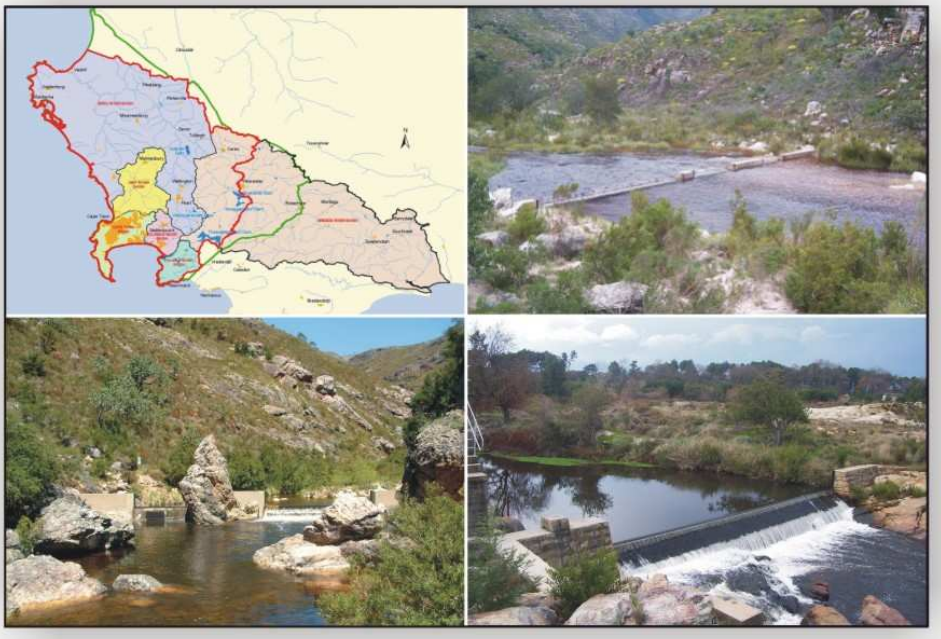
Ref No: P WMA19/000/00/0408

Department of Water Affairs and Forestry

Directorate: National Water Resource Planning

The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models

Report No. 5 : Update of Catchment Hydrology
Volume 3 : Peripheral Rivers



FINAL **May 2009**

Submitted by:
Ninham Shand (Pty) Ltd
in Association with
Umvoto Africa (Pty) Ltd

NINHAM SHAND
CONSULTING SERVICES

UMVOTO

DEPARTMENT OF
WATER AFFAIRS AND FORESTRY

DEPARTMENT OF WATER AFFAIRS AND FORESTRY

THE ASSESSMENT OF WATER AVAILABILITY IN THE BERG CATCHMENT (WMA 19) BY MEANS OF WATER RESOURCE RELATED MODELS

REPORT No. 5 : UPDATE OF CATCHMENT HYDROLOGY

Volume No. 3 : Peripheral Rivers

Final

May 2009

Department of Water Affairs and Forestry
Directorate National Water Resource Planning

THE ASSESSMENT OF WATER AVAILABILITY IN THE BERG CATCHMENT (WMA 19) BY MEANS OF WATER RESOURCE RELATED MODELS

REPORT No. 5 : UPDATE OF CATCHMENT HYDROLOGY

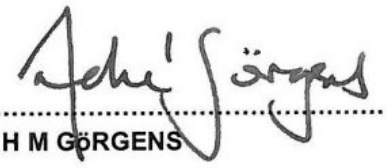
Volume No. 3 : Peripheral Rivers

APPROVAL

DWAF REF NO.	:	P WMA19/000/00/0408
CONSULTANTS	:	Ninham Shand in association with Umvoto Africa
AUTHORS	:	Louise Hayes, Frank Denys, Wageed Kamish, Verno Jonker
REPORT STATUS	:	Final
DATE	:	May 2009

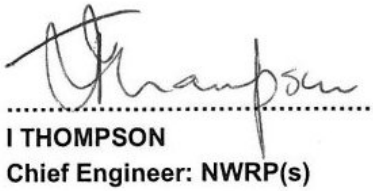
STUDY TEAM : Approved for Ninham Shand

.....
G ENGLISH

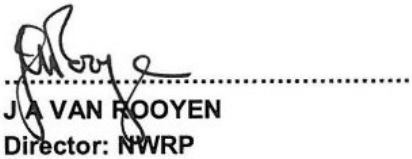


.....
A H M GÖRGENS

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
Directorate National Water Resource Planning
Approved for Department of Water Affairs and Forestry



.....
I THOMPSON
Chief Engineer: NWRP(s)



.....
J A VAN ROOYEN
Director: NWRP

REFERENCE

This report is to be referred to in bibliographies as:

Department of Water Affairs and Forestry, South Africa. 2008. *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models. Report No. 5: Update of Catchment Hydrology. Volume No. 3: Peripheral Rivers*.

Prepared by Ninham Shand (Pty) Ltd in association with Umvoto Africa on behalf of the Directorate : National Water Resource Planning. DWAF Ref No. P WMA19/000/00/0408.

REPORT No	REPORT TITLE	VOLUME No.	VOLUME TITLE
1	Final Summary Report		
2	Rainfall Data Preparation and MAP Surface		
3	The Assessment of Flow Gauging Stations		
4	Land Use and Water Requirements	Vol 1	Data in Support of Catchment Modelling
		Vol 2	Invasive Alien Plant Mapping
		Vol 3	Water Use and Water Requirements
5	Update of Catchment Hydrology	Vol 1	Berg River
		Vol 2	Upper Breede River
		Vol 3	Peripheral Rivers
6	Water Quality	Vol 1	A Literature Review of Water Quality Related Studies in the Berg WMA, 1994 - 2006
		Vol 2	Updating of the ACRU Salinity Model for the Berg River
		Vol 3	Update Monthly FLOSAL Model to WQT
7	(Report No Not Used)		
8	System Analysis Status Report		
9	Groundwater Model	Vol 1	Overview of Methodology and Results
		Vol 2	Data Availability and Evaluation
		Vol 3	Regional Conceptual Model
		Vol 4	Regional Water Balance Model
		Vol 5	Cape Flats Aquifer Model
		Vol 6	Langebaan Road and Elandsfontein Aquifer System Model
		Vol 7	TMG Aquifer, Piketberg Model
		Vol 8	TMG Aquifer, Witzenberg – Nuy Model
		Vol 9	Breede River Alluvium Aquifer Model
10	Berg and Mhlathuze Assessment Studies (Refer to Report No.1)		
11	Applicability of the Sami Groundwater Model to the Berg WAAS Area		

THE ASSESSMENT OF WATER AVAILABILITY IN THE BERG CATCHMENT (WMA 19) BY MEANS OF WATER RESOURCE RELATED MODELS

REPORT No. 5 : UPDATE OF CATCHMENT HYDROLOGY

Volume No. 3 : Peripheral Rivers

EXECUTIVE SUMMARY

INTRODUCTION

The objective of the catchment hydrology reports for the Berg WAAS is to present updated hydrology for subcatchments in the study area in order to support the determination of allocable water quantification, as well as to provide model-based assessment of water resource augmentation options in support of the Western Cape Reconciliation Strategy Study. Monthly simulated runoff sequences are produced which are used in the system yield analyses relating to present and future land-use development scenarios and scheme development options.

RESULTS

A summary of the calibration results is shown in Table 1 and the final Pitman parameters for each subcatchment are presented in Table 2.

