	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5
T35L	3	0	50	9.5	0	999	999	2.5	0.25	0	0.5

Where:

POW	Power of soil moisture/subsurface flow equation
SL	Soil moisture state when subsurface flow = 0
ST	Soil moisture capacity in mm
FT	Subsurface flow at soil moisture capacity
GW	Maximum groundwater flow in mm/month
ZMIN	Minimum catchment absorption in mm/month
ZMAX	Maximum catchment absorption in mm/month
PI	Interception storage in mm
TL	Lag of flow (excluding groundwater)
GL	Lag of groundwater flow in months
R	Coeff.in evaporation/soil moisture equation

APPENDIX C

SEDIMENTATION CALCULATIONS

Table C-1: Rooseboom Calculation Sheet for the Somabadi Dam Sedimentation Volumes

EQUATION: $Y_c = Y_s[F_h(A_h/A_t) + F_m(A_m/A_t) + F_l(A_l/A_t)]$									
Catchment Size - A_t	2376	km ²						OUTPUTS - Weight	
Yield Region	9	Figure 5.1						Sediment Yield (t/a.km ²)	Percentile
Erodibility Index	1 - 15	Figure 5.2						14.1	10
Standardised Regional Average Yield	185	Table 5.5.1						27.7	20
Regional Soil Potential Sedimentation Factors	1	F_h	Table 5.5.1	Rooseboom 1992 - 297/1/92				92.3	50
	1	F_m						245.4	80
	0	F_l						293.0	90
Regional Multiplication Factor	0.148	0.1	Figure 5.12					381.4	95
	0.296	0.2							
	1	0.5				OUTPUTS - Volume (V50)			
	2.667	0.8				Sediment Yield (m ³)	Percentile		
	3.185	0.9				1 240 281.4	10		
Converted Standardised Regional Average Yield - Y_s	4.148	0.95					2 436 243.0	20	
	27.38	0.1			V50 Bulk Density		8 125 141.3	50	
	54.76	0.2			1.35	t/km ² /a	21 595 870.5	80	
	185	0.5			Rooseboom 1992		25 781 735.9	90	
	493.395	0.8			Page 4.15		33 563 566.9	95	
	589.225	0.9					Somabadi		
767.38	0.95					OUTPUTS - Volume (V100)			
High Sediment Potential Area - A_h	1179.363118	km ²			V100/V50	1.275	Sediment Yield (m ³)	Percentile	
Moderate Sediment Potential Area - A_m	1196.636882	km ²			Rooseboom 1992		1 581 358.8	10	
Low Sediment Potential Area - A_l	0	km ²			Figure 4.7, Page 4.14		3 106 209.8	20	
							10 359 555.1	50	
High Sediment Potential Area - A_h	50%	% Area					27 534 734.8	80	
Moderate Sediment Potential Area - A_m	50%	% Area					32 871 713.3	90	
Low Sediment Potential Area - A_l	0%	% Area					42 793 547.8	95	

Table C-2: Rooseboom (1992) Calculation Sheet for the Thabeng Dam Sedimentation Volumes

EQUATION:			Yc = Ys[Fh(Ah/At) + Fm(Am/At) + FI(Al/At)]		
Catchment Size - At	2134	km ²			
Yield Region	9	Figure 5.1			
Erodibility Index	1 - 15	Figure 5.2			
Standardised Regional Average Yield	185	Table 5.5.1			
Regional Soil Potential Sedimentation Factors	1	Fh	Table 5.5.1	Rooseboom 1992 - 297/1/92	
	1	Fm			
	0	FI			
Regional Multiplication Factor	0.148	0.1	Figure 5.12		
	0.296	0.2			
	1	0.5			
	2.667	0.8			
	3.185	0.9			
	4.148	0.95			
Converted Standardised Regional Average Yield - Ys	27.38	0.1			
	54.76	0.2			
	185	0.5			
	493.395	0.8			
	589.225	0.9			
	767.38	0.95			
High Sediment Potential Area - Ah	1059.242801	km ²			
Moderate Sediment Potential Area - Am	1074.757199	km ²			
Low Sediment Potential Area - Al	0	km ²			
High Sediment Potential Area - Ah	50%	% Area			
Moderate Sediment Potential Area - Am	50%	% Area			
Low Sediment Potential Area - Al	0%	% Area			

OUTPUTS - Weight	
Sediment Yield (t/a.km ²)	Percentile
14.1	10
27.7	20
92.3	50
245.4	80
293.0	90
381.4	95

OUTPUTS - Volume (V50)	
Sediment Yield (m ³)	Percentile
1 113 956.5	10
2 188 107.1	20
7 297 580.6	50
19 396 291.1	80
23 155 818.4	90
30 145 055.5	95
Thabeng	
OUTPUTS - Volume (V100)	
Sediment Yield (m ³)	Percentile
1 420 294.5	10
2 789 836.6	20
9 304 415.2	50
24 730 271.1	80
29 523 668.4	90
38 434 945.7	95

**Table C-3:
Rooseboom
Calculation
the
Ntabelanga**

Sedimentation volumes

Table C-4: WRC (2010) Calculation Sheet for the Ntabelanga Dam Sedimentation Volumes - Phase 2

SEDIMENT YIELD PREDICTION FOR SOUTH AFRICA - 2010 EDITION				
Calculation sheet for the prediction of sediment yield				
Fill in yellow the cells using data obtained from regional maps (pdf files or GIS)				
For the user manual on how to extract data from the pdf files consult report in Appendix K				
CATCHMENT CHARACTERISTICS		References		
Region	7	Figure 2.6-1		
1:10 Year flood Peak, Q_{10} (m ³ /s)	590	Flood hydrology text books		
Average River Slope, S_a (%)	13.184	Flood hydrology text books		
River Network Density (m/km ²)	193.3375	Appendix K		
EROSION POTENTIAL STATISTICS				
Erosion Index				
Incremental catchment area (km ²)				
F_1	0	Appendix K		
F_2	0	Appendix K		
F_3	13.10939	Appendix K		
F_4	307.27211	Appendix K		
F_5	454.73897	Appendix K		
F_6	400.15344	Appendix K		
F_7	407.40376	Appendix K		
F_8	428.76082	Appendix K		
F_9	5.08182	Appendix K		
F_{10}	0	Appendix K		
Calculated sediment yield for empirical or probabilistic method as applicable				
Confidence Band Factor (If Empirical)	3.65	Appendix F or H		
Confidence Band factor (If Probabilistic)	1	Appendix F or H		
Sediment Load (t/a)	947 943			
Sediment Yield (t/km ² .a)	FALSE			
Calculated sediment yield with confidence band (t/km ² .a) - Empirical		Blank when probabilistic		
1 716				
Calculated sediment yield with confidence band (t/km ² .a) -		Blank when empirical		
-				



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Table C-5: WRC (2010) Calculation Sheet for the Lalini Dam Incremental Catchment Sedimentation Volumes - Phase 2

SEDIMENT YIELD PREDICTION FOR SOUTH AFRICA - 2010 EDITION					
Calculation sheet for the prediction of sediment yield					
Fill in yellow the cells using data obtained from regional maps (pdf files or GIS)					
For the user manual on how to extract data from the pdf files consult report in Appendix K					
CATCHMENT CHARACTERISTICS		References			
Region	7	Figure 2.6-1			
1:10 Year flood Peak, Q_{10} (m ³ /s)	679	Flood hydrology text books			
Average River Slope, S_e (%)	9.031667	Flood hydrology text books			
River Network Density (m/km ²)	195.7083	Appendix K			
EROSION POTENTIAL STATISTICS					
Erosion Index					
Incremental catchment area (km ²)					
F_1	0	Appendix K			
F_2	0	Appendix K			
F_3	22.08504	Appendix K			
F_4	386.09495	Appendix K			
F_5	269.83852	Appendix K			
F_6	402.38471	Appendix K			
F_7	544.81976	Appendix K			
F_8	780.38698	Appendix K			
F_9	0	Appendix K			
F_{10}	0	Appendix K			
Calculated sediment yield for empirical or probabilistic method as applicable					
Confidence Band Factor (If Empirical)	3.5	Appendix F or H			
Confidence Band Factor (If Probabilistic)	1	Appendix F or H			
Sediment Load (t/a)	1 012 999				
Sediment Yield (t/km ² .a)	FALSE				
Calculated sediment yield with confidence band (t/km ² .a) - Empirical		Blank when probabilistic			
Calculated sediment yield with confidence band (t/km ² .a) - Probabilistic		Blank when empirical			



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APPENDIX D1

STOCHASTIC STREAMFLOW ANALYSIS TESTS KINIRA RIVER SYSTEM

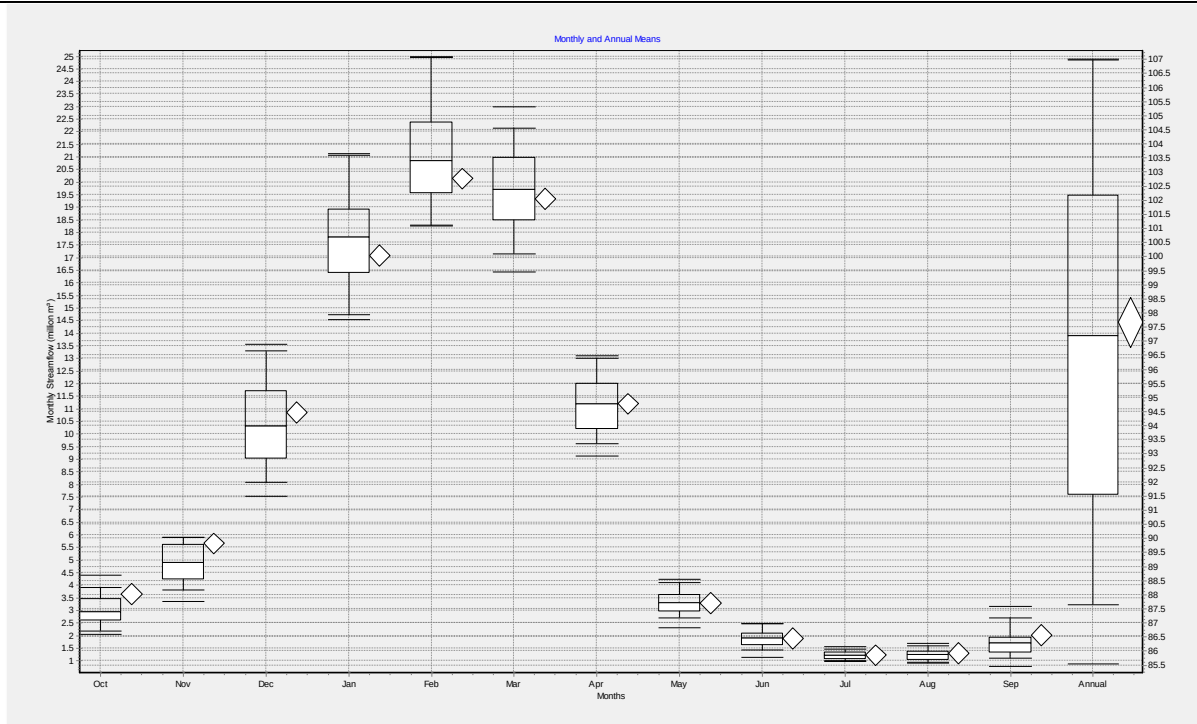


Figure D1- 1 Plot of the Monthly and Annual Means for Quaternary Catchment T33A

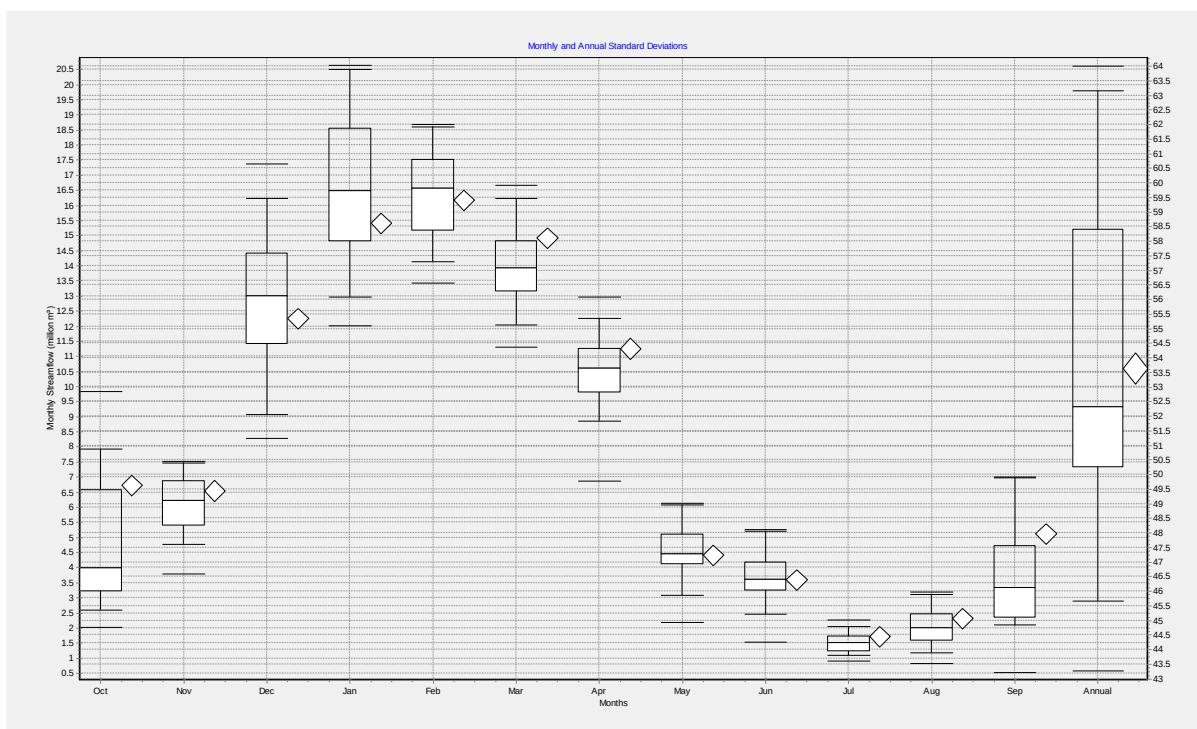


Figure D1- 2 Plot of the Monthly and Annual Standard Deviations for quaternary Catchment T33A

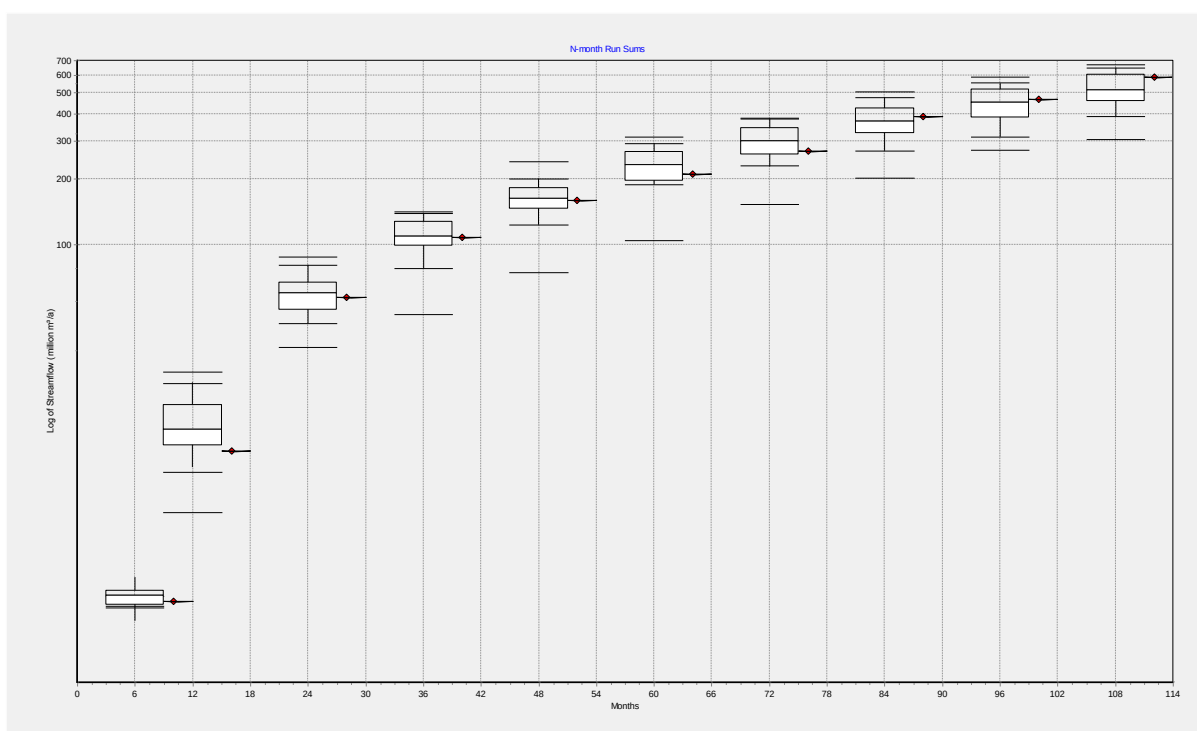


Figure D1- 3 Plot of the N-month Run Sums for Quaternary Catchment T33A

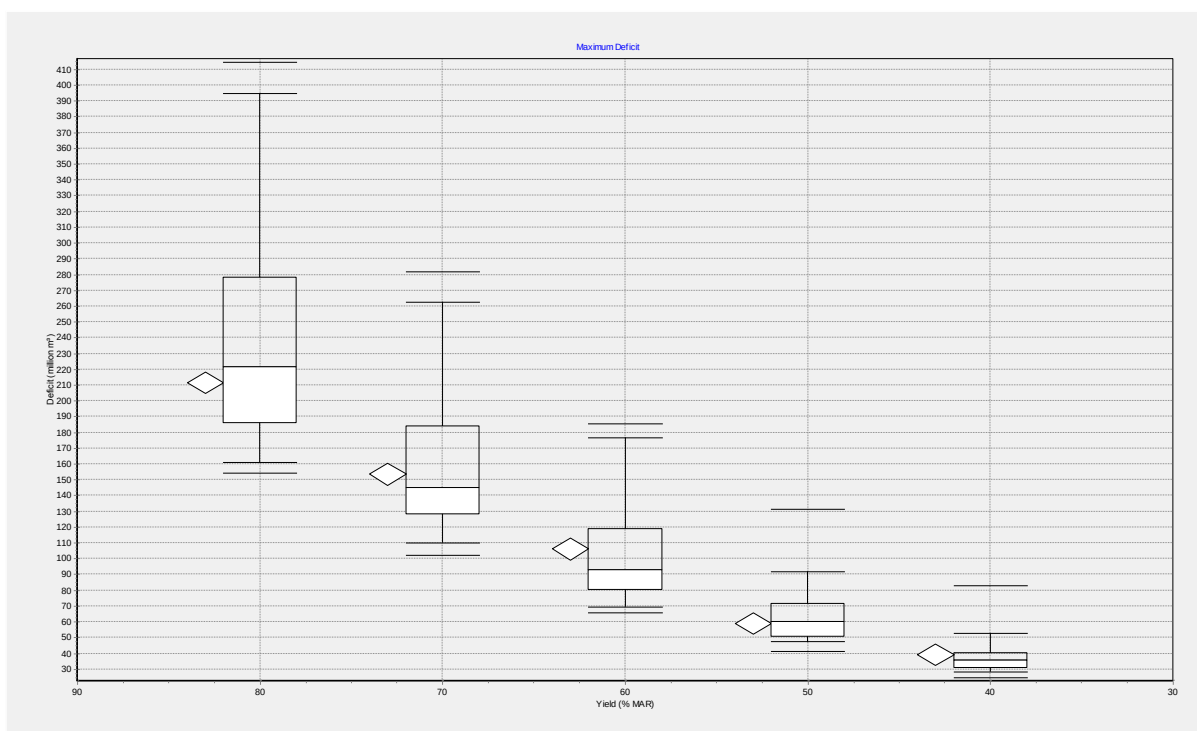


Figure D1- 4 Plot of the Maximum Deficits for Quaternary Catchment T33A

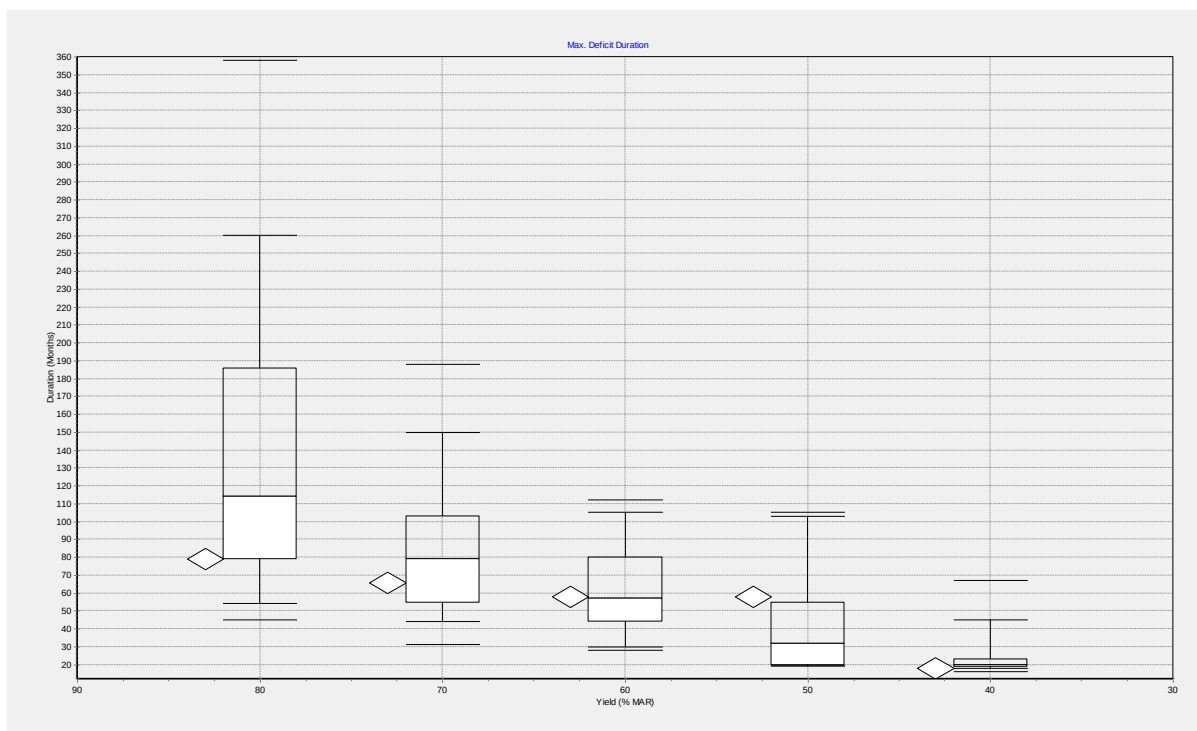


Figure D1- 5 Plot of the Maximum Deficit Durations for quaternary Catchment T33A

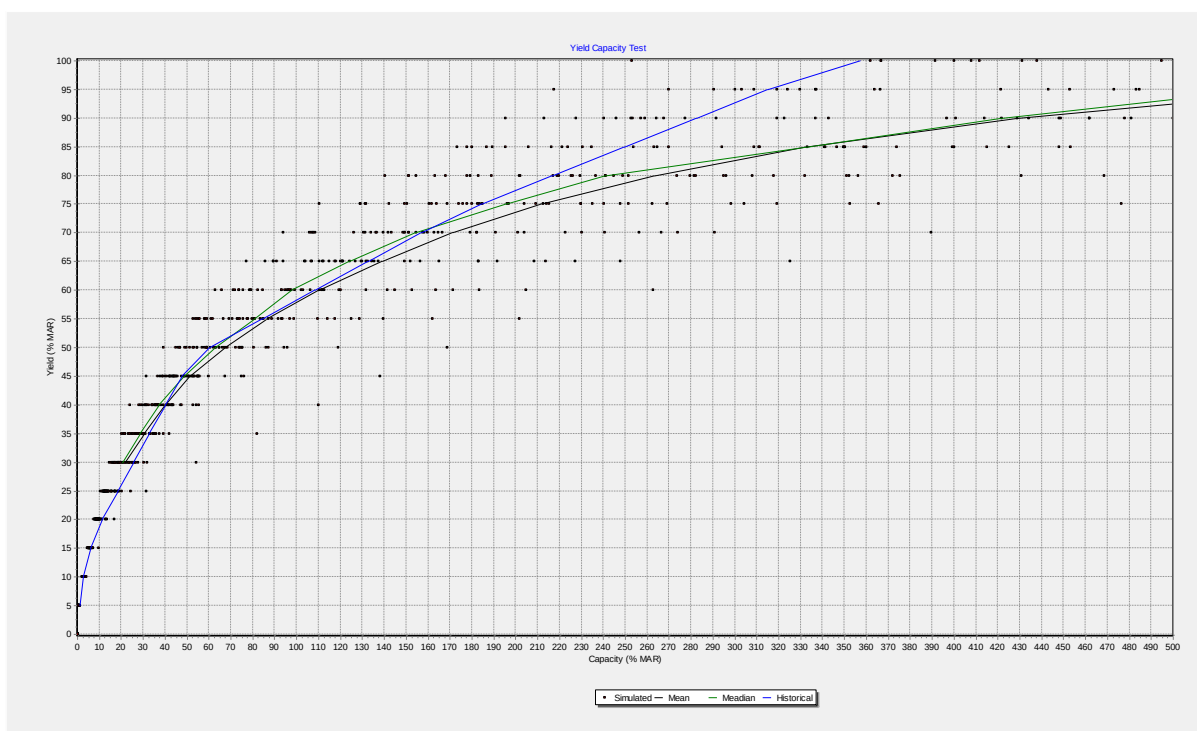


Figure D1- 6 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T3

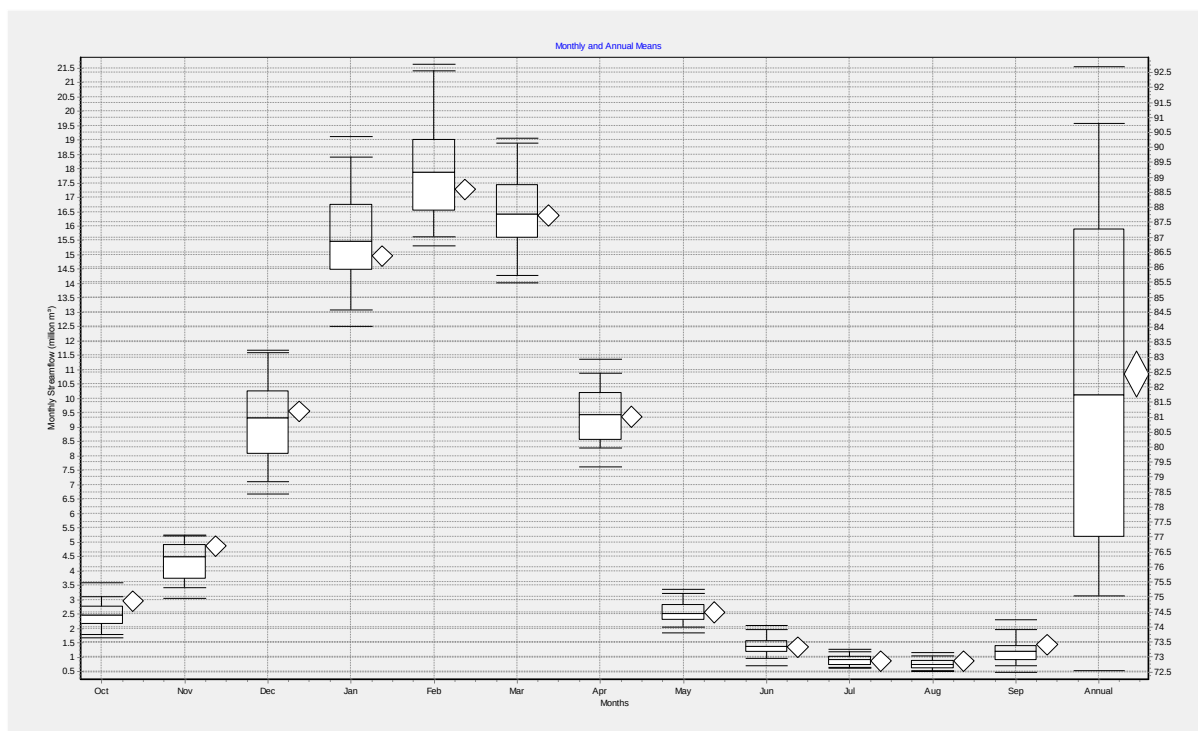


Figure D1- 7 Plot of the Monthly and Annual Means for Quaternary Catchment T3

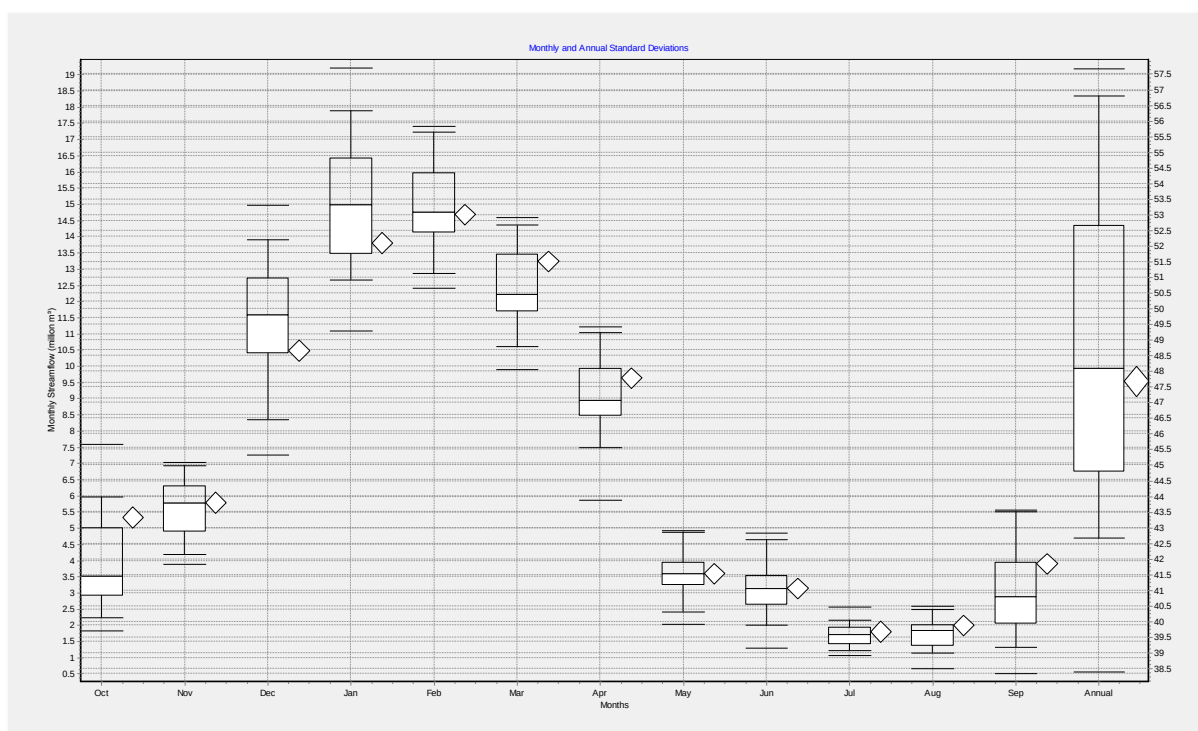


Figure D1- 8 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T33B

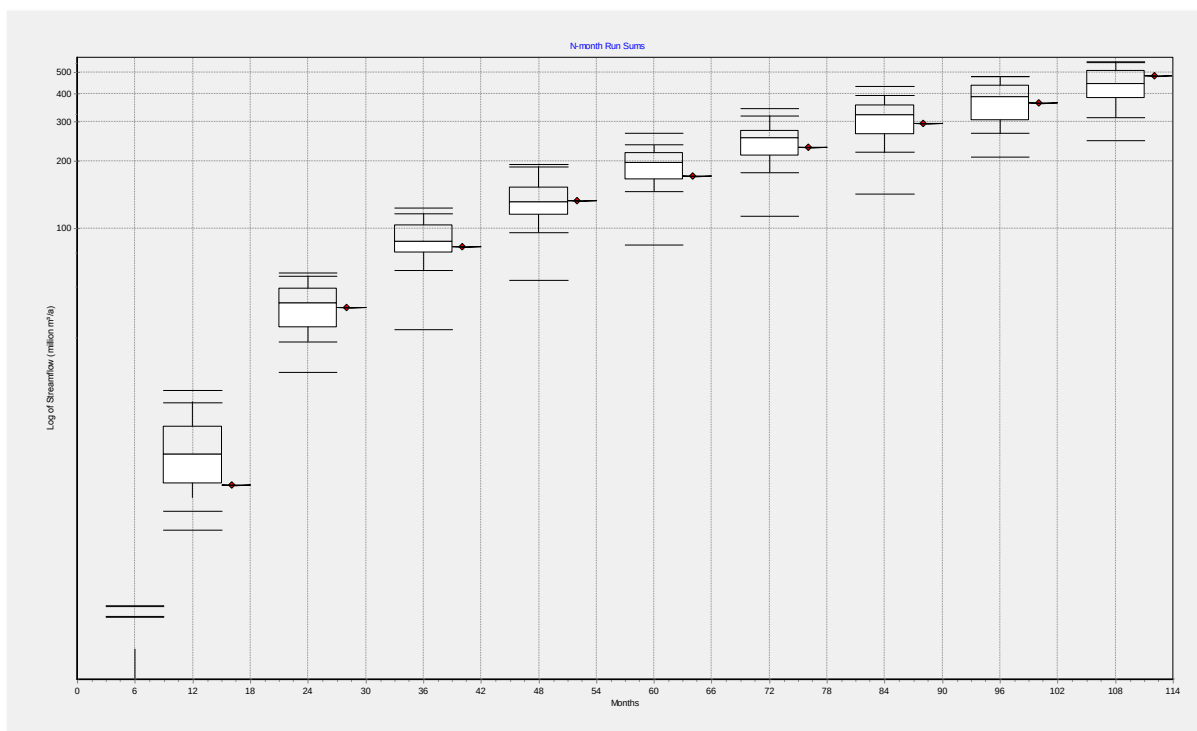


Figure D1- 9 Plot of the N-month Run Sums for Quaternary Catchment T33B

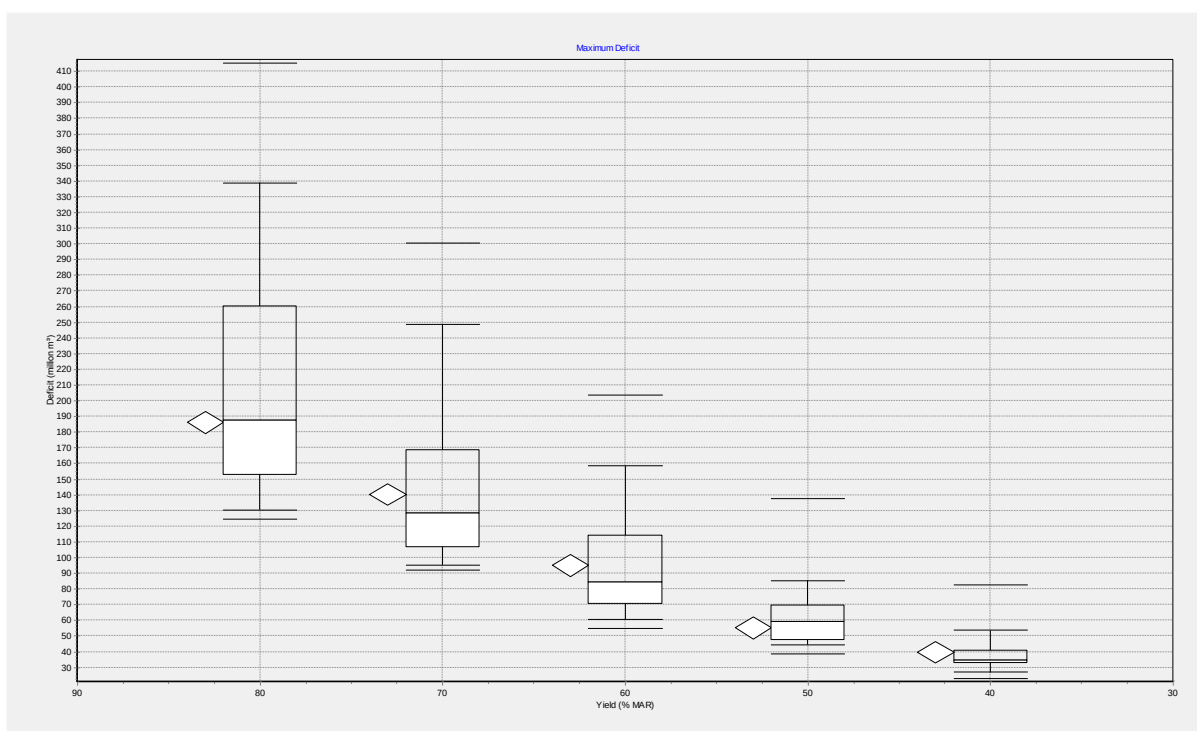


Figure D1- 10 Plot of the Maximum Deficits for Quaternary Catchment T33B

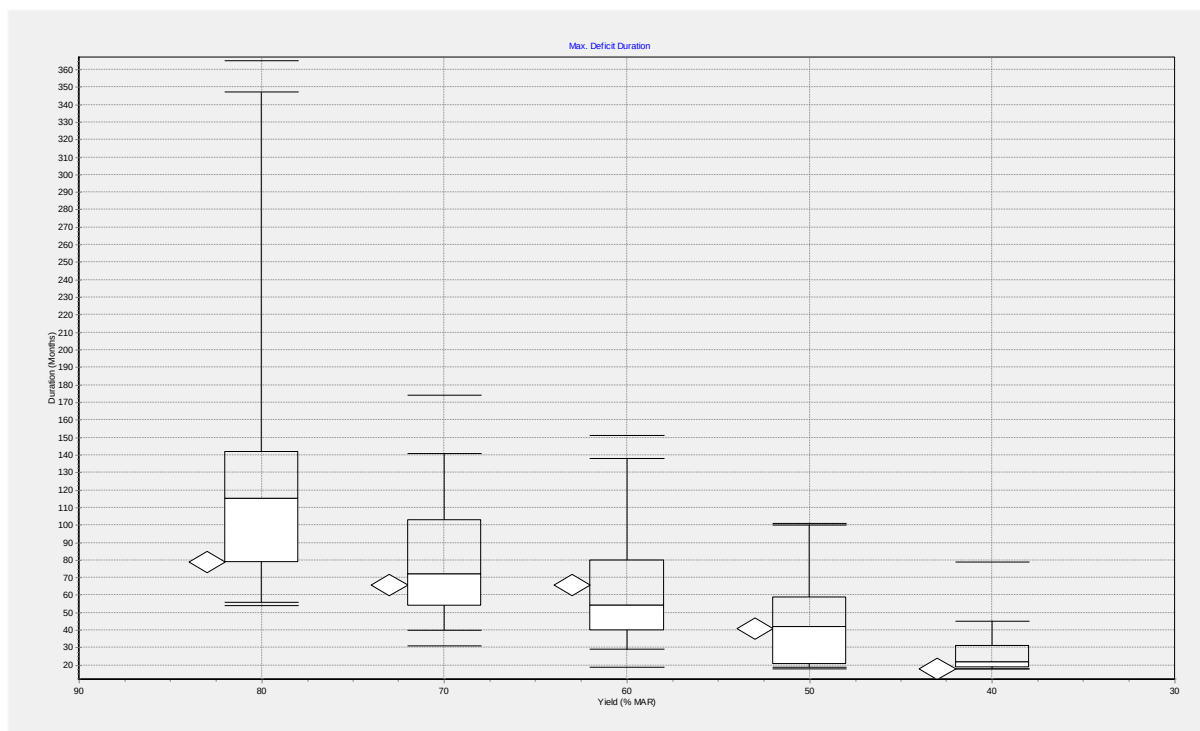


Figure D1- 11 Plot of the Maximum Deficit Durations for Quaternary Catchment T33B