Table 1: Summary of Peripheral Rivers calibration results

Basin	Flow gauge	MAP (mm)	Catchment area (km^2)	Patched observed MAR (Mm^3/a)	Calibration period	Naturalised MAR (Mm^3/a) 1927-2004	Naturalised runoff coefficient
Diep	G2H012	546	245.8	11.1	1964-2004	13.6	10%
Diep	G2H013	521	471.5	20.5	1965-1985	30.4	12%
Diep	G2H014*	350	1391.8	44.6	1966-1981	63.2	13%
Diep	G2H042	369	586.6	39.4	1998-2004	25	12%
Eerste	G2H015*	844	333.2	104.1	1967-1976	120.4	42%
Lourens	G2H016	1124	92.3	44.4	1969-1990	48.2	46%
Eerste	G2H020	873	147	21	1980-2004	37.8	29%
Eerste	G2H037	1900	24	22.3	1988-2004	25.7	56%
Palmiet	G4H005	1073	83	41.6	1978-1997	49.9	56%
Palmiet	G4H007	925	319.3	141.7	1987-2004	146.1	48%
Steenbras	G4R001	1169	60.5	44.8	1927-1987	46.6	66%
Palmiet	G4R002	1671	65.3	54.9	1978-1997	54.6	50%
Riviersonderend	H6H007	1455	46	39.5	1963-1991	38.6	58%
Riviersonderend	H6H008	2320	39.1	63.9	1963-1991	63.2	70%
Riviersonderend	H6R001*	1099	441.2	316	1987-2004	354.5	73%
Riviersonderend	H6R002	1042	49.9	22	1979-2004	22.1	43%

* Cumulative calibration

Table 2: Summary of Peripheral Rivers final Pitman parameters

Flow gauge	POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
G2H012	2	0	285	5	0	85	500	1.5	0.2	0	0
G2H013	2	0	220	5	0	40	500	1.5	0	0	0
G2H014	2	0	500	1	0	100	750	1.5	0	0	0
G2H042	2	0	230	24	0	60	475	1.5	0	0	0
G2H015	2	0	250	65	0	20	500	1.5	0	0	0
G2H016	2	0	260	60	0	50	650	1.5	0	0	0
G2H020 High	2	0	320	35	0	35	600	1.5	0	0	0
G2H020 Low	2	0	400	35	0	40	700	1.5	0	0	0
G2H037	2	0	340	15	0	50	650	1.5	0.15	0	0
G4H005	2	0	120	60	0	35	280	1.5	0.25	0	0
G4H007	2	0	150	45	0	0	300	1.5	0.35	0	0
G4R001	2	0	150	80	0	0	180	1.5	0.25	0	0
G4R002	2	0	510	35	0	0	800	1.5	0	0	0
H6H007	2	0	400	99	0	0	500	1.5	0	0	0
H6H008	2	0	400	30	0	0	200	1.5	0.25	0	0
H6R001	2	0	100	75	0	0	165	1.5	0.25	0	0
H6R002	2	0	375	50	0	0	500	1.5	0	0	0

The calibrated flows in the Berg WAAS are based on longer flow records wherever possible, than in previous studies and naturalised flows have been generated for a 78-year period which extends the previous naturalised flow sequences by ten years. In the Diep River catchment, the cumulative naturalised flow sequences for the current study are higher overall by 41% than in the WCSA. In the Eerste and Lourens catchments, the cumulative naturalised flows on the Eerste River are lower overall by 11% and on the Lourens, higher overall by 12% than in the WCSA. In the Palmiet and Steenbras catchments, the cumulative naturalised flows on the Palmiet River compare favourably with the previous study and are only 5% lower overall. Flows in the Steenbras catchment are 8% lower than in the WCSA. Finally, in the Riviersonderend catchment, the cumulative naturalised inflows to the Theewaterskloof Dam are 24% higher than in the WCSA.

CONCLUSIONS AND RECOMMENDATIONS

Rainfall data is one of the most important data requirements for hydrological modelling. The rainfall surface was also updated as a separate task in the Berg WAAS and it provides an improved estimation of catchment MAP in high-lying, mountainous areas of the Western Cape. There is however still some uncertainty surrounding estimations of MAP in these areas and therefore, it is important the rainfall gauging network in the high mountains be extended and improved in order to provide better estimates for the future, especially in light of the need to properly monitor the effects of climate change.

THE ASSESSMENT OF WATER AVAILABILITY IN THE BERG CATCHMENT (WMA 19) BY MEANS OF WATER RESOURCE RELATED MODELS

REPORT No. 5 : UPDATE OF CATCHMENT HYDROLOGY

Volume No. 3 : Peripheral Rivers

TABLE OF CONTENTS

Page No.

APPENDICES

LIST OF TABLES

LIST OF FIGURES

1 INTRODUCTION

This report documents the updated hydrological information for the Peripheral Rivers in the Berg WAAS area, including the Diep River catchment, the Eerste and Lourens River catchments, the Palmiet and Steenbras River catchments and the Riviersonderend catchment, which forms part of the study entitled *The Assessment of Water Availability in the Berg River Catchment (WMA19) by means of Water Resources Related Models* commissioned by the Department of Water Affairs and Forestry (DWAF). The WRSM2000 model (Pitman *et al*, 2006) was configured and calibrated for this purpose. This study has been commissioned to assist in the determination of allocable water quantification as a prerequisite for compulsory licensing, and to provide model-based assessment of water resource augmentation options in support of the Western Cape Reconciliation Strategy Study.

Previous monthly hydrological modelling studies in the Peripheral Rivers catchments include the *Western Cape Systems Analysis* (WCSA) (DWAF, 1993/4), and in the Diep River catchment, the *Dieprivierskema : Moontlike aanwending van die Dieprivier as waterbron vir die stedelike gebied van Suidwes-Kaapland* (Krous et al., 1979).

In accordance with the terms of reference (DWAF, 2005), the aforementioned studies were reviewed to acquire the datasets and relevant model configurations which were subsequently used as basis for the development of the final network diagrams of the system and to redefine the catchments on a finer spatial scale where required. As with previous studies, particular attention was given to the following issues:

- Growth in farm dam numbers over time,
- Winter runoff storage in farm dams with increasing capacity over time,
- River abstractions for the purpose of topping-up farm dams in winter,
- Simulation of low flows,
- Groundwater interaction with surface runoff.

A map showing the location of the Peripheral Rivers catchments within the Berg WAAS area is shown in Figure 1.1, while the calibration subcatchments in each Peripheral catchment are shown individually in Section 2.

1.1 Aims and objectives

The overarching objective of this component of the study was to extend the naturalisation of streamflow forward to the 2004 hydrological year to capture the significant droughts of the past decade. Specific aims to meet this objective were as follows:

- To improve calibration of the WRSM2000 model at a number of gauging stations where previous calibration periods were relatively short and to update existing model calibrations at the rest of the gauging stations.
- To reflect improved quantification of the impacts of farm dams, winter abstractions and groundwater use on the historical streamflows.
- To improve the representation of groundwater contributions to streamflow in the monthly modelling process.

1.2 Report layout

This report starts with a brief description of the Peripheral Rivers catchments, which is followed by the modelling strategy and procedure. Finally, the flow calibration results and naturalised flows are presented.

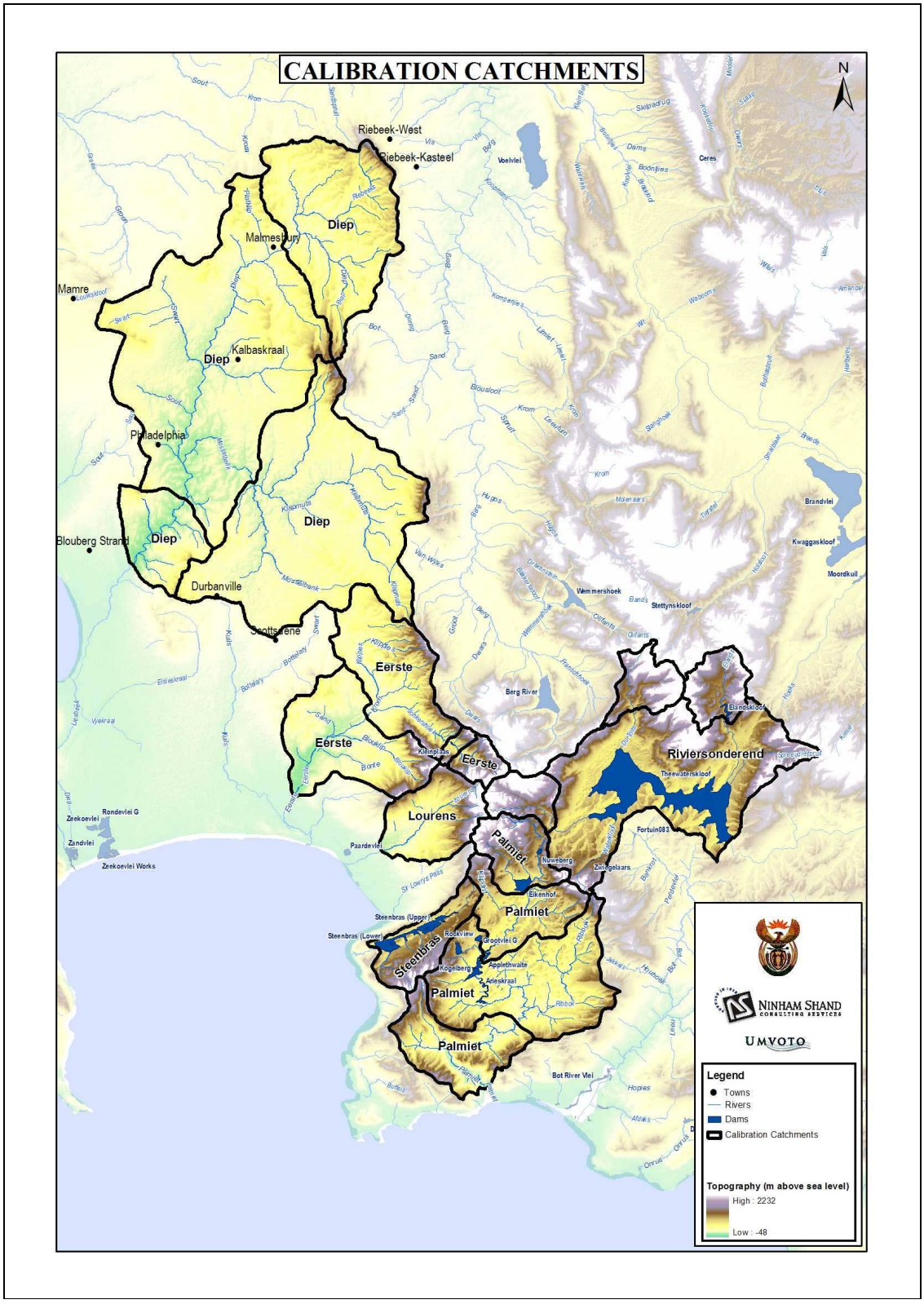


Figure 1.1: Location of Peripheral Rivers catchments in the Berg WAAS area

2 CATCHMENT DESCRIPTION

The Peripheral Rivers include the Diep River catchment, the Eerste and Lourens River catchments, the Palmiet and Steenbras River catchments and the Riviersonderend catchment. The location of the calibration subcatchments in each of these basins is shown in Figure 2.1, Figure 2.2, Figure 2.3 and Figure 2.4 respectively. Each of these catchments is described in more detail below.

2.1 Location

The Diep River is located in the Western Cape, north of Cape Town. The catchment is bounded by the towns of Riebeeck-West in the north, Paarl in the east, Atlantis in the west and Milnerton in the south.

The Eerste and Lourens River catchments are located in the south-eastern part of the Berg WAAS area near Stellenbosch and Somerset West. The Eerste River is fed by two tributaries, the Jonkershoek and Plankenburg Rivers, and flows in a southerly direction from Stellenbosch to False Bay. The Jonkershoek River finds its source in the Jonkershoek Mountains and flows in a north-westerly direction down the Jonkershoek Valley. The Plankenburg River flows in a south-easterly direction with the Kromme and Klippies rivers as its main tributaries.

The Palmiet and Steenbras River catchments are located in the southern central portion of the Berg WAAS area and are separated from the other catchments by mountains to the north, west and east. The Atlantic Ocean forms the southern boundary of these catchments.

The Riviersonderend catchment is located to the south of the Berg River catchment and has the Theewaterskloof Dam at its outlet. It is bounded by mountains to the north, west and south-west.

The Palmiet, Steenbras and Riviersonderend catchments are situated in the Breede Water Management Area (WMA).