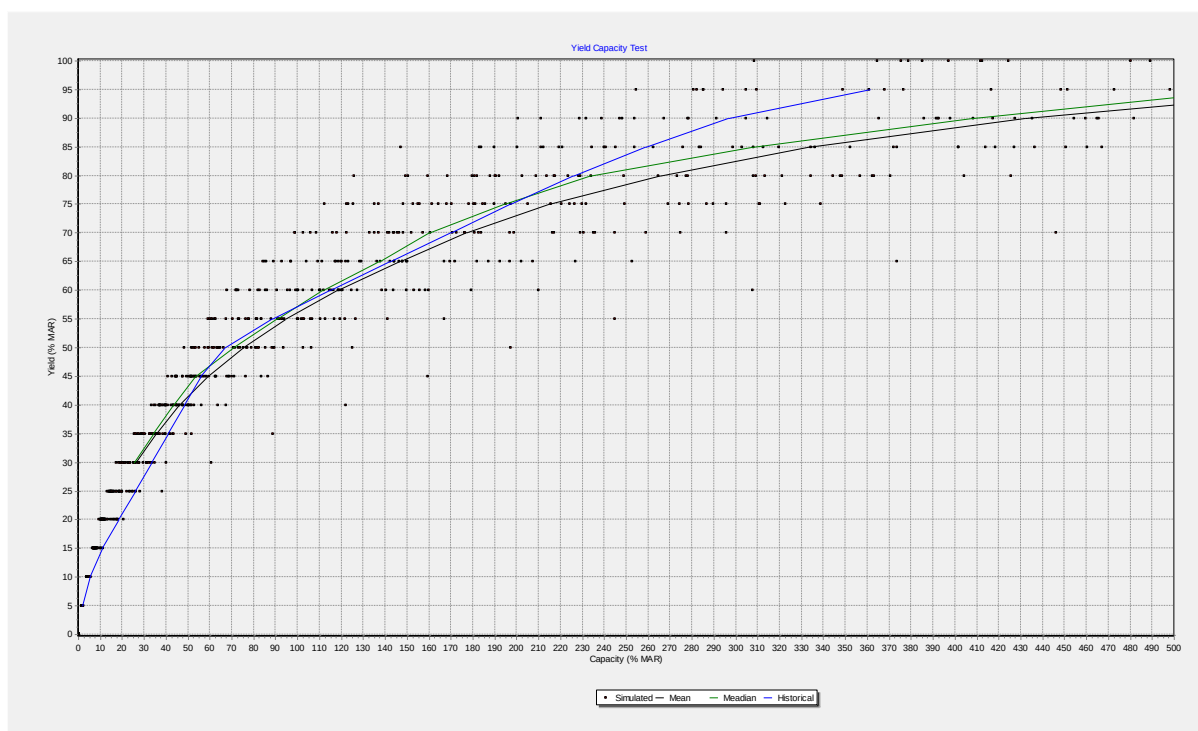


Figure D1- 12 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T33B

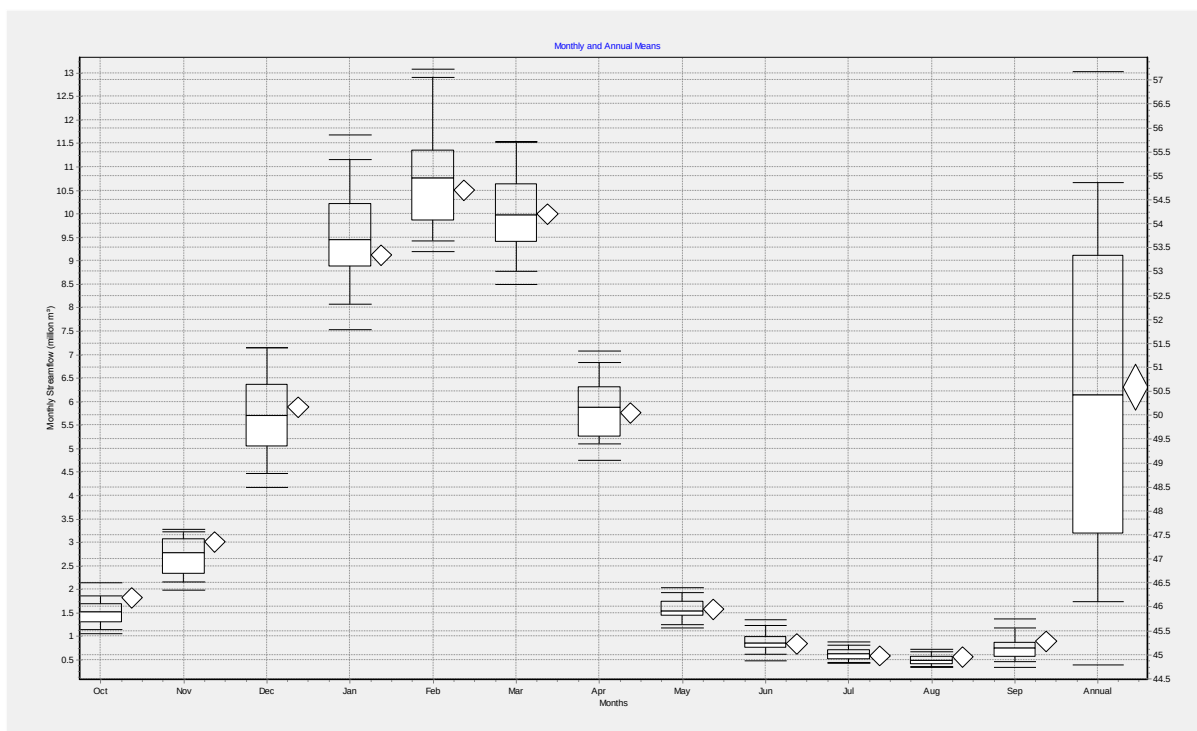


Figure D1- 13 Plot of the Monthly and Annual Means for Quaternary Catchment T33C

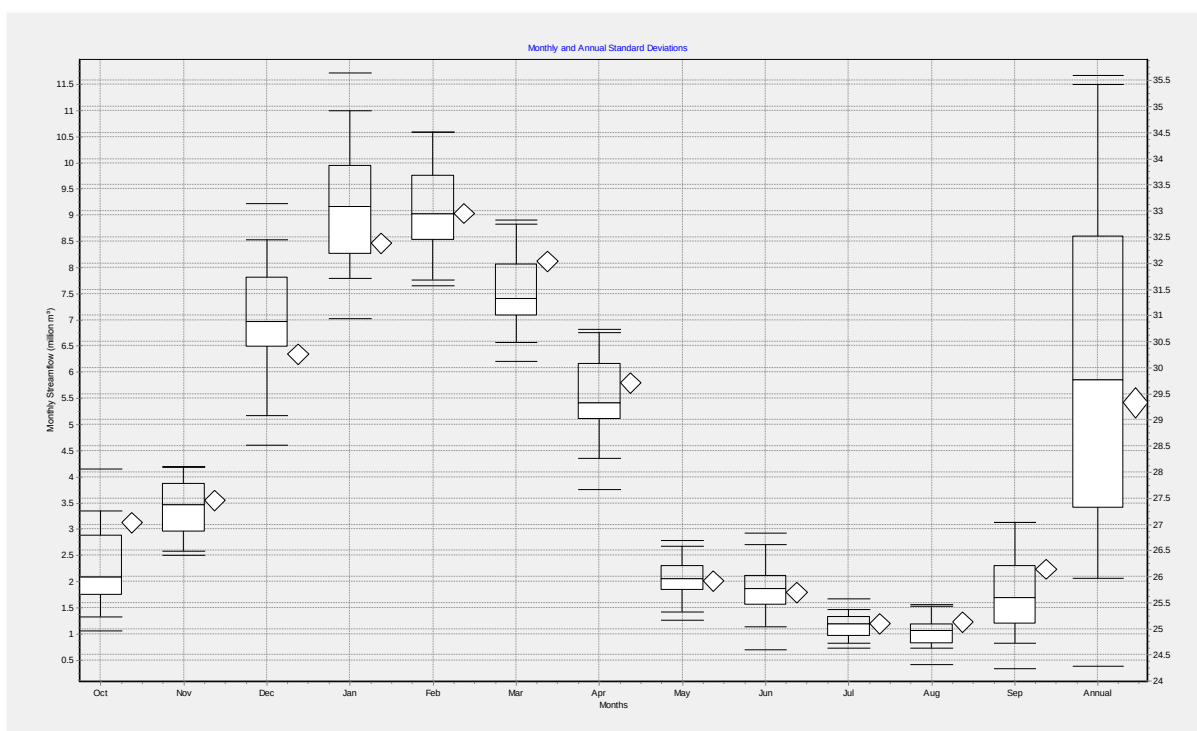


Figure D1- 14 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T33C

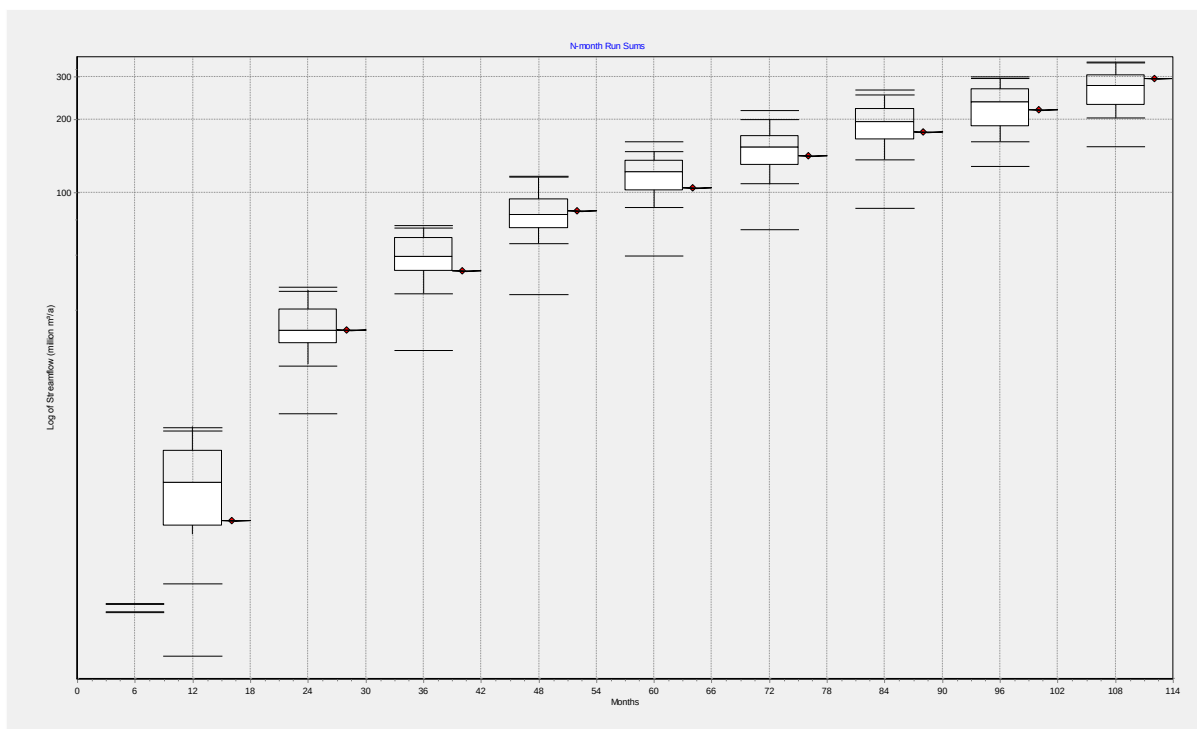


Figure D1- 15 Plot of the N-month Runs Sums for Quaternary Catchment T33C

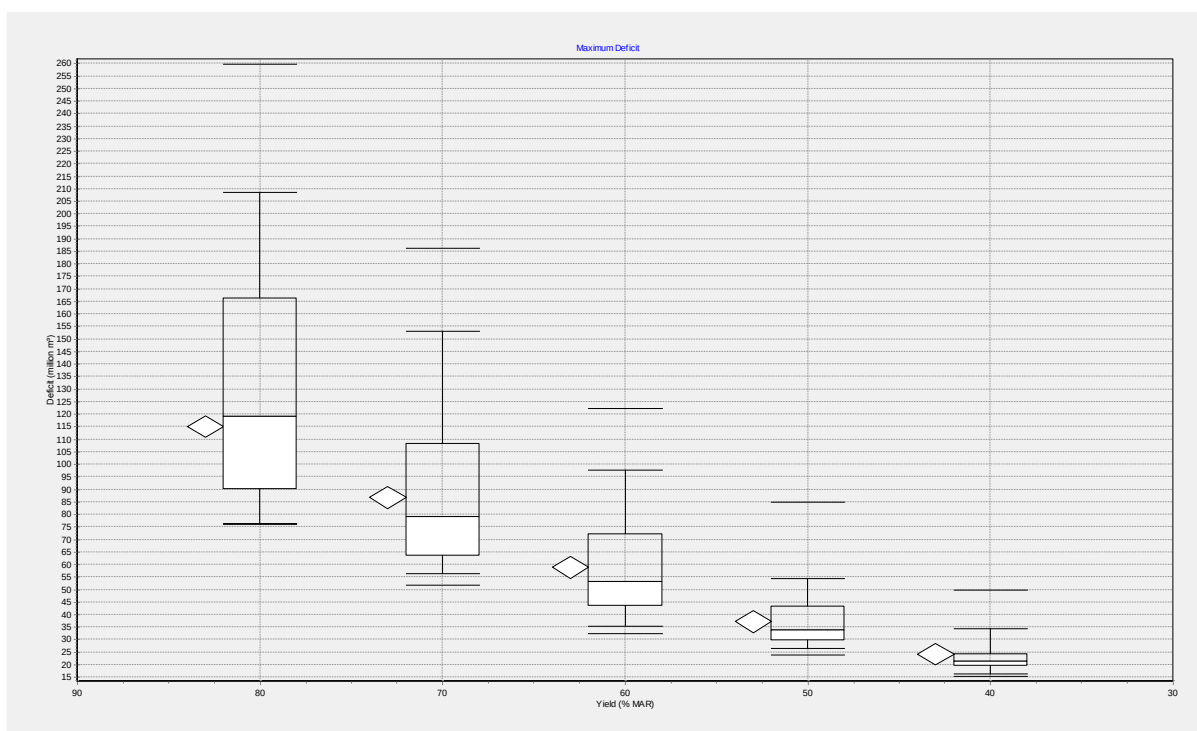


Figure D1- 16 Plot of the Maximum Deficits for Quaternary Catchment T33C

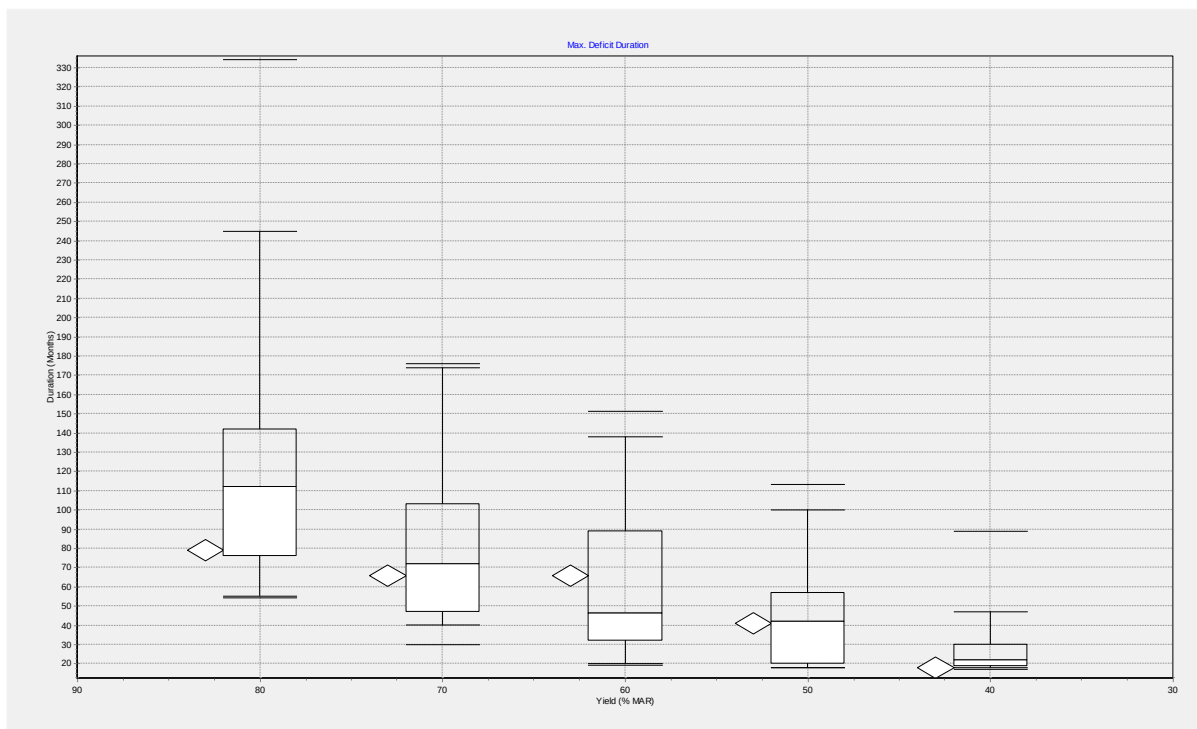


Figure D1- 17 Plot of the Maximum Deficit Durations for quaternary Catchment T33C

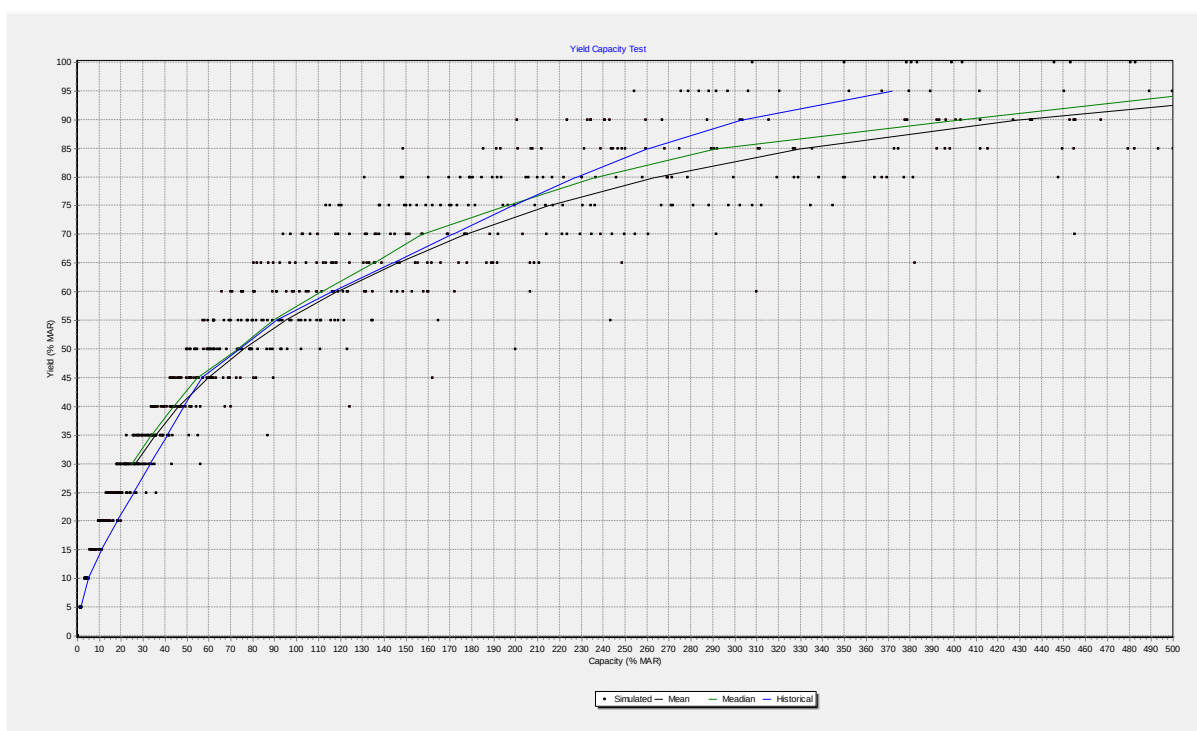


Figure D1- 18 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T33C

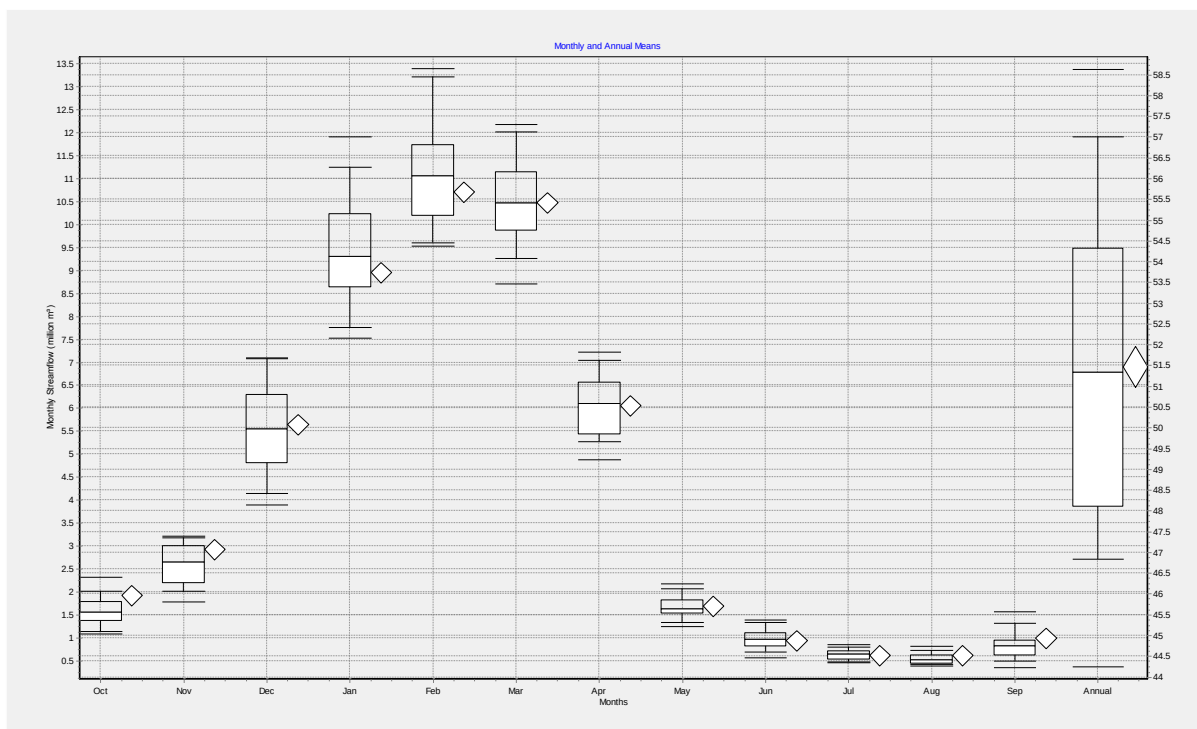


Figure D1- 19 Plot of the Monthly and annual Means for Quaternary Catchment T33D

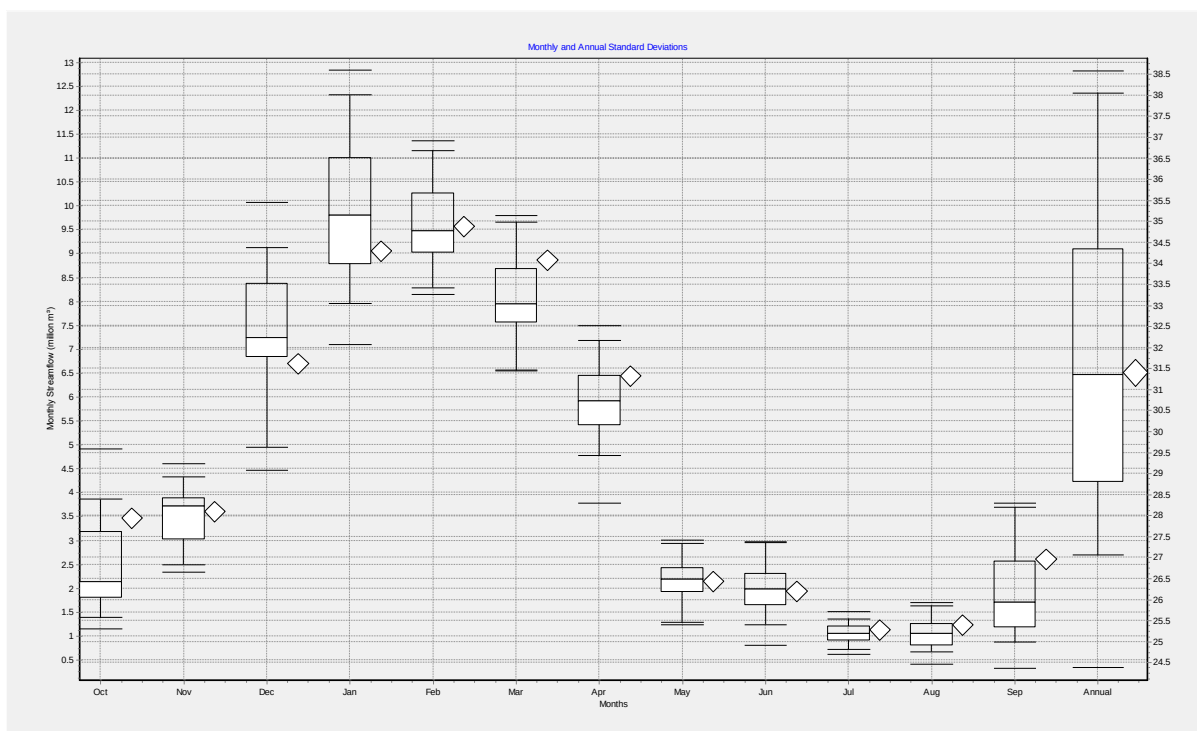


Figure D1- 20 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T33D

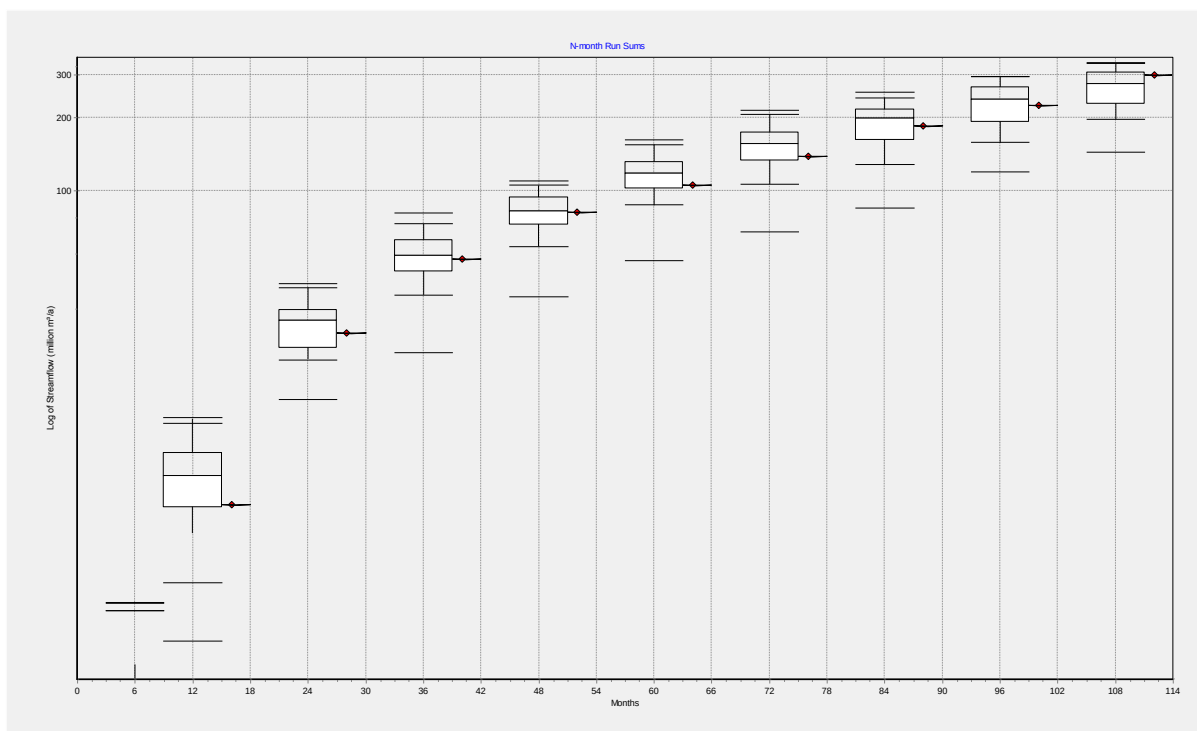


Figure D1- 21 Plot of the N-month Run Sums for Quaternary Catchment T33D

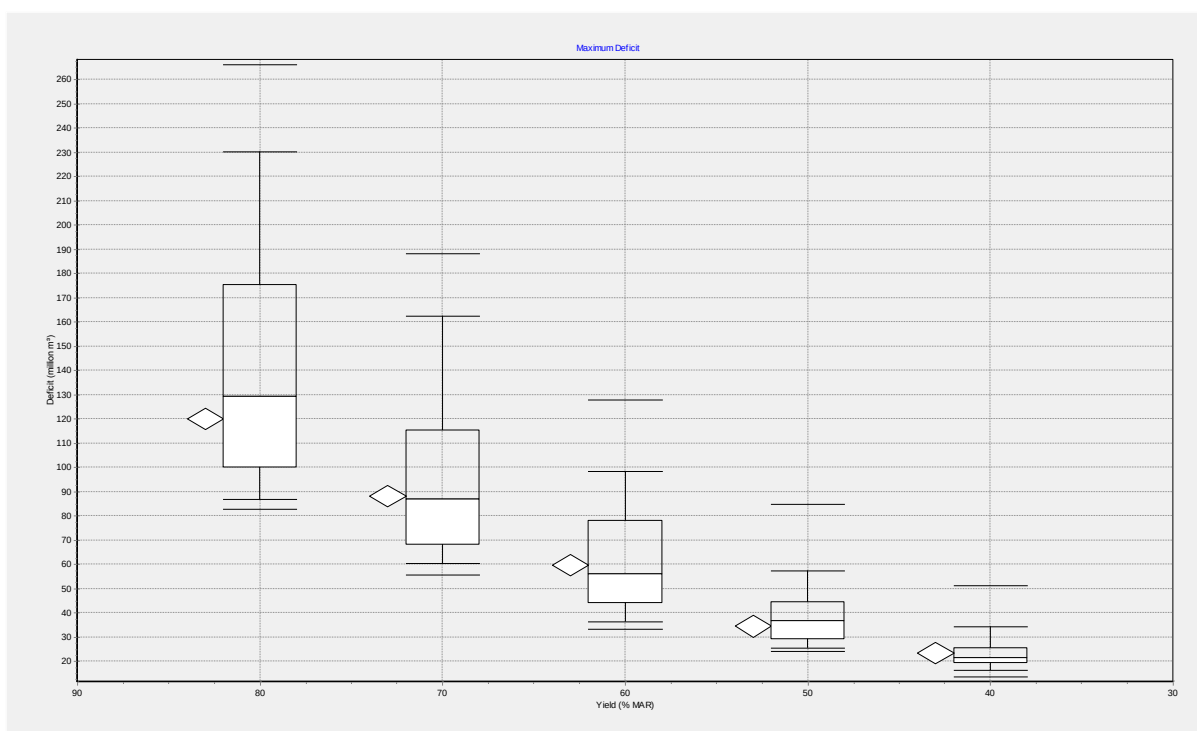


Figure D1- 22 Plot of the Maximum deficits for quaternary Catchment T33D

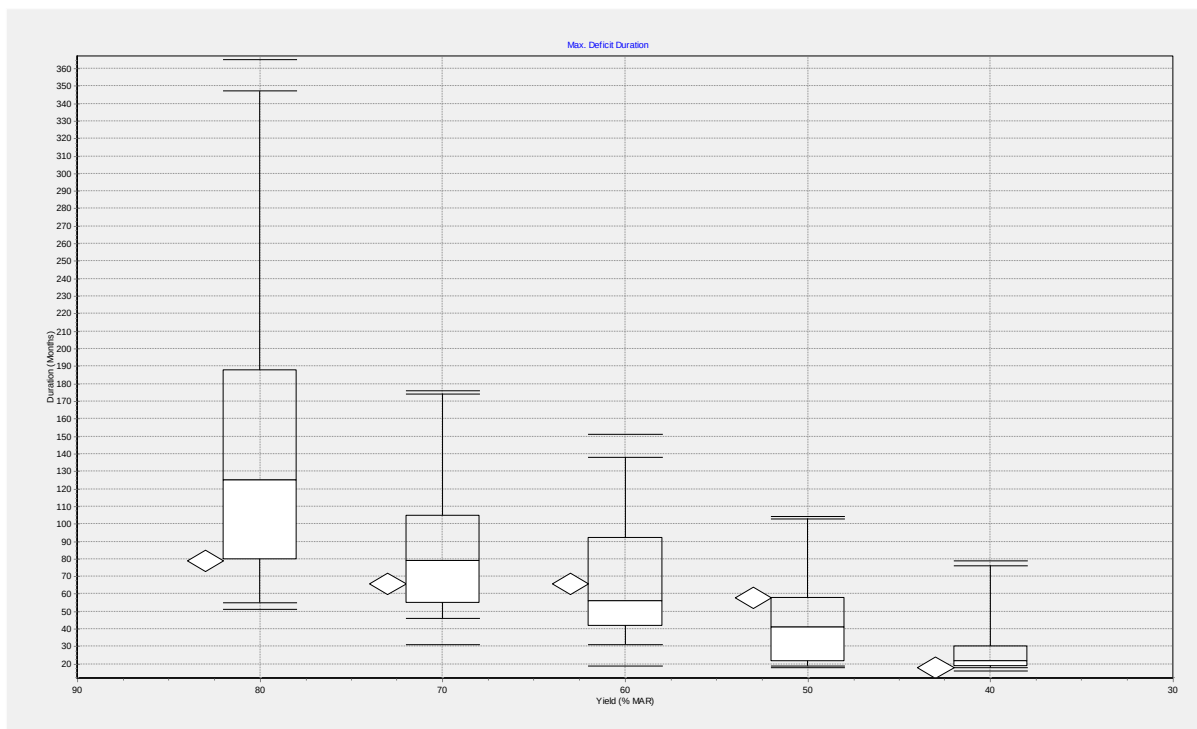


Figure D1- 23 Plot of the Maximum Deficit Durations for Quaternary Catchment T33D

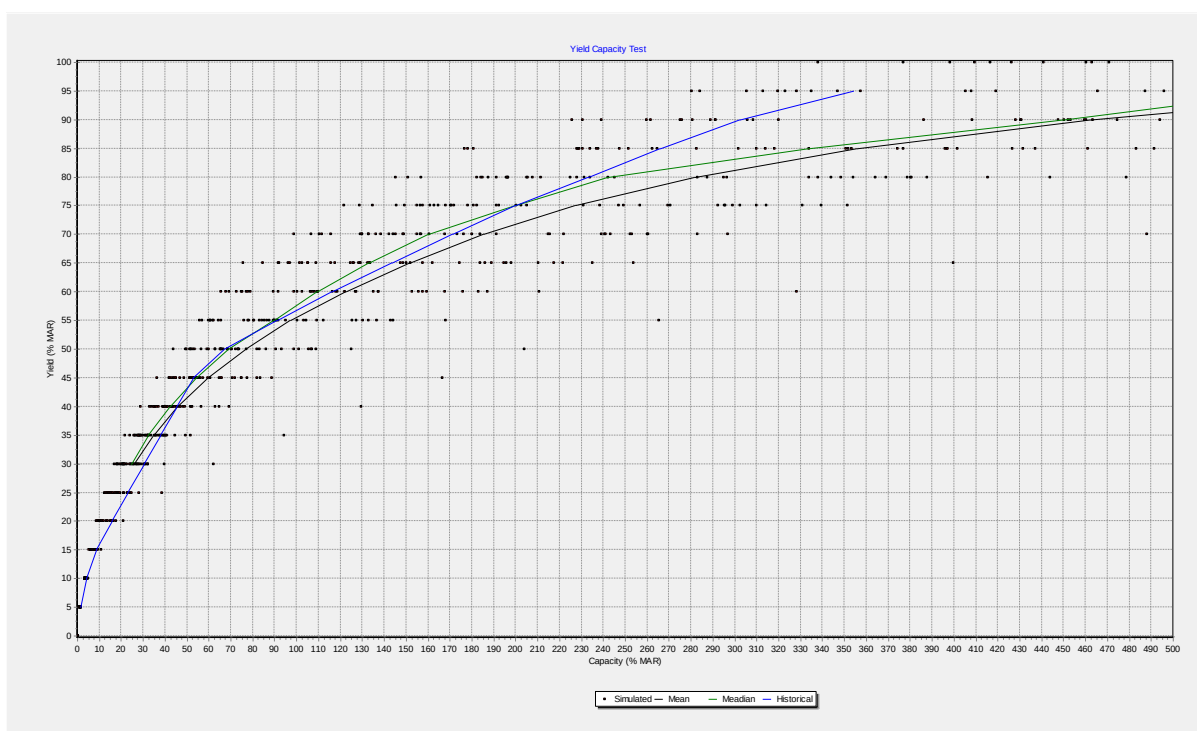


Figure D1- 24 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T33D

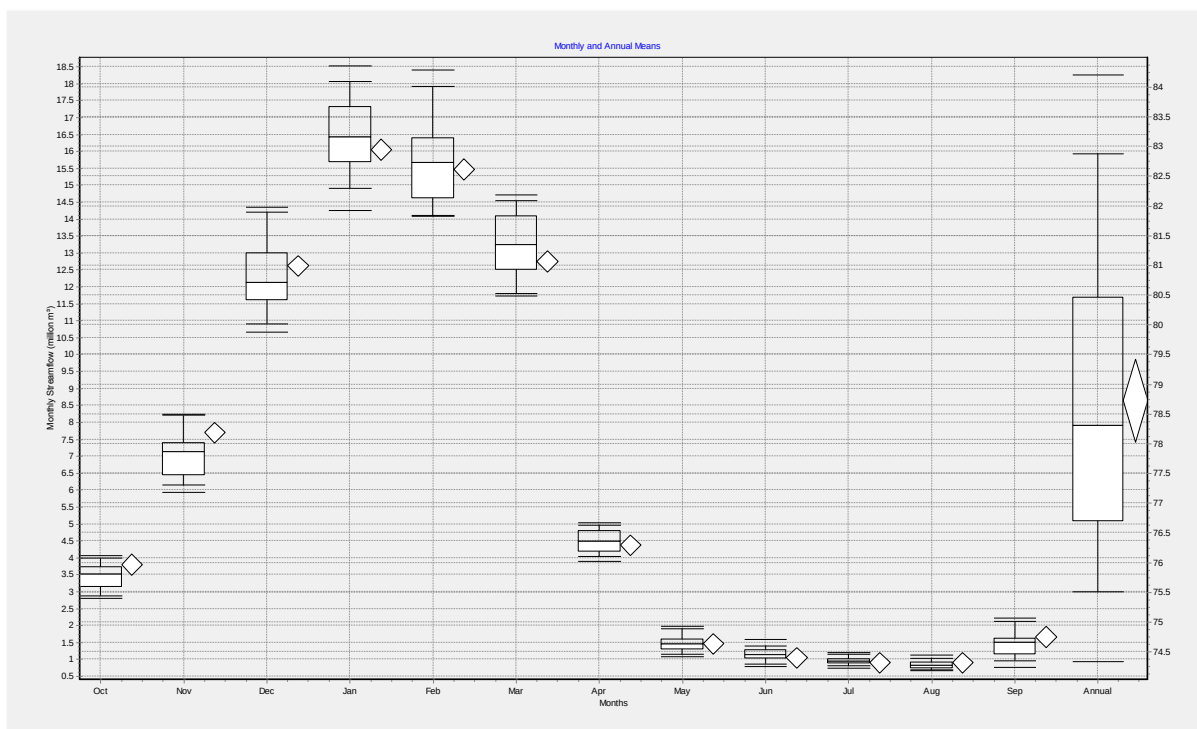


Figure D1- 25 Plot of the Monthly and Annual Means for Quaternary Catchment T33E

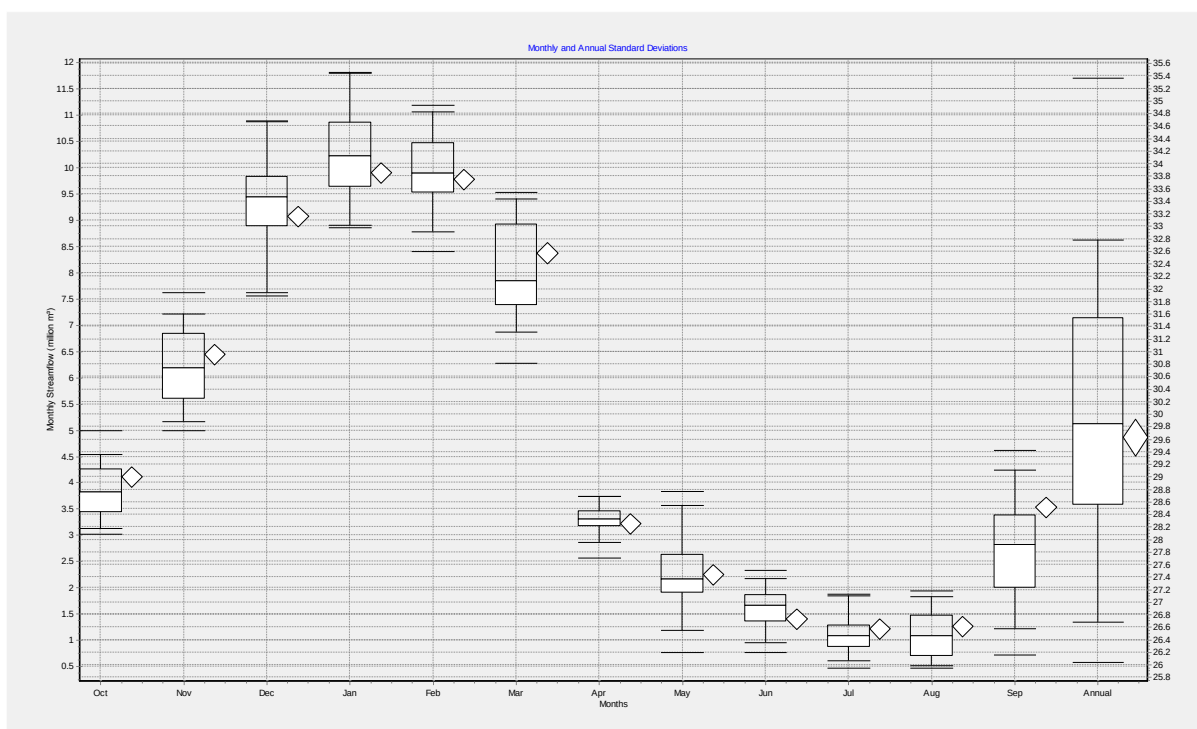


Figure D1- 26 Plot of the Monthly and Annual Standard deviations for Quaternary Catchment T33E

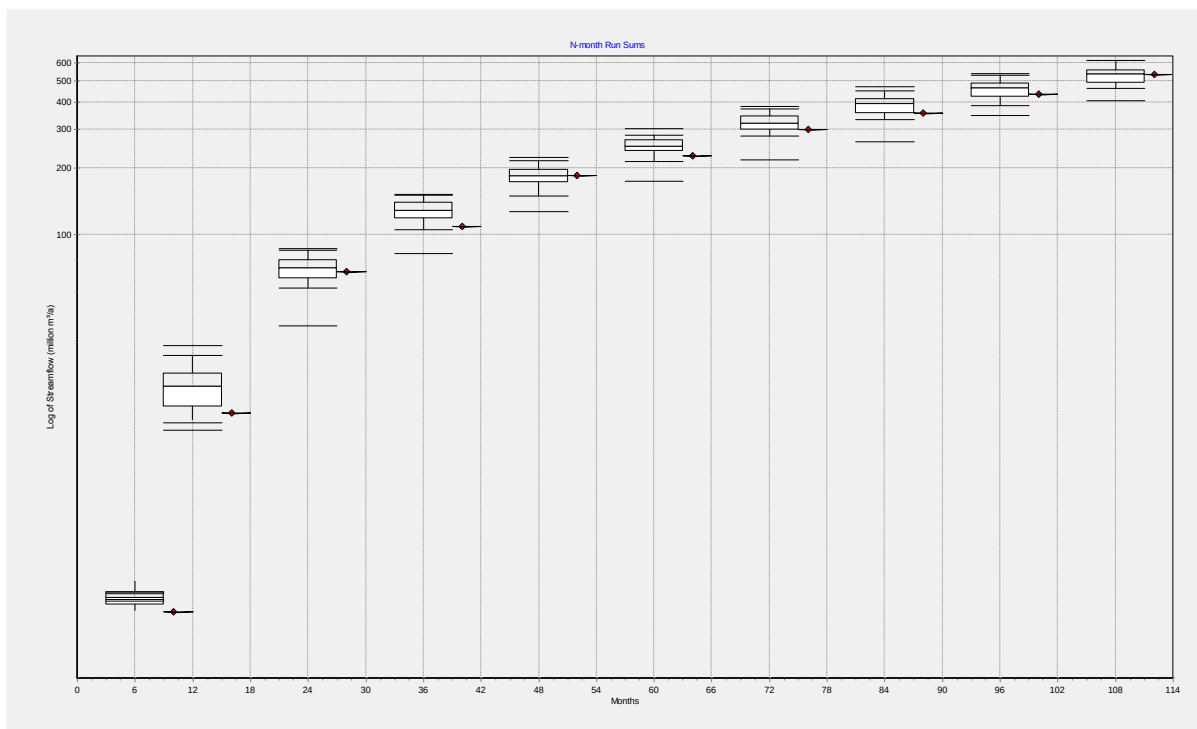


Figure D1- 27 Plot of the N-month Run Sums for Quaternary Catchment T33E

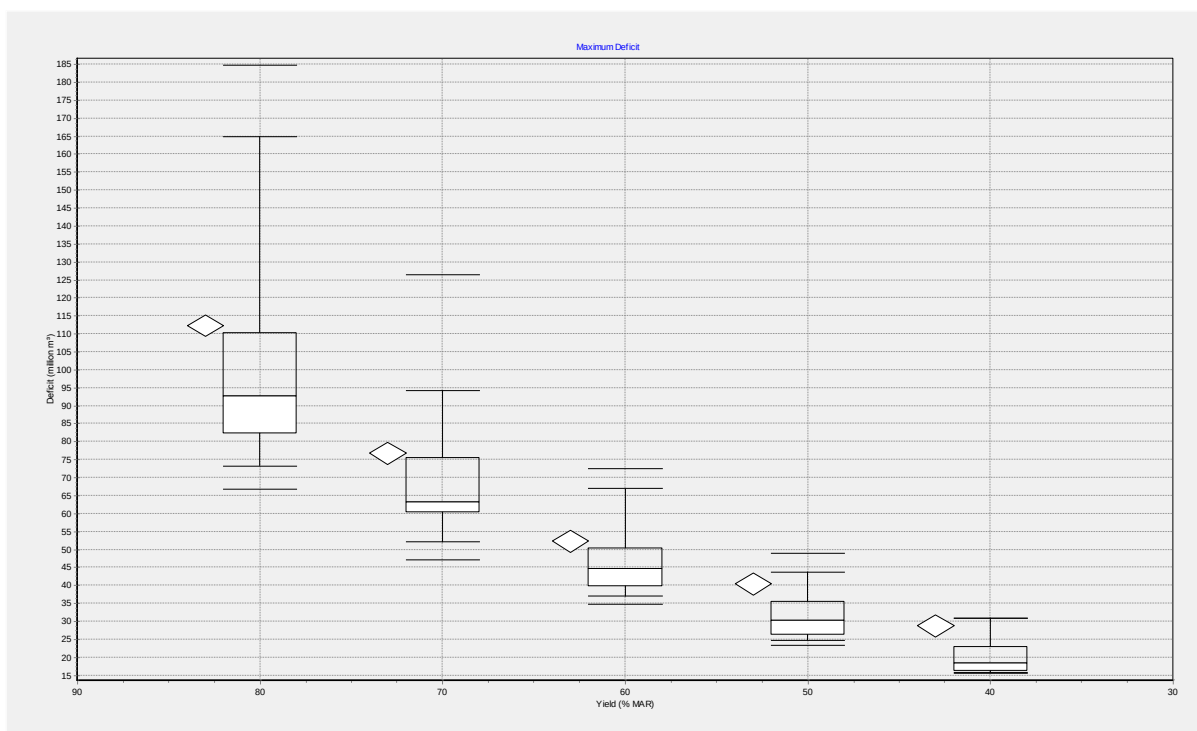


Figure D1- 28 Plot of the Maximum Deficits for Quaternary Catchment T33E

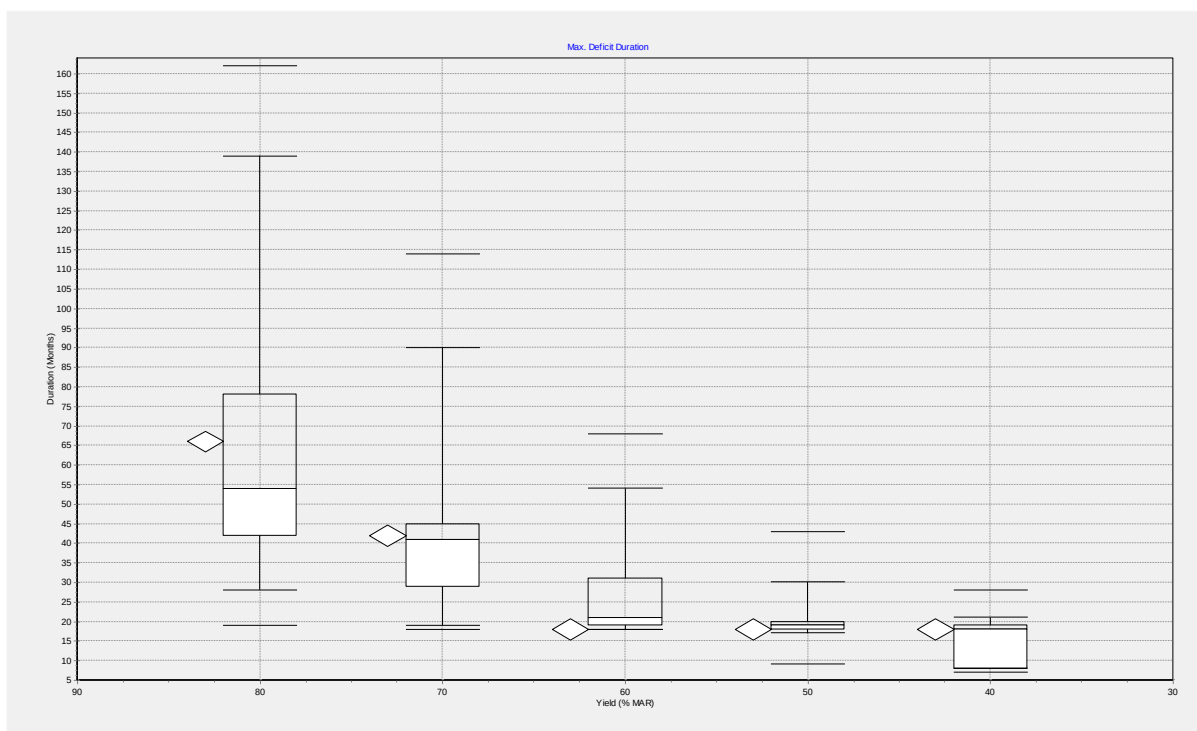


Figure D1- 29 Plot of the Maximum Deficit Durations for Quaternary Catchment T3

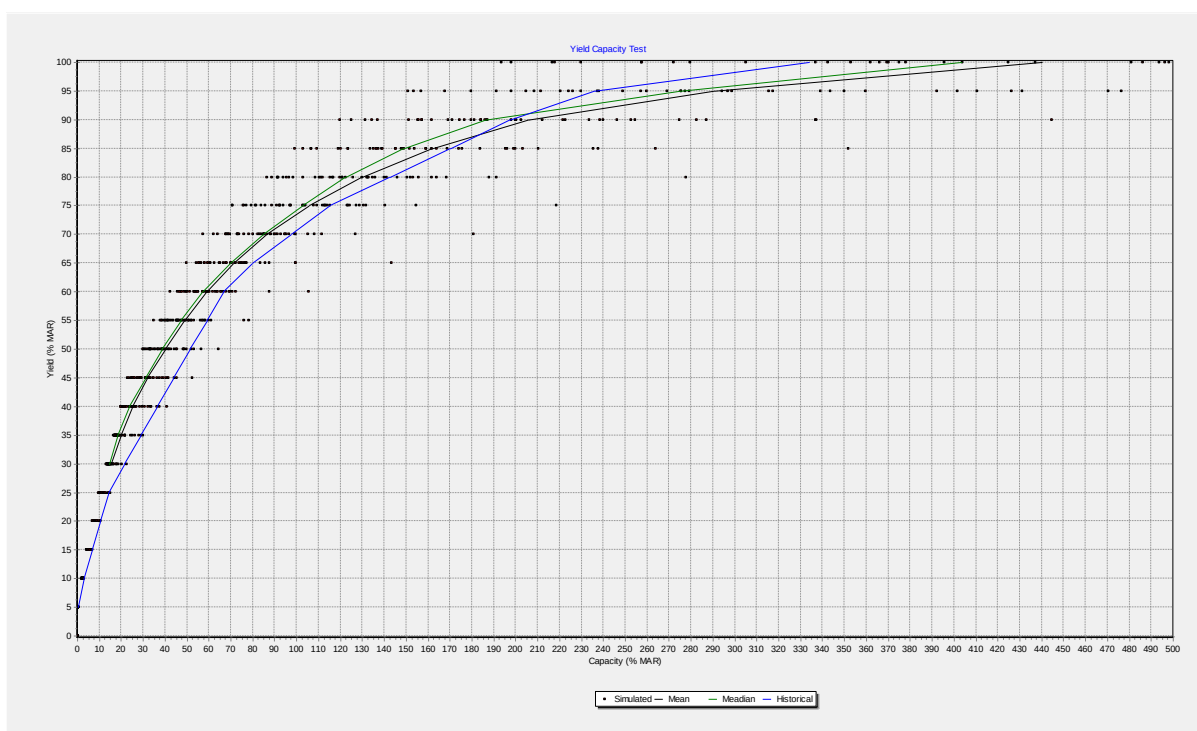


Figure D1- 30 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T3E

APPENDIX D2

STOCHASTIC STREAMFLOW ANALYSIS TESTS TSITSA RIVER SYSTEM

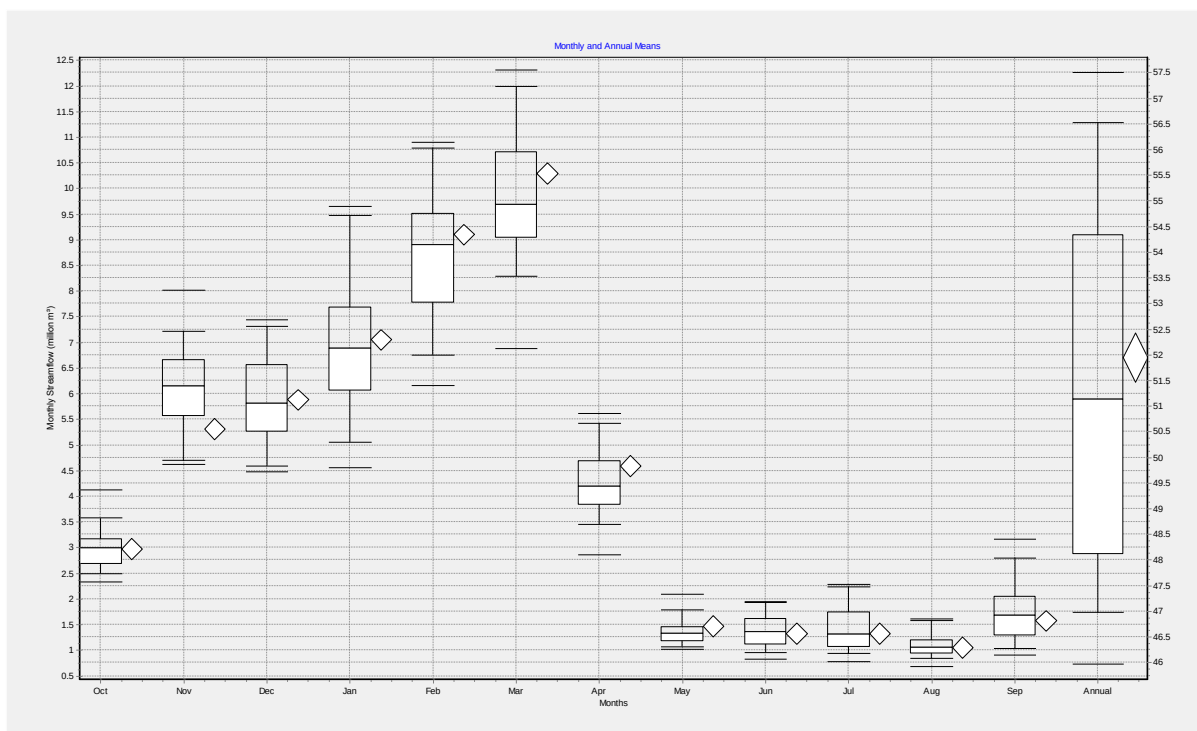


Figure D2- 1 Plot of the Monthly and Annual Means for Quaternary Catchment T35A

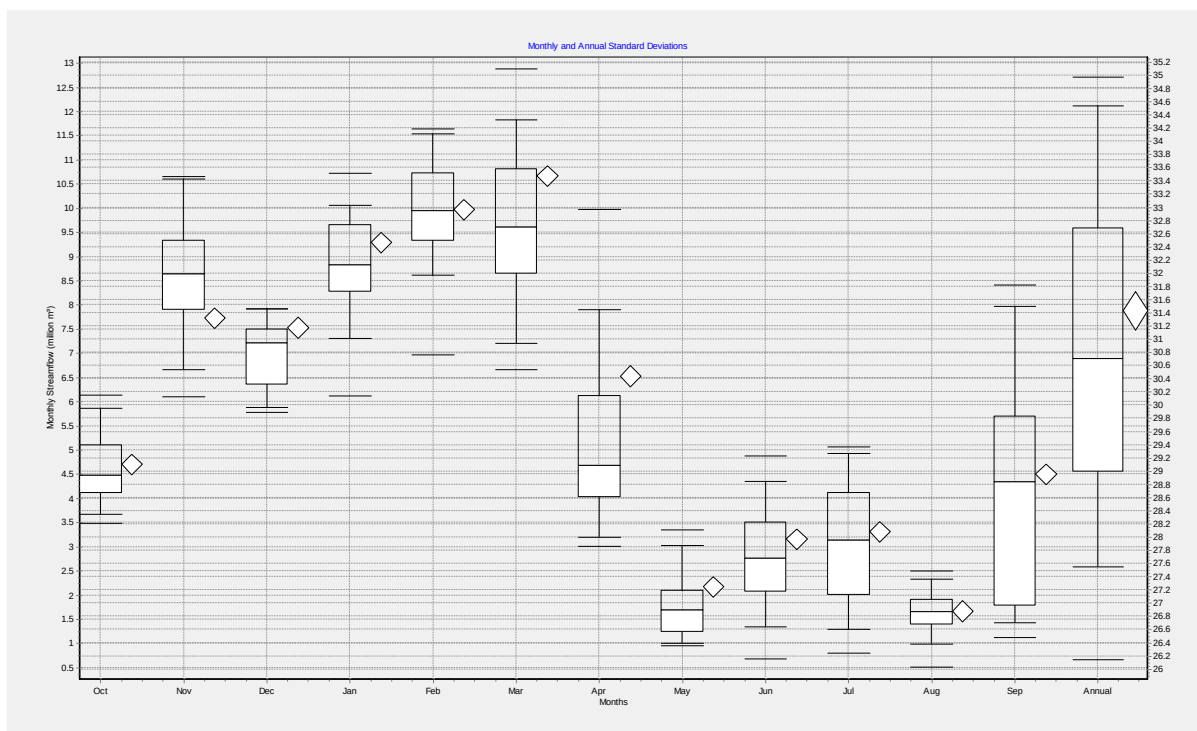


Figure D2- 2 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35A

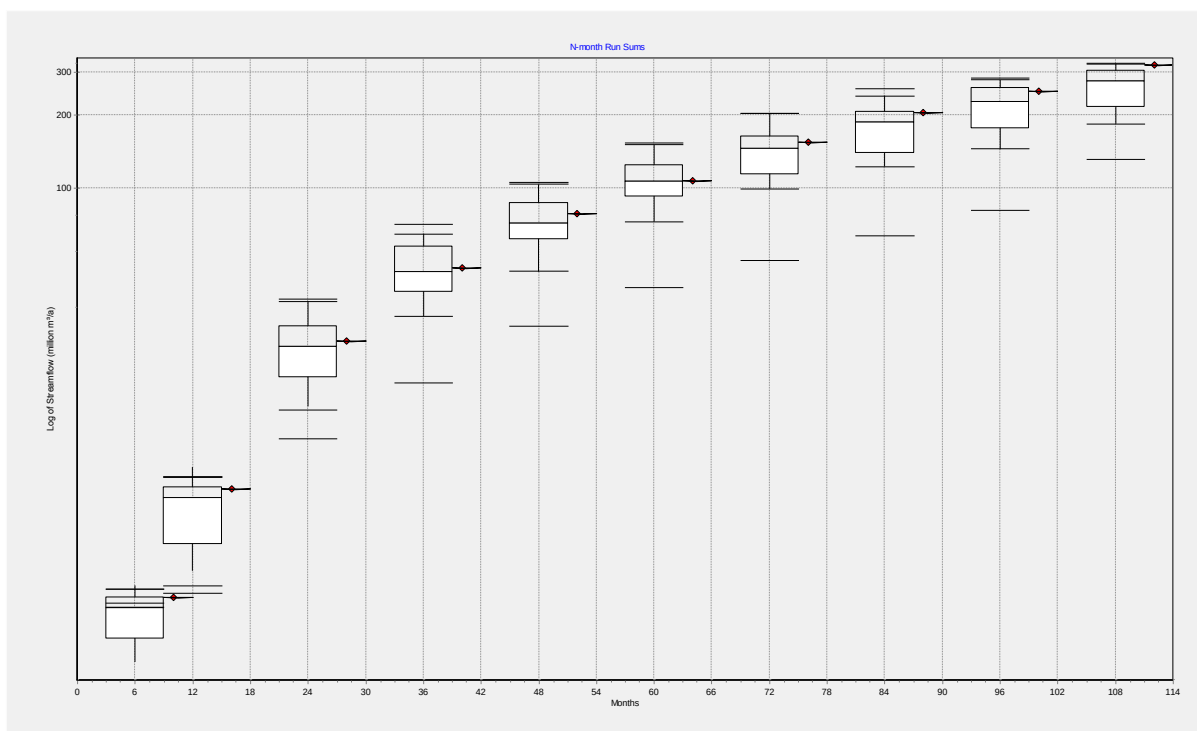


Figure D2- 3 Plot of the N-month Run Sums for quaternary Catchment T35A

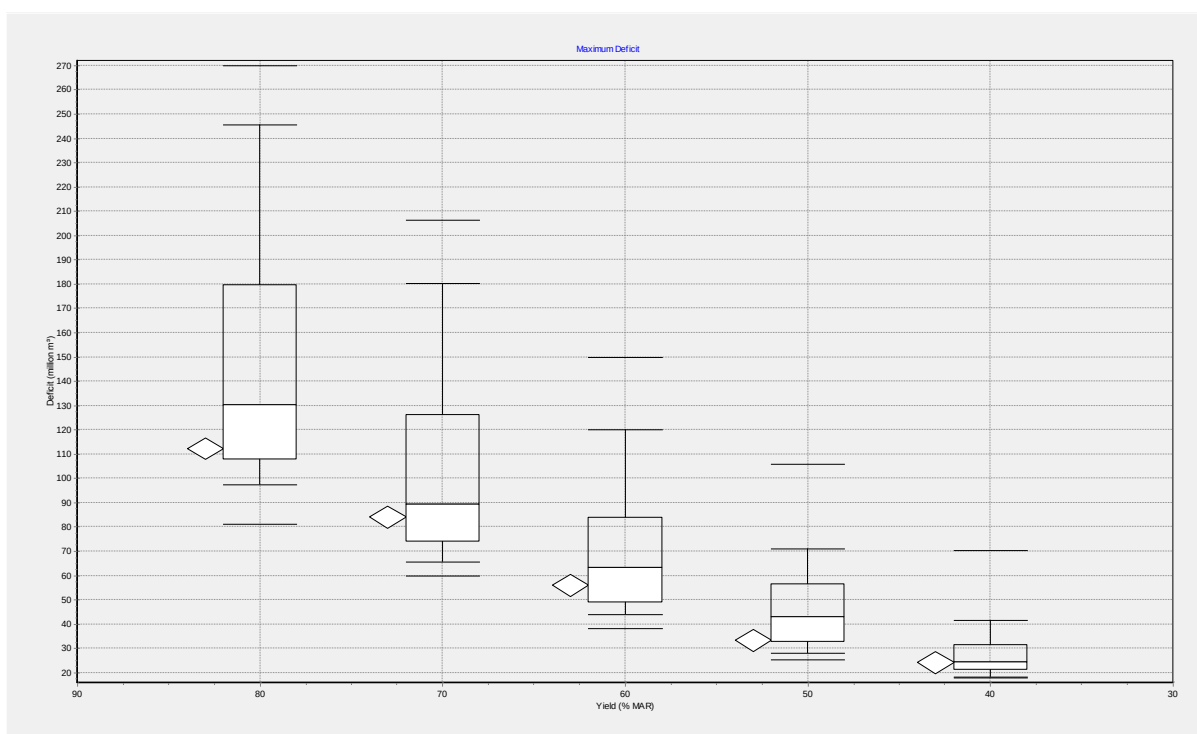


Figure D2- 4 Plot of the Maximum Deficits for Quaternary Catchment T35A

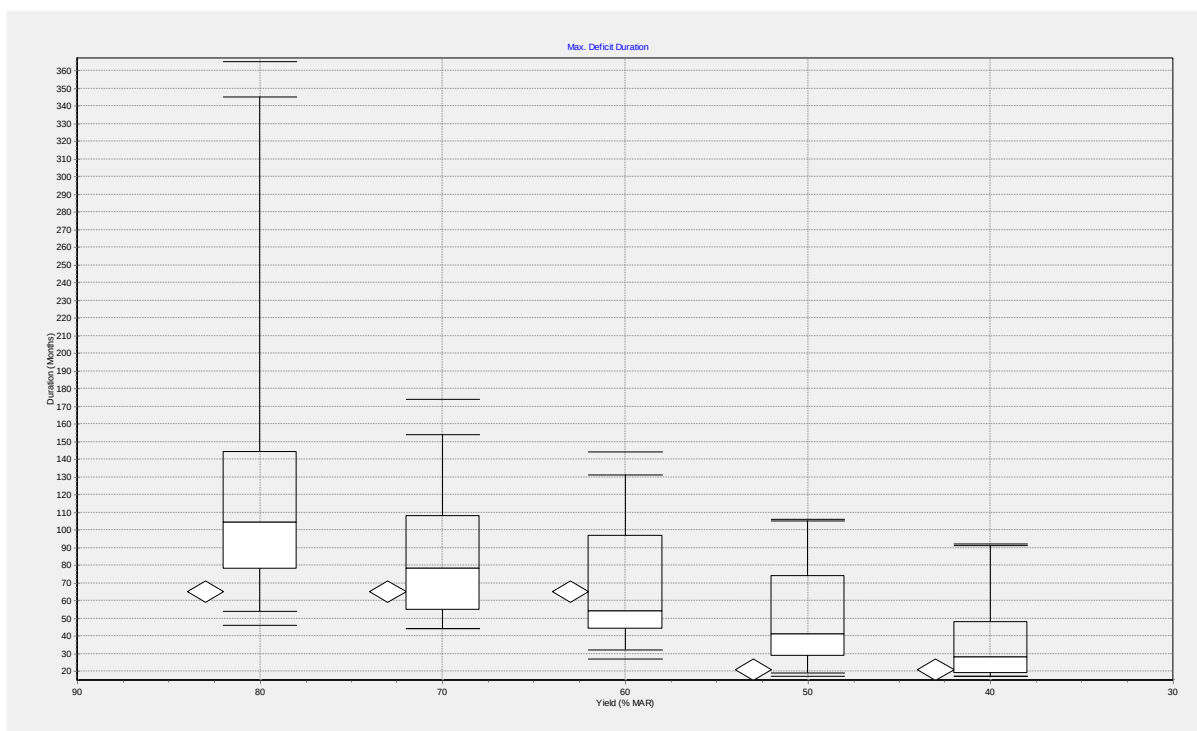


Figure D2- 5 Plot of the Maximum Deficit Durations for Quaternary Catchment T35A

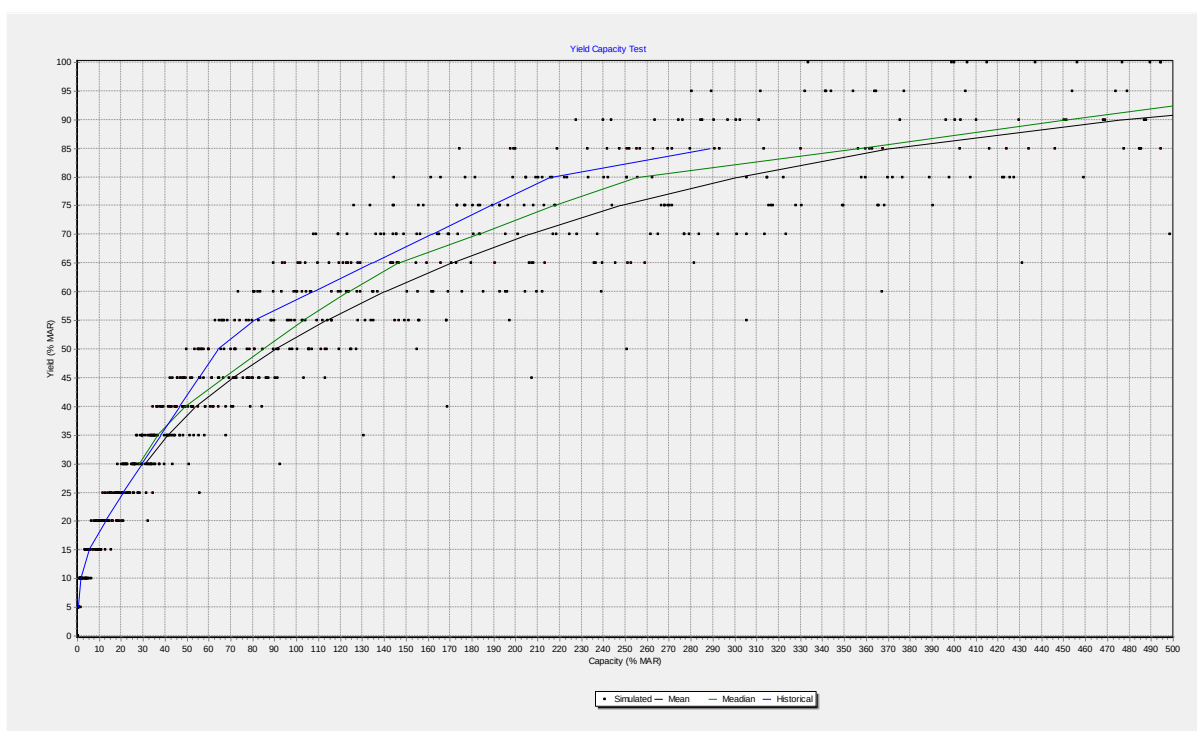


Figure D2- 6 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35A

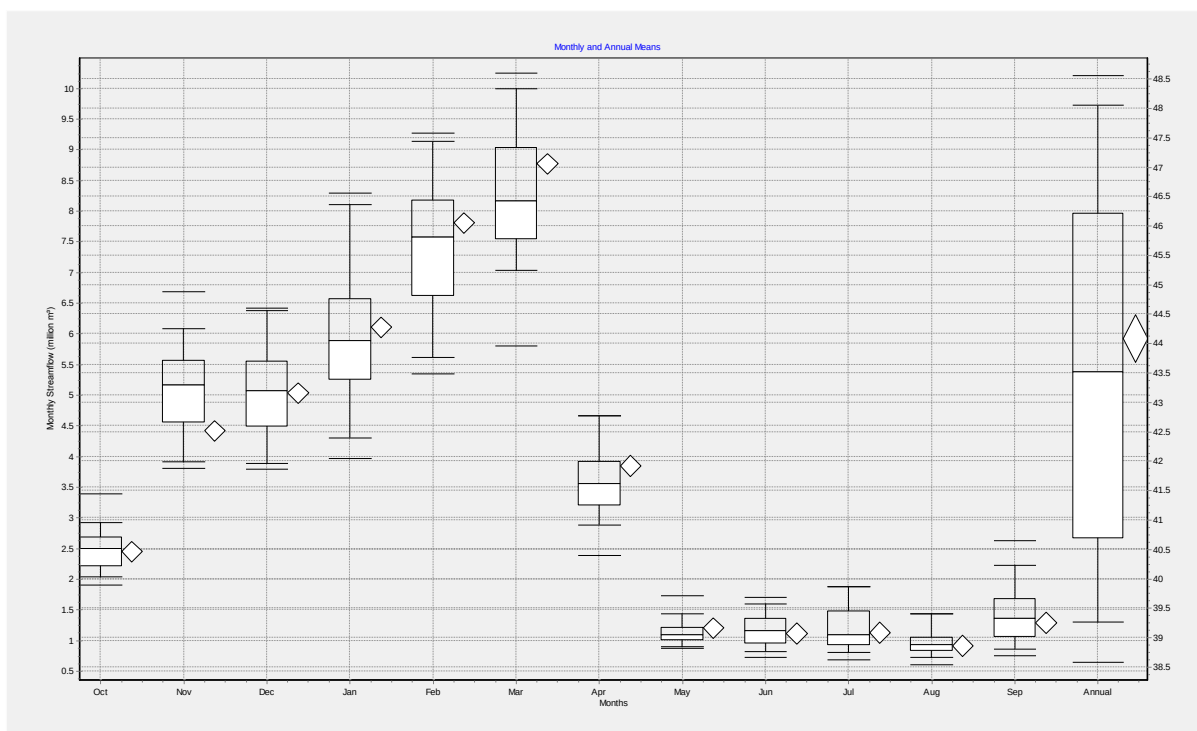


Figure D2- 7 Plot of the Monthly and annual Means for Quaternary Catchment T35B

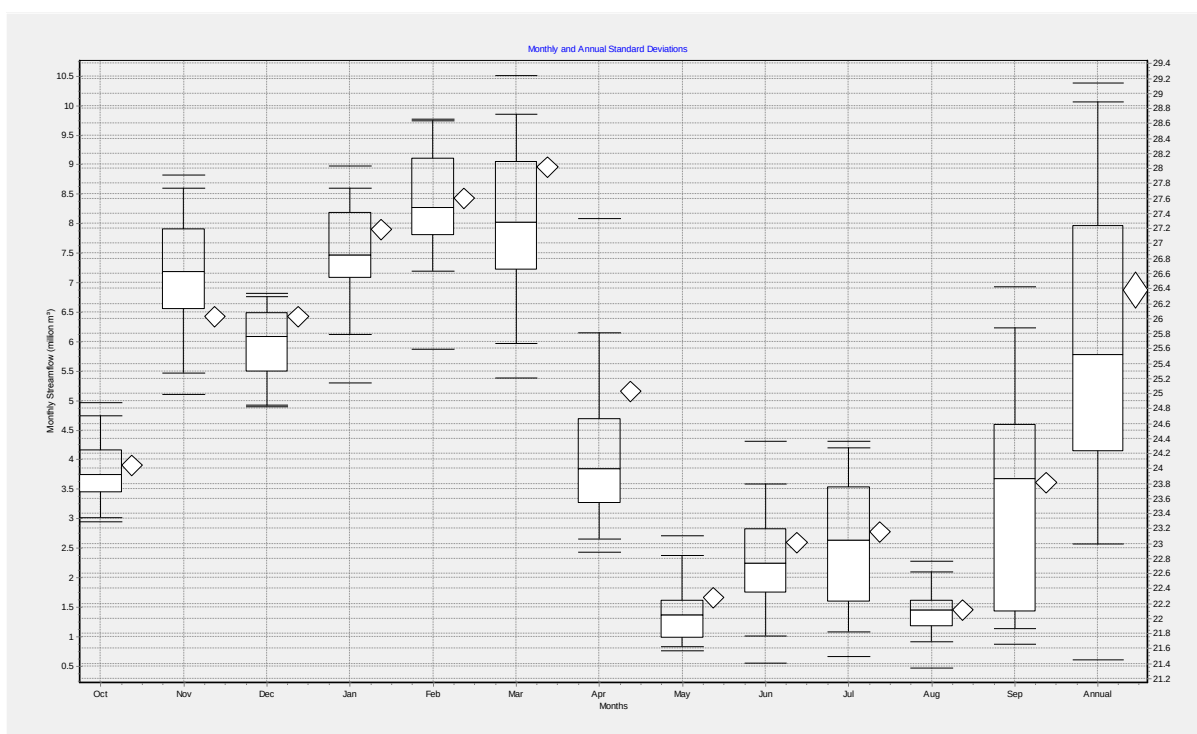


Figure D2- 8 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35B

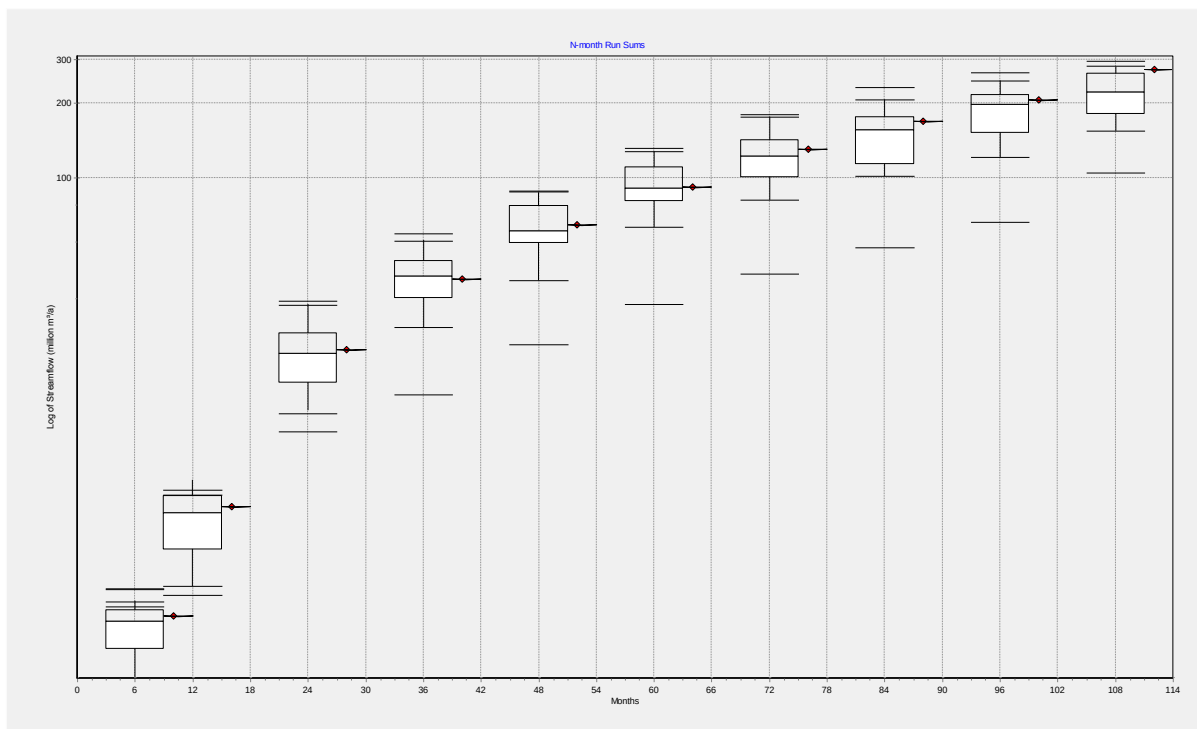


Figure D2- 9 Plot of the N-month Run Sums for quaternary Catchment T35B

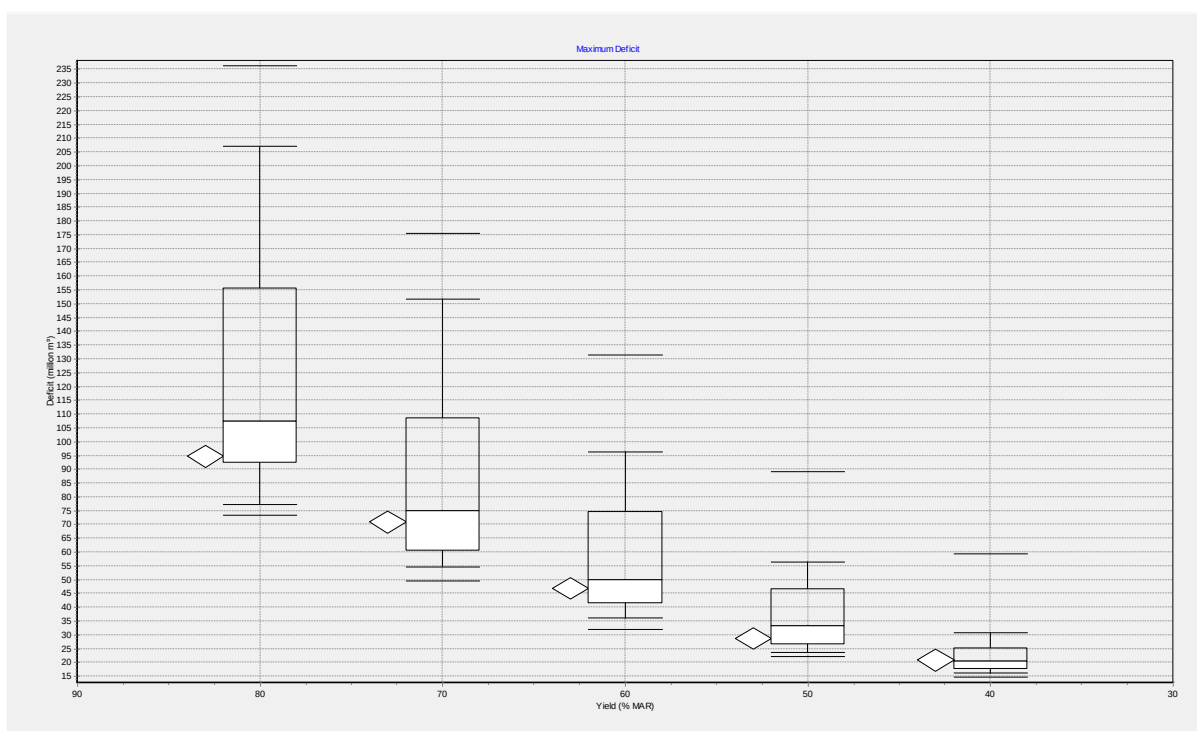


Figure D2- 10 Plot of the Maximum Deficits for Quaternary Catchment T35B

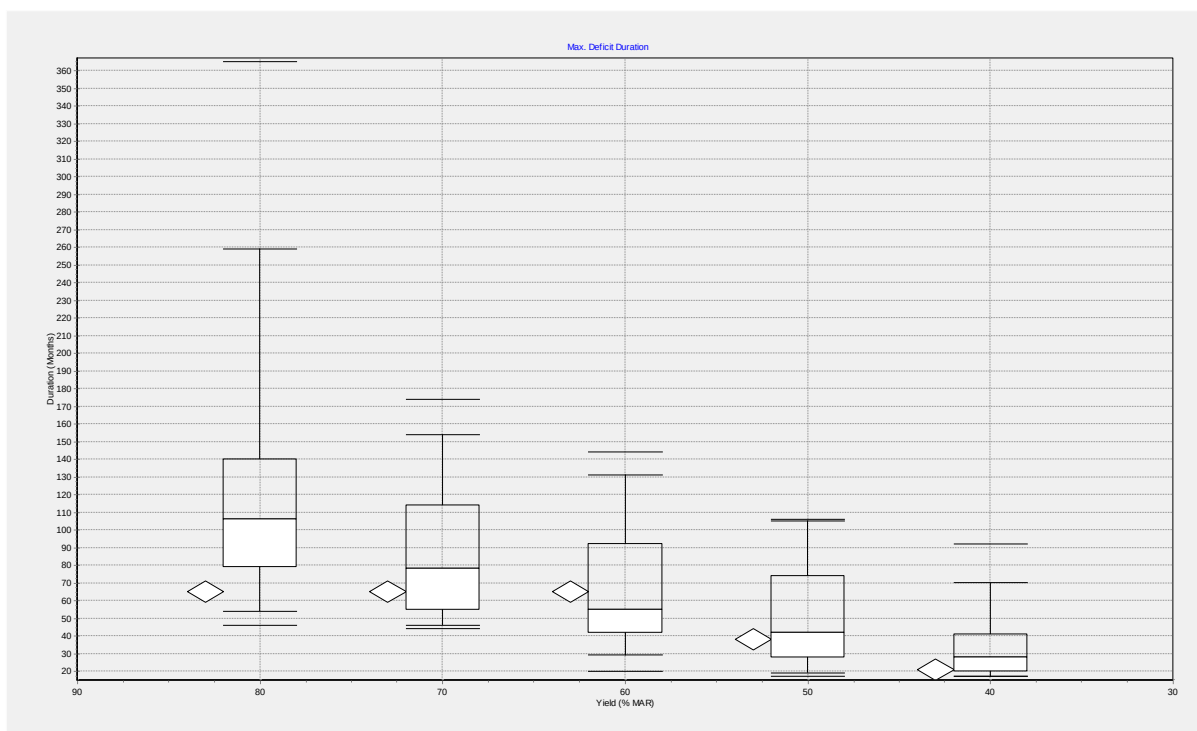


Figure D2- 11 Ploto f the Maximum Deficit Durations for Quaternary Catchment T35B

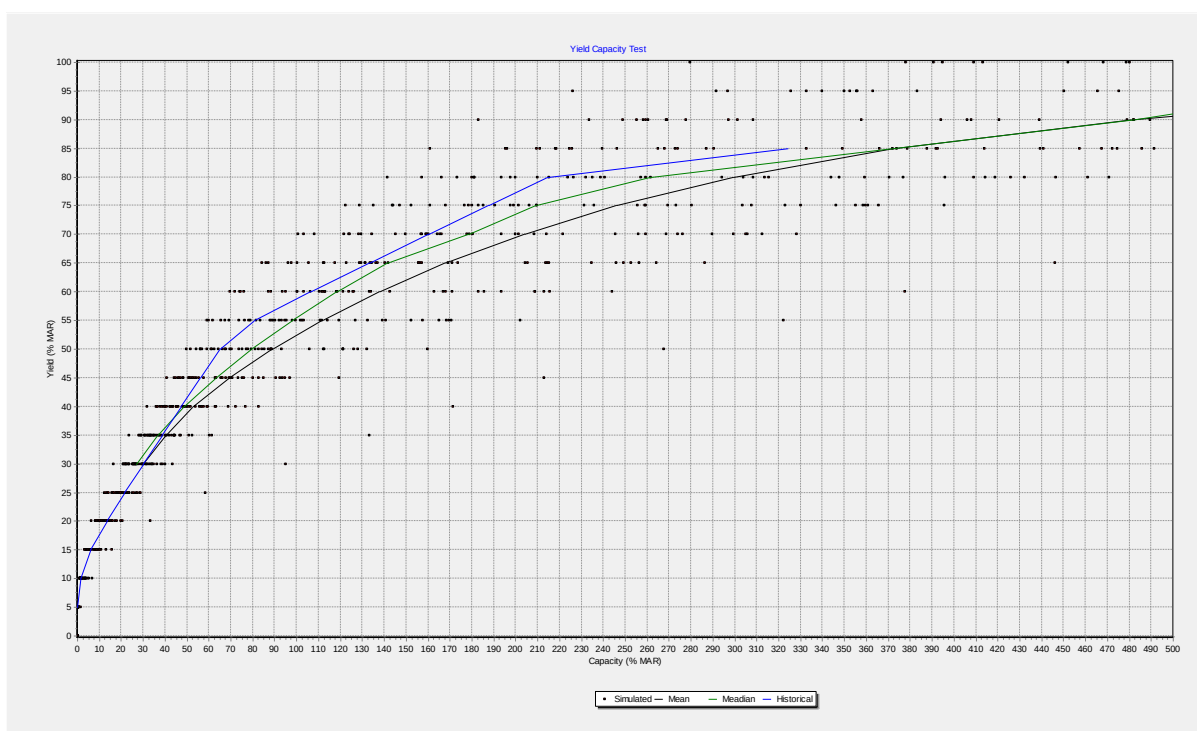


Figure D2- 12 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35B

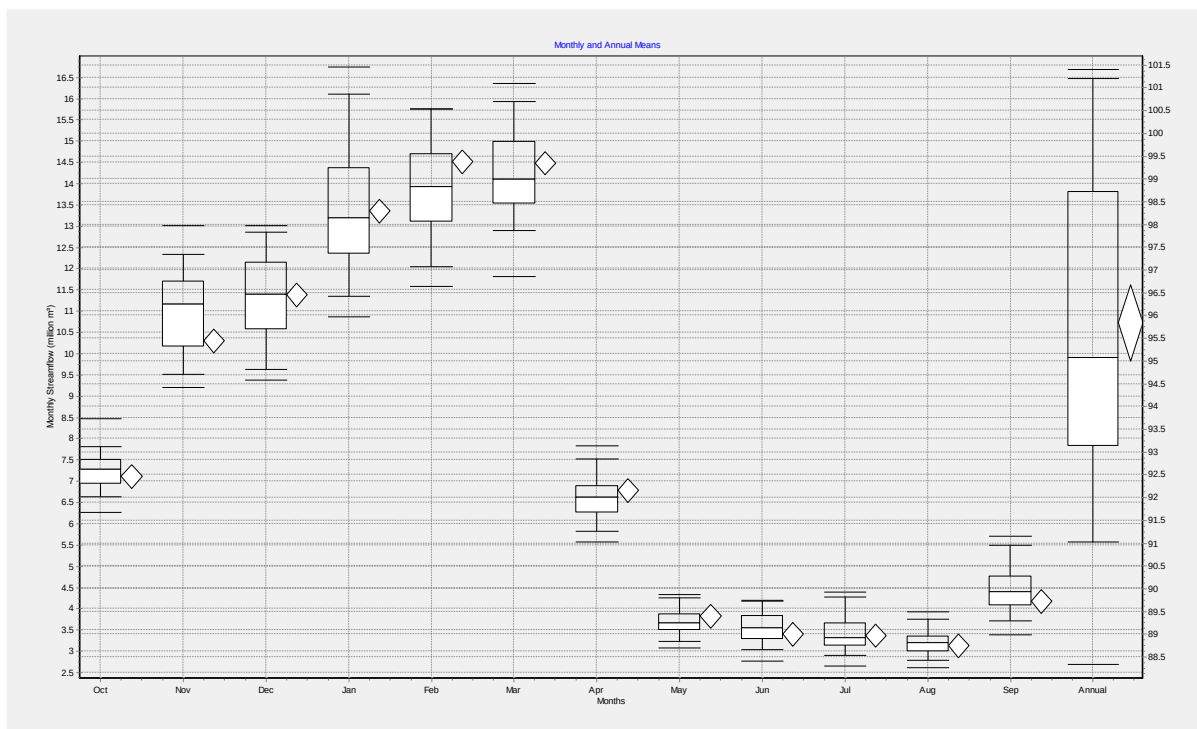


Figure D2- 13 Plot of the Monthly and Annual Means for Quaternary Catchment T35C

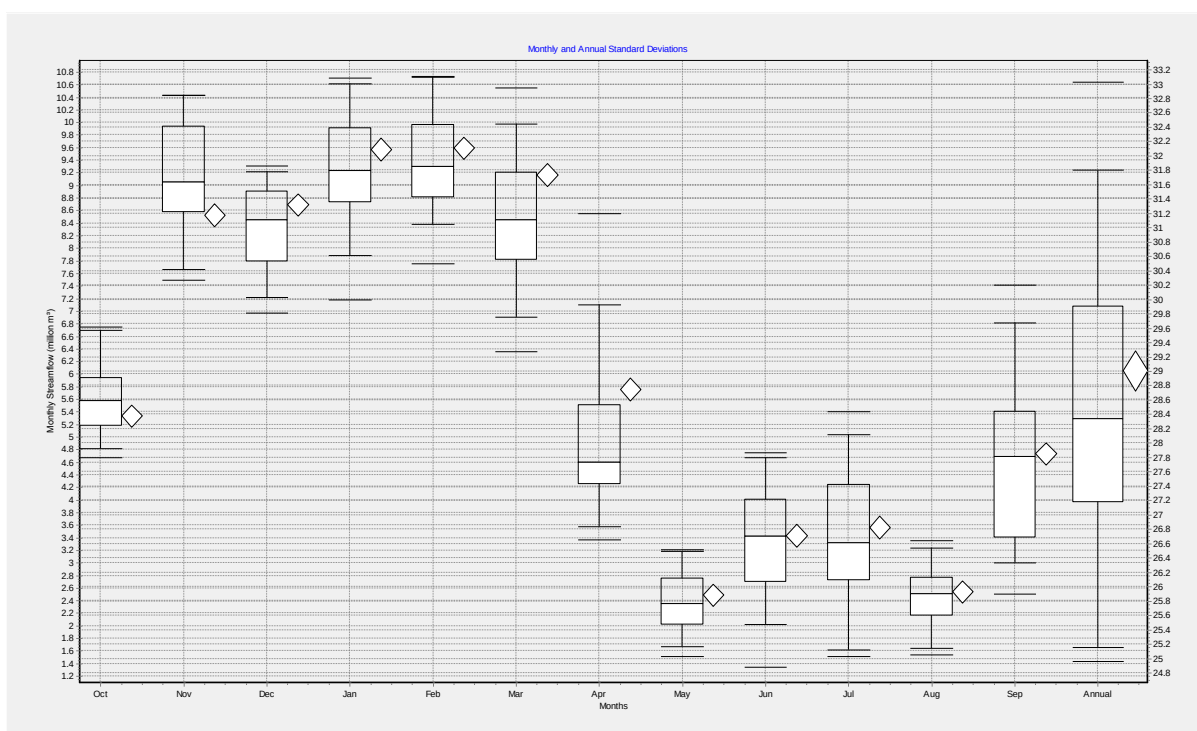


Figure D2- 14 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35C

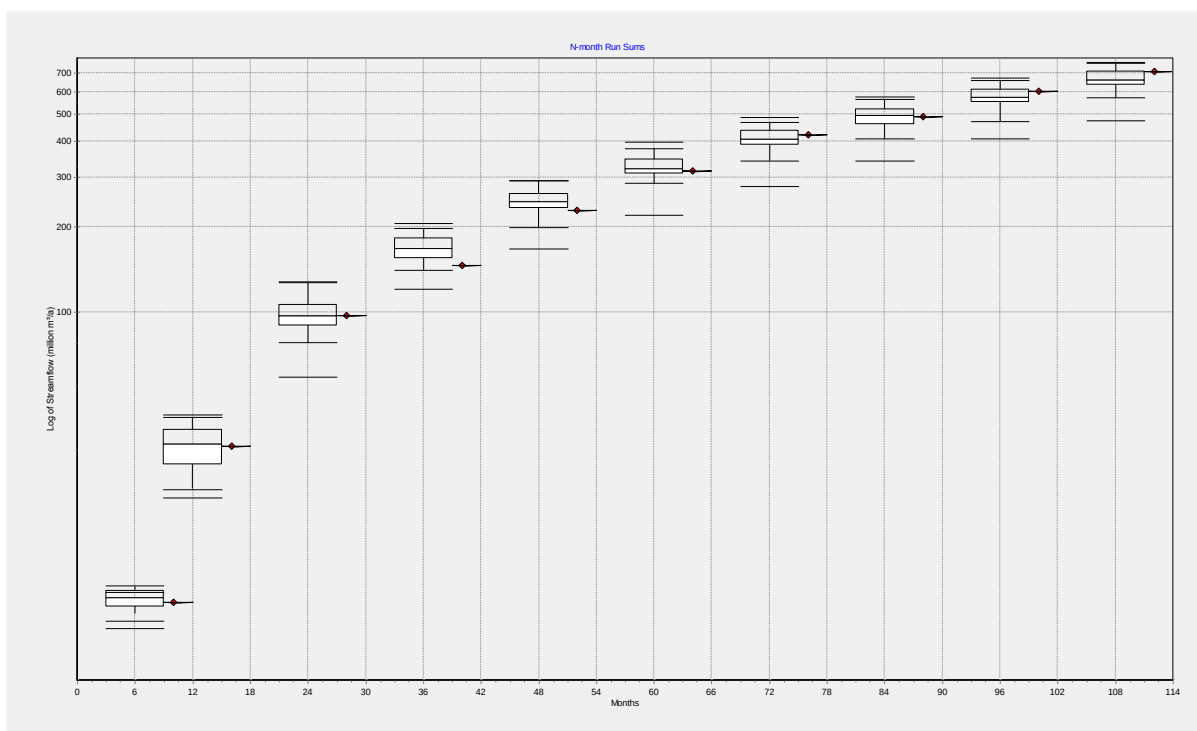


Figure D2- 15 Plot of the N-month Run Sums for Quaternary Catchment T35C

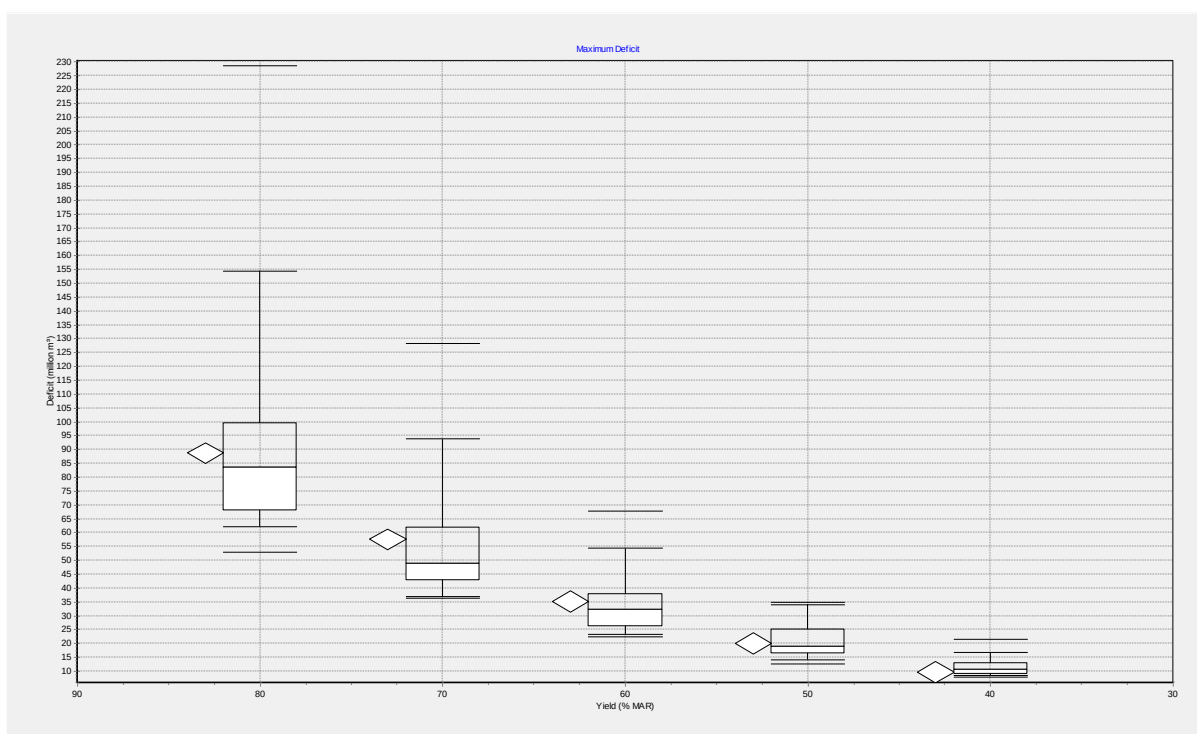


Figure D2- 16 Plot of the Maximum Deficits for Quaternary Catchment T35C

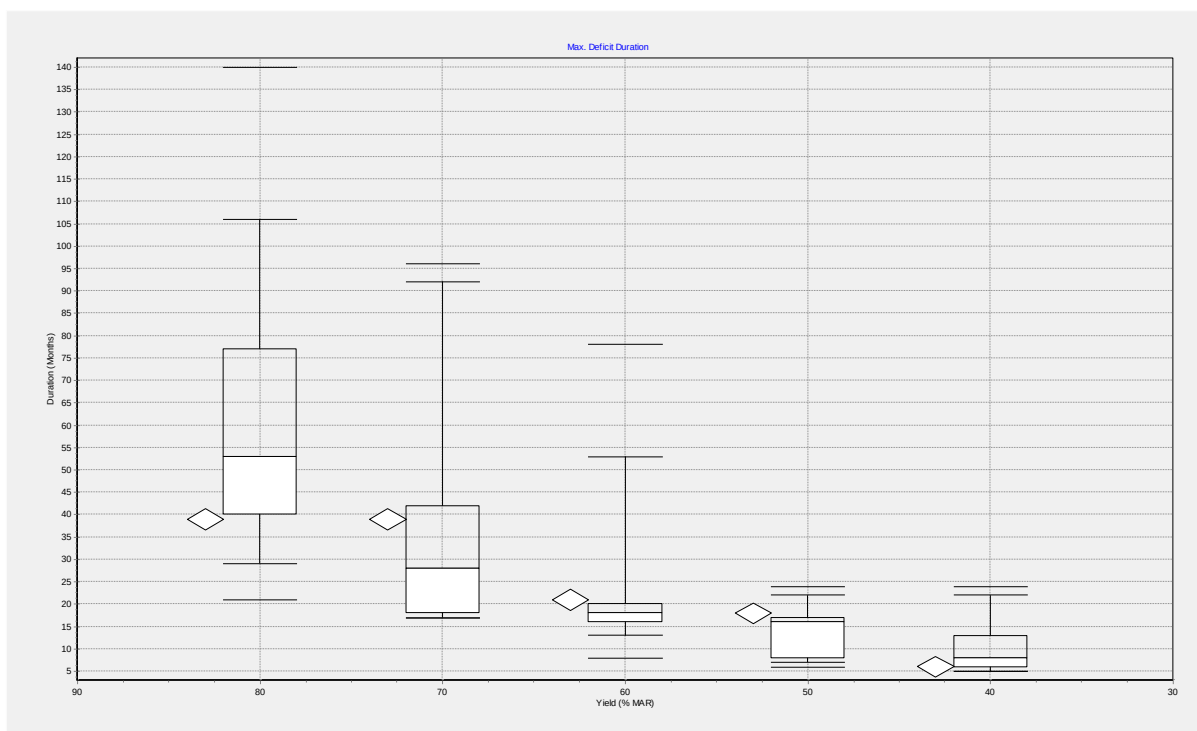


Figure D2- 17 Plot of the Maximum Deficit Durations for Quaternary Catchment T35C