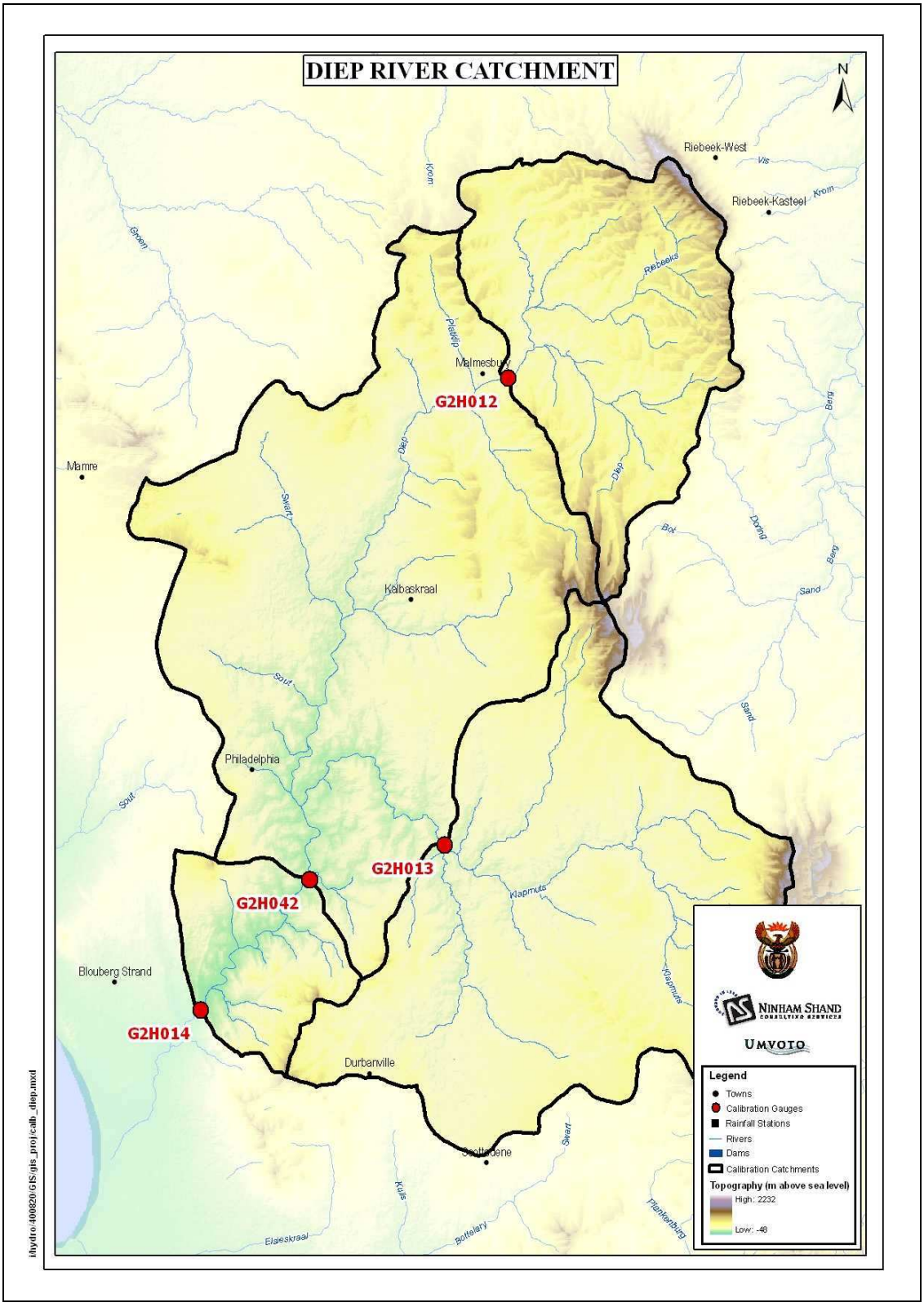


Figure 2.1: Catchment calibration gauges in the Diep River

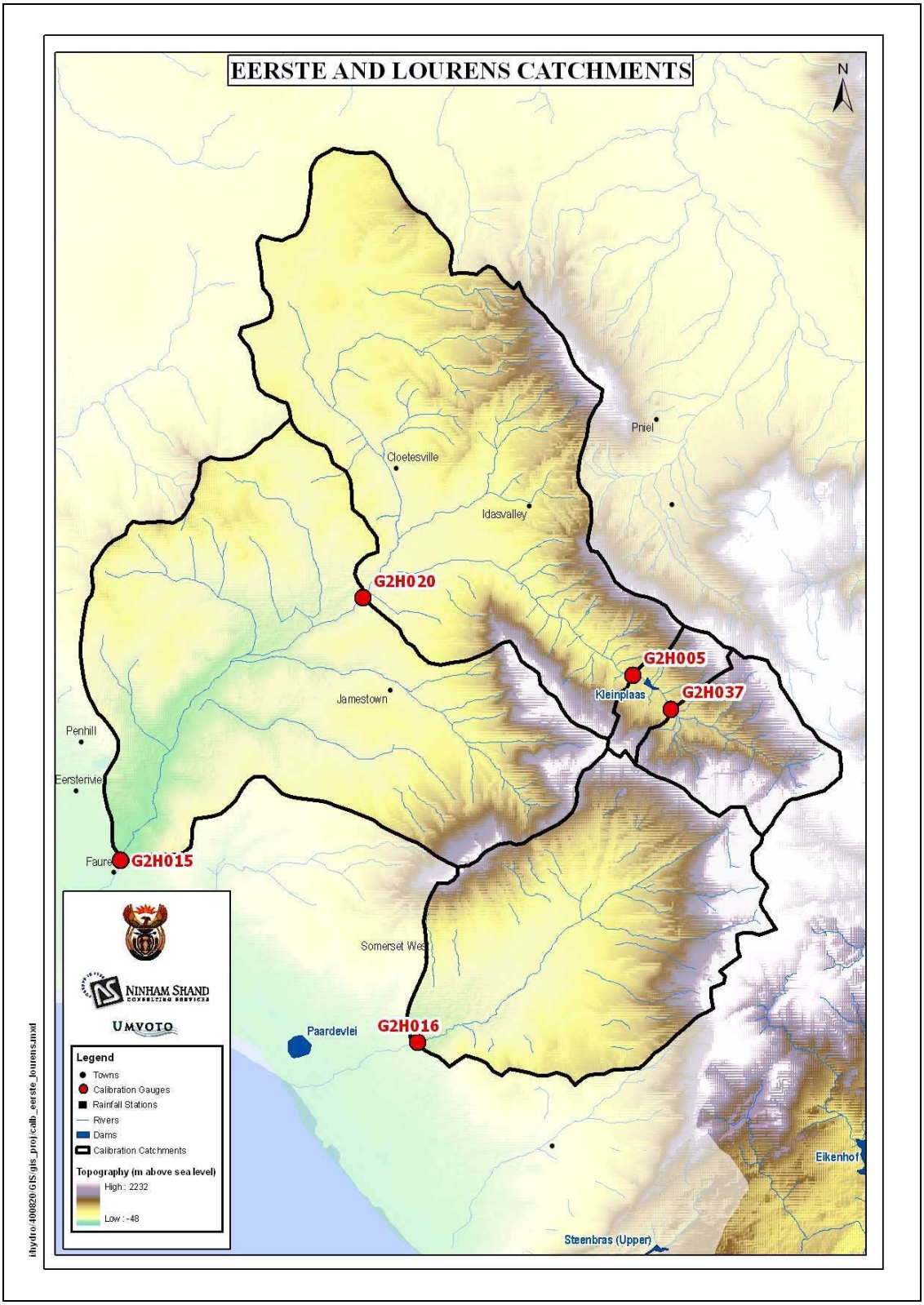


Figure 2.2: Catchment calibration gauges in the Eerste and Lourens Rivers

Figure 2.3: Catchment calibration gauges in the Palmiet and Steenbras Rivers

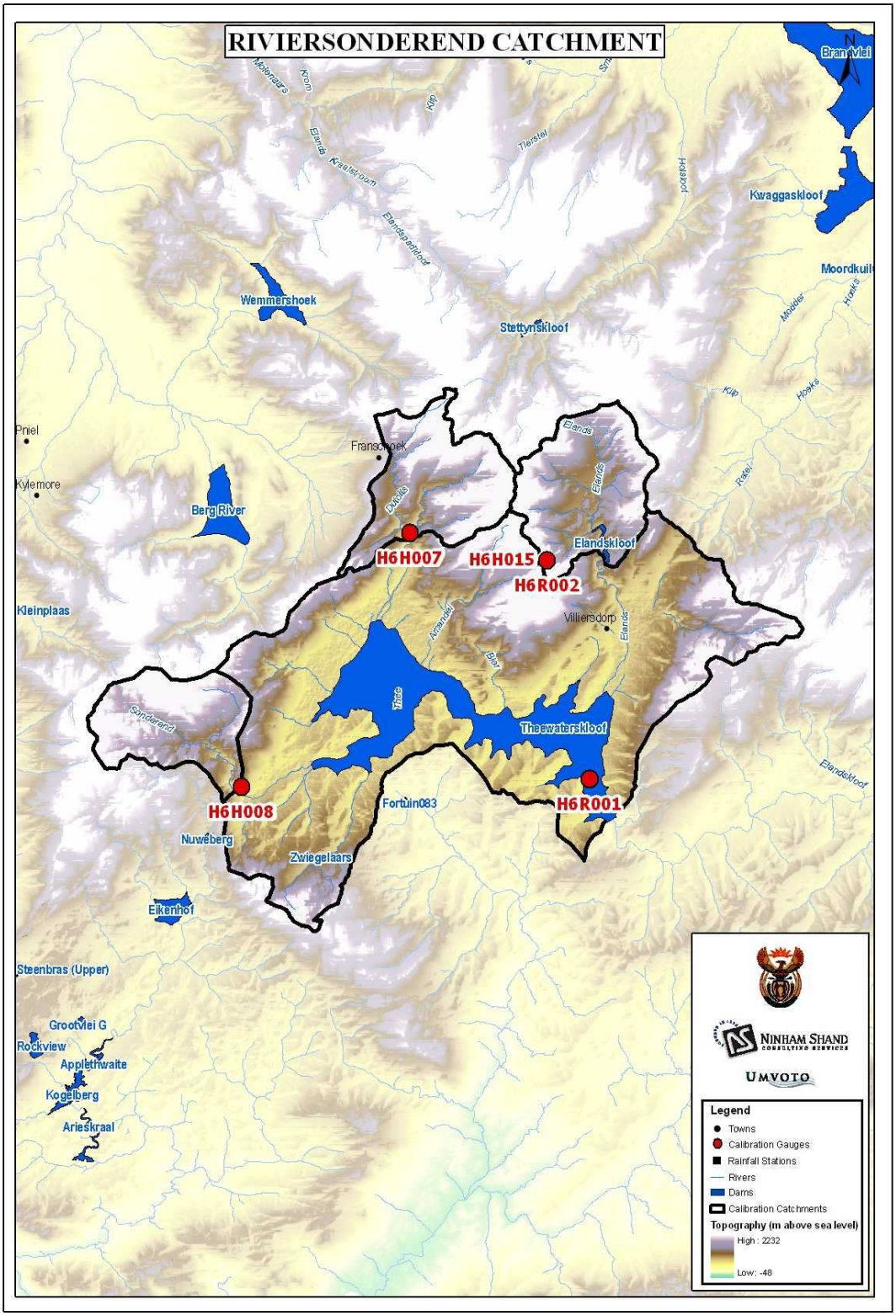


Figure 2.4: Catchment calibration gauges in the Riviersonderend

2.2 Drainage, topography and land use

The Diep River has its origin in the Riebeeck Kasteel Mountains after which it flows in a south westerly direction through Malmesbury and the wheat producing areas of the Swartland. The Diep River Basin is low-lying and flat with isolated mountains on its eastern boundary and a major mountain range to the east of that. The Mosselbank River is the only major tributary, emanating in the Skurweberge and drains the south eastern portion of the catchment. Vineyards make up most of the irrigated land in the upper catchment. Fruit and vegetables make up the rest of the irrigation demand in the middle and lower catchments. There is also some dryland agriculture in the lower parts of the catchment. There is very little afforestation in the Diep River catchment.

Topography in the Eerste and Lourens River catchments is steep in the upper mountain reaches but levels out rapidly moving away from the mountain ranges towards the False Bay coast. These catchments are separated from the Palmiet, Steenbras, and Riviersonderend catchments by the Hottentots Holland Mountain Range and from the Berg River basin by the Jonkershoek Mountain range. These mountain ranges constitute the highest parts of the catchment with peaks in both ranges at an altitude of over 1500 masl. Much of the land in the Eerste and Lourens River catchments is cultivated with vineyards and orchards.

The Palmiet River has its source in the Hottentots-Holland Mountains to the north of the catchment and flows southwards, bounded by the Kogelberg Mountains to the west and the Groenlandberg Mountains in the east. The highest peak is Landdroskop at an altitude of 1436 masl. Intensive irrigation and large areas of afforestation occur throughout the central valley. The Krom River is a major tributary which joins the Palmiet River in the central valley. The Dwars River is another major tributary that joins the Palmiet River in the south of the catchment where it enters a coastal estuary. The Steenbras River is located to the west of the Kogelberg Mountains and is bounded by the Hottentots Holland Mountains to the north and west. There are numerous small tributaries that drain to the upper and lower Steenbras dams. There is significant afforestation in this catchment.