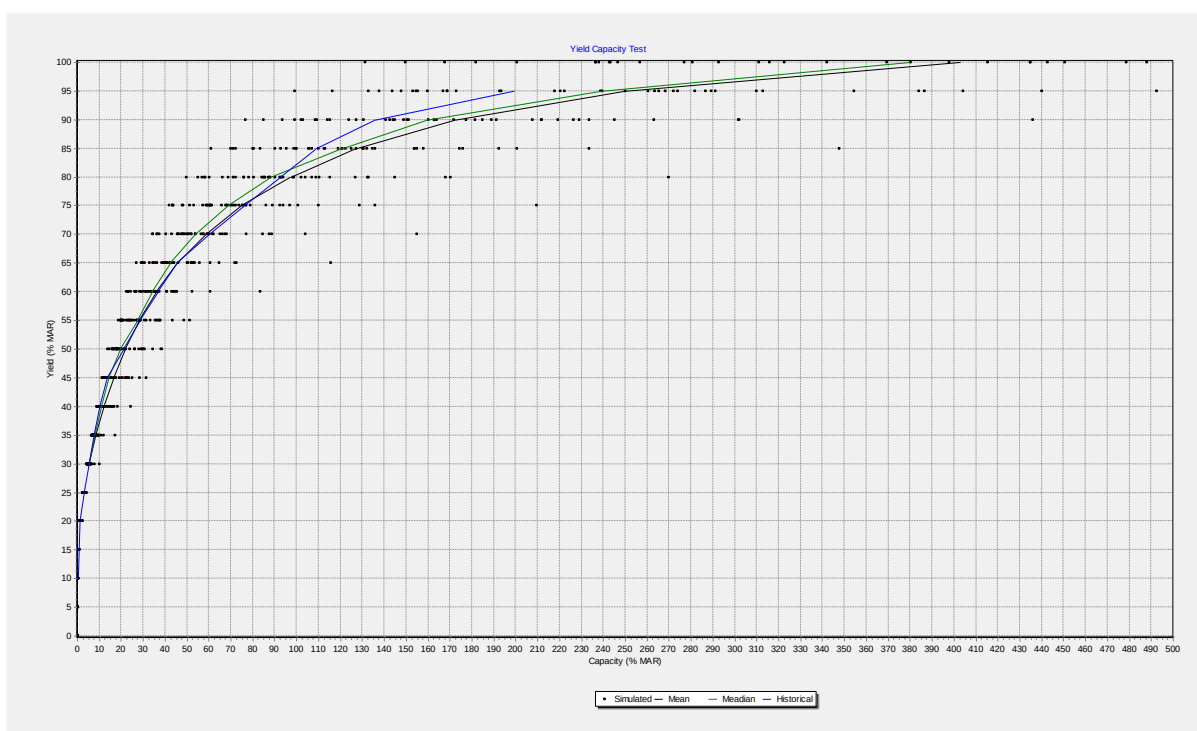


Figure D2- 18 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35C

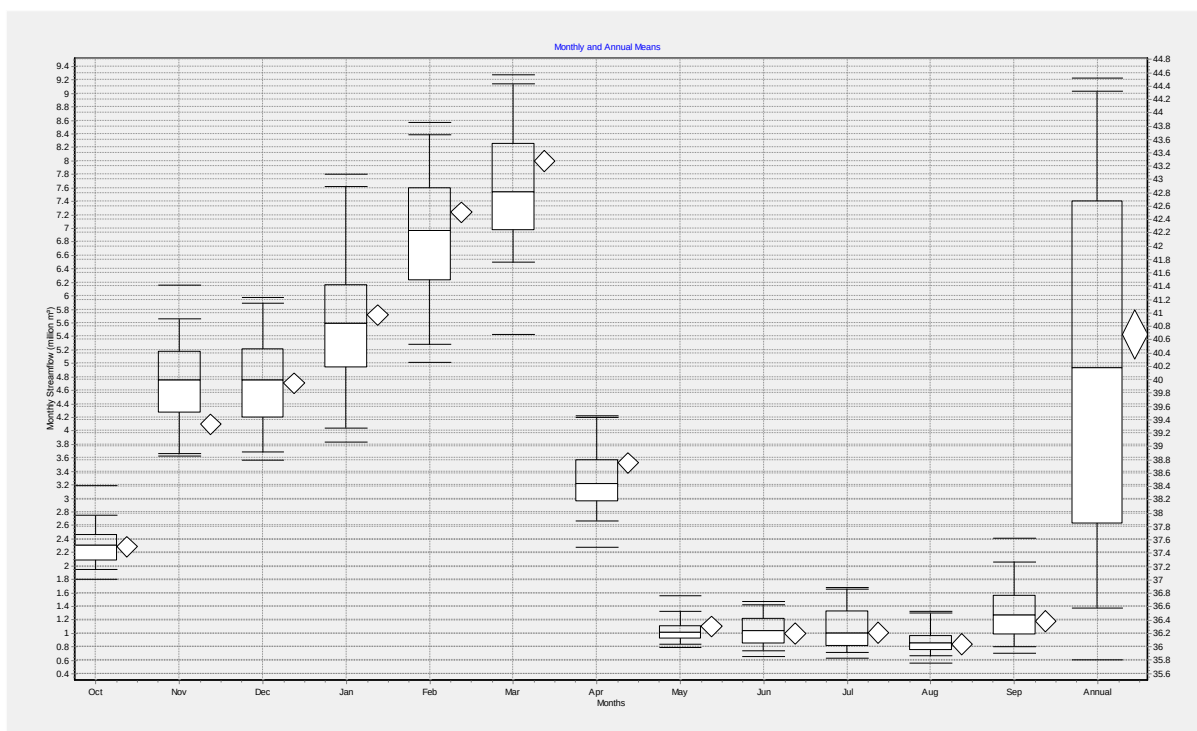


Figure D2- 19 Plot of the Monthly and Annual Means for Quaternary Catchment T35D

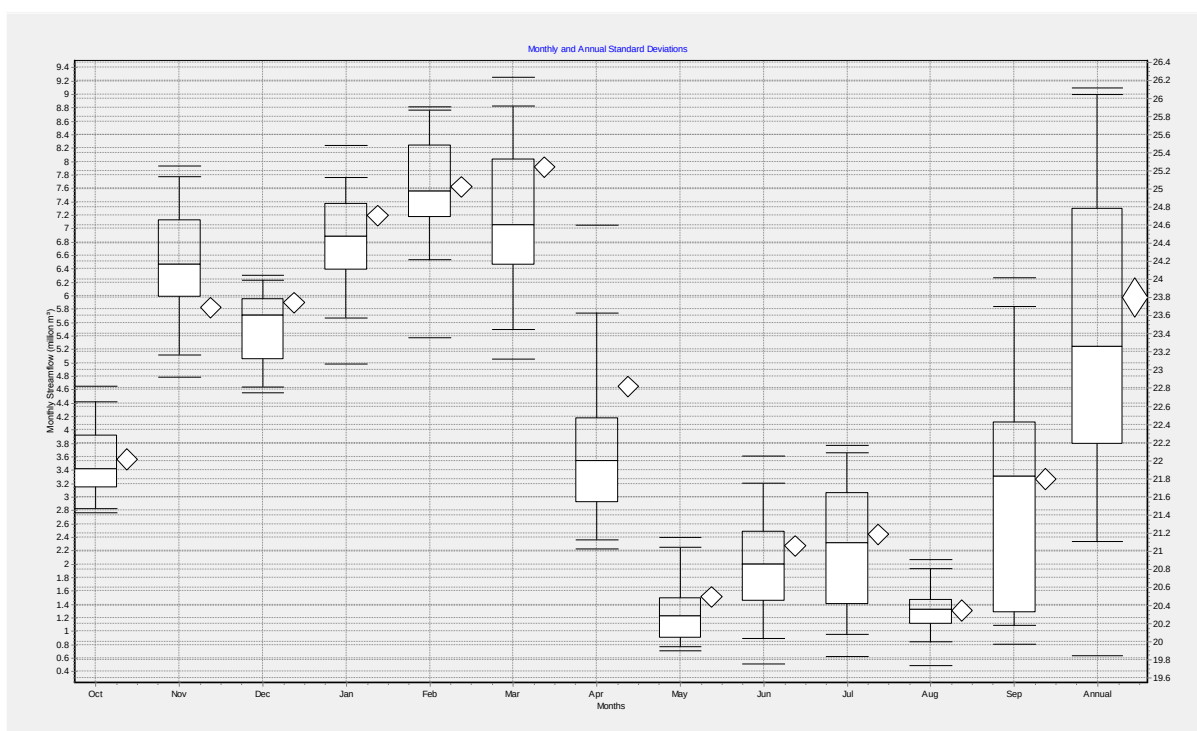


Figure D2- 20 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35D

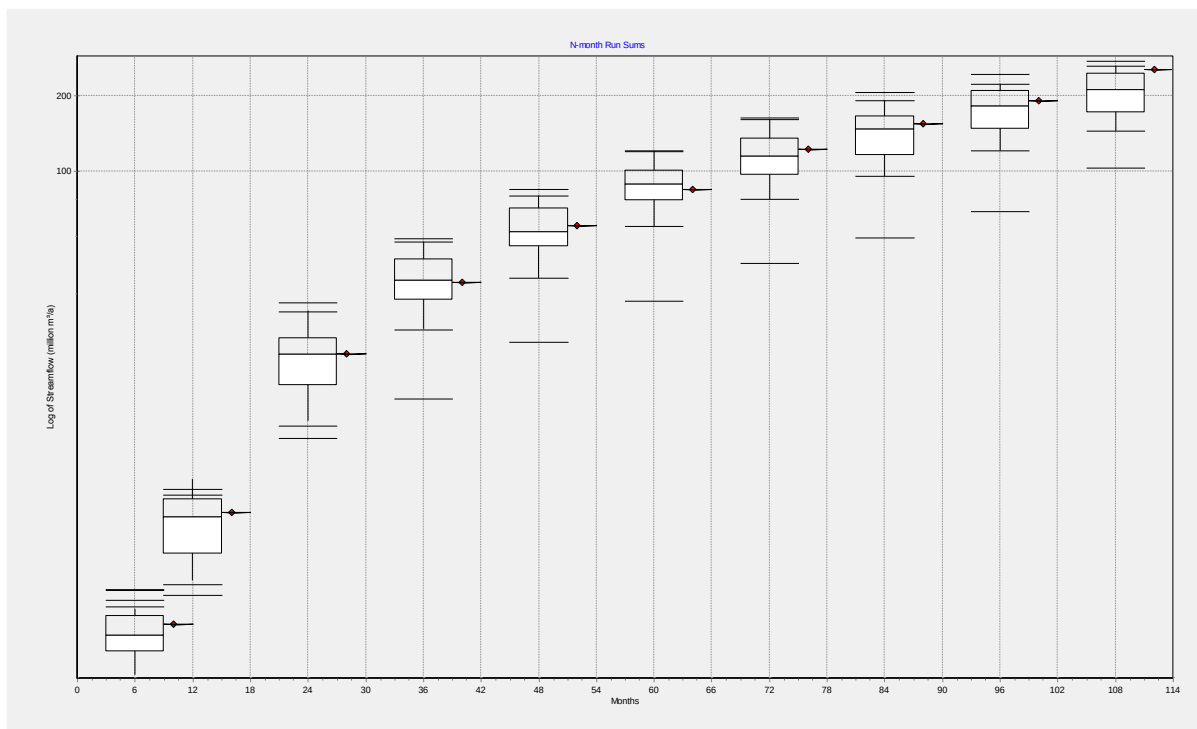


Figure D2- 21 Plot of the N-month Run Sums for quaternary Catchment T35D

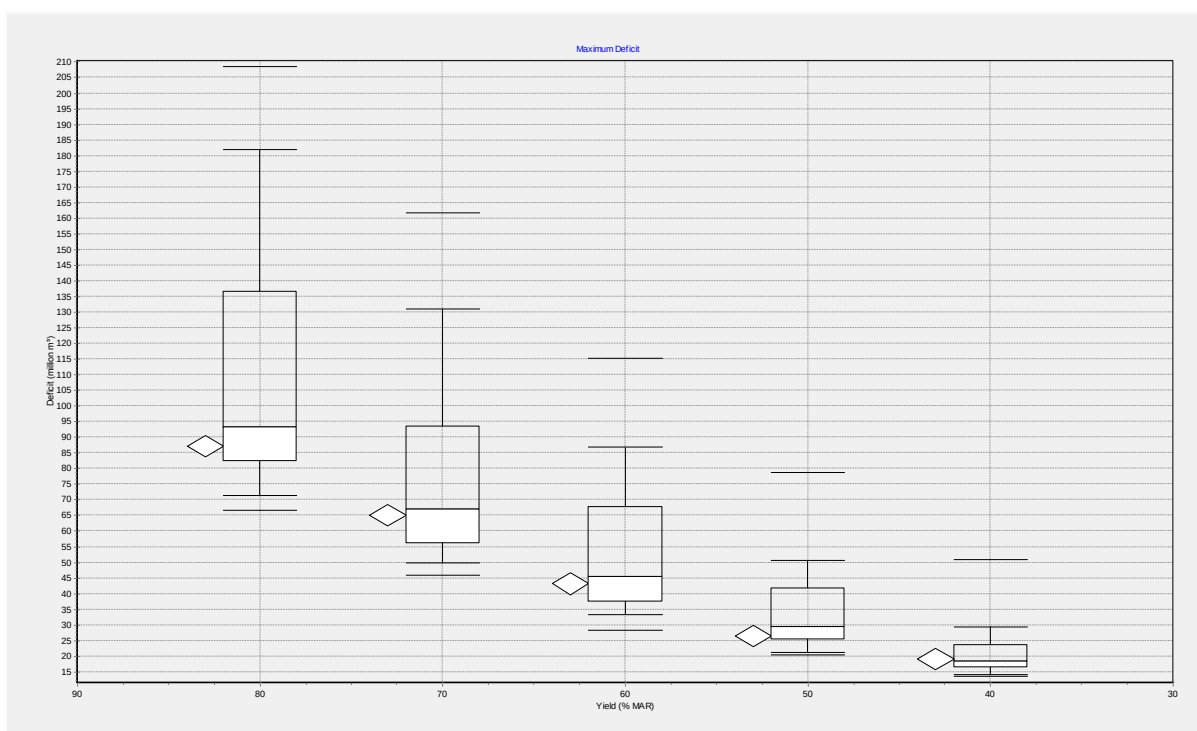


Figure D2- 22 Plot of the Maximum Deficits for Quaternary Catchment T35D

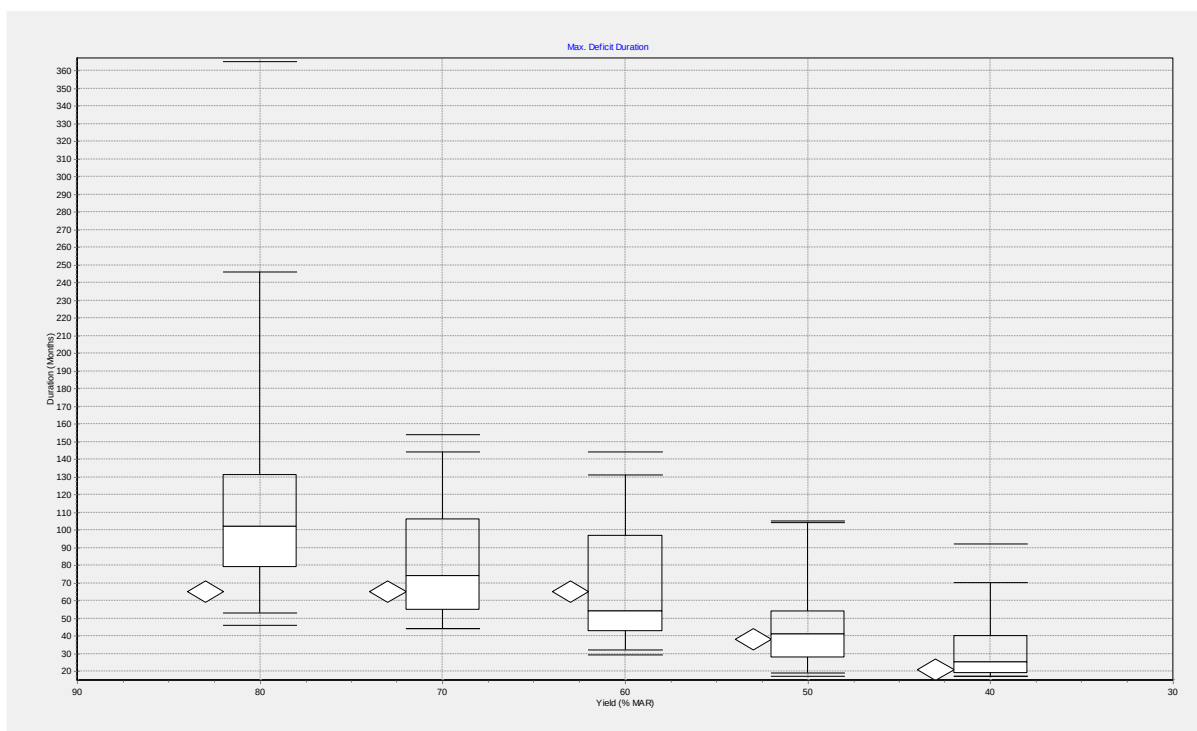


Figure D2- 23 Plot of the Maximum Deficit Durations for Quaternary Catchment T35D

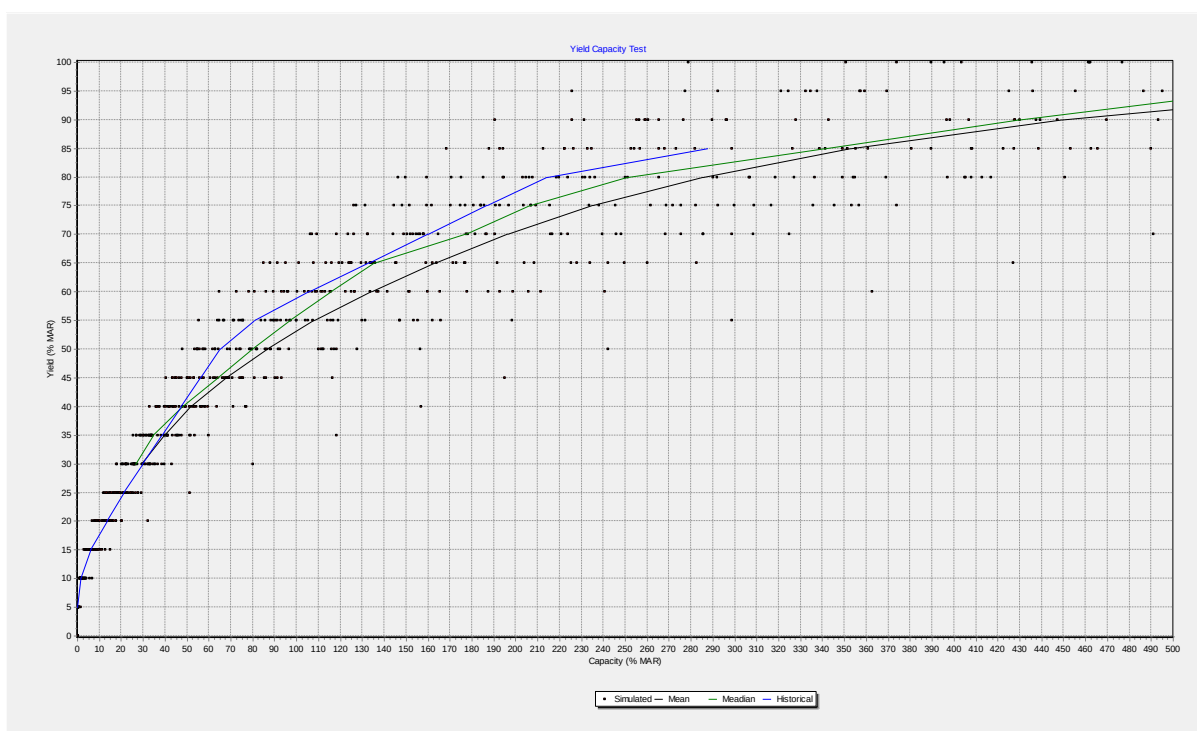


Figure D2- 24 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35E

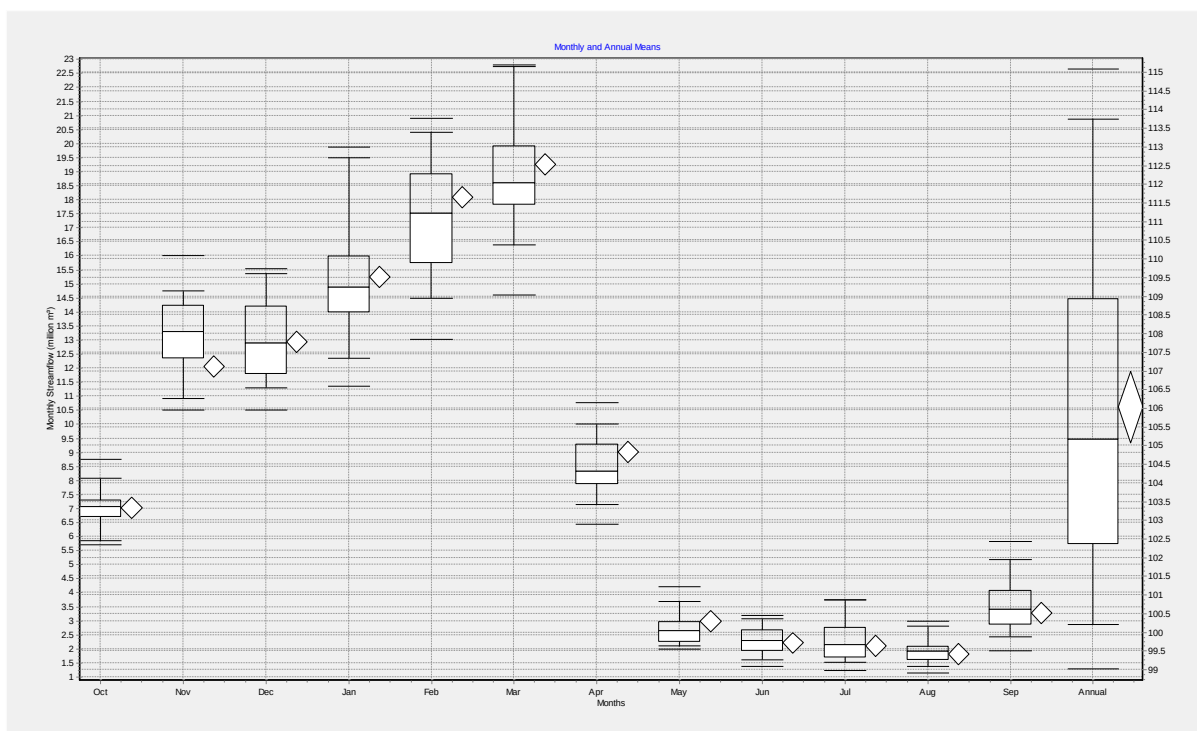


Figure D2- 25 Plot of the Monthly and Annual Means for quaternary Catchment T35E

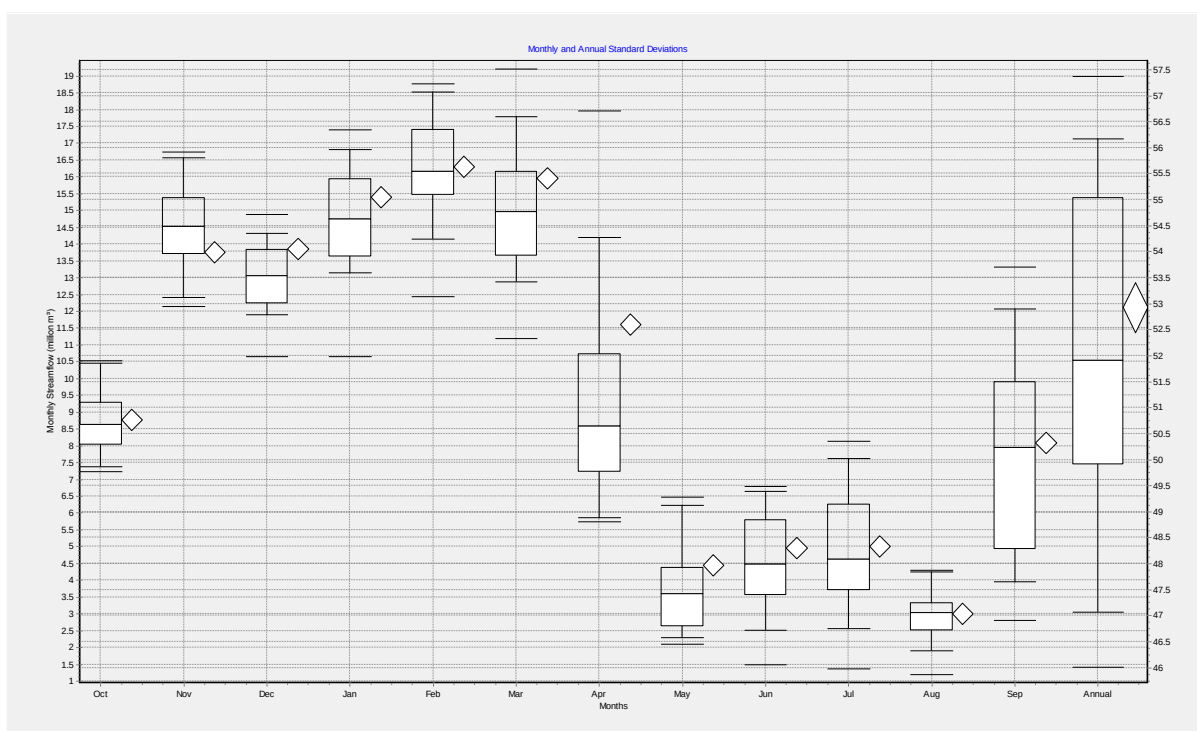


Figure D2- 26 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35E

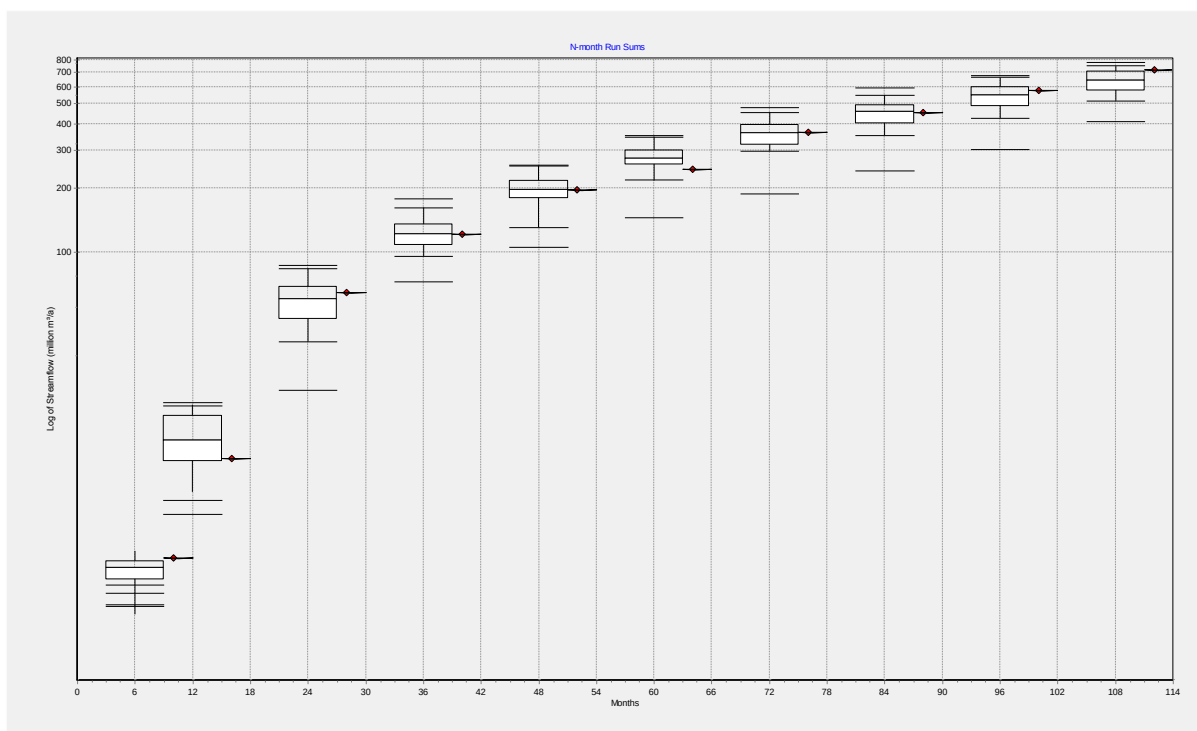


Figure D2- 27 Plot of the N-month Run Sums for Quaternary Catchment T35E

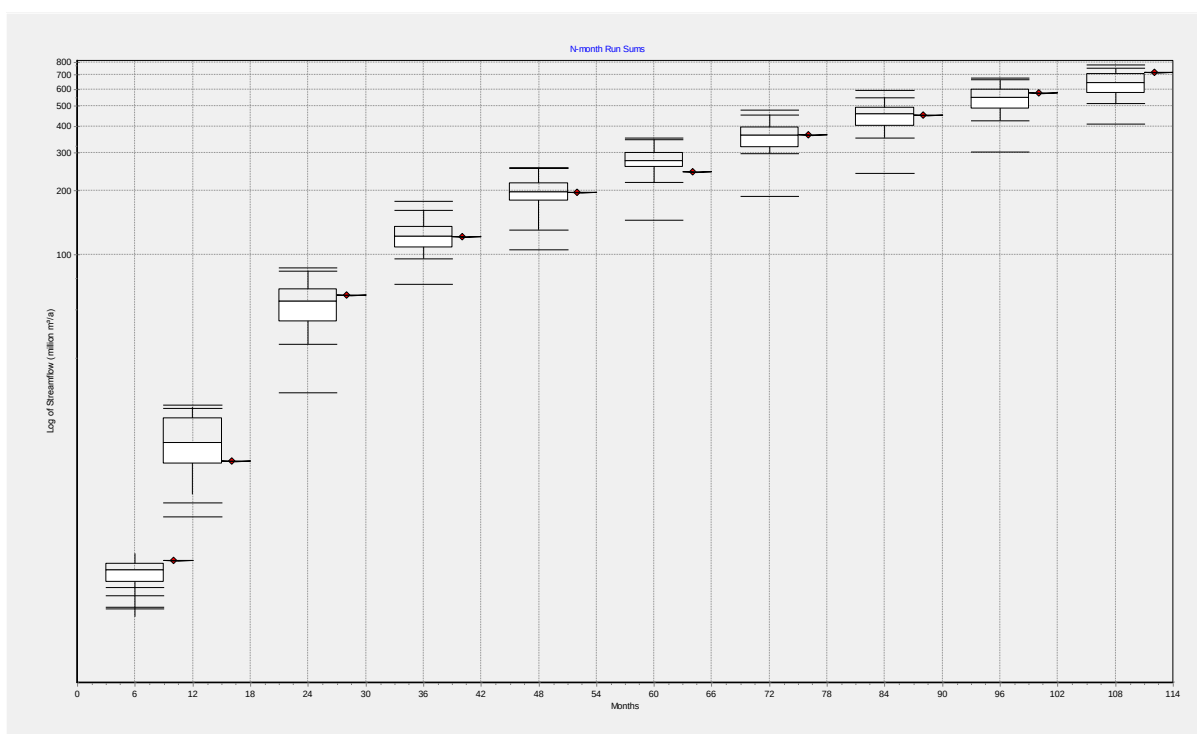


Figure D2- 28 Plot of the Maximum Deficits for Quaternary Catchment T35E

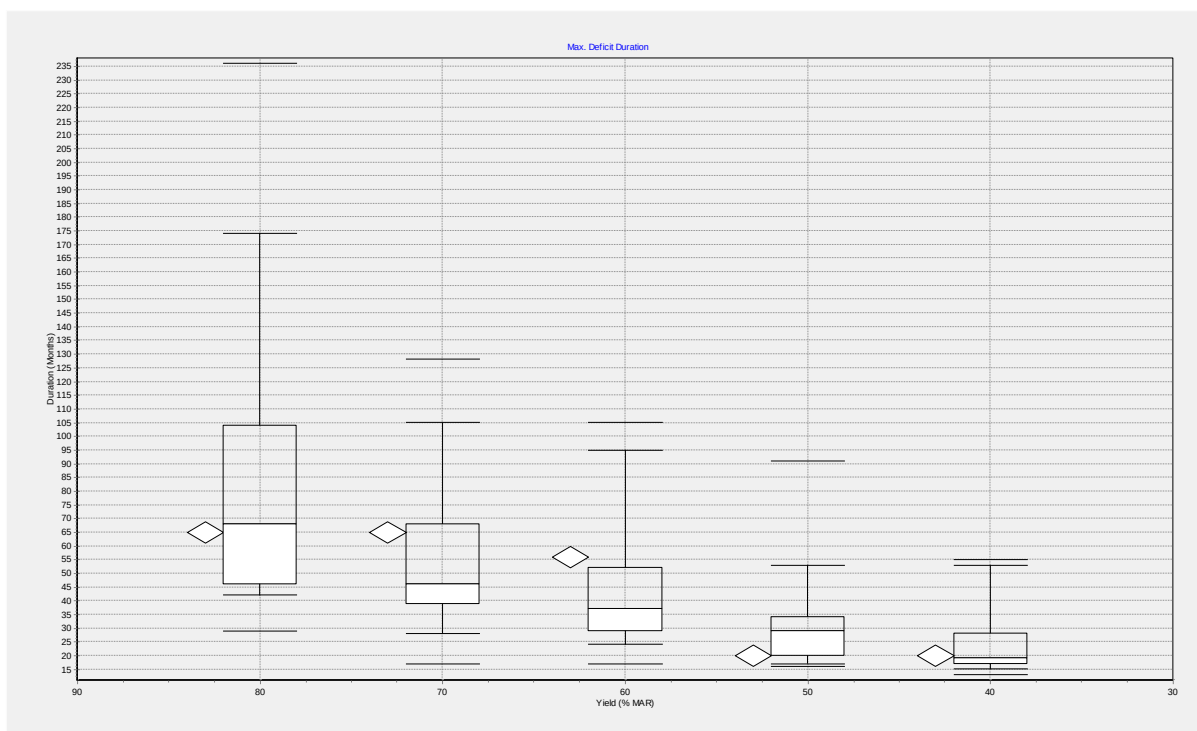


Figure D2- 29 Plot of the Maximum Deficit Durations for Quaternary Catchment T35E

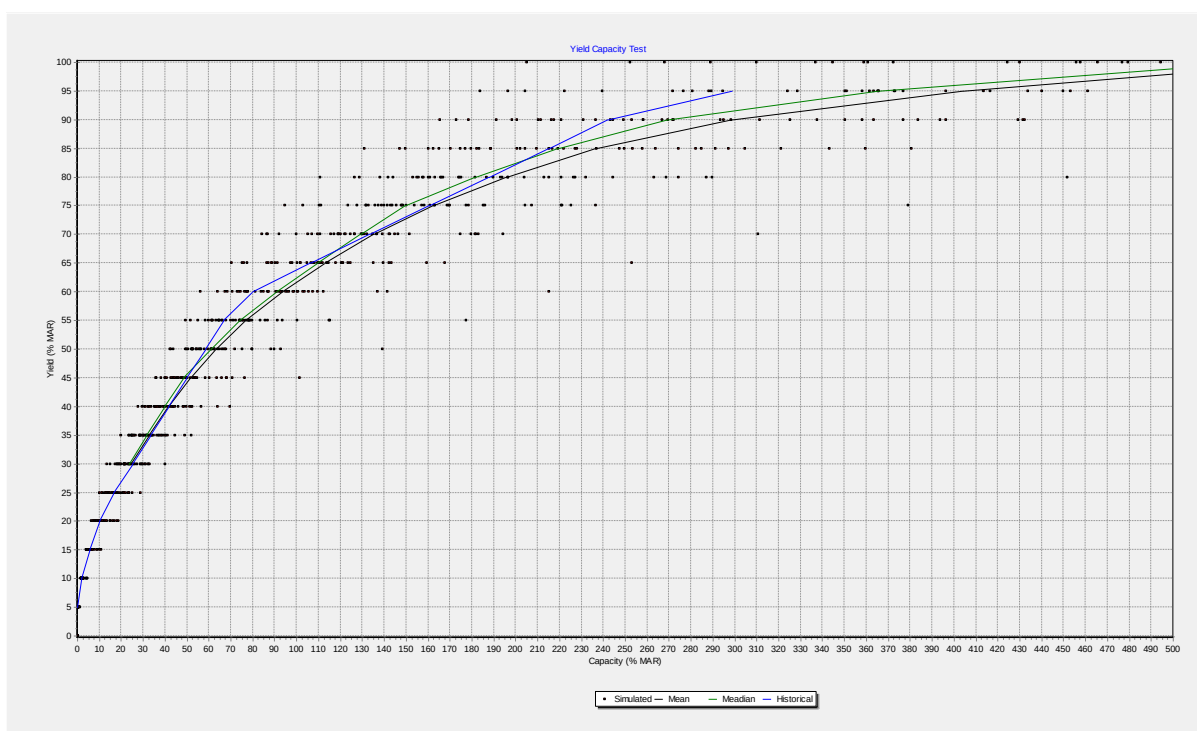


Figure D2- 30 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35E

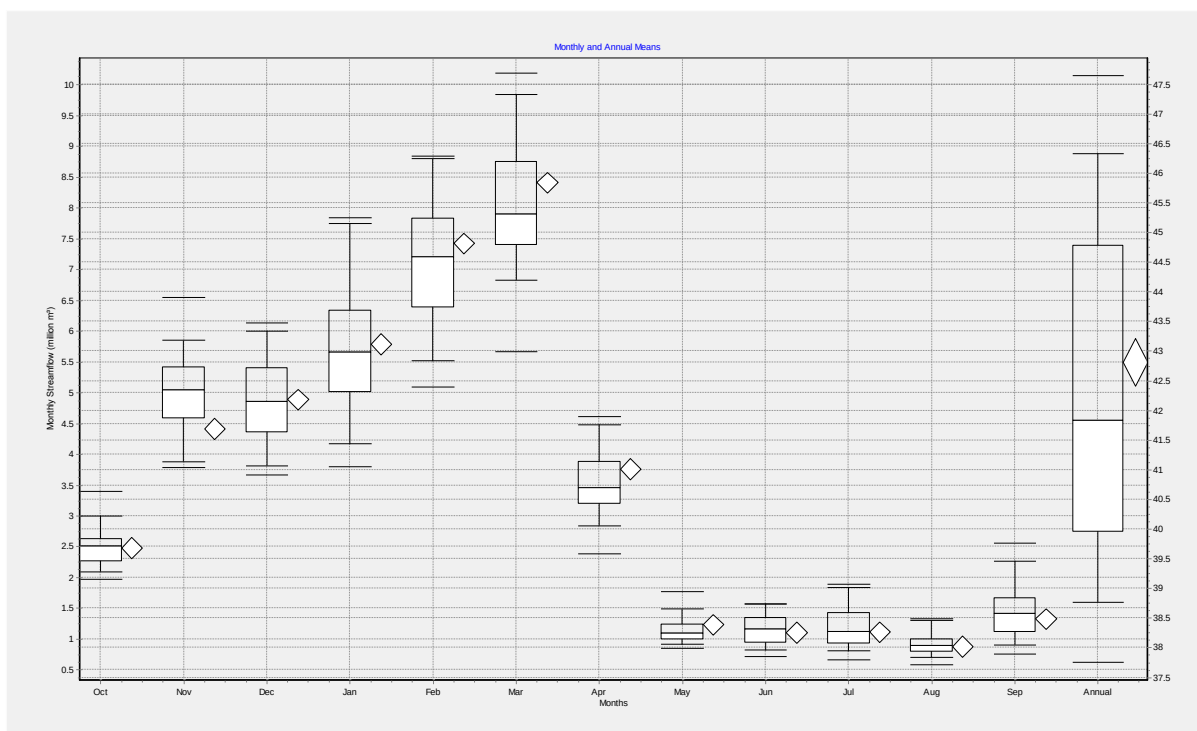


Figure D2- 31 Plot of the Monthly and Annual Means for Quaternary Catchment T35F

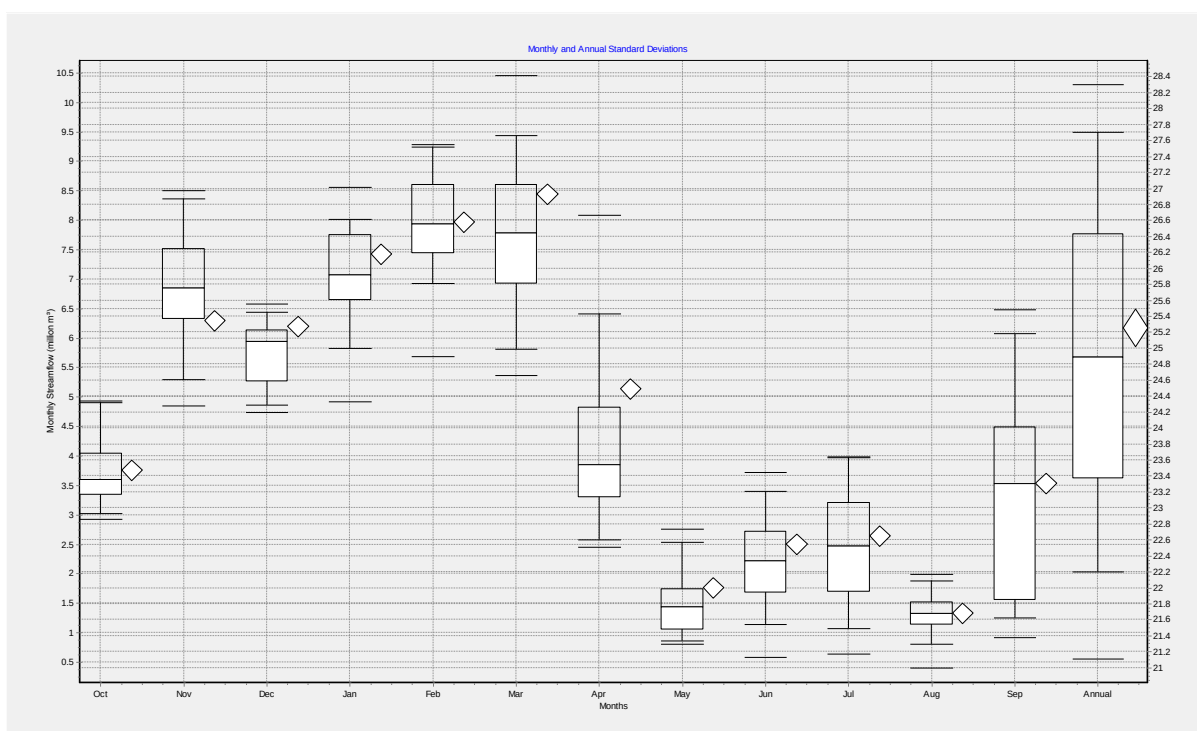


Figure D2- 32 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35F

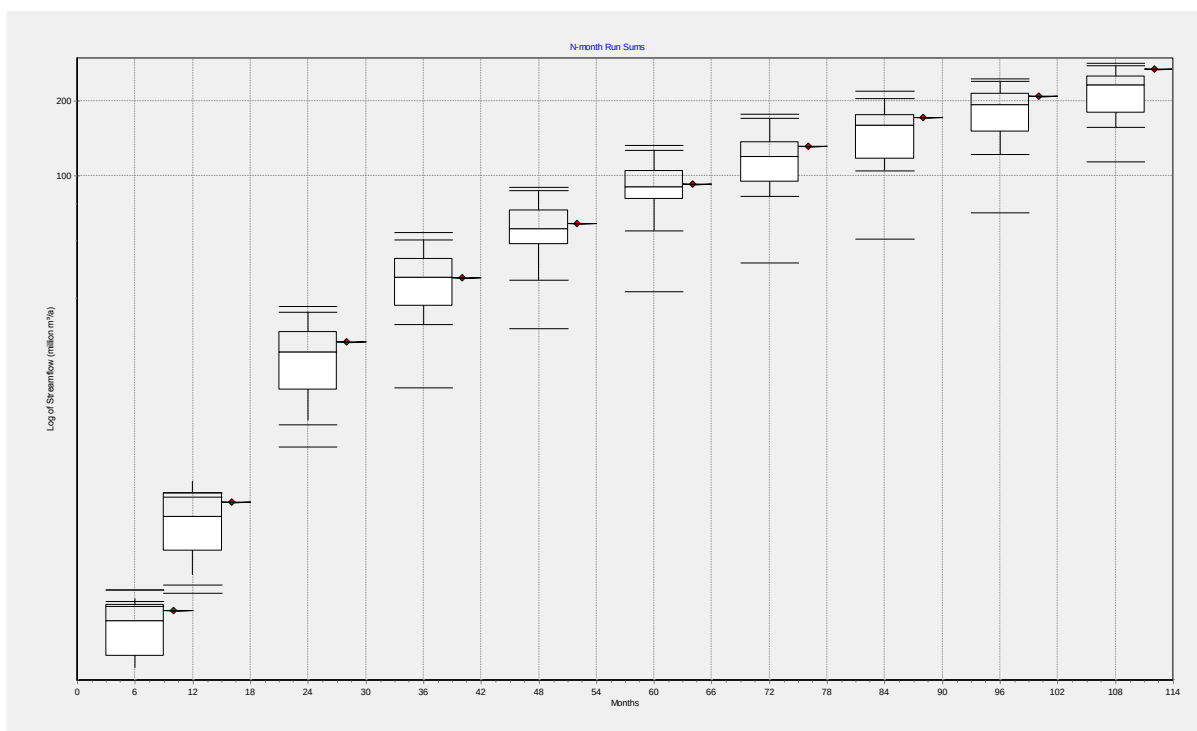


Figure D2- 33 Plot of the N-month Run Sums for Quaternary Catchment T35F

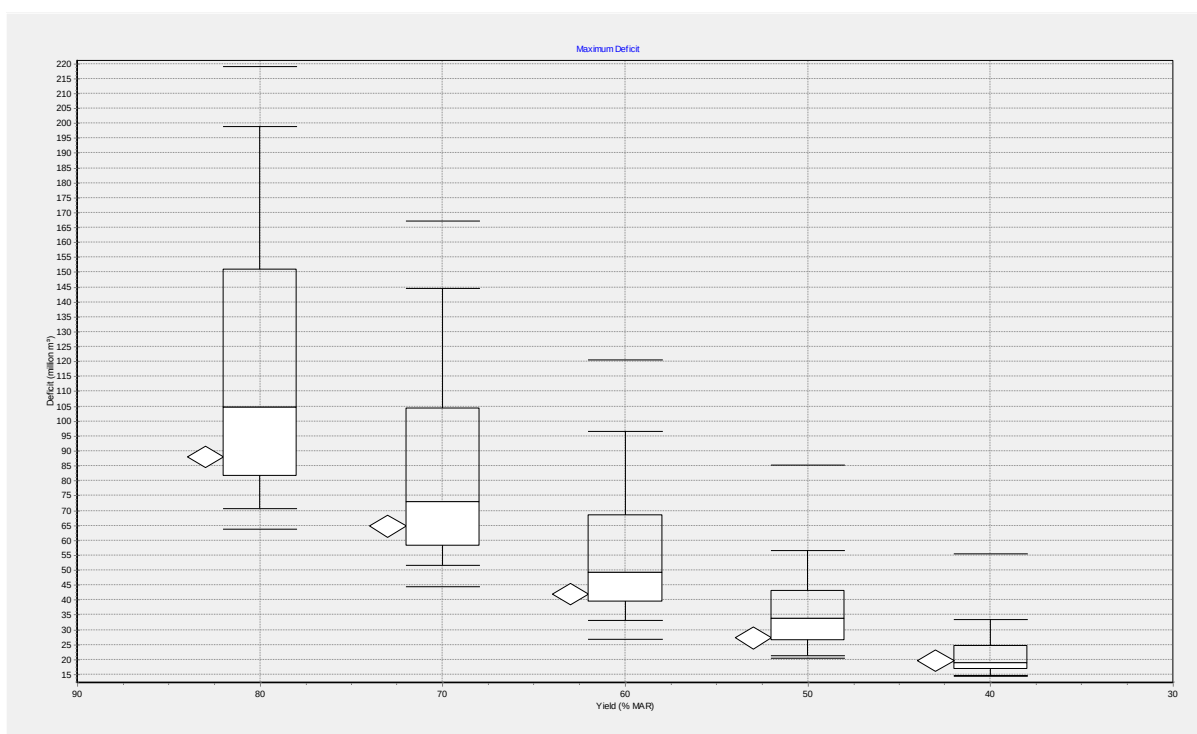


Figure D2- 34 Plot of the Maximum Deficits for Quaternary Catchment T35F

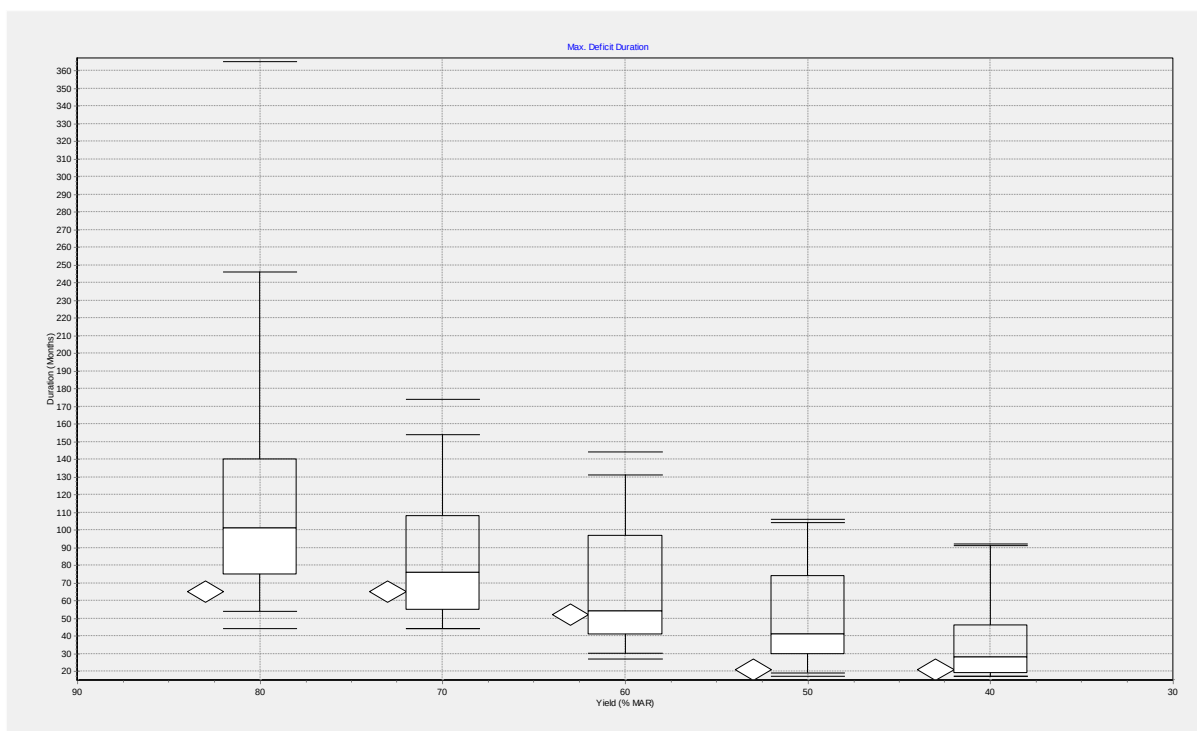


Figure D2- 35 Plot of the Maximum Deficit Durations for quaternary Catchment T35F