Theewaterskloof Dam is fed by the Riviersonderend, the Du Toits, the Elandspad and Waterkloof rivers. The Riviersonderend drains in a south-easterly direction from an altitude of 1590 masl, the Du Toits River flows from the north at 1500 masl and the Elandspad and Waterkloof rivers flow from the east at 1820 masl and 1300 masl respectively. The topography flattens out over the central areas of the Riviersonderend catchment at about 300 masl. Natural vegetation predominates most of the high-lying areas whereas fruit-farming is practised on the lower, flatter areas.

Details of land use in the Berg WAAS area is documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). This report presents historical and present-day land use data in the Berg WAAS surface water study area. Monthly records of localised water use and return flows as well as inter-basin transfers and diversions are also presented along with spatial data in the form of GIS coverages of all present-day land use.

2.3 Climate

The Peripheral rivers catchments, like the Berg River catchment, lie in the winter rainfall area of the south-western Cape and the largest percentage of the total annual rainfall can be expected during the months of April to September, which is associated with cold fronts moving in from the northwest.

Rainfall in the mountains is estimated at about 2600 mm per year (DWAF, 1993). The snow that falls on the peaks and upper slopes of the mountains during intermittent cold spells in the winter also contributes to the streamflows. In the Diep River catchment, rainfall is fairly constant at about 500 mm per year. In the Eerste and Lourens River catchments, the orographic effect of the Hottentots Holland is evident with MAP varying from 3200 mm in the mountains to 500 mm in the lower-lying areas of Stellenbosch. Rainfall in the Palmiet catchment varies from 700-2500 mm. Similarly in the Riviersonderend catchment, annual rainfall varies from 2300 mm in the mountains to 600 mm in the lower-lying areas.

The inaccessibility of mountainous areas, however, contributes to the uncertainty in the estimation of the rainfall in those higher lying areas and as a result, an updated rainfall surface was prepared for these areas. The CCWR rainfall surface used in previous studies was updated to better account for the topographic effects of the mountainous regions on rainfall. Anomalies which were observed in the original surface generated by the CCWR were considered serious enough to potentially have a significant impact on the modelled streamflow. The specific reasons for the occurrence of these anomalies and the techniques used to accommodate them are explained in the report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 2: Rainfall Data Preparation and MAP Surface* (DWAF, 2007b).

The updated MAP surface for the Peripheral Rivers is shown in Figure 2.5.

As may be expected for a semi-arid region, the evaporation rates are significant during the summer months. Typically the monthly evaporation ranges from 40-50 mm during winter to 230-250 mm during summer.

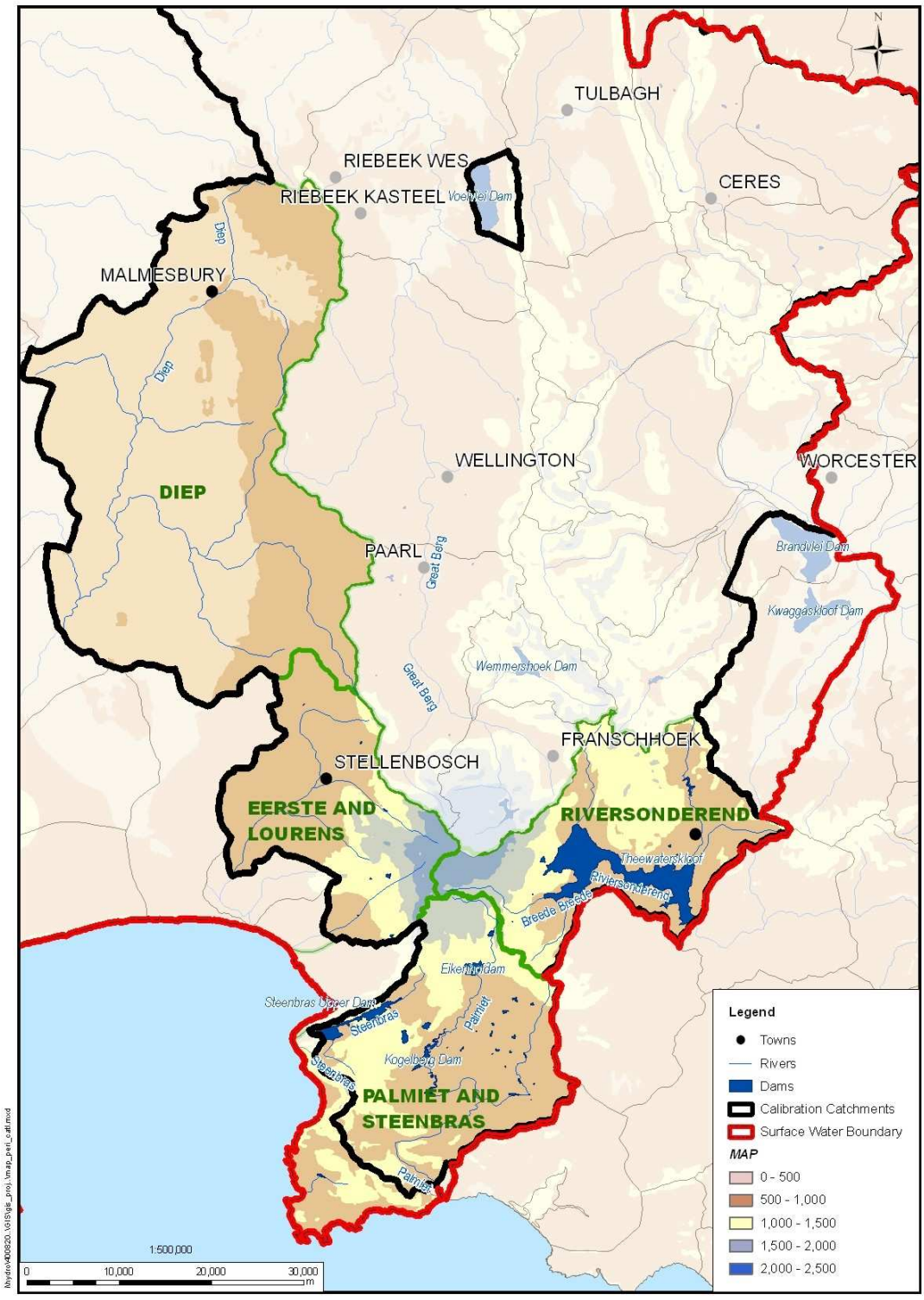


Figure 2.5: Updated rainfall surface produced for the Peripheral Rivers catchments

3 MODELLING STRATEGY

The approach to modelling the streamflow in the Peripheral Rivers catchments was to:

i) Select appropriate streamflow gauging stations based on pre-determined quality criteria and then to calibrate the monthly rainfall-runoff model such that a representative streamflow time series is simulated at these gauges when compared to the observed streamflow. Suitably defined objective functions are used to quantify the goodness-of-fit between the simulated and observed records.

ii) Prepare long term flow sequences for the unimpacted natural state.

3.1 Requirements for modelling developed catchments

To ensure realistic simulation of streamflow within a developed catchment, several development-related aspects need to be quantified beforehand. These aspects typically include:

- The volume of rainfall which could potentially be intercepted and the volume of soil water which is directly evaporated or which is lost through transpiration by natural or cultivated vegetation.
- The volume of water abstracted from the river or reservoirs to meet the irrigation or urban demands.
- The volume of water captured by storages such as farm dams or large reservoirs.
- The volume of supplementary water used to fill up farm dams during winter.
- The volume of water transferred during inter-basin transfers.

All but one of the aspects mentioned above were quantified either directly or indirectly before the modelling exercise and are summarised in the report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 Land Use and Water Requirements: Volume 1 Data in Support of Catchment Modelling* (DWAF, 2007d). The volume of water used for the winter-filling of farm dams was estimated as described in Section 4.6.

For this study the recently-updated Water Resource Simulation Model (WRSM2000) (Pitman *et al.*, 2006) was used. The model (previously called WRSM90) has had several enhancements including the incorporation of the Council for Scientific and Industrial Research (CSIR) algorithms for the streamflow reduction effects of alien vegetation, inclusion of the CSIR and Smoothed Gush/Pitman algorithms for the streamflow reduction effects of afforestation, incorporation of the WQT methodology for the irrigation modules, and the introduction of additional surface water-groundwater interaction modules and accompanying interfaces (Sami and Hughes methodologies).

WRSM2000 operates on the network principle which allows water to be transferred from one module to the next depending on the user-specified configuration for the system. The modules currently available in WRSM2000 are the:

- runoff module (RU) (for surface water and groundwater routines)
- channel reach module (CR)
- reservoir module (RV)
- irrigation block module (RR)
- mine module (MM)

3.2 Modelling dynamic time varying catchments

The calibration process of the rainfall-runoff model at any particular flow gauging station could span a significant number of years during which the development in the catchment upstream of the gauge may have changed. To account for this change in development (e.g. farm dams, irrigation, afforested or alien vegetation areas), a geographical information system (GIS) was used to extract information at various time slices from aerial photographs. This information was then used to represent the dynamic nature of development within the catchment which could be used for the hydrological modelling process. The WRSM2000 model used in this study allows for the input of time-varying data (time slices) for the different land use classes resulting in the production of more representative simulated streamflows.

3.3 Modelling incremental subcatchments

Incremental subcatchments are defined as catchments which are downstream of one or more flow gauging stations. By way of example, gauging station G1H036 measures the total flow generated in the catchment upstream of this gauge. Runoff from incremental subcatchment G1H036 (G1H036inc), however, would be obtained by subtracting all the upstream observed inflows from the observed flows at gauging station G1H036. In the example the upstream observed flows to be subtracted from the observed flows at G1H036 would be G1H007, G1H020, G1H041, G1H039 and G1H037 resulting in an incremental observed flow record at G1H036.

Cumulative calibration of the flows at gauging station G1H036 could also be undertaken. This would involve accounting for all the upstream inflows (i.e. G1H007, G1H020, G1H041, G1H039 and G1H037) and comparing the cumulative runoff measured at G1H036. In the example the observed flows generated upstream of G1H020 may be significantly more than flow generated between gauging station G1H020 and G1H036 with the result that the flow-related Pitman parameters may become insensitive to adjustments of their values in this part of the catchment. Thus, the final parameters may not be representative of the incremental catchment.

With the implementation of the incremental calibration strategy the upstream inflows are subtracted from the flows at the gauging station of interest (G1H036 in the example) and negative flows may occur in the incremental observed record. This may be as a result of abstractions (irrigation or other), unaccounted for seepage or inaccuracies in the measured flows. These negative flows are set to zero when preparing the final incremental observed record. If the number of zero values is significant, the incremental observed record may become unusable and the incremental calibration case would have to be abandoned for this subcatchment. This restriction is, however, more applicable to daily time-step modelling rather than the monthly scenario.

3.4 Representation of groundwater contributions to streamflow

The Berg WAAS team conducted a pilot investigation into the applicability of the Sami groundwater module in the WRSM2000 model for Western Cape catchments (DWAF, 2007a). It was concluded that in the Berg WAAS area, it would be preferable to account for groundwater contributions to streamflow in an explicit empirical fashion in the WRSM2000 model and not to implement the Sami methodology. This approach is described in Section 4.8.2.