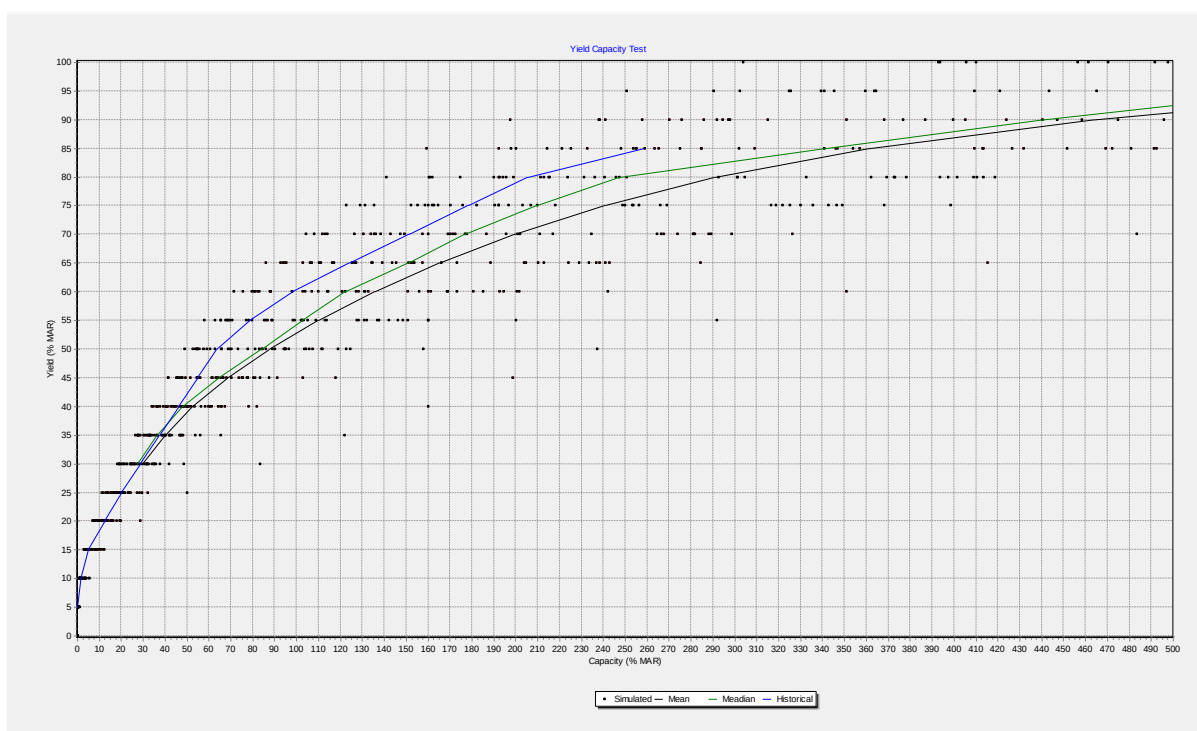


Figure D2- 36 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35F

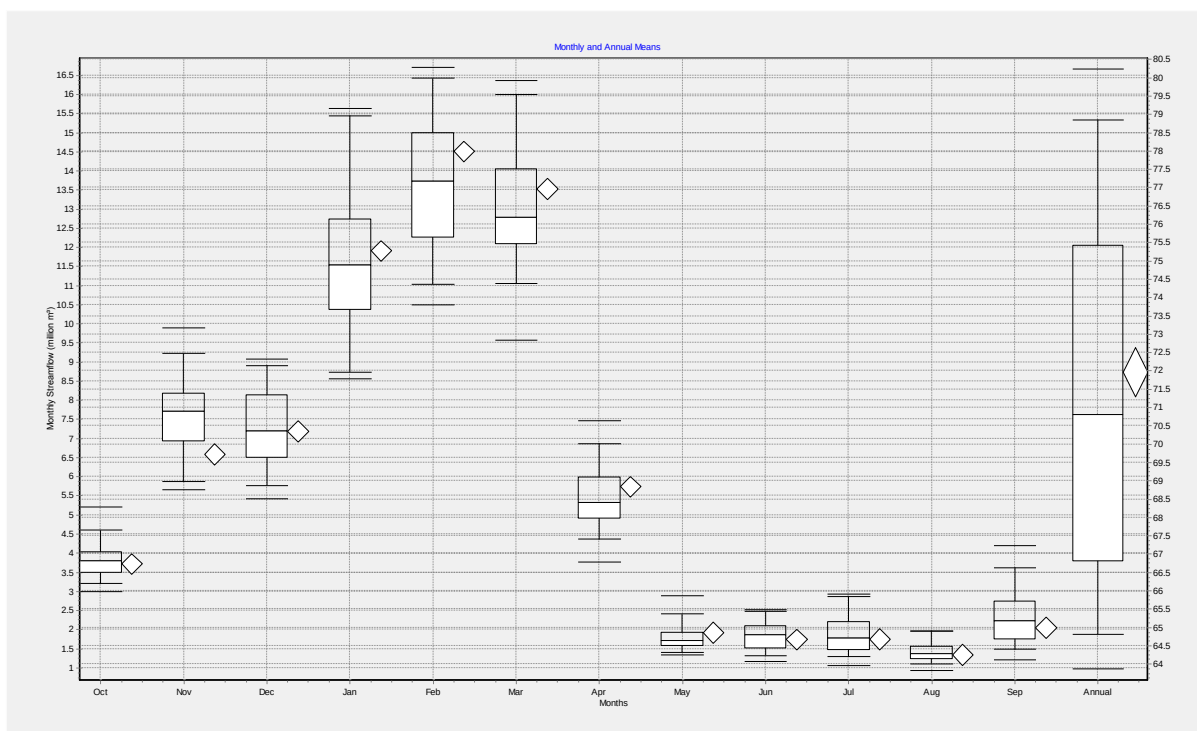


Figure D2- 37 Plot of the Monthly and Annual Means for Quaternary Catchment T35G

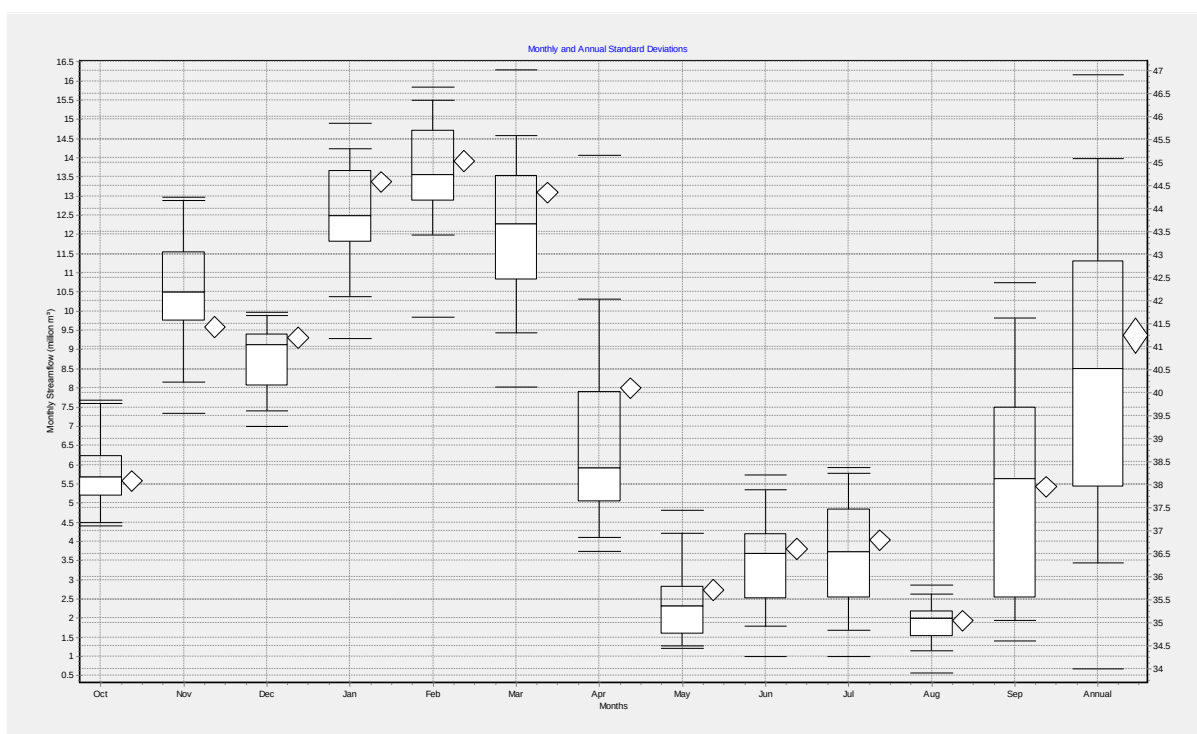


Figure D2- 38 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35G

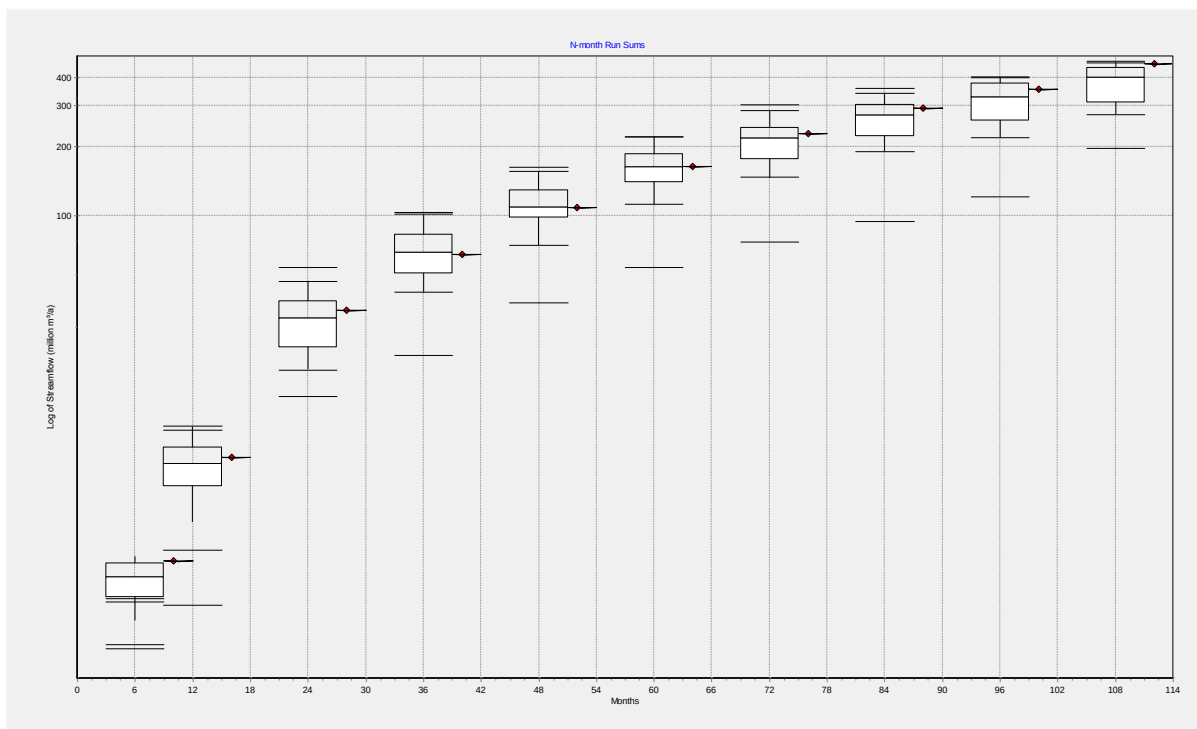


Figure D2- 39 Plot of the N-month Run Sums for Quaternary Catchment T35G

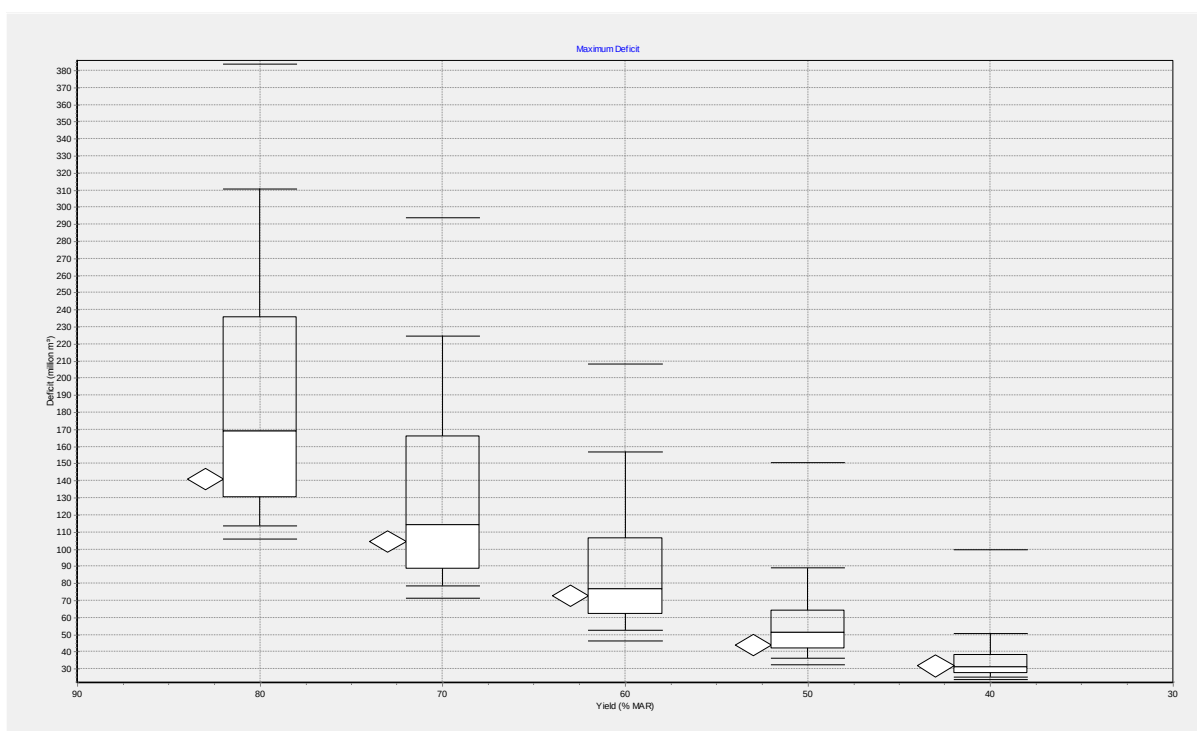


Figure D2- 40 Plot of the Maximum Deficits for Quaternary Catchment T35G

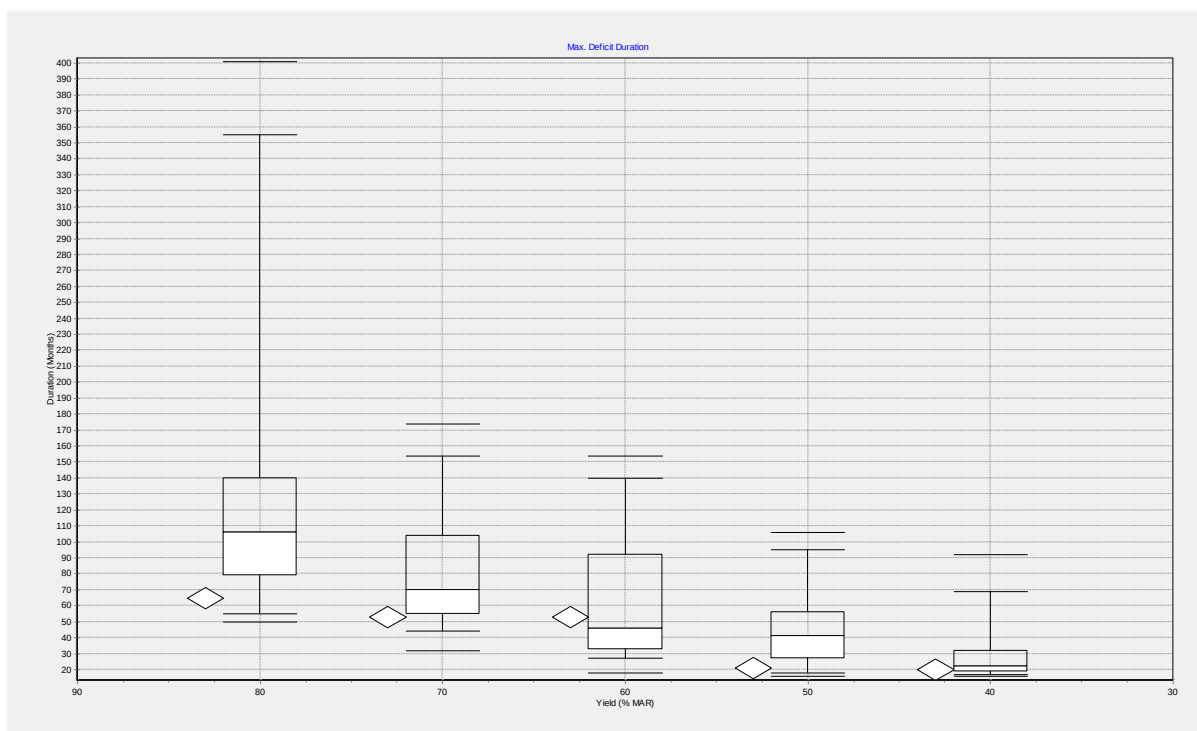


Figure D2- 41 Plot of the Maximum Deficit Durations for Quaternary Catchment T35G

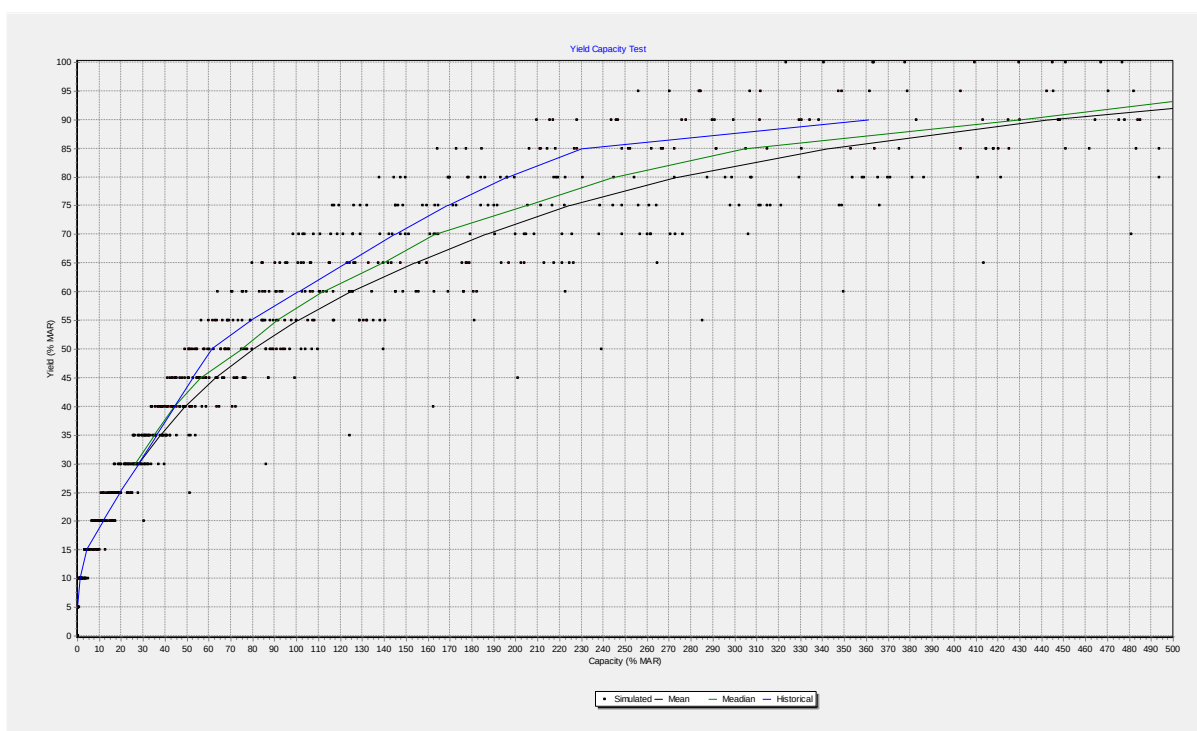


Figure D2- 42 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35G

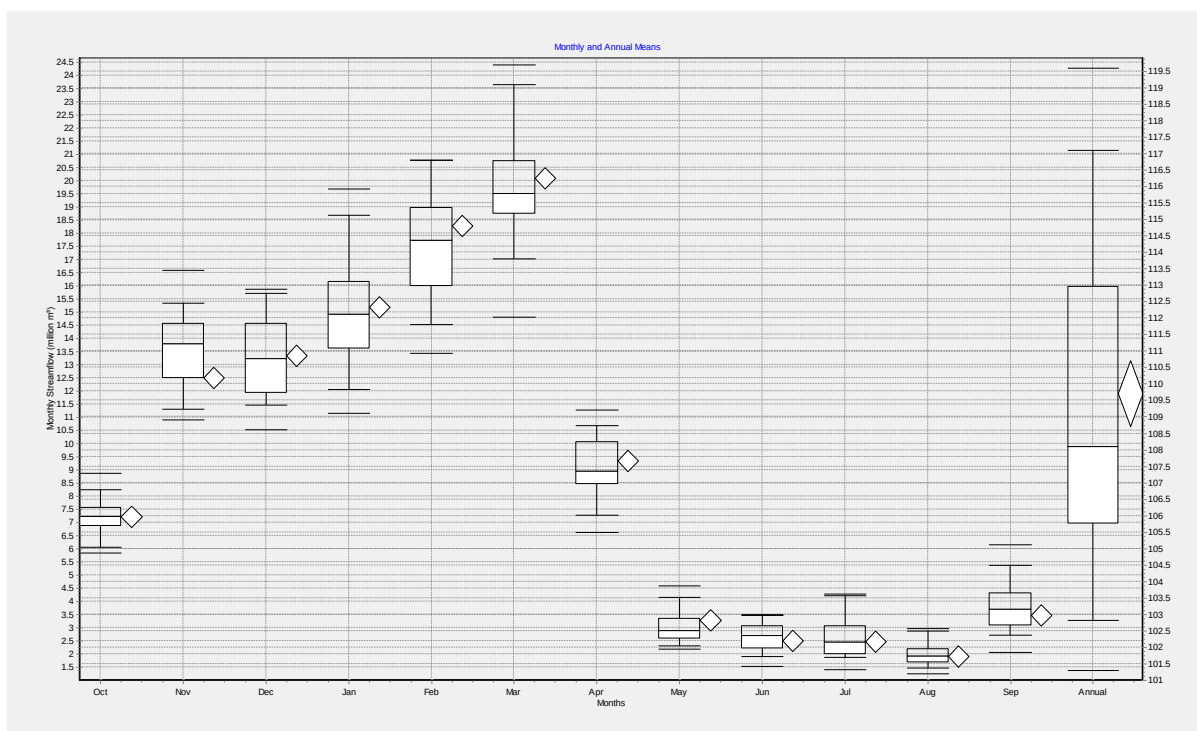


Figure D2- 43 Plot of the Monthly and Annual Means for Quaternary Catchment T35H

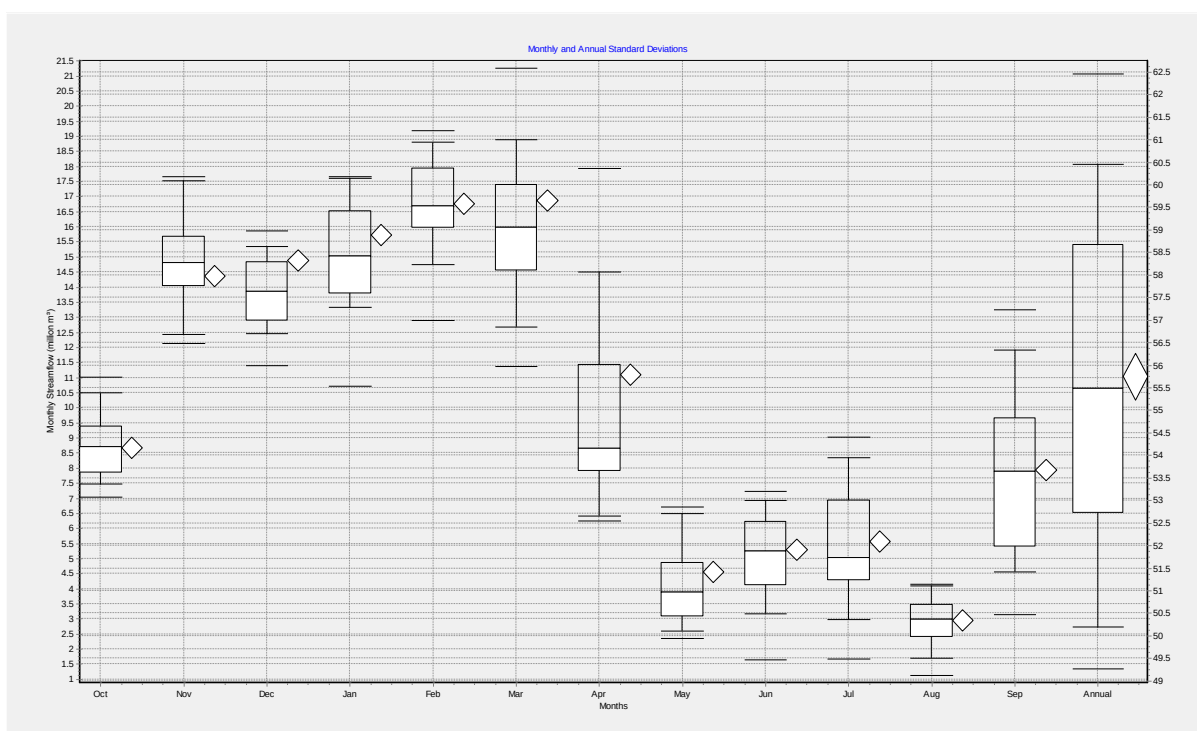


Figure D2- 44 Plot of the Monthly and annual Standard Deviations for Quaternary Catchment T35H

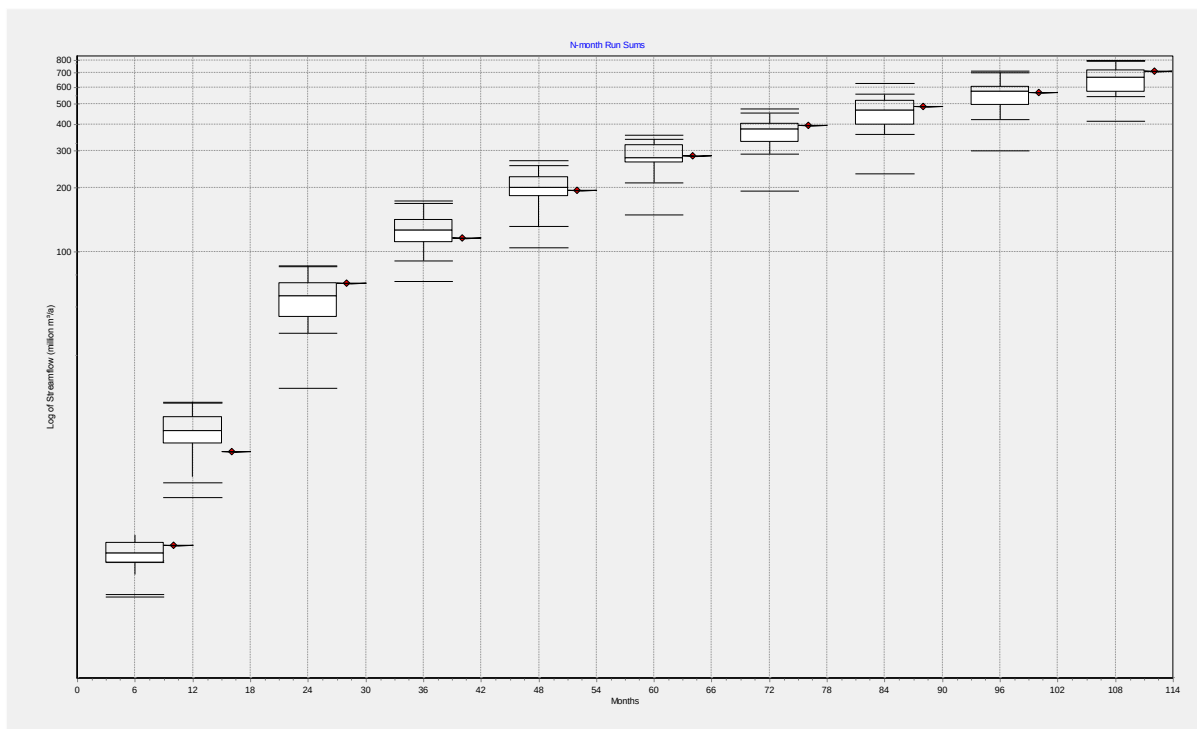


Figure D2- 45 Plot of the N-month Run Sums for Quaternary Catchment T35H

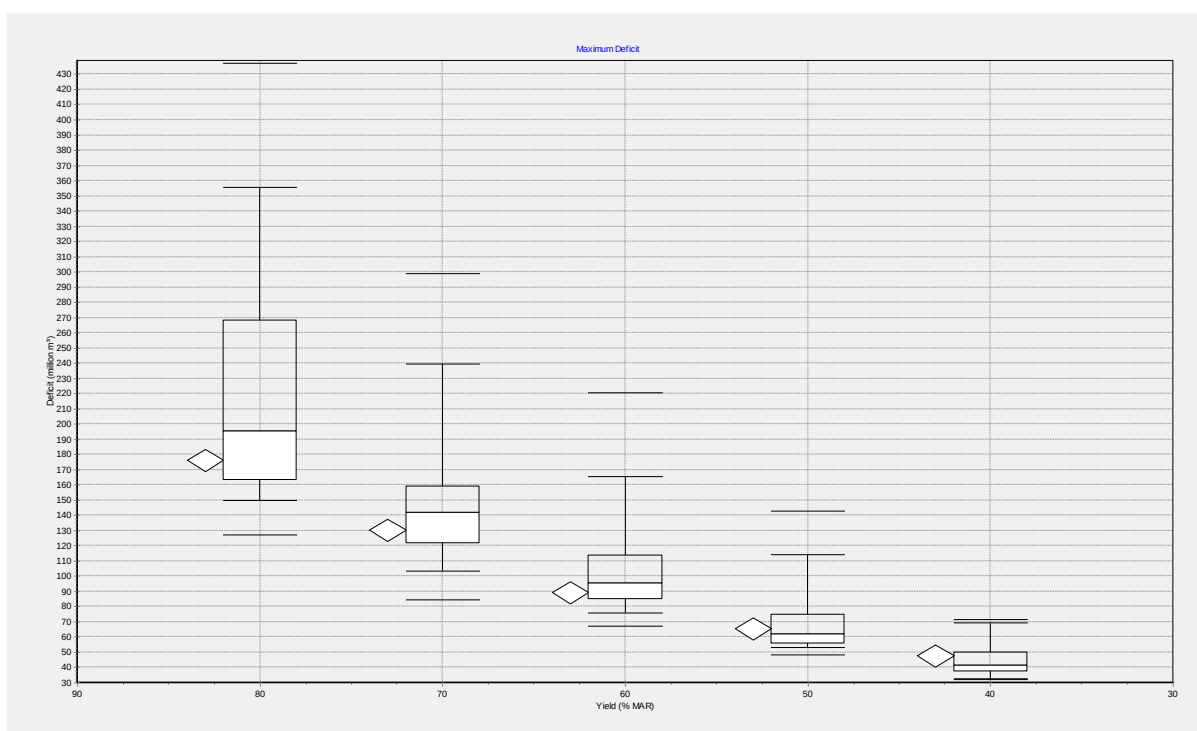


Figure D2- 46 Plot of the Maximum Deficits for Quaternary Catchment T35H

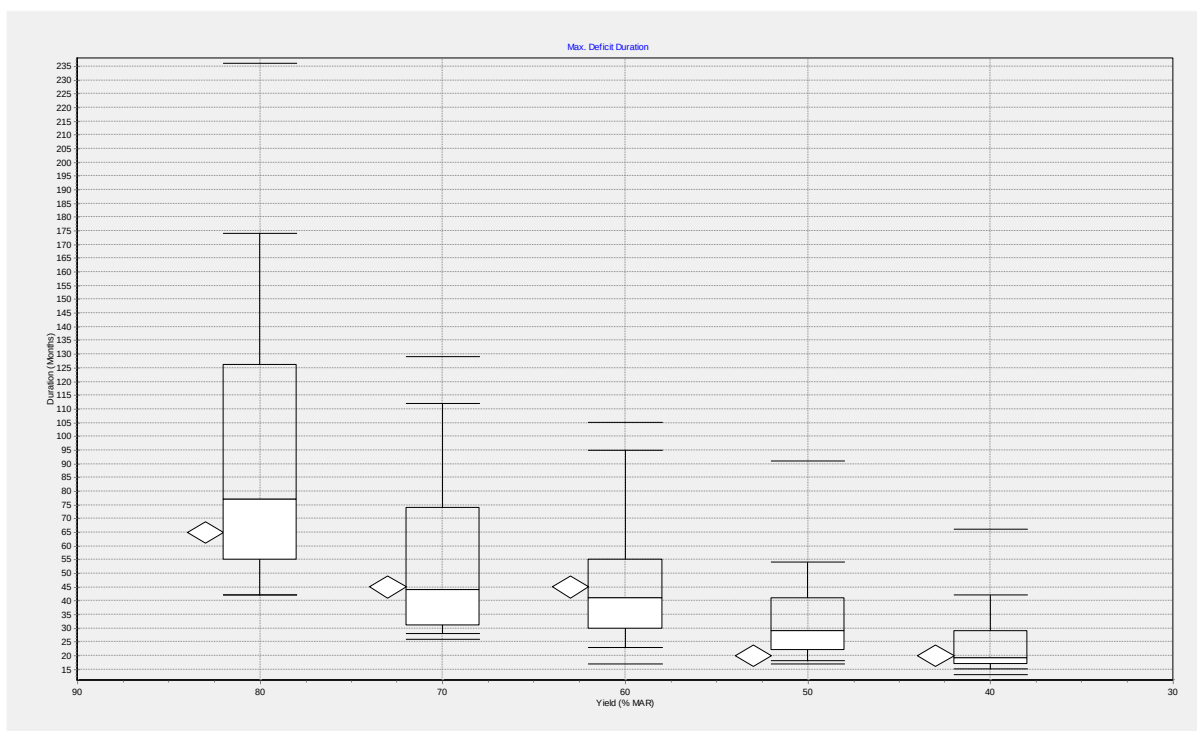


Figure D2- 47 Plot of the Maximum Deficit Durations for Quaternary Catchment T35H