4 MODELLING PROCEDURE

4.1 Evaluation of flow records

An evaluation of flow records within the Berg WAAS area was undertaken as a separate task and the reader is referred to *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The evaluation focused particularly on the gauges that were used for flow calibration during previous studies and those which have been opened subsequent to the last study. During this process the historical background to the gauge together with the availability of data was presented. Based on this information it was possible to quantify the number of days within each month when the discharge table was exceeded and the number of days when there were missing data. A recommendation was then made on whether the data measured at the gauging station was suitable for use in calibration of the catchment model. The final flow gauges used for calibration in the Peripheral Rivers catchments are shown in Table 4.1.

Observed flow records were obtained from the DWAF website (www.dwaf.gov.za\Hydrology) and flow records for each calibration gauge were patched using the methodology shown diagrammatically in Figure 4.1. For each flow gauge, the observed daily record was scrutinised for missing or exceeded data. For data gaps of less than three days corresponding to a low flow period, missing values were patched manually using linear interpolation. The daily record was then aggregated into a monthly record and checked against the monthly exceedence estimates provided by DWAF (E. Holemans, Pers Com., 2006). The observed values that were flagged as exceeded were replaced with the DWAF estimate and their flags removed. The resultant partly manually patched file was then used as input to the PatchS routine in order to patch all of the remaining months still flagged as having missing or exceeded days. In the PatchS routine, two or three representative flow gauges were grouped together for patching each other as well as their associated patched rainfall files which were used to generate catchment rainfall. The patched flow records for each calibration catchment are included in Appendix C.

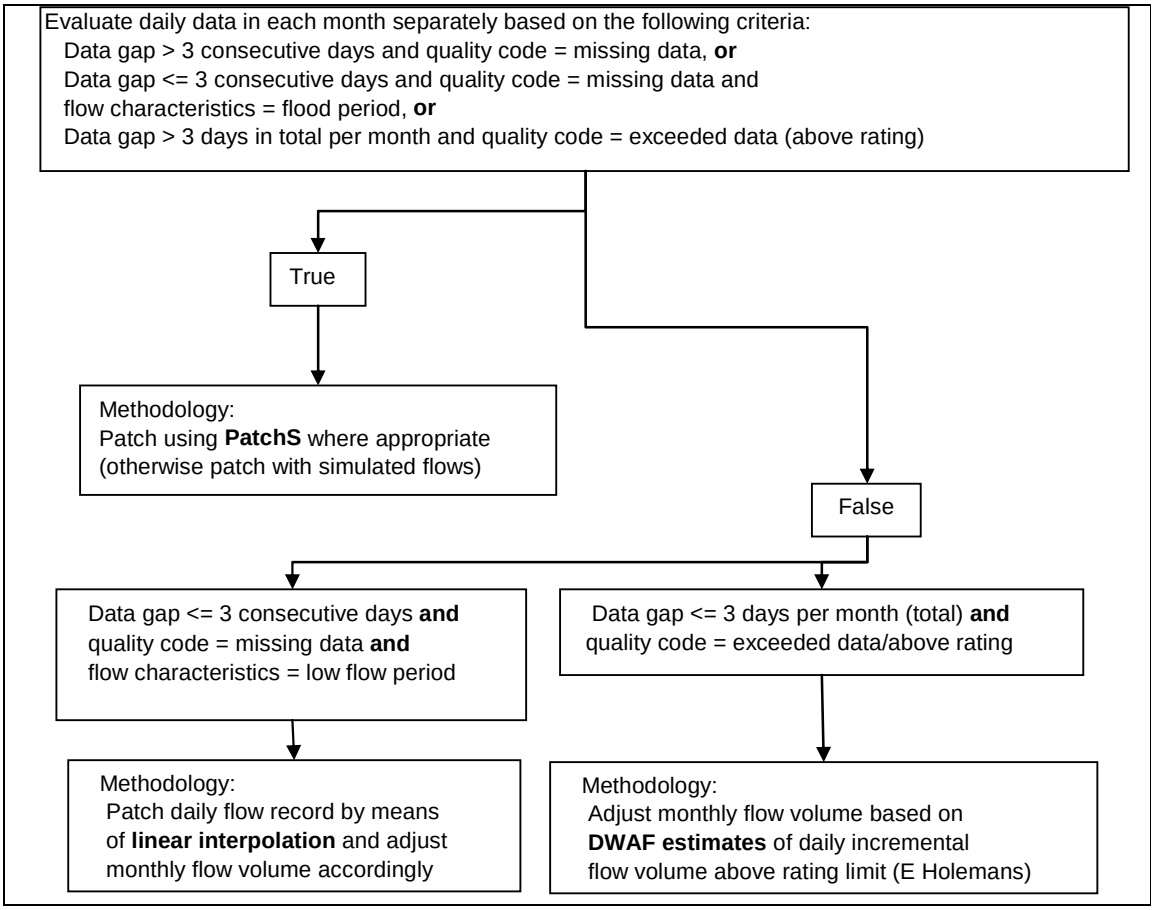


Figure 4.1: Flow record patching methodology

Table 4.1: List of final calibration gauges in the Peripheral Rivers catchments

STATION	RIVER	PLACE OR DESCRIPTION	LATITUDE	LONGITUDE	CATCHMENT AREA (km^2)	DATE OPENED	DATE RECORDER INSTALLED	DATE CLOSED	RECORD PERIOD HYDROLOGICAL YEAR	STATION INSPECTED DURING WAAS
	DIEP									
G2H012	Diep	Malmesbury	33 27' 50"	18 44' 25"	244	02/03/65	02/03/65	-	1965 – 2004	Yes
G2H013	Mosselbank	Klipheuwel	33 42' 18"	18 42' 02"	473	06/04/66	06/04/66	27/05/86	1966 – 1985	
G2H014	Diep	Vissershok	33 47' 23"	18 32' 58"	1360	14/04/67	-	11/11/82	1967 – 1981	
G2H042	Diep	Adderley	33 43' 22"	18 37' 00"	1304	14/10/98	14/10/98	-	1999 – 2004	
	EERSTE LOURENS									
G2H005	Jonkershoek	Kleinplaas Dam	38 58' 25"	18 56' 17"	31	01/10/40	01/08/47	-	1947 – 2005	Yes
G2H015	Eerste	Faure	34 01' 49"	18 44' 54"	338	21/04/68	20/04/68	25/05/88	1967 – 1978	Yes
G2H016	Lourens	Somerset West	34 05' 13"	18 51' 31"	92	23/04/70	22/04/70	22/04/91	1970 – 1989	
G2H020	Eerste	Stellenbosch	33 56' 58"	18 50' 19"	183	10/05/78	10/05/78	-	1978 – 2005	
G2H037	Jonkershoek	Kleinplaas	33 59' 02"	18 57' 11"	21	12/06/89	12/06/89	-	1989 – 2004	Yes
	PALMIET STEENBRAS									
G4H005	Palmiet	Applethwaite	34 11' 49"	18 58' 50"	146	11/03/57	11/03/57	-	1957 – 2005	
G4H007	Palmiet	Welgemoed	34 19' 47"	18 59' 25"	465	30/03/63	30/03/63	-	1963 – 2005	
G4R001	Steenbras	Lower Steenbras Dam	34 11' 13"	18 51' 10"	60.5	1915	Unknown	-	1989 – 2004	
G4R002	Palmiet	Eikenhof Dam	34 07' 39"	19 02' 10"	63	24/04/78	24/04/78	-	1978 – 2004	
	RIVIERSONDEREND									
H6H007	Du Toits	Purgatory Outspan	33 56' 19''	19 10' 17''	46	14/03/64	14/03/64	07/09/92	1964 - 1991	
H6H008	Riviersonderend	Nuweberg Forest	33 03' 44''	19 04' 23''	38	18/04/64	18/04/64	07/09/92	1964 - 1991	
H6R001	Riviersonderend	Theewaterskloof Dam	34 03' 29''	19 03' 29''	497	18/03/49	18/03/49	-	1979 - 2004	
H6R002	Elands	Elandskloof Dam	33 57' 53''	19 17' 32''	50	01/07/76	01/07/76	-	1982 - 2004	

4.2 Evaluation of rainfall records

The generation of representative streamflow data requires reliable monthly rainfall records. In this study the Water Resources Information Management System (WR-IMS) (developed by the DWAF) which contains data for 12 748 rainfall stations in Southern Africa was used as the interface for selection of the appropriate rainfall stations. The ClassR and PatchR utilities which allow for the identification of outliers and appropriate groupings of source rainfall gauges in order to patch the missing records of selected rainfall gauges are also included as part of the interface. For a full description of the rainfall station selection, evaluation and patching processes, the reader is referred to *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models. Report No. 2: Rainfall Data Preparation and MAP Surface* (DWAF, 2007b).

Catchment rainfall files were generated for each calibration catchment using patched rainfall station files, based on the groupings of rainfall stations used in the WCSA (DWAF, 1993) and updated where necessary. These groupings are presented in Section 5 for each calibration catchment and the catchment rainfall files are included in Appendix B.

4.3 Evaporation

Evaporation data from the Surface Water Resources of South Africa 1990 (WR90) study (Midgley *et al*., 1994) were used in this project.

4.4 Land use data and water demand sequences

For a full description of the land use survey undertaken the reader is referred to the report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). This report presents historical and present-day land use data in the Berg WAAS surface water area. Monthly records of localised water use and return flows as well as inter-basin transfers and diversions are also presented along with spatial data in the form of GIS coverages of all present-day land use.

4.4.1 Irrigation demands

A total area of approximately 509 km^2 in the Peripheral Rivers catchments is irrigated. The Eerste and the Diep River catchments have the highest irrigation areas respectively, followed by the Palmiet, Riviersonderend and Lourens River catchments. There is no irrigation in the Steenbras catchment. Most irrigation is for vineyards (69%) and orchards (27%) while pastures, lucerne and vegetables make up the remainder. In the WRSM2000 model, the original WRSM methodology is used to estimate the irrigation demands.

4.4.2 Forestry demands

Owing to the decommissioning of commercial plantations in the late 1990s, there has been an overall reduction of afforestation in the Berg WAAS area. There is a total of approximately 102 km^2 of commercial forestry in the Peripheral Rivers catchments which is concentrated in the Palmiet and Lourens catchments with 48 km^2 and 22 km^2 respectively, with smaller areas of forestry found in the Steenbras, Eerste and Riviersonderend catchments (14 km^2, 12 km^2 and 6 km^2 respectively). In the WRSM2000 model, forestry is modelled as a Streamflow Reduction Activity using the Smoothed Gush/Pitman algorithms.

4.4.3 Alien vegetation demands

The present-day extent of invasive alien plants (IAPs) in the Peripheral Rivers catchments was updated based on the 2004 1:10 000 aerial photography supplied by DWAF. Species, density, age and size of IAPs were estimated as well as whether IAPs were located in riparian or upland areas. There is approximately 15 km^2 (condensed area which is equivalent to 100% density) IAPs in the Peripheral Rivers catchments of which about 33% is located in the riparian areas. In the WRSM2000 model, IAPs are also modelled as a Streamflow Reduction Activity using the CSIR methodology.

4.4.4 Urban demands and other users

The bulk of the urban water requirements in the Berg WAAS area is supplied by the Western Cape Water Supply System (WCWSS) which is not modelled at the subcatchment scale. Local municipal and irrigation abstractions, and return flows were obtained from local sources including municipalities, irrigation boards and Water Users Associations (WUAs). Municipal abstractions in the Peripheral Rivers catchments are included for Stellenbosch and Grabouw. Irrigation abstractions made by irrigation boards are included for the Eerste River and the Palmiet River. Return flows from WWTW are included for Stellenbosch.

4.5 Farm dam data

Information on farm dams was obtained by digitising the farm dam areas from the 2004 1:10 000 aerial photography supplied by DWAF and then verifying it against the most recent 1:50 000 topographical maps. The area-capacity relationship was based on the power curve regression shown below:

$$Area = A \times Capacity^{B}$$

During the WCSA study, an extensive evaluation was undertaken to determine the values of the A and B coefficients for the dummy dams and these coefficients have been accepted for the purposes of this study. Based on the aforementioned procedure, a total farm dam volume of 96 Mm^3 was estimated for the Peripheral Rivers catchments. The Diep River and Eerste River catchments have the largest farm dam volume followed by the Palmiet, Lourens and Riviersonderend catchments respectively. There are no farm dams in the Steenbras catchment.

4.6 Winter filling of farm dams

Similar to the Berg and the Upper Breede catchments, irrigation in the Peripheral Rivers is normally dependent on farm dams and it is unlikely that irrigators would not fill their farm dams with direct abstractions from nearby rivers during winter. Based on this assumption, a method for calculating the probable winter transfer volumes was implemented. This method was based on the approach used in the WCSA and involved the following steps:

- Preliminary hydrological sub-system simulation and calibration without consideration of winter filling of farm dams.
- Analysis of simulated farm dam volume trajectories in each calibration catchment over the winter months (May to September) and the subsequent calculation of volumes required for transfer to fill the farm dams to their full supply capacities.
- Preparation of river flow abstraction time series for farm dam filling.
- Final calibration of the Pitman model parameters considering the effects of the winter abstractions to fill farm dams.

4.7 Subcatchment configuration in the WRSM2000 model

Each of the 17 calibration subcatchments in the Peripheral Rivers was configured in the WRSM2000 model. Each subcatchment has the same basic structure consisting of modules linked together to form a network, comprising *inter alia* a runoff-producing module, channels, farm dams and irrigation modules. Irrigation areas and farm dam areas are lumped together to make up one representative irrigation and reservoir module respectively in each network. Afforestation and alien vegetation areas are included in the runoff module as a streamflow reduction activity. Rainfall and evaporation inputs are included in each module and values for the Pitman calibration parameters are input to the runoff module.

4.8 Calibration of the Pitman model

During the calibration process the main aim is to produce monthly simulated flow records which are representative of the observed flow records. Quantification of this goodness-of-fit is then based on the calculation of a set of pre-defined Objective Functions for the simulated record for comparison with those calculated for the observed flow record. For this study the objective functions are as defined in Table 4.2.

Table 4.2: Objective functions used for Pitman calibrations

Objective Function	Limit of acceptability
Mean annual runoff (MAR)	< 4%
Standard deviation (SD) of annual flows	< 6%
Mean log annual runoff	< 4%
Standard deviation of logs of annual flows	<6%
Time series	As similar as possible
Seasonal distribution	As similar as possible
Storage vs. yield	As similar as possible
Cumulative frequency	As similar as possible

4.8.1 Definition of Pitman parameters

Table 4.3 lists a brief description of the Pitman parameters that are available for calibration as well as the relative effects that the adjustment of the parameter would have on the simulated runoff.

4.8.2 Pitman calibration process

The procedure used for calibrating the simulated flows in the Pitman model was as follows:

i) Pitman parameters from either the WCSA or the VAFS were used as the starting Pitman parameter set and the simulated runoff was then compared to the observed flows based on the goodness-of-fit criteria listed in Table 4.2.

ii) Once a preliminary calibration was obtained, the