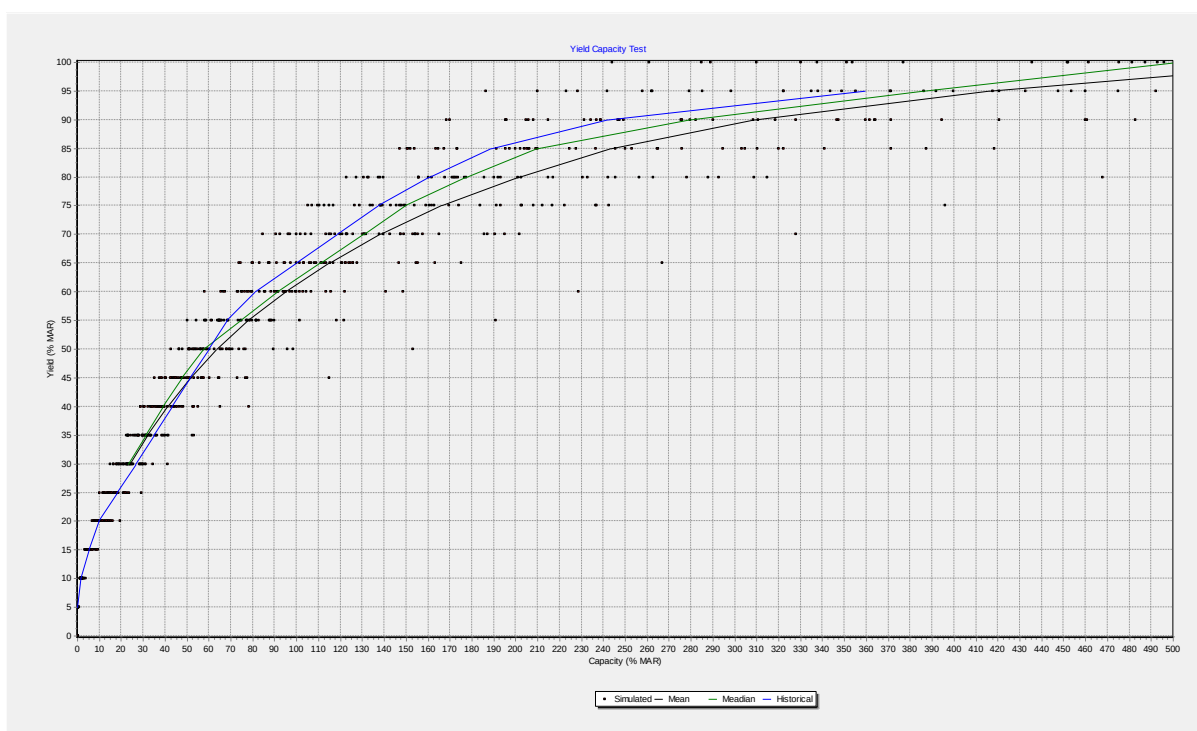


Figure D2- 48 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35H

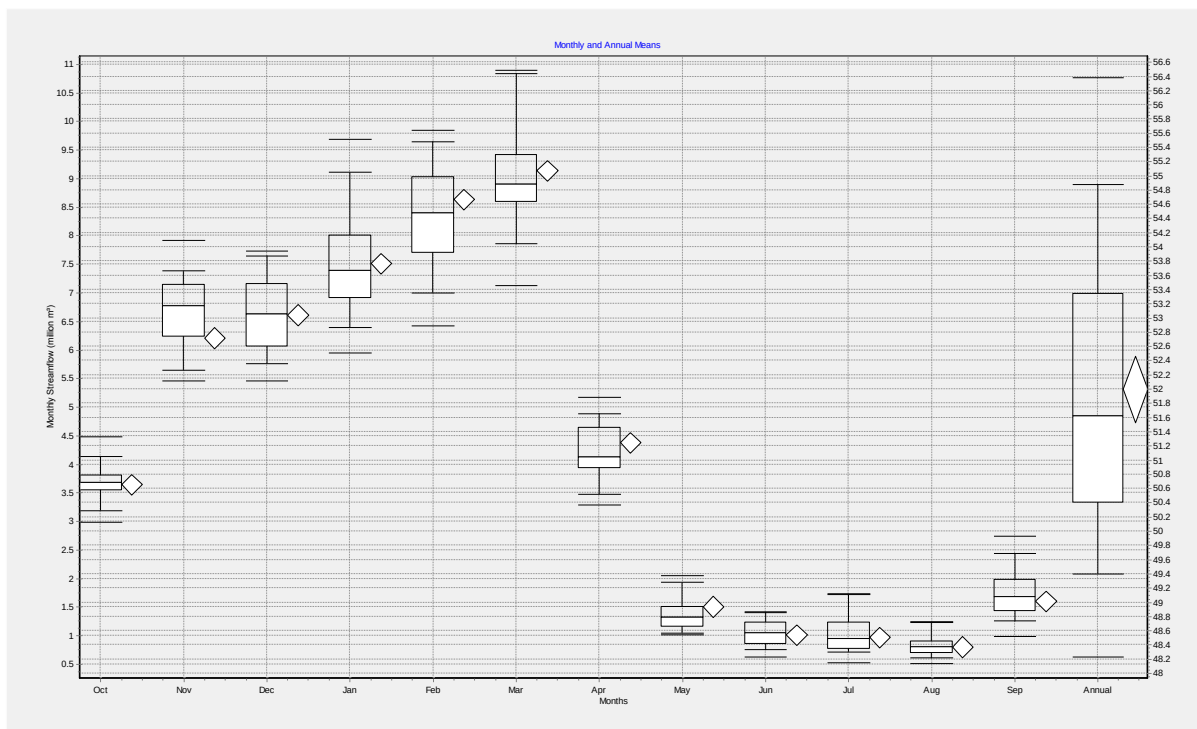


Figure D2- 49 Plot of the Monthly and Annual Means for quaternary Catchment T35J

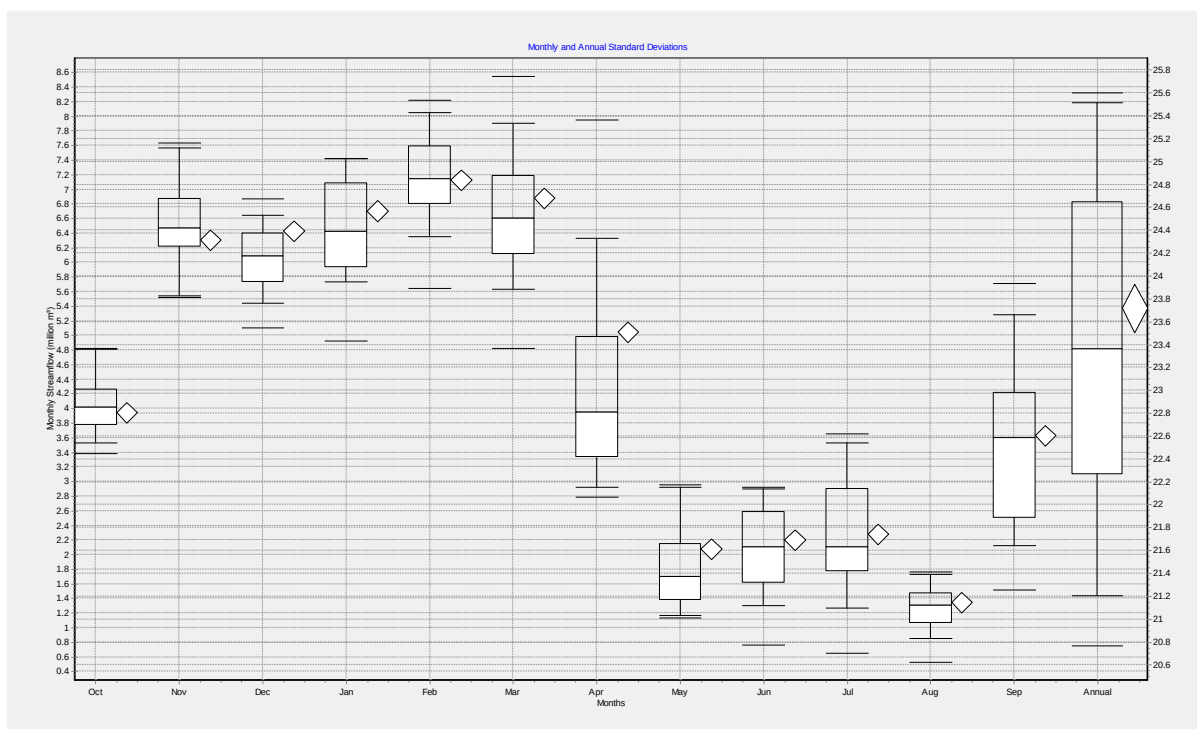


Figure D2- 50 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35J

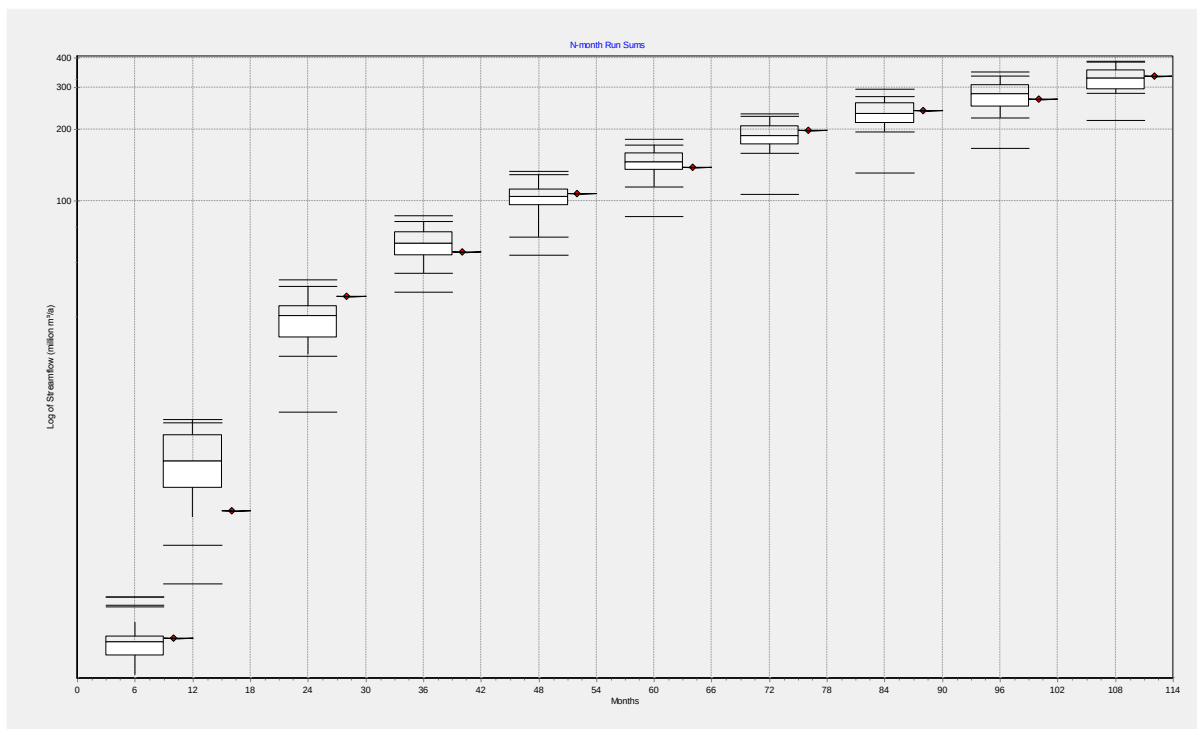


Figure D2- 51 Plot of the n-month Run Sums for Quaternary Catchment T35J

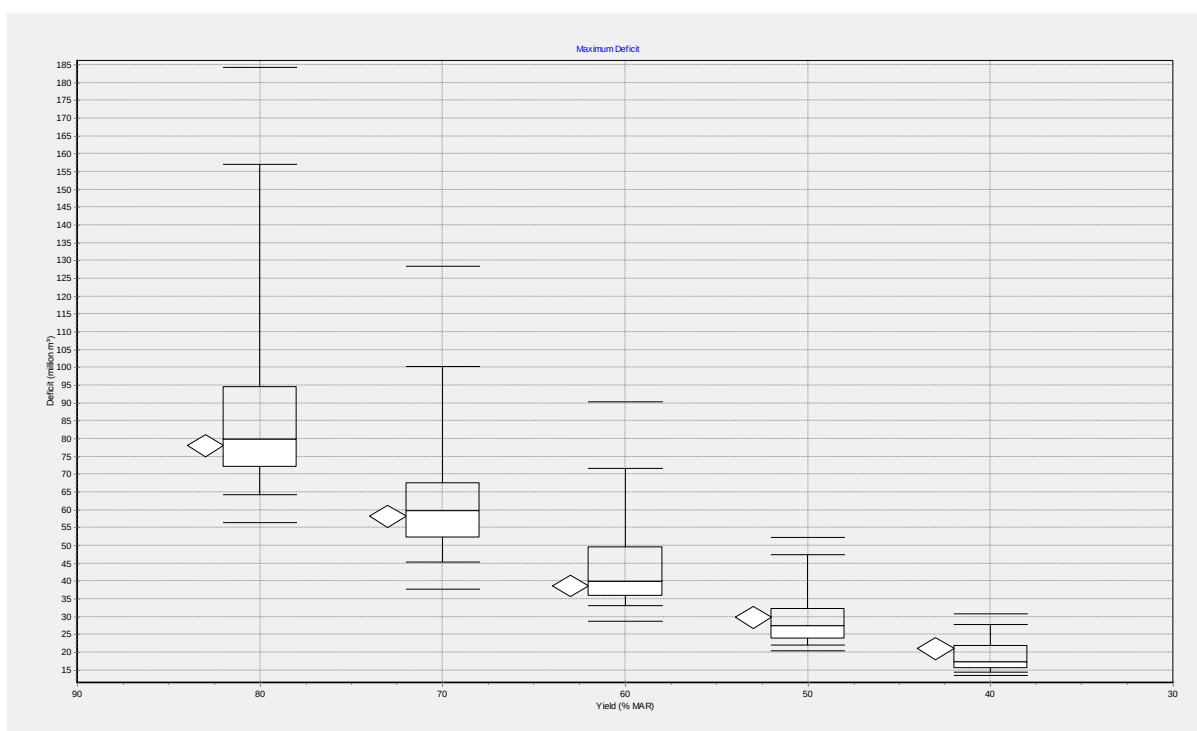


Figure D2- 52 Plot of the Maximum Deficits for Quaternary Catchment T35J

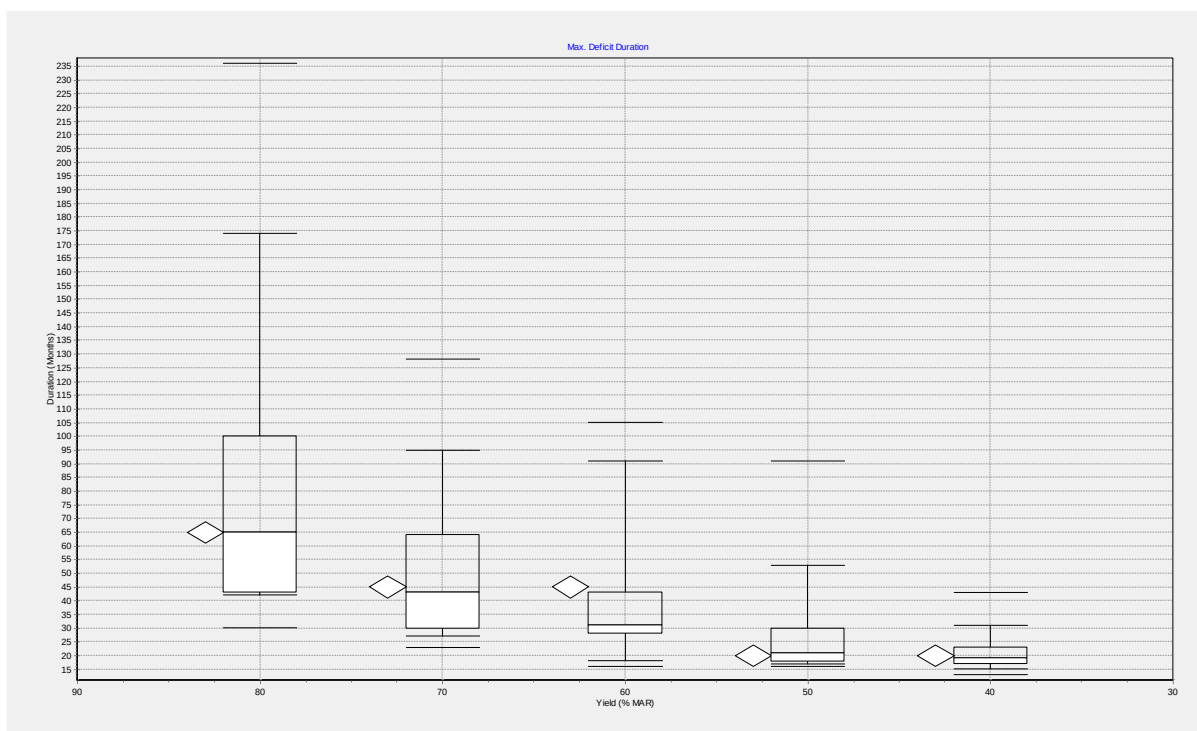


Figure D2- 53 Plot of the Maximum Deficit Durations for Quaternary Catchment T35J

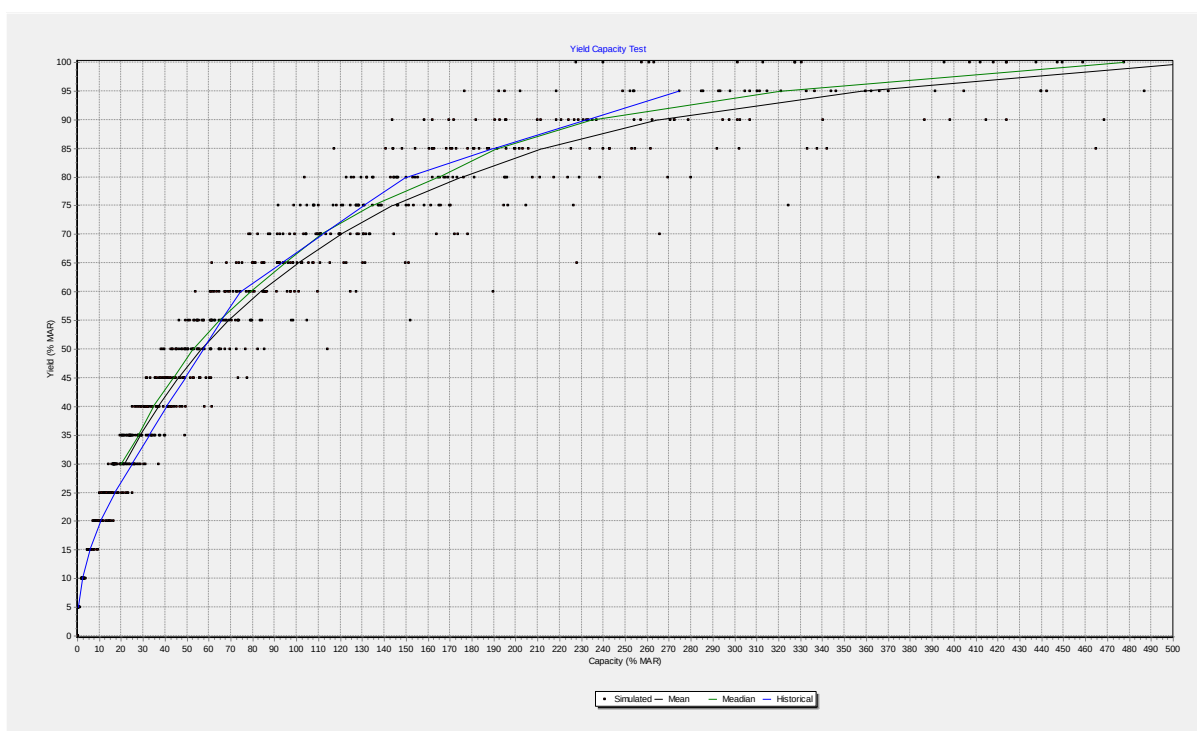


Figure D2- 54 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35J

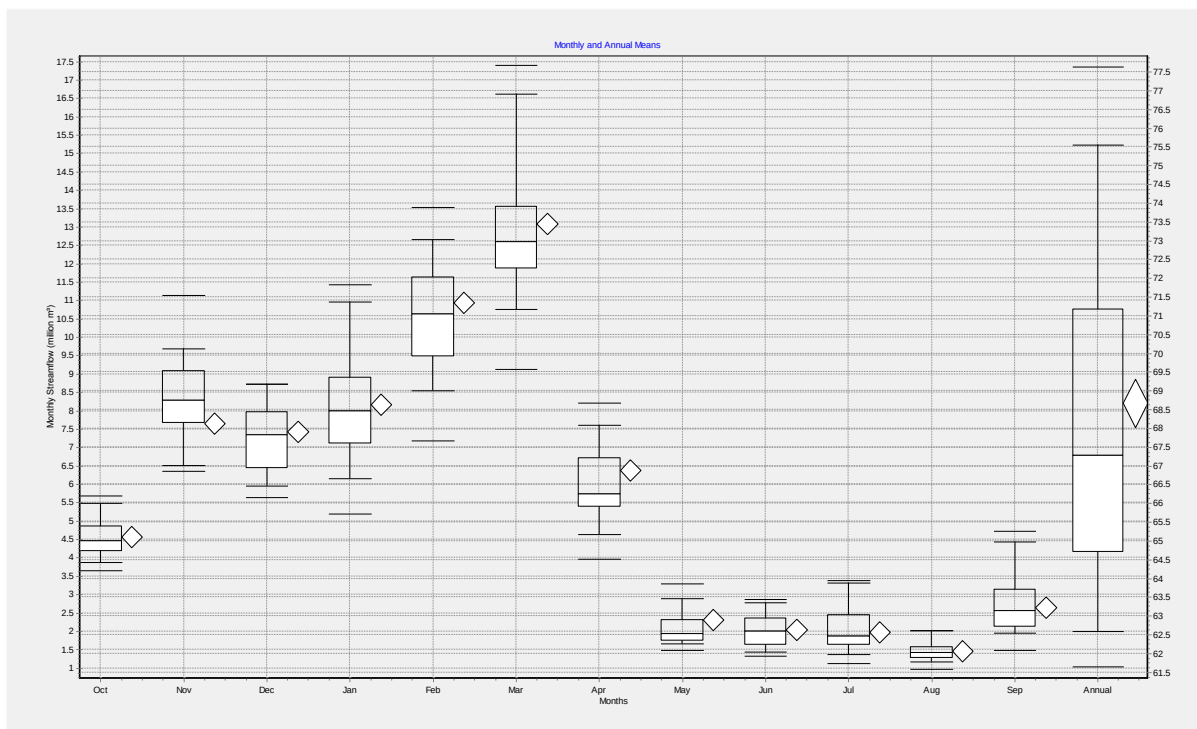


Figure D2- 55 Plot of the Monthly and Annual Means for Quaternary Catchment T35K

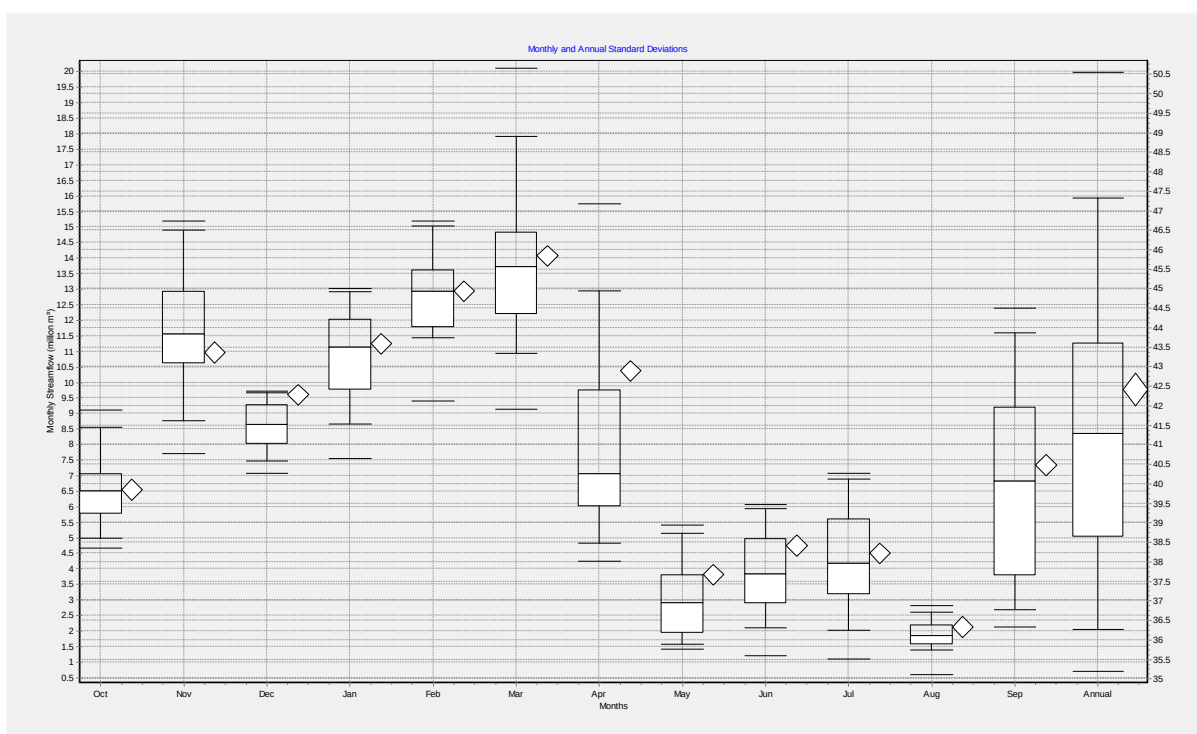


Figure D2- 56 Plot of the Monthly and Annual Standard Deviations for Quaternary Catchment T35K

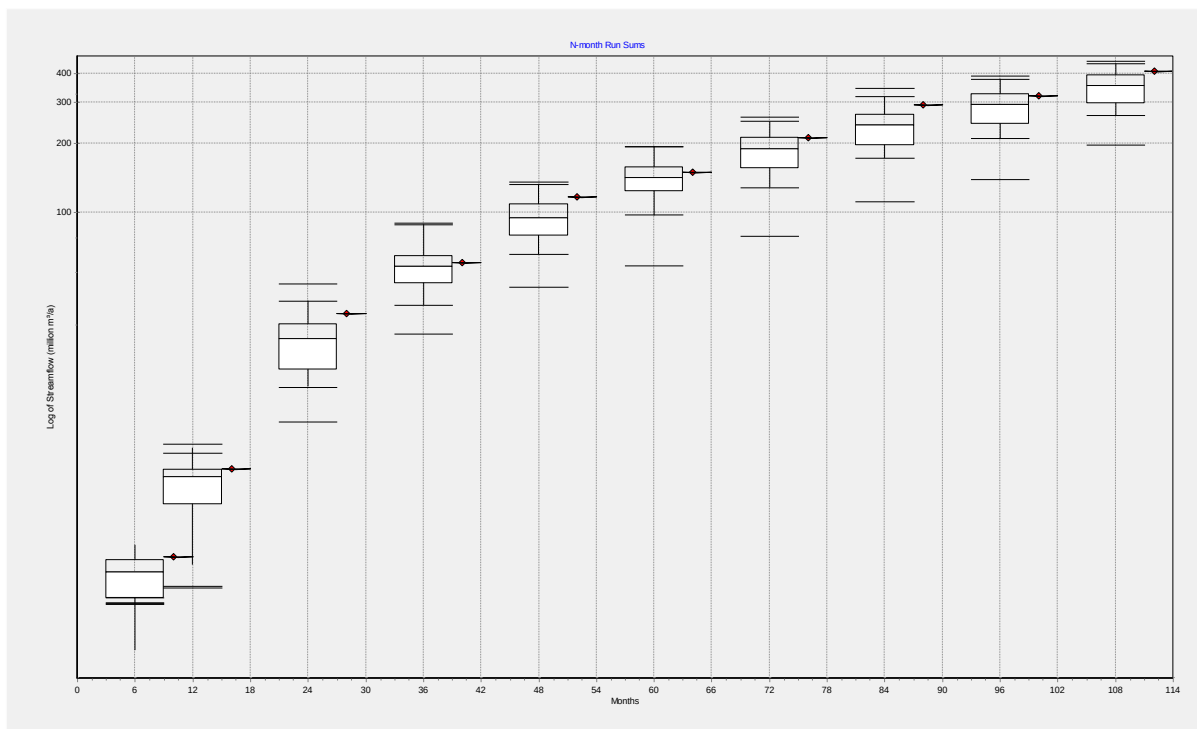


Figure D2- 57 Plot of the N-month Run Sums for Quaternary Catchment T35K

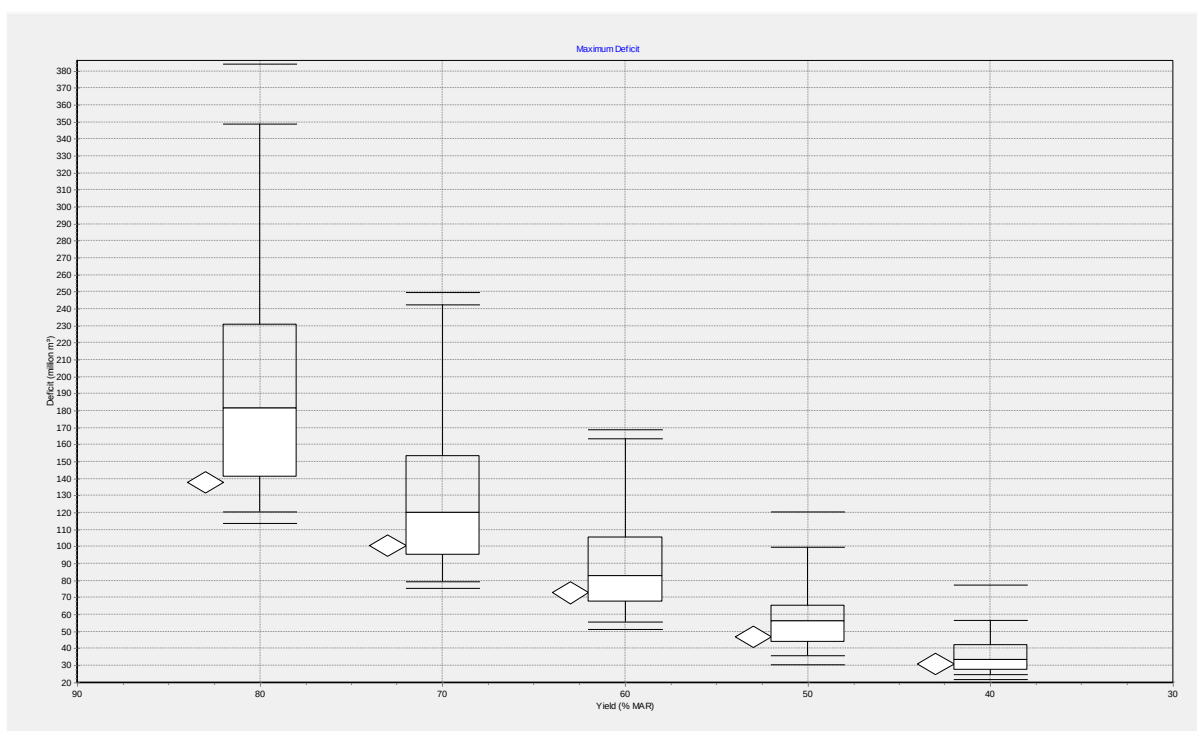


Figure D2- 58 Plot of the Maximum Deficits for Quaternary Catchment T35K

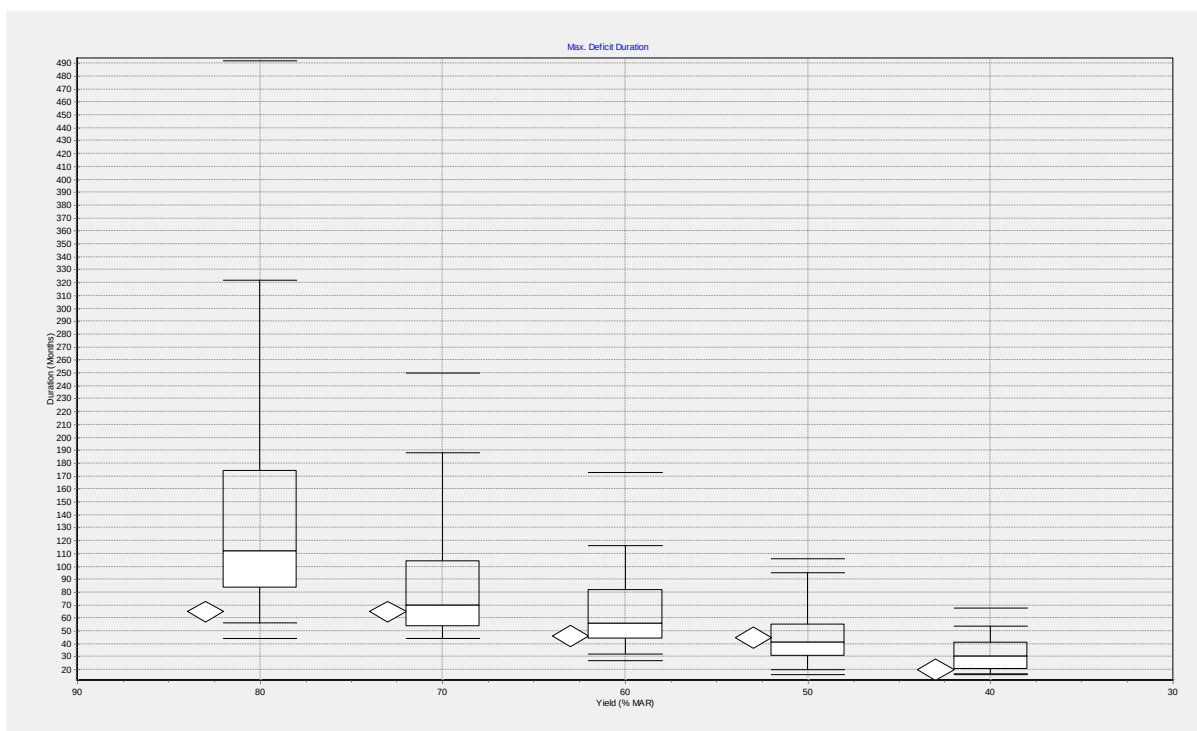


Figure D2- 59 Plot of the Maximum Deficit Durations for Quaternary Catchment T35K

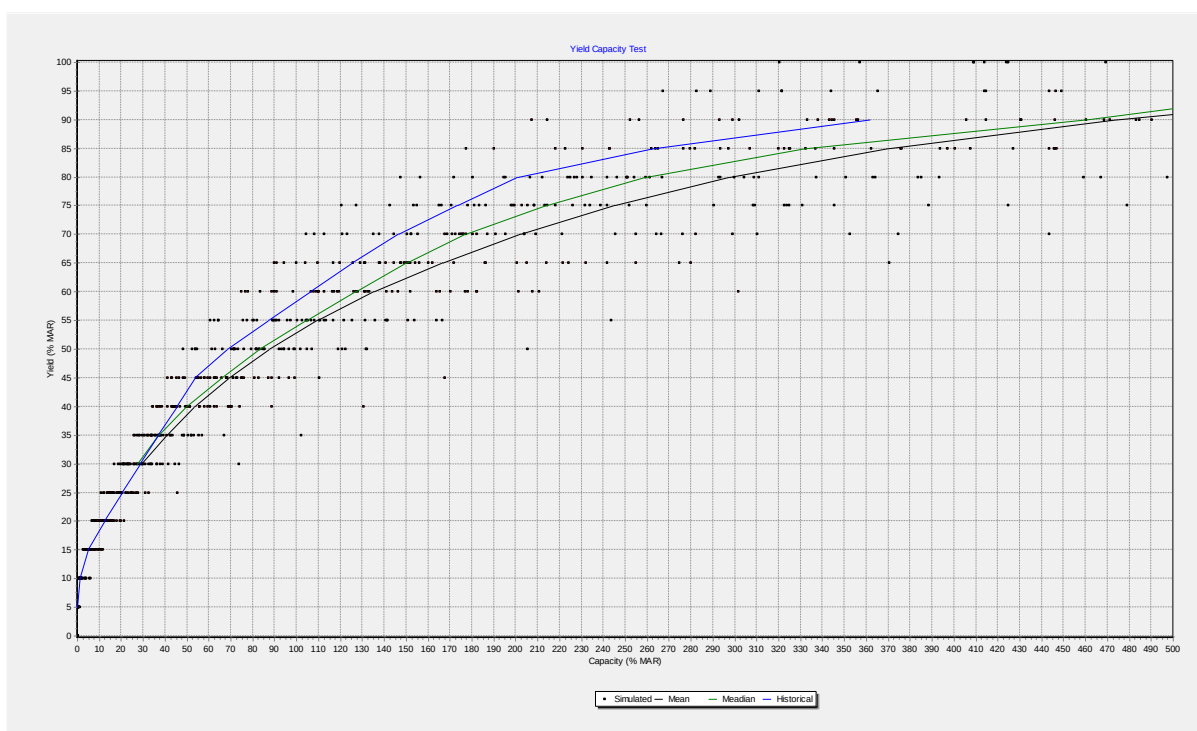


Figure D2- 60 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35K

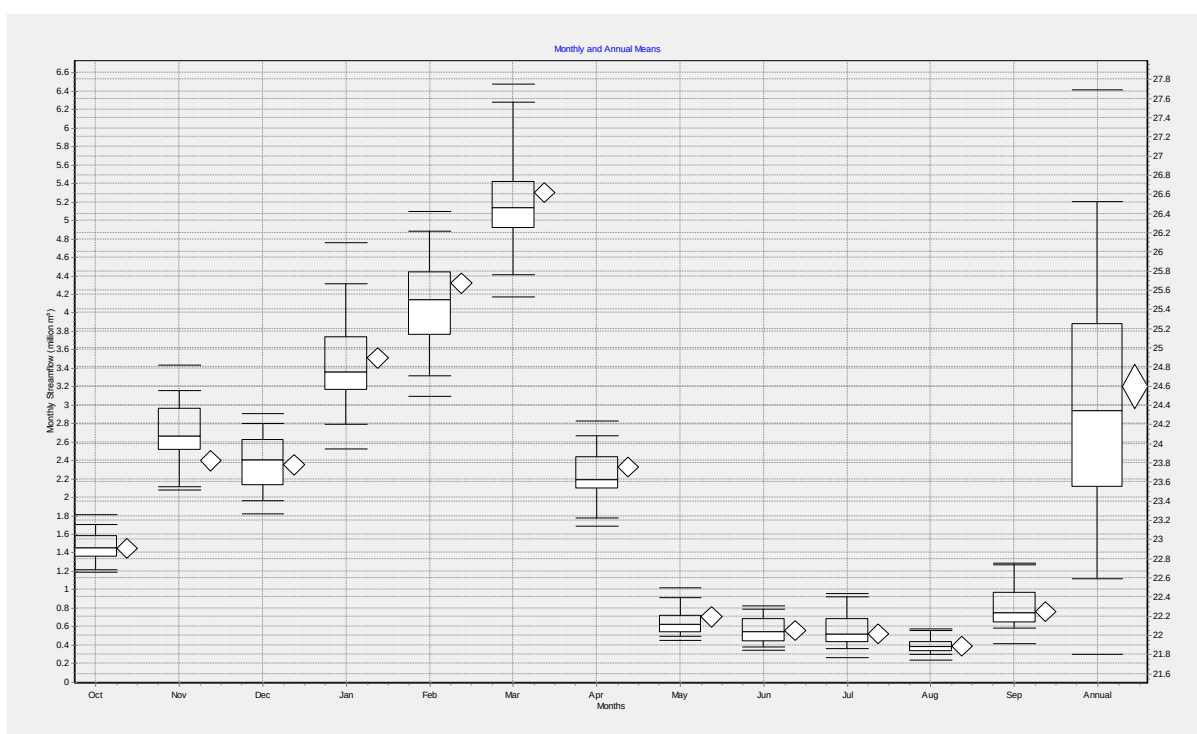


Figure D2- 61 Plot of the Monthly and annual Means for Quaternary Catchment T35L1

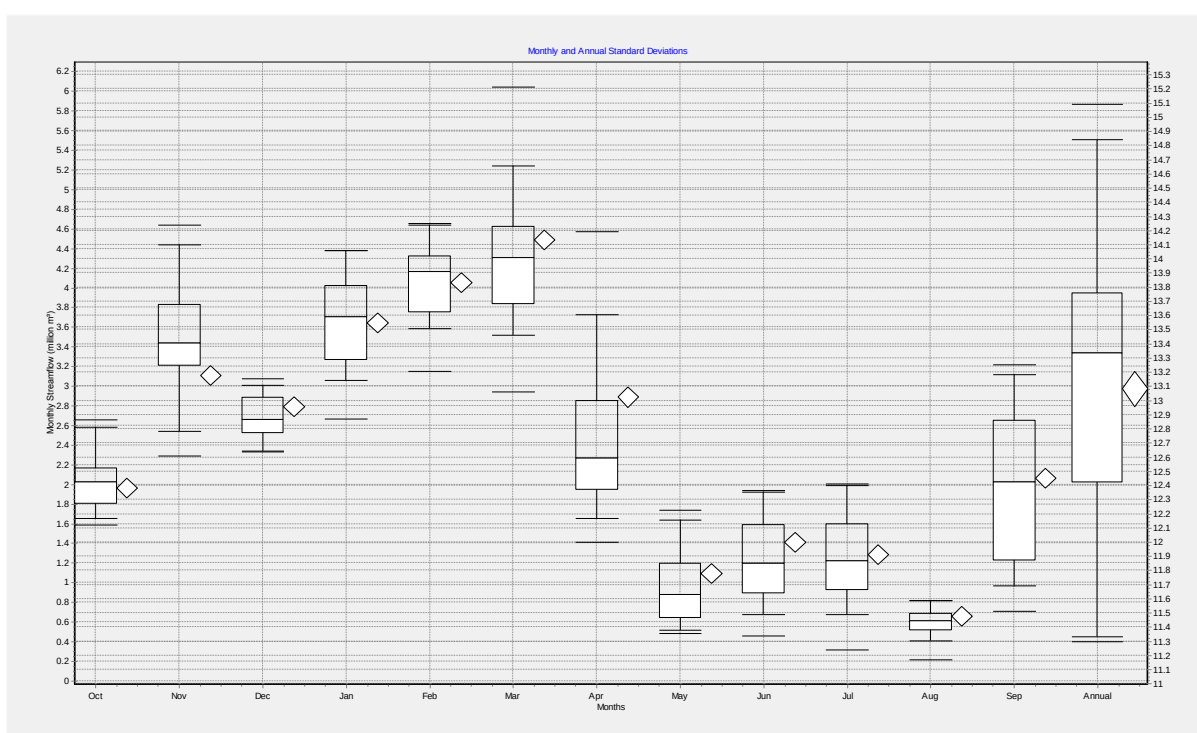


Figure D2- 62 Plot of the Monthly and Annual Standard Deviations for quaternary Catchment T35L1

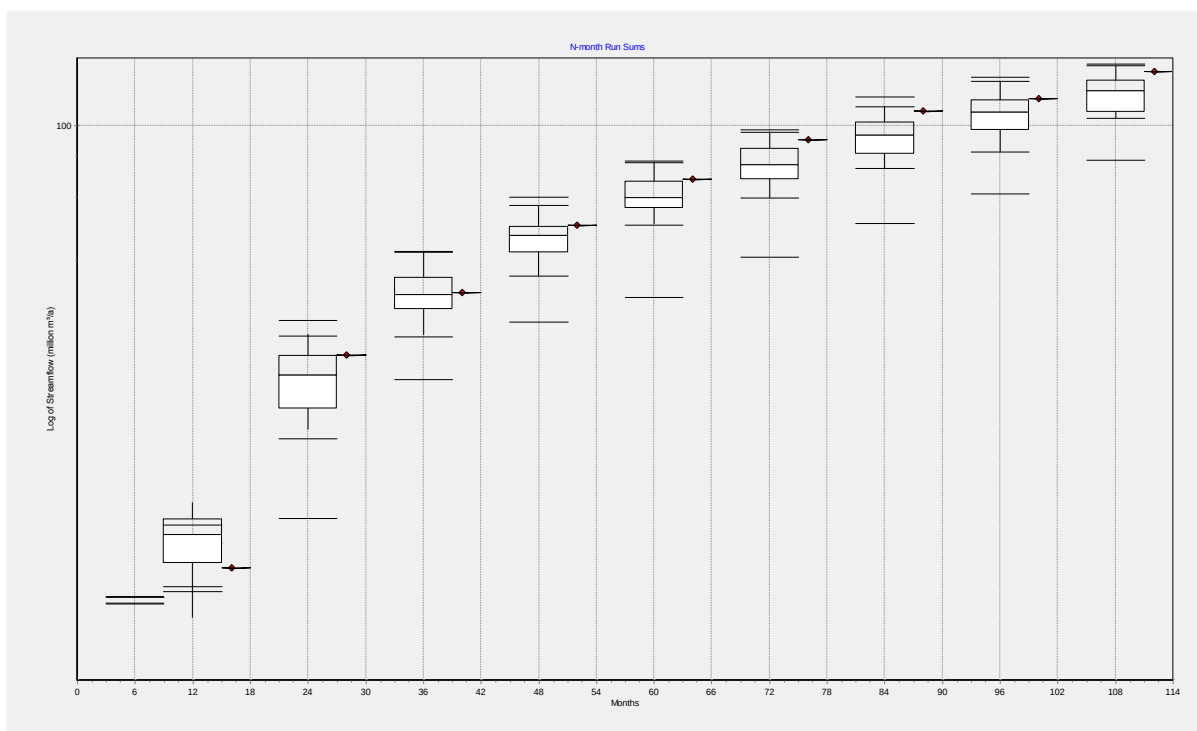


Figure D2- 63 Plot of the N-month Run Sums for Quaternary Catchment T35L1

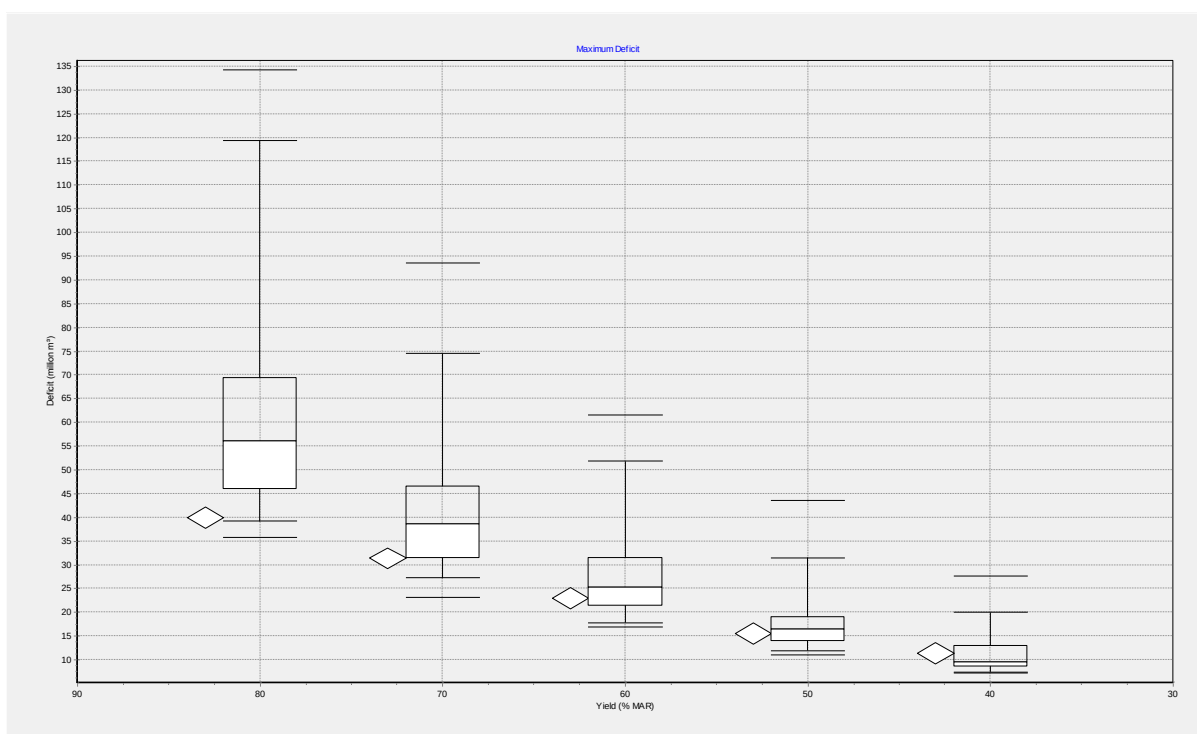


Figure D2- 64 Plot of the Maximum deficits for quaternary Catchment T35L1

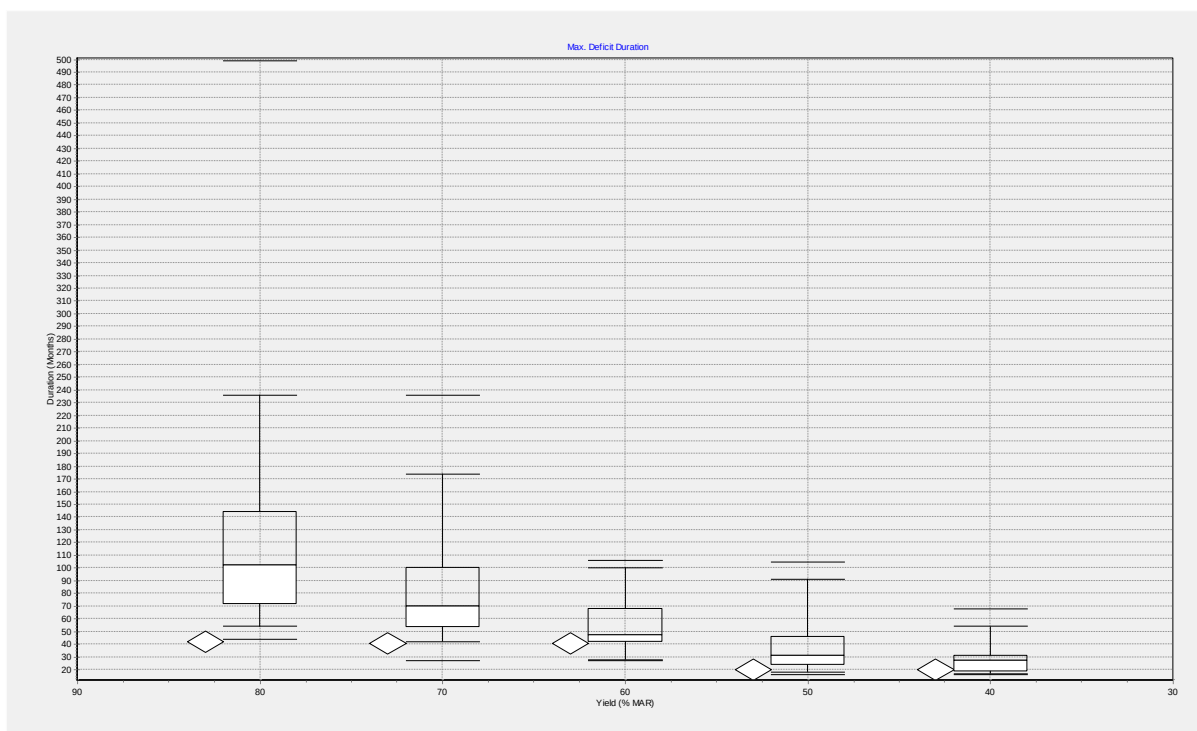


Figure D2- 65 Plot of the Maximum Deficit Durations for Quaternary Catchment T35L1

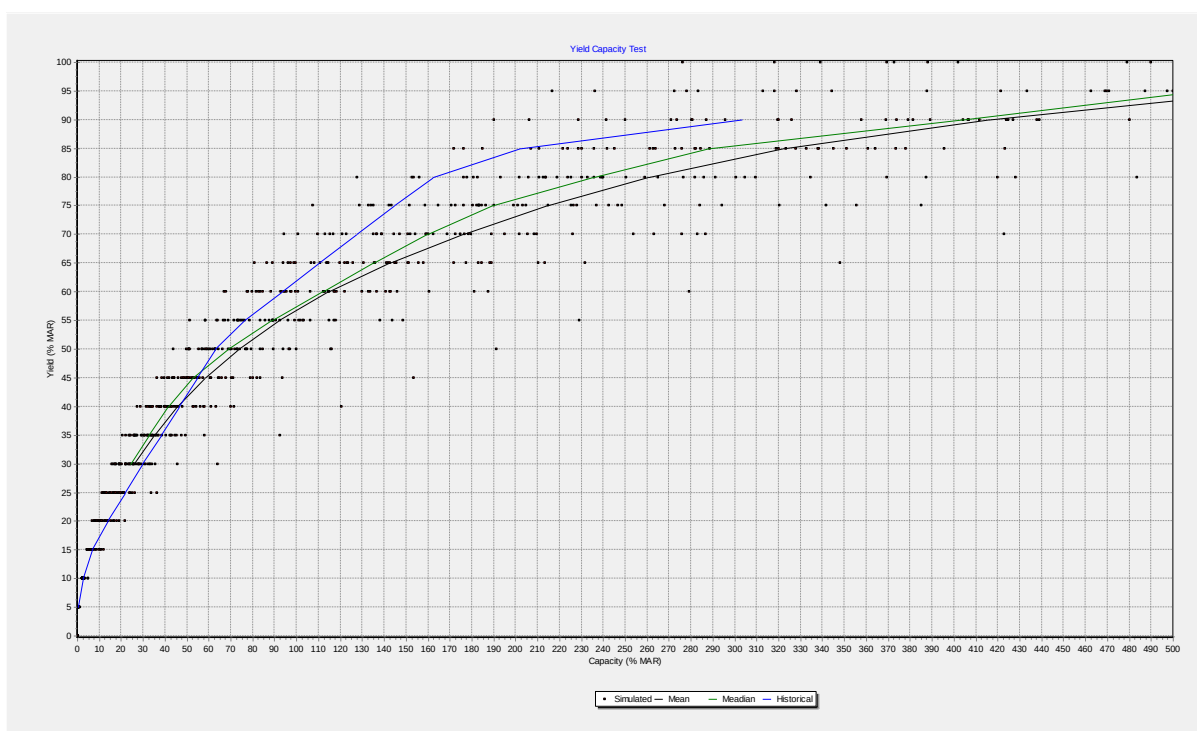


Figure D2- 66 Plot of the Yield-Capacity Characteristics for Quaternary Catchment T35L1

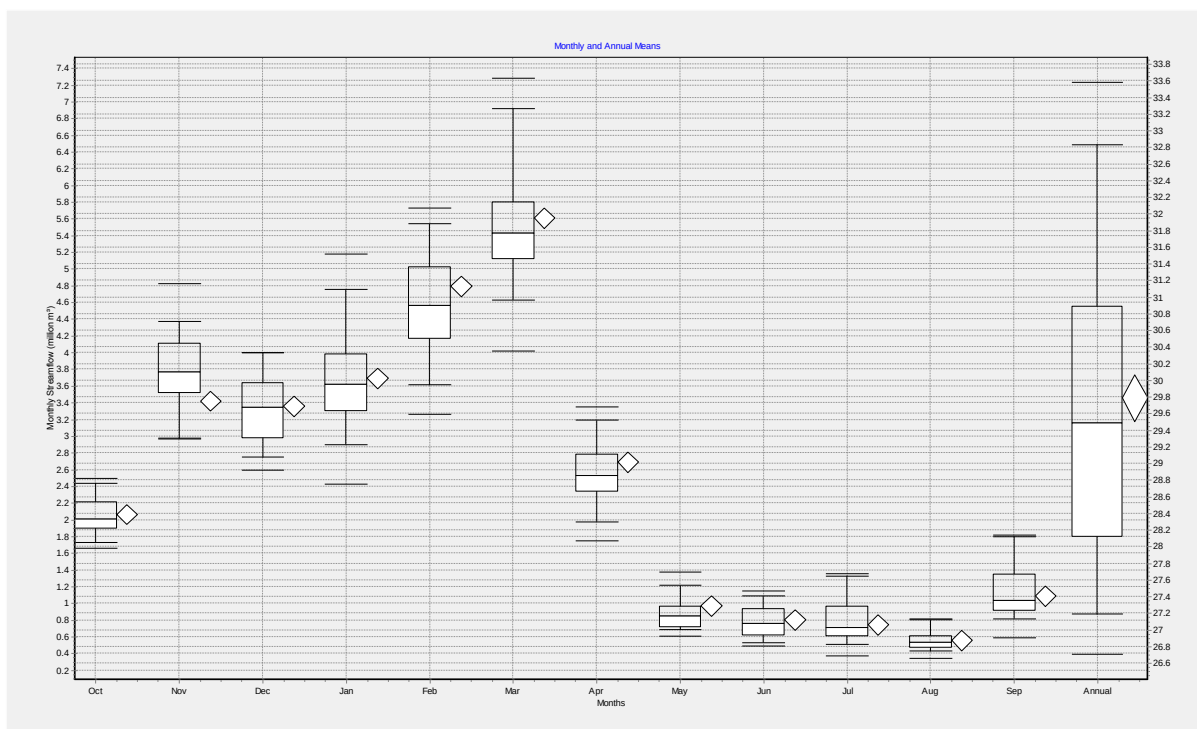


Figure D2- 67 Plot of the Monthly and Annual Means for Quaternary Catchment T35L2

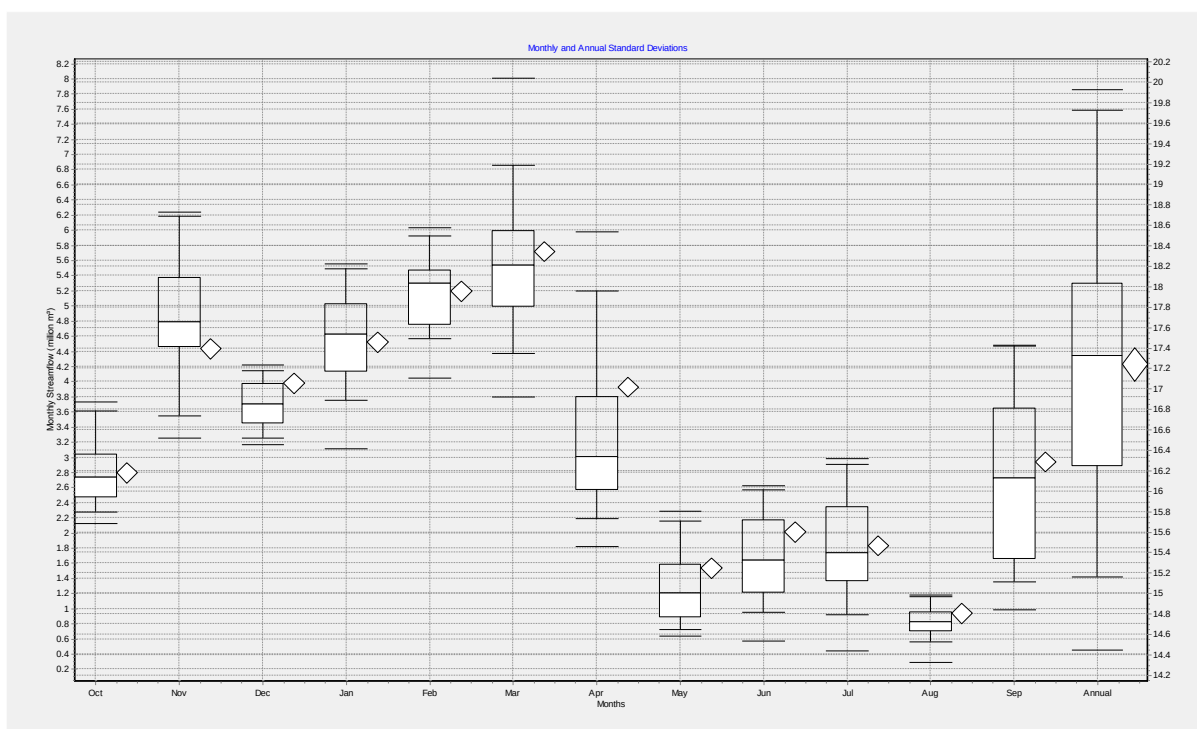


Figure D2- 68 Plot of the Monthly and annual Standard Deviations for Quaternary Catchment T35L2

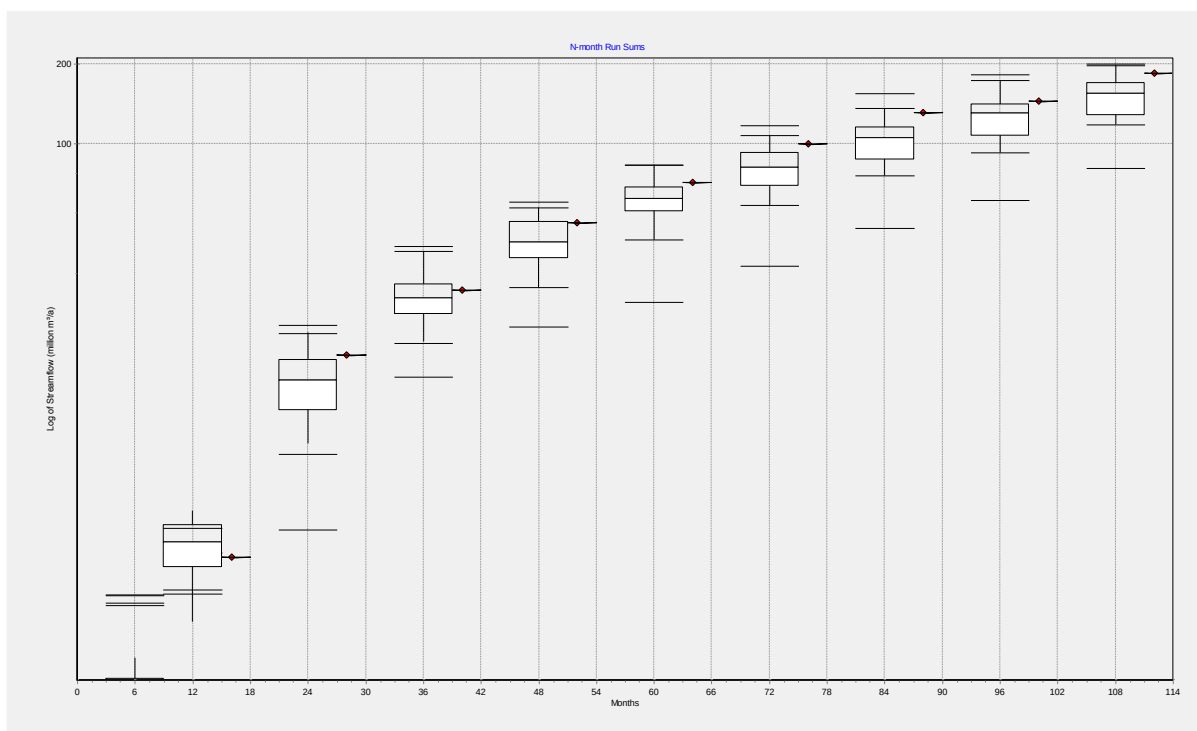


Figure D2- 69 Plot of the N-month Run Sums for Quaternary Catchment T35L2

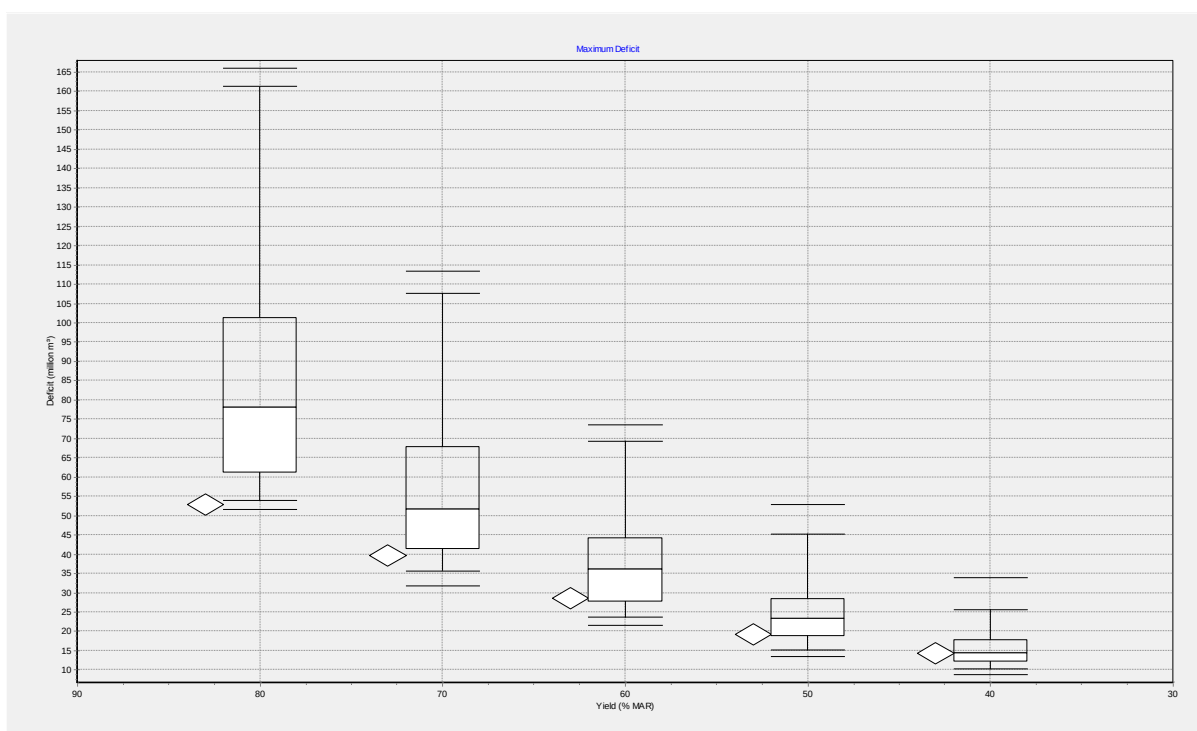


Figure D2- 70 Plot of the Maximum Deficits for Quaternary Catchment T35L2

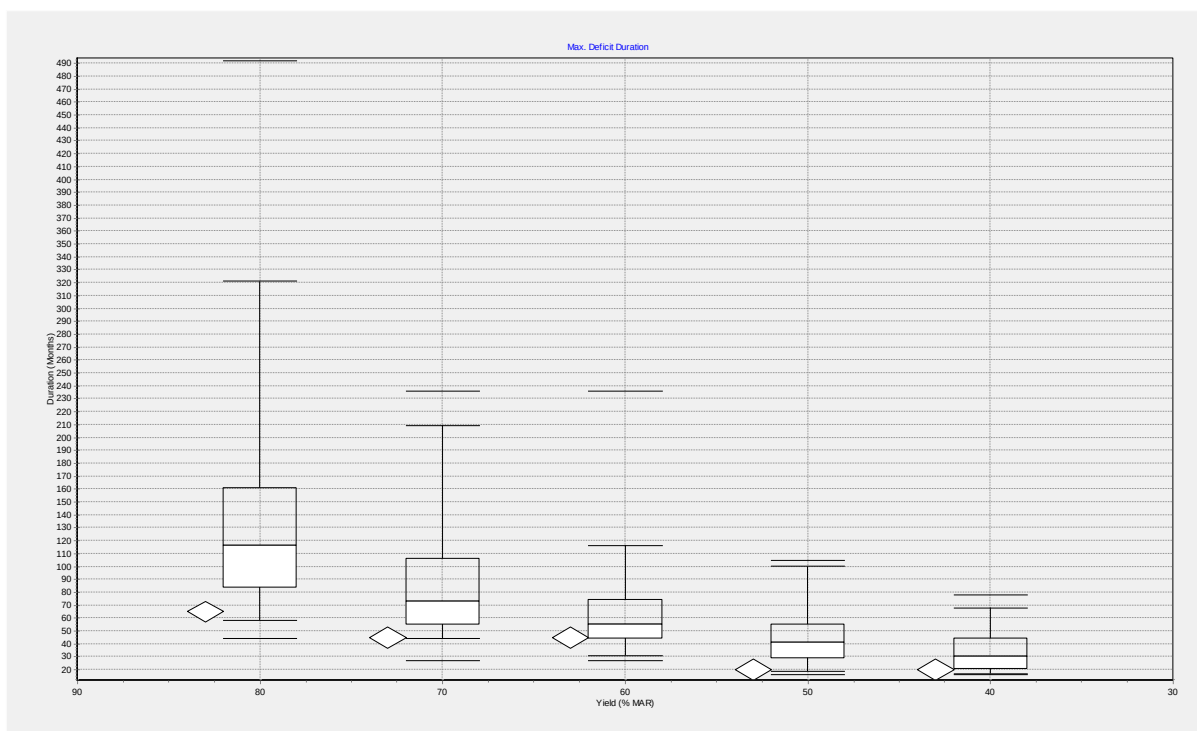


Figure D2- 71 Plot for the Maximum Deficit Durations for quaternary Catchment T35L2

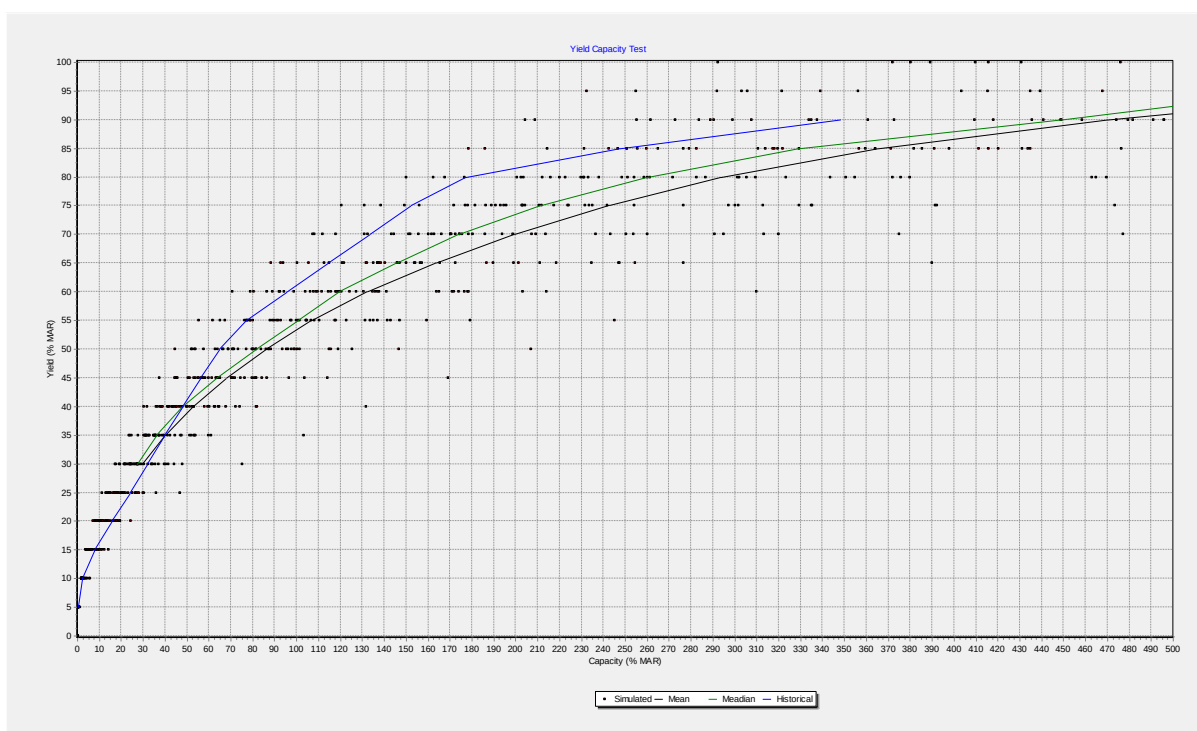


Figure D2- 72 Plot of the Yield-Capacity Characteristics for quaternary Catchment T35L2

APPENDIX E1

SOMABADI DAM YIELD ANALYSIS RESULTS

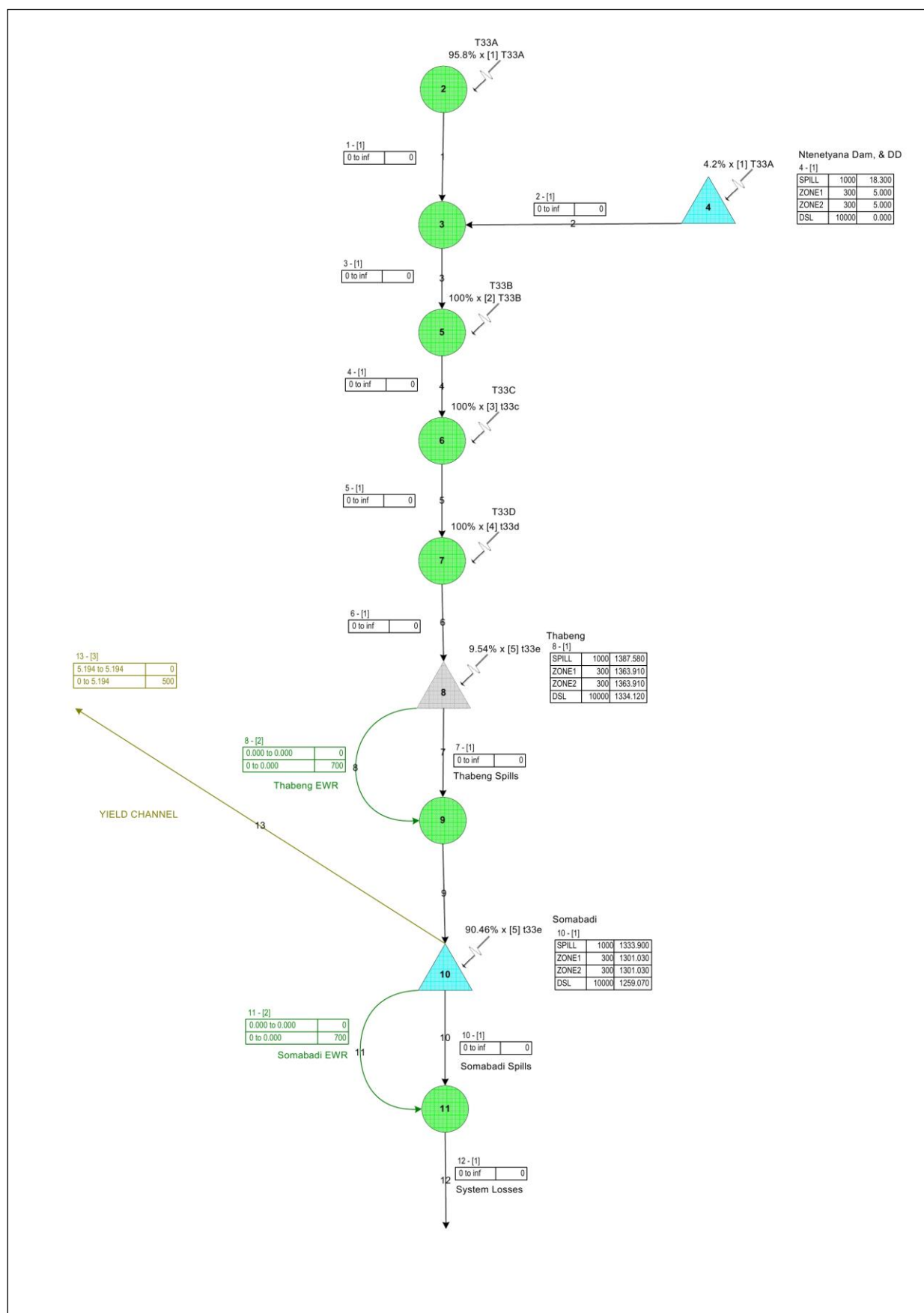


Figure E1- 1 WRYM System Diagram for the Kinira River - Somabadi Dam

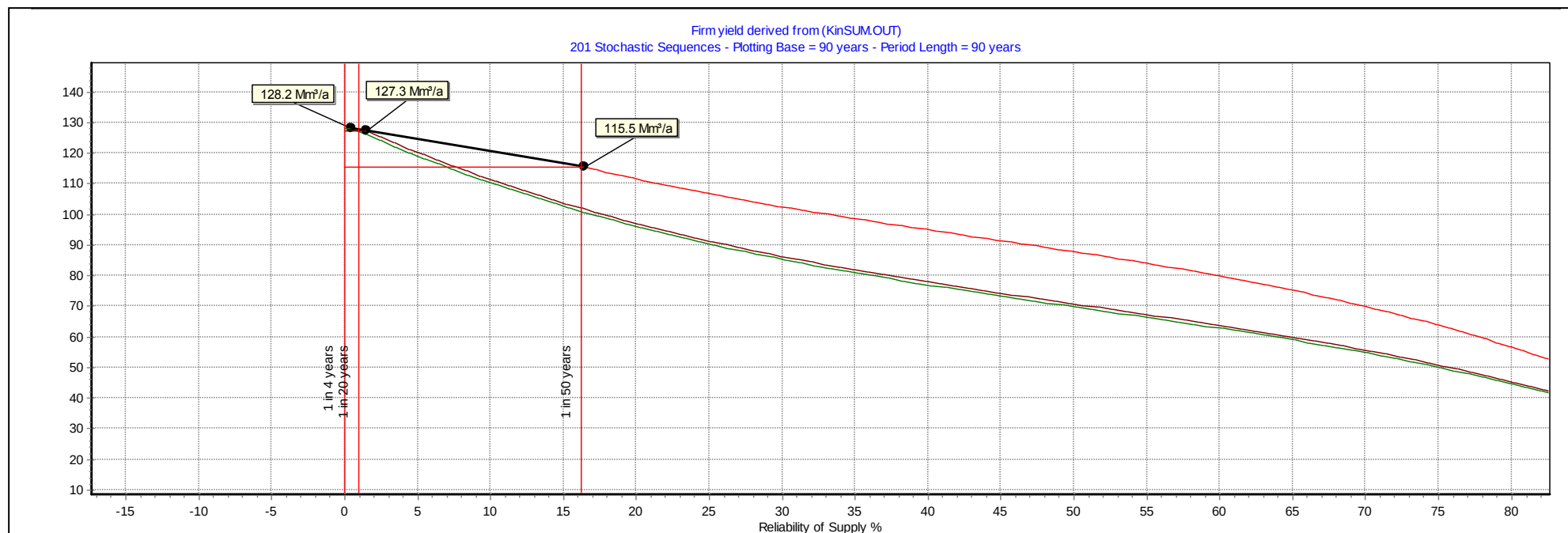


Figure E1- 2 Yield-Reliability Curve for Scenario 01 for the Somabadi Dam (0.10 MAR)

Figure E1- 3 Yield-Reliability Curve for Scenario 02 for the Somabadi Dam (0.25 MAR)

Figure E1- 4 Yield-Reliability Curve for Scenario 03 for the Somabadi Dam (0.5. MAR)

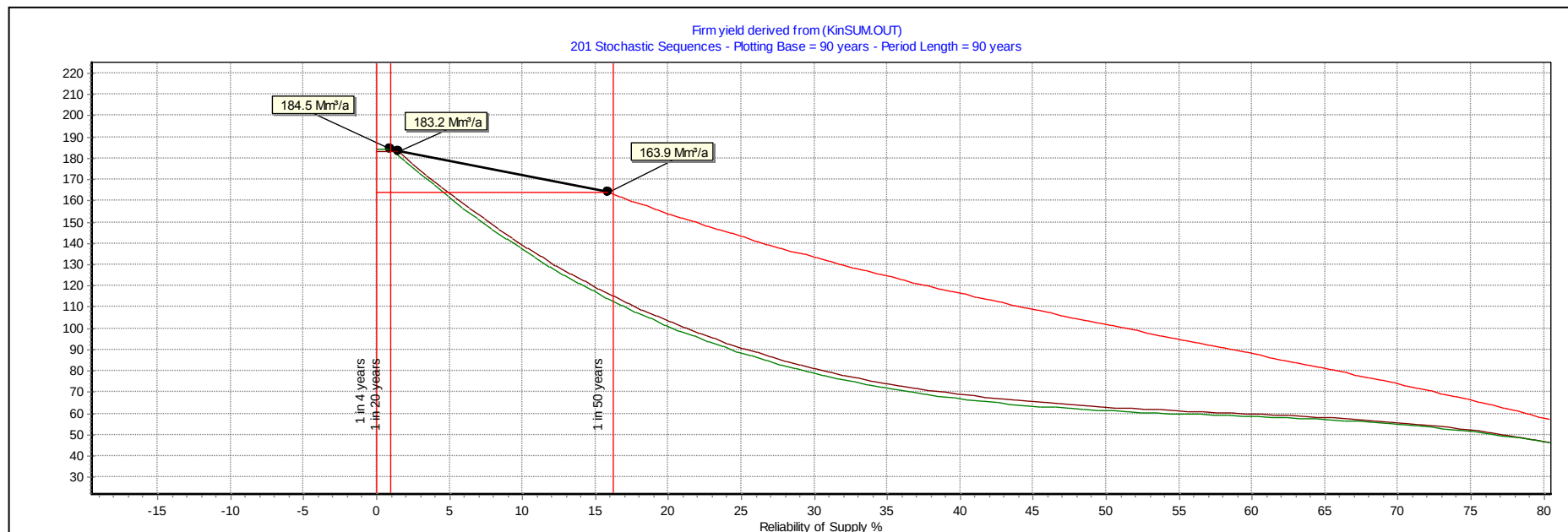


Figure E1- 5 Yield-Reliability Curve for Scenario 04 for the Somabadi Dam (1.00 MAR)

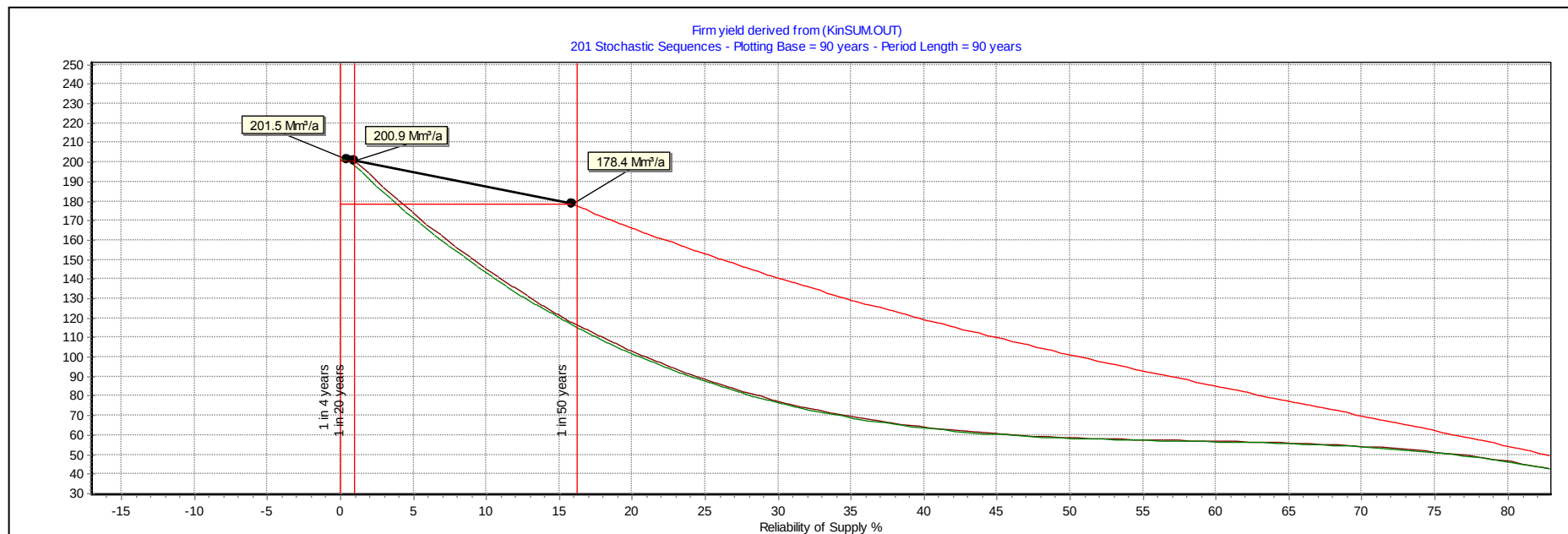


Figure E1- 6 Yield-Reliability Curve for Scenario 05 for the Somabadi Dam (1.23 MAR)

APPENDIX E2

THABENG DAM YIELD ANALYSIS RESULTS

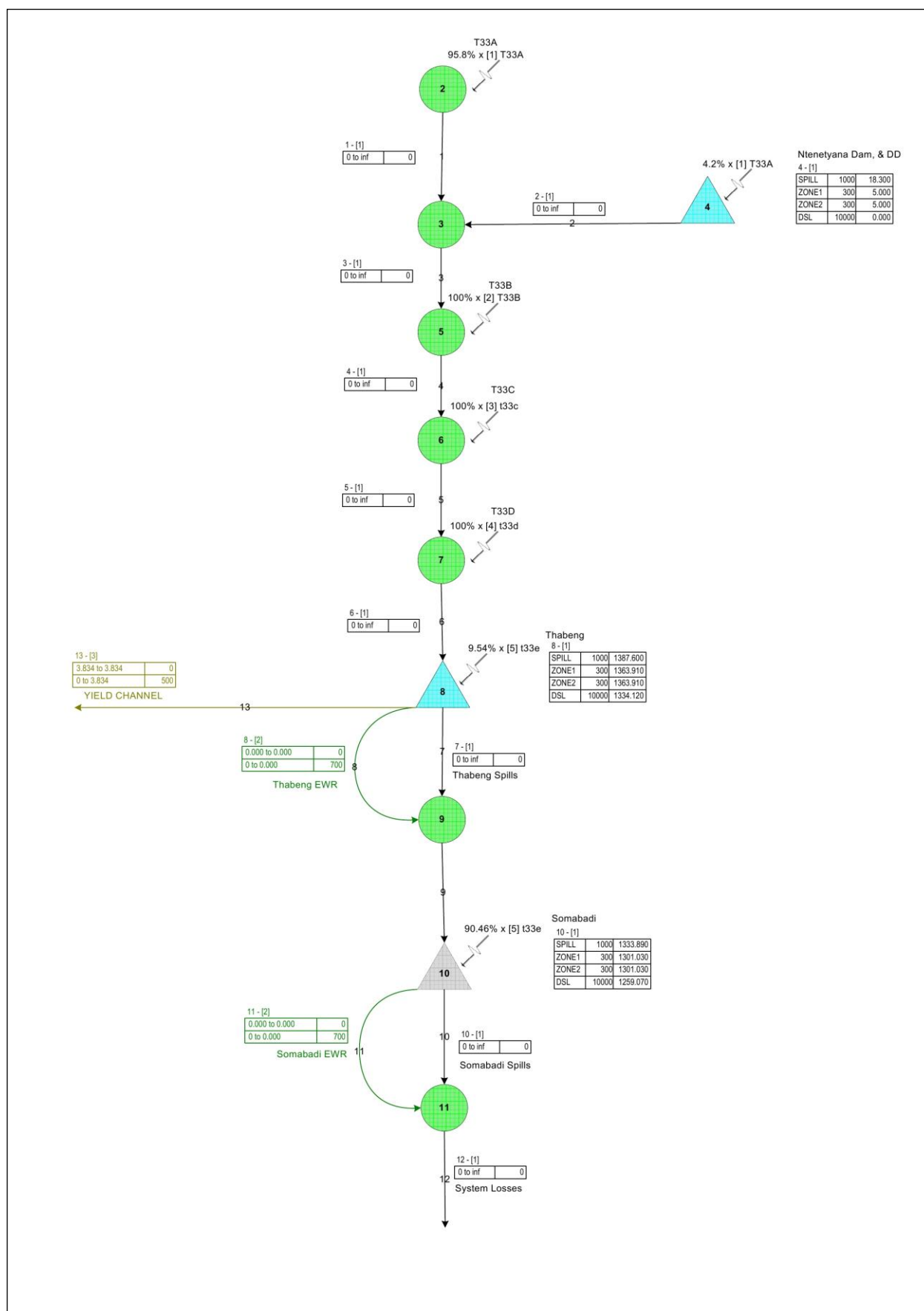


Figure E2- 1 WRYM System Diagram for the Kinira River - Thabeng Dam

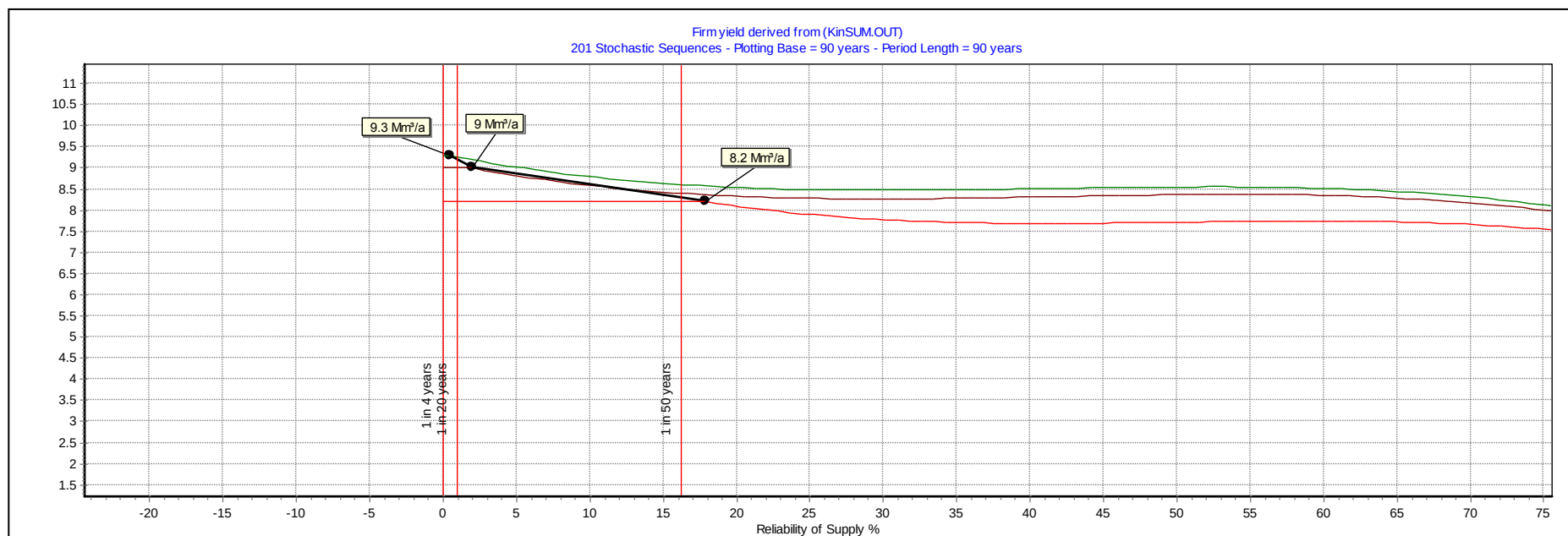


Figure E2- 2 Yield-Reliability Curve for Scenario 01 for the Thabeng Dam (0.15 MAR)

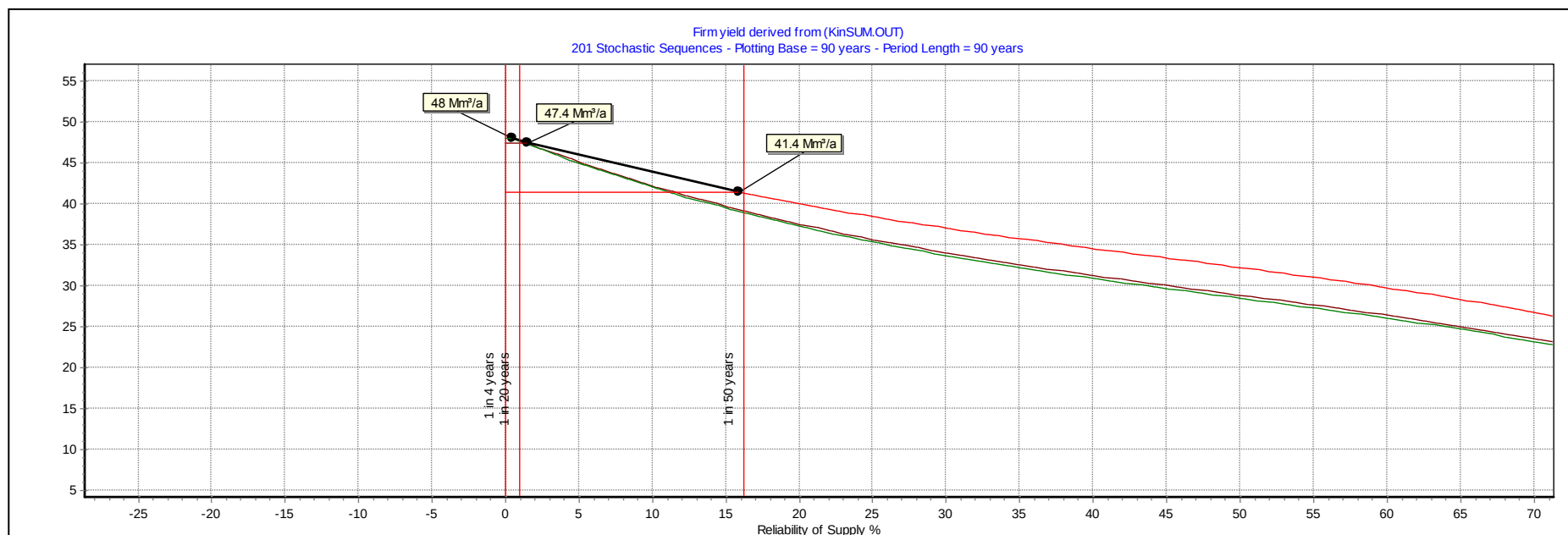


Figure E2- 3 Yield-Reliability Curve for Scenario 02 for the Thabeng Dam (0.25 MAR)

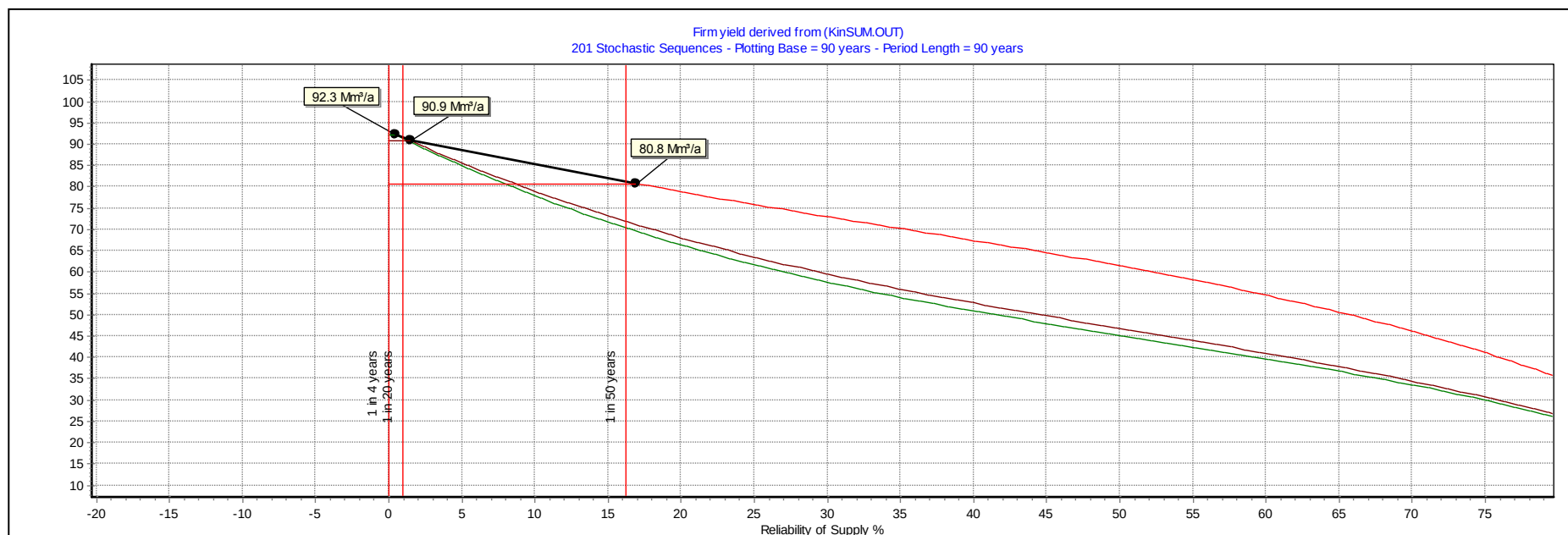


Figure E2- 4 Yield-Reliability Curve for Scenario 03 for the Thabeng Dam (0.50 MAR)

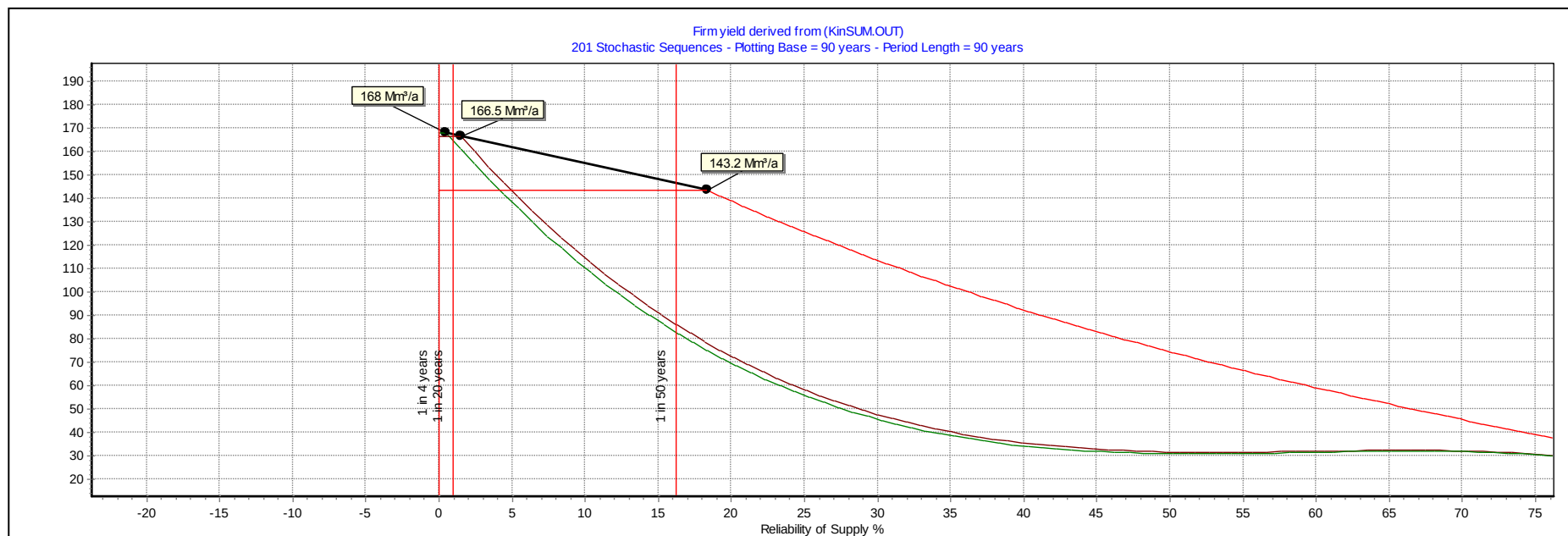


Figure E2- 5 Yield-Reliability curve for Scenario 04 for the Thabeng Dam (1.00 MAR)

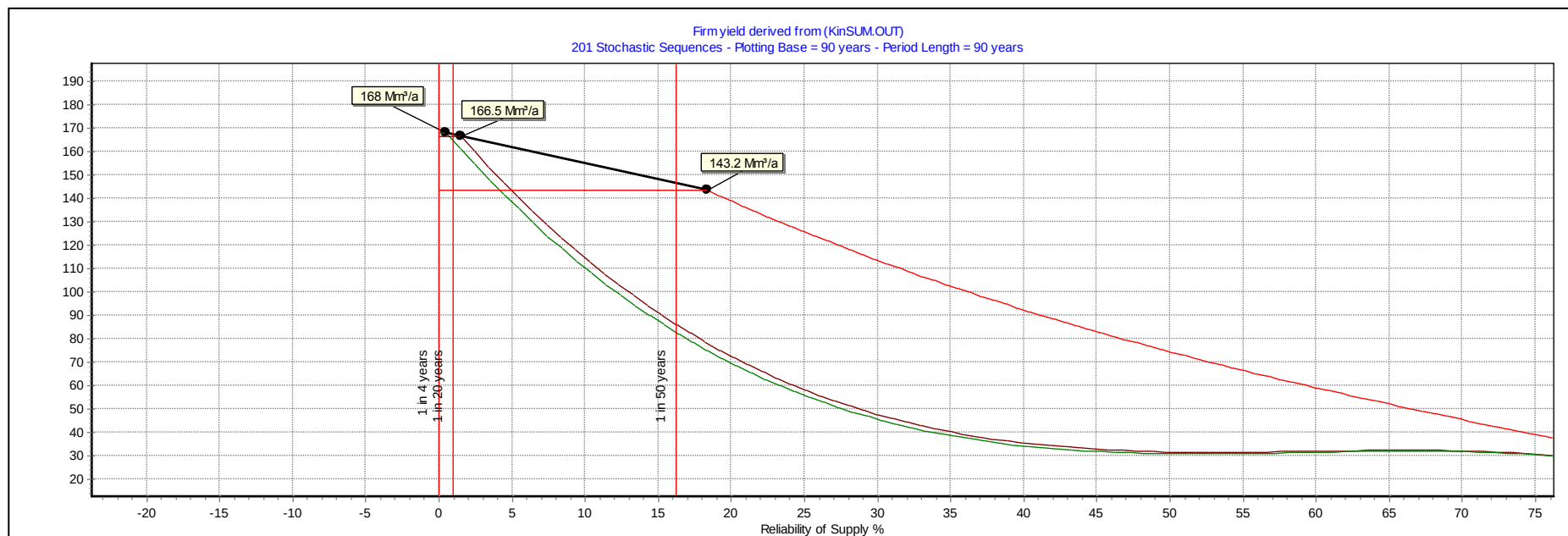


Figure E2- 6 Yield-Reliability Curve for Scenario 05 for the Thabeng Dam (1.50 MAR)

APPENDIX E3

NTABELANGA DAM YIELD ANALYSIS RESULTS

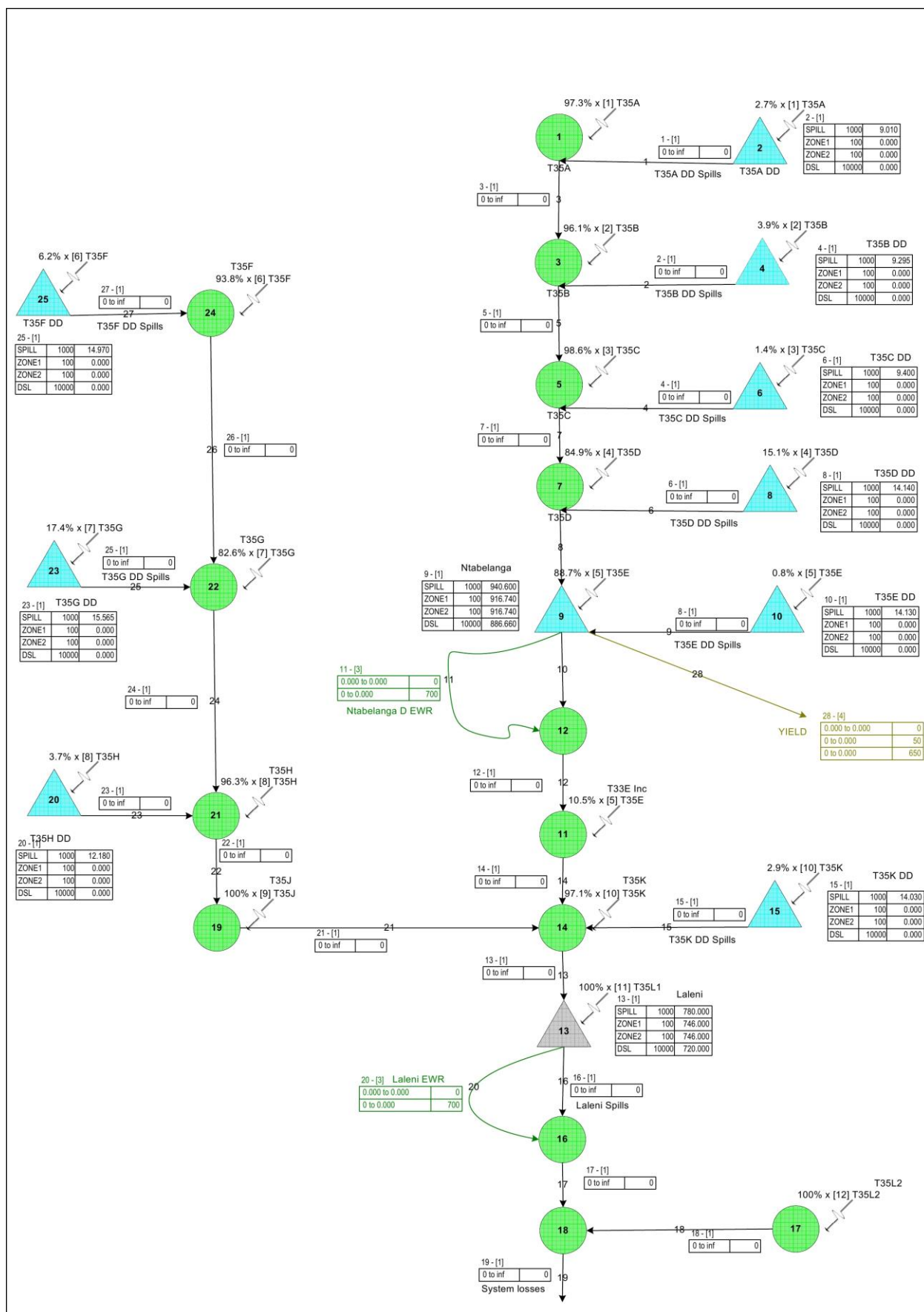


Figure E3- 1 WRYM System Diagram for the Tsitsa River - Ntabelanga Dam

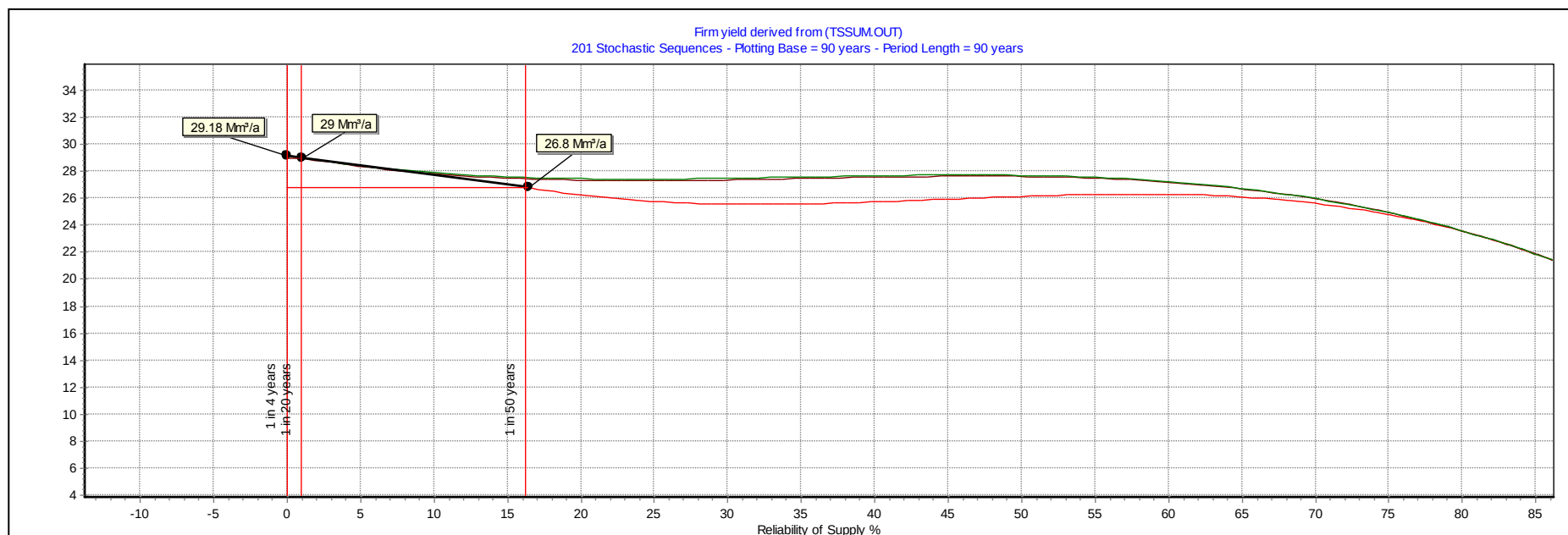


Figure E3- 2 Yield-Reliability Curve for Scenario 01 for the Ntabelanga Dam 0.10 MAR)

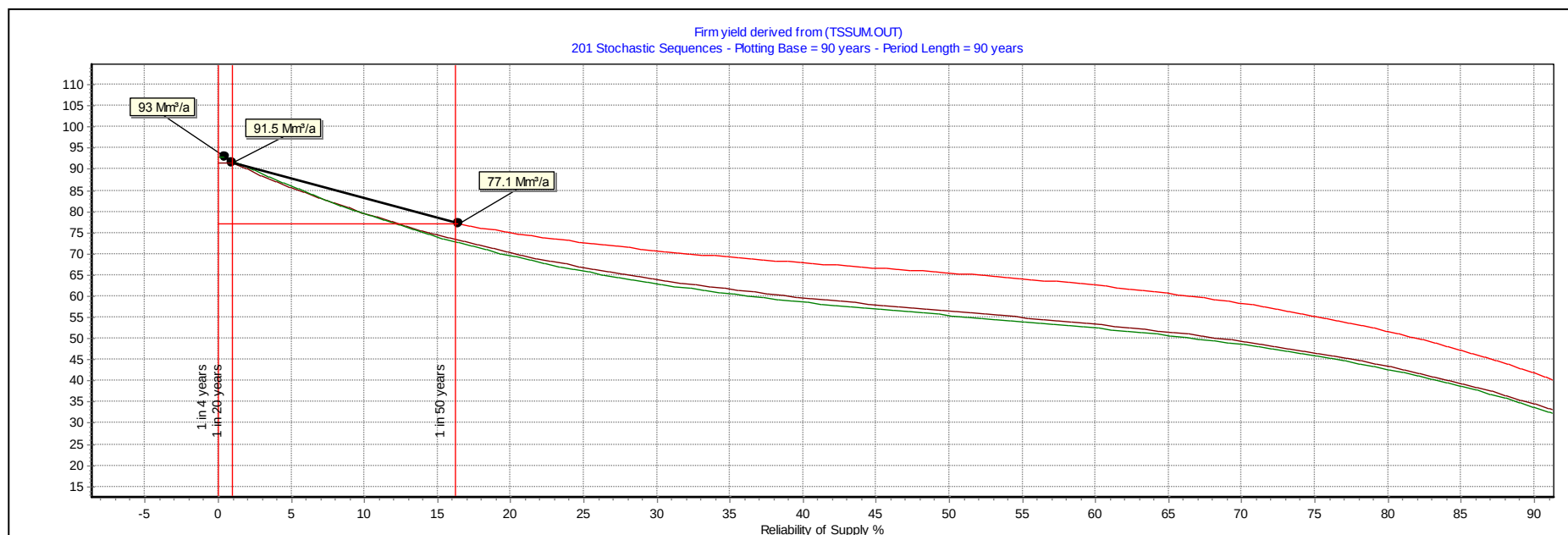


Figure E3- 3 Yield-Reliability Curve for Scenario 02 for the Ntabelanga Dam (0.25 MAR)

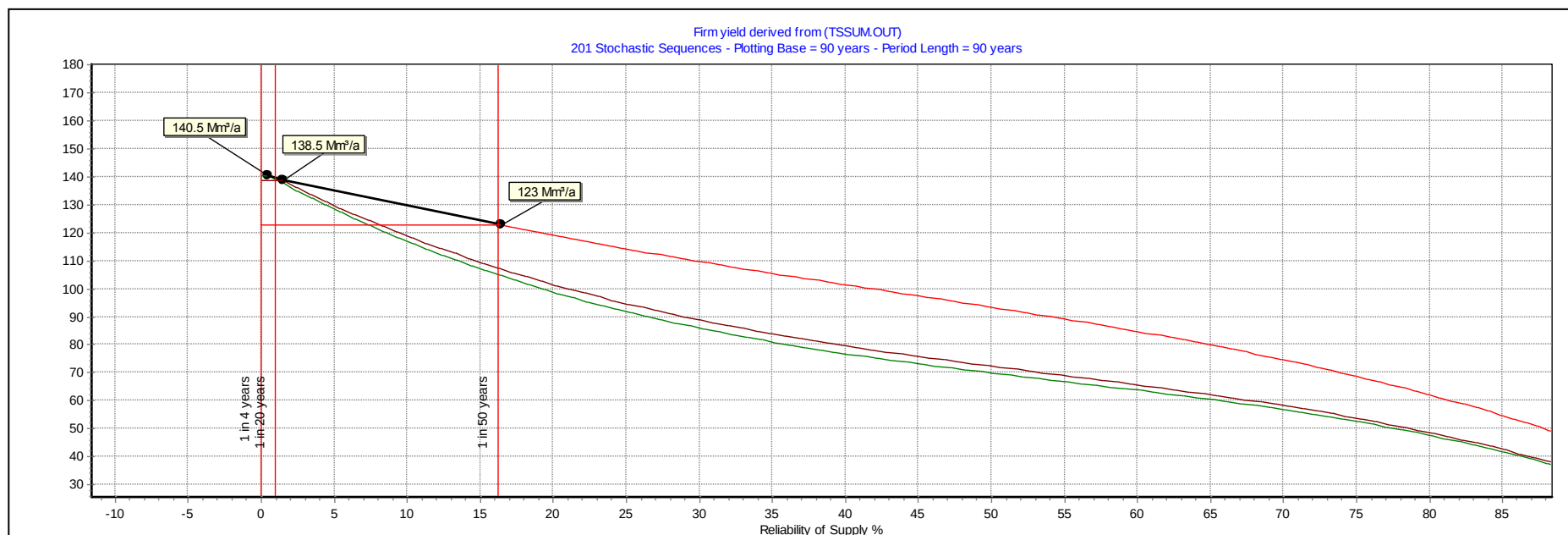


Figure E3- 4 Yield-Reliability Curve for Scenario 03 for the Ntabelanga Dam (0.50 MAR)

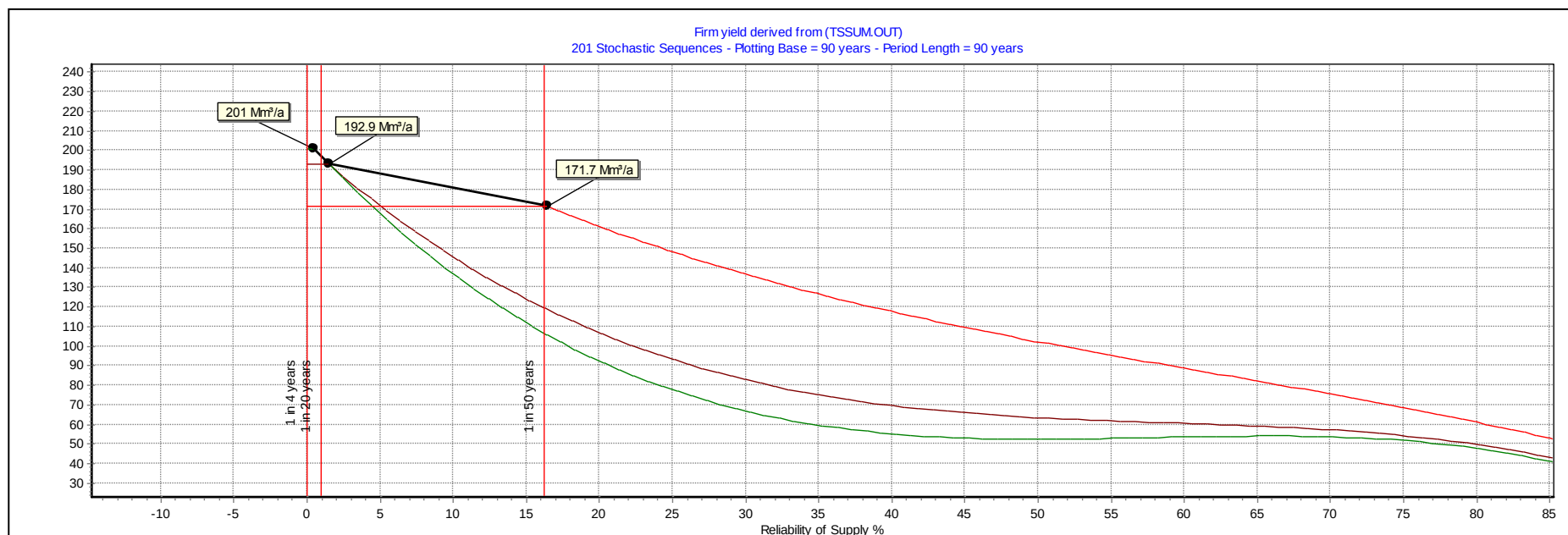


Figure E3- 5 Yield-Reliability Curve for Scenario 04 for the Ntabelanga Dam (1.00 MAR)

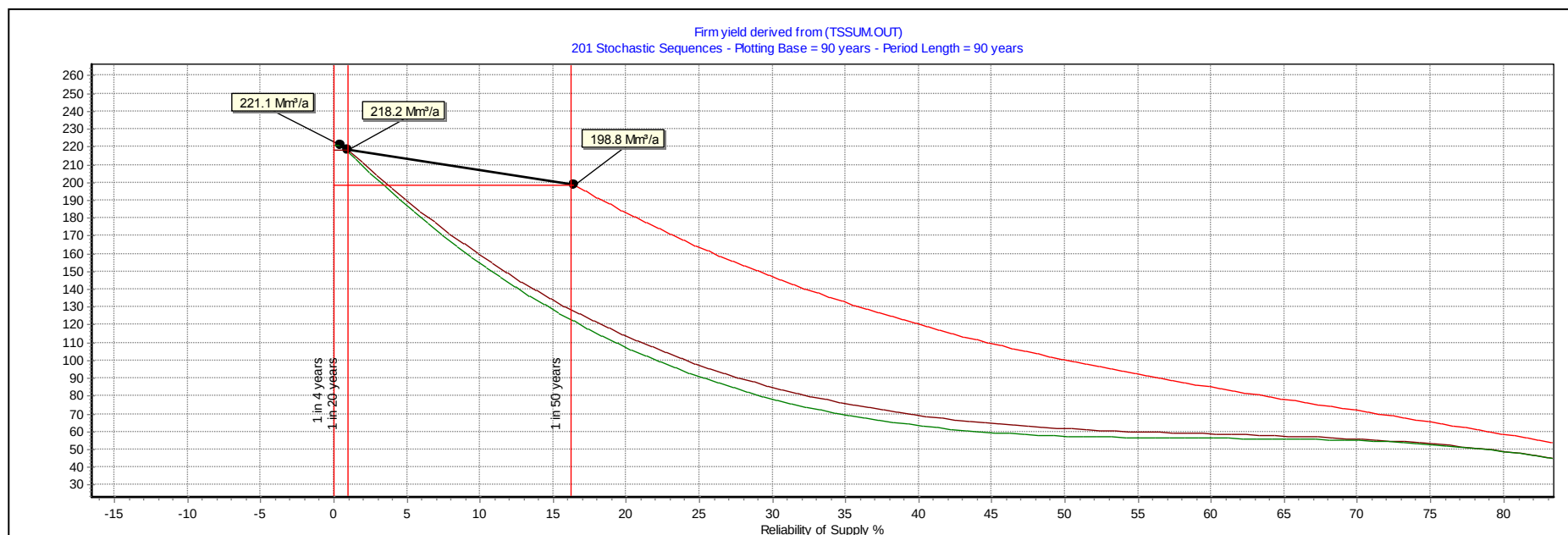


Figure E3- 6 Yield-reliability Curve for Scenario 05 for the Ntabelanga Dam (1.50 MAR)

APPENDIX E4

NTABELANGA DAM YIELD ANALYSIS AND LALINI DAM HYDROPOWER GENERATION ANALYSIS RESULTS

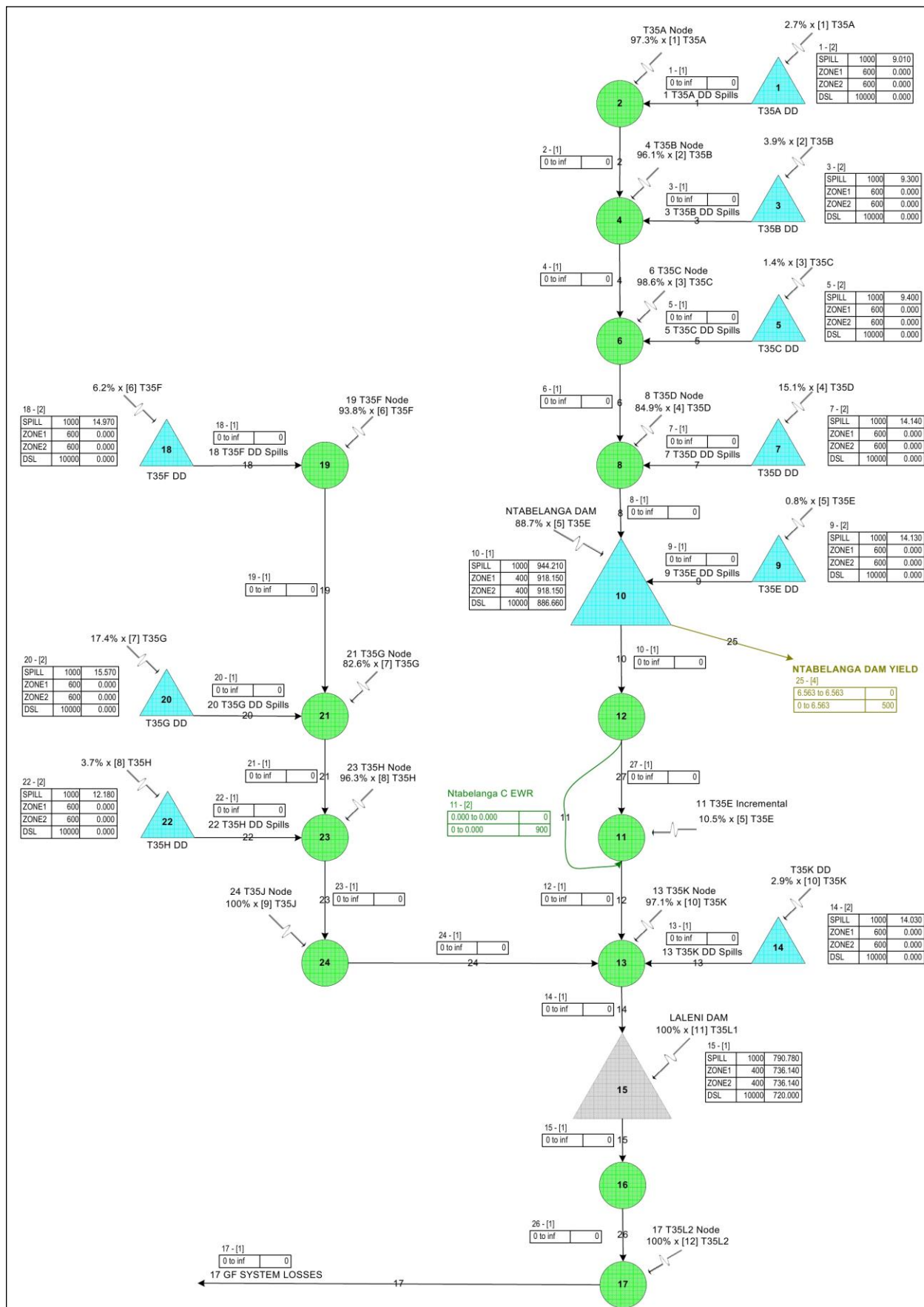


Figure E4- 1 WRYM System Diagram for the Tsitsa River - Ntabelanga Dam Phase 2

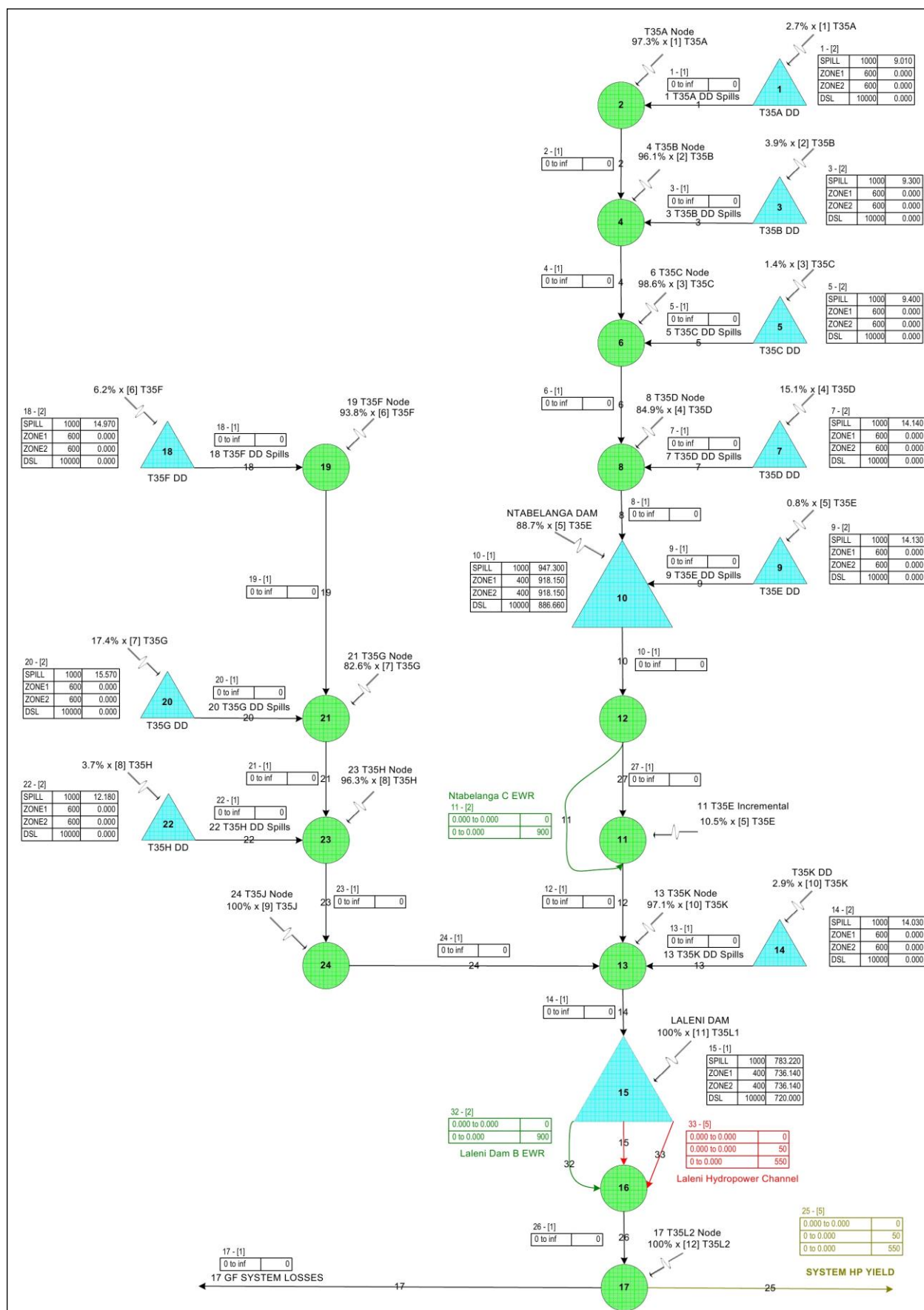


Figure E4- 2 WRYM System Diagram for the Tsitsa River - Ntabelanga and Lalini Dams Hydropower Generation Assessment Phase 2

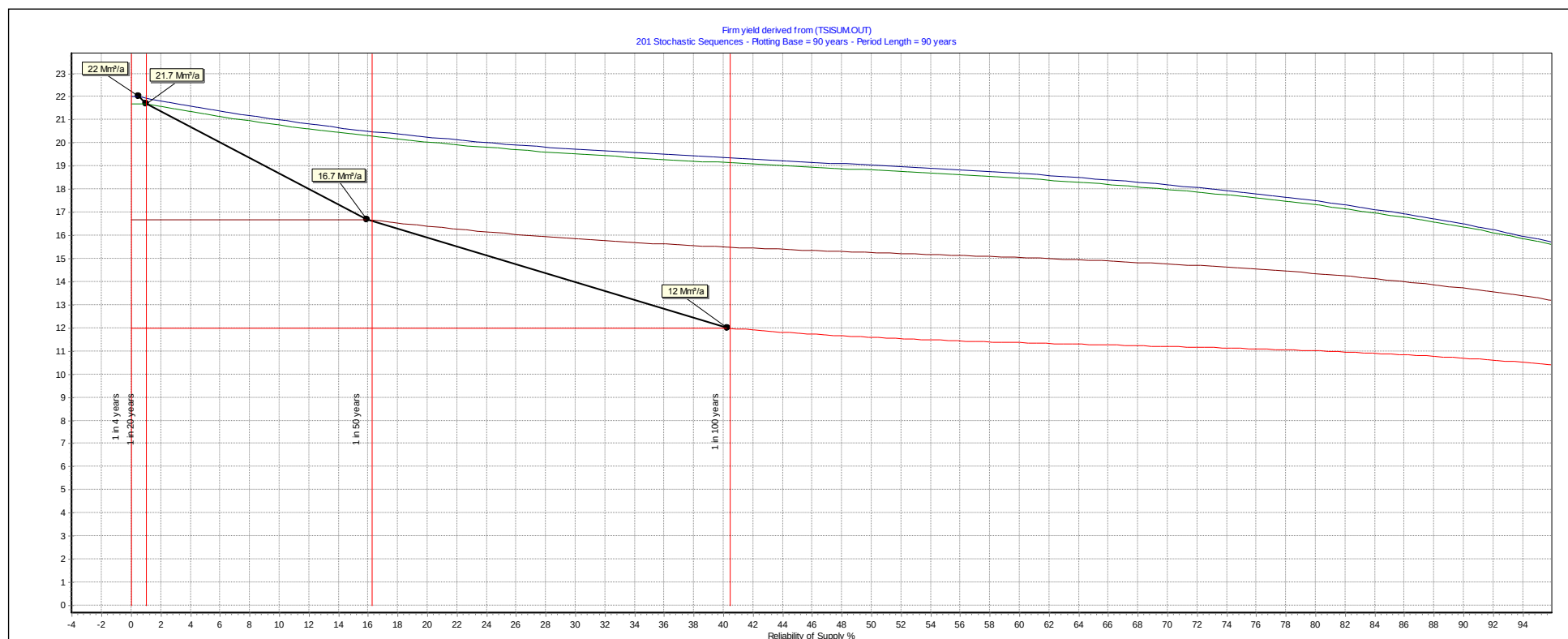


Figure E4- 3 Yield-Reliability Curve for Yield Scenario 01 for the Ntabelanga Dam (0.10 MAR) - Phase 2

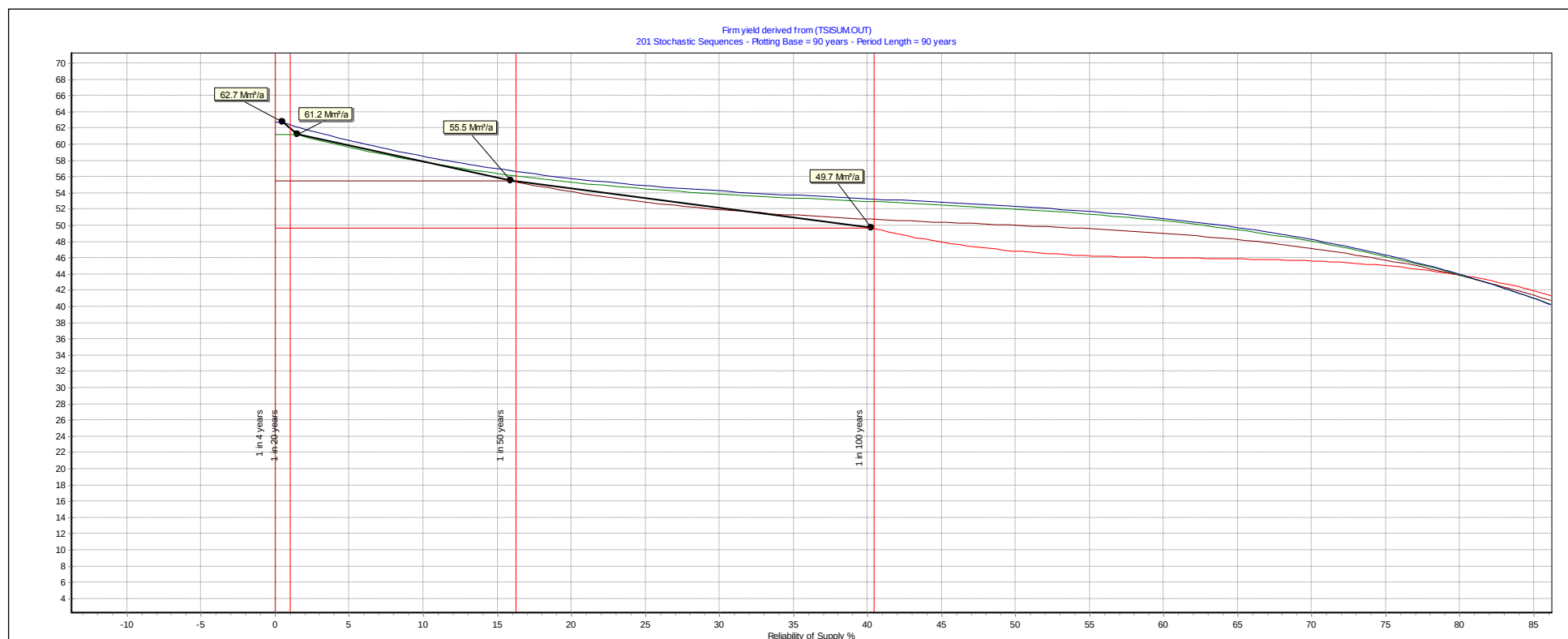


Figure E4- 4 Yield-Reliability Curve for Yield Scenario 02 for the Ntabelanga Dam (0.145 MAR) - Phase 2

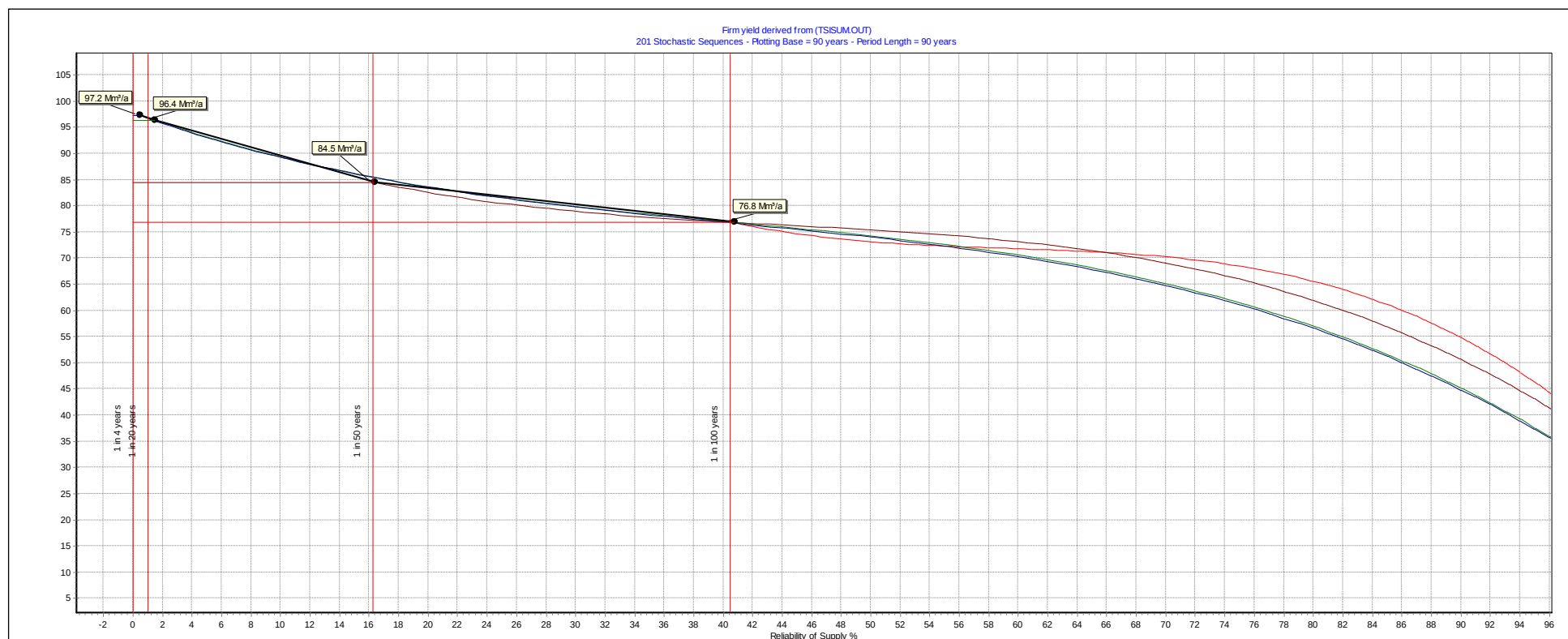


Figure E4- 5 Yield-Reliability Curve for Yield Scenario 03 for the Ntabelanga Dam (0.20 MAR) - Phase 2

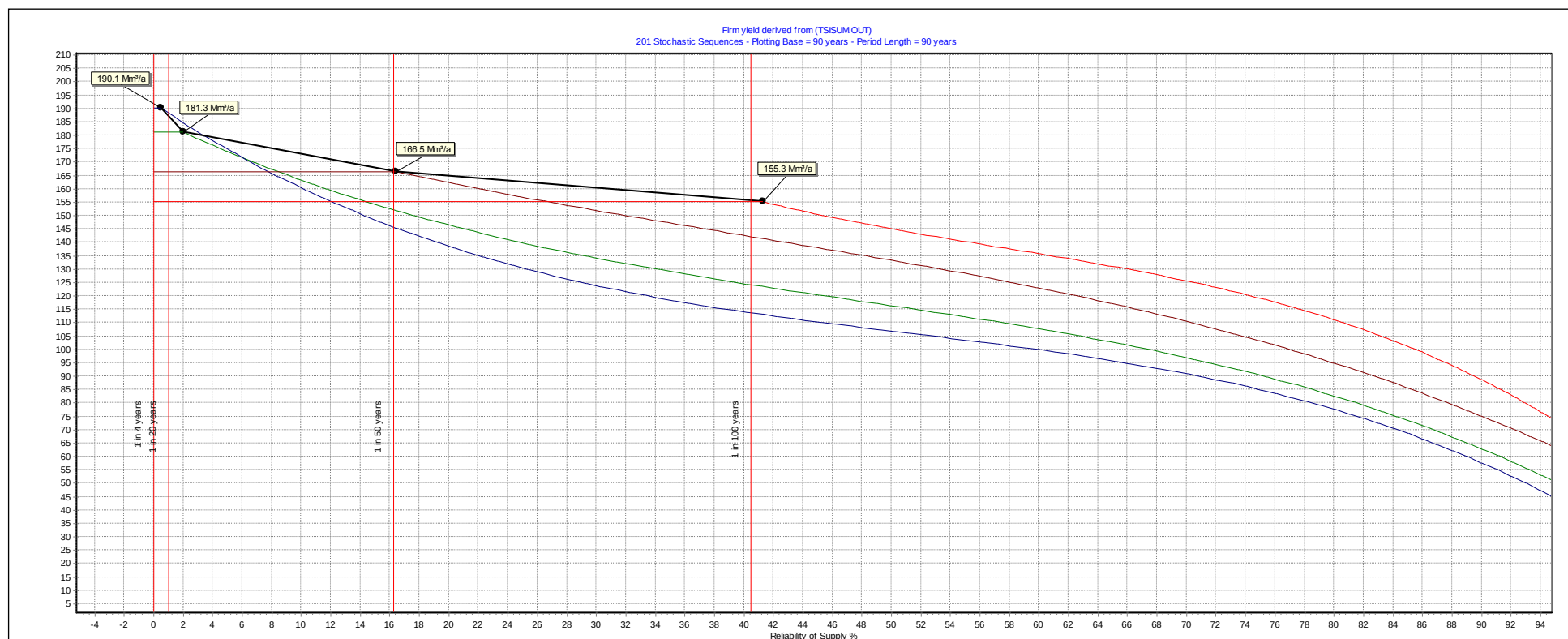


Figure E4- 6 Yield-Reliability Curve for Yield Scenario 04 for the Ntabelanga Dam (0.50 MAR) - Phase 2

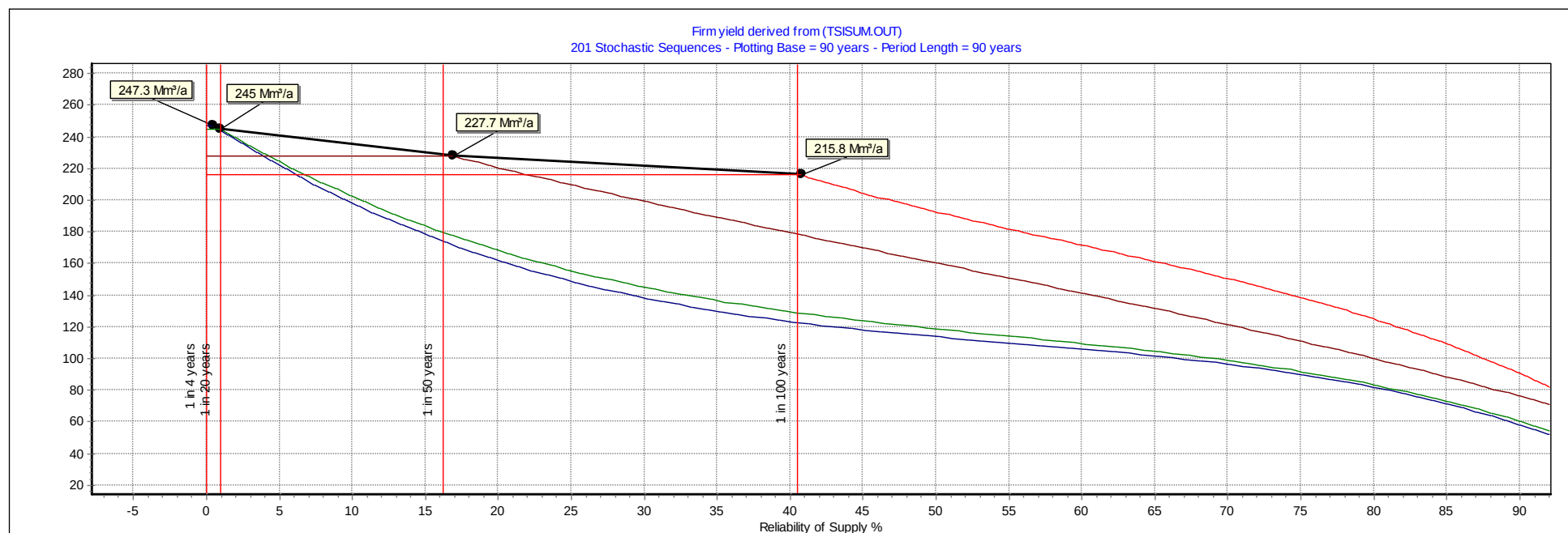


Figure E4- 7 Yield-Reliability Curve for Yield Scenario 05 for the Ntabelanga Dam (1.00 MAR) - Phase 2

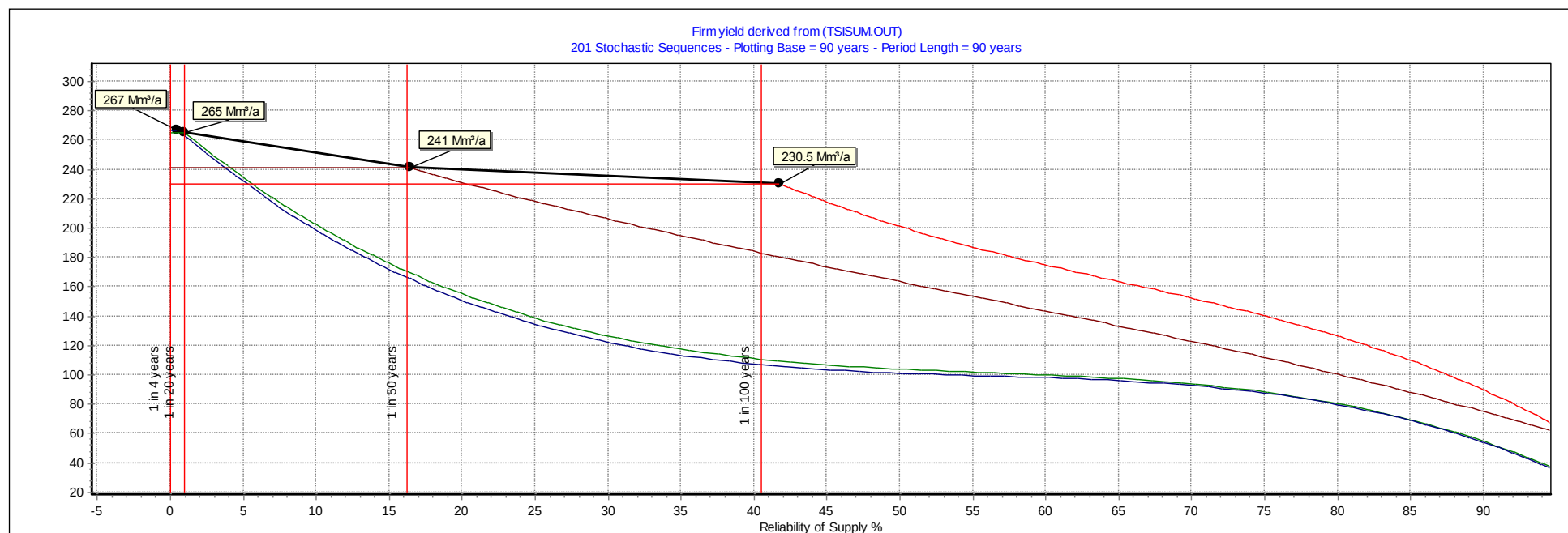


Figure E4- 8 Yield-Reliability Curve for Yield Scenario 06 for the Ntabelanga Dam (1.18 MAR) - Phase 2

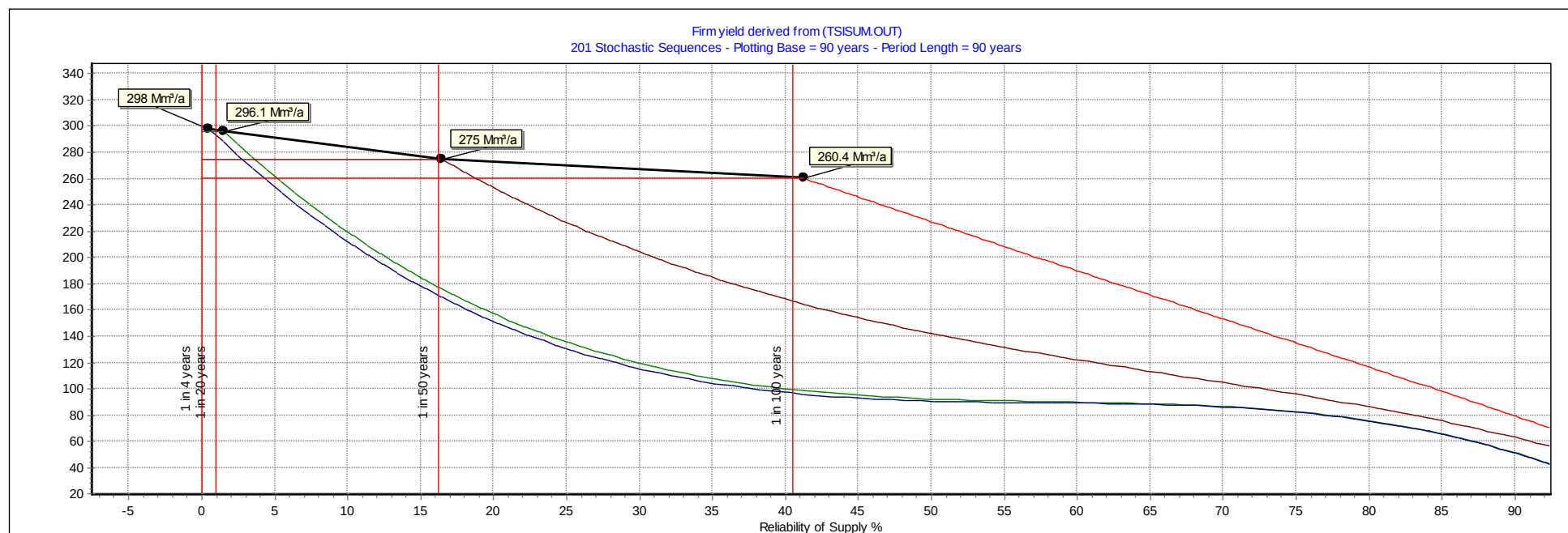


Figure E4- 9 Yield-Reliability Curve for Yield Scenario 07 for the Ntabelanga Dam (1.80 MAR) - Phase 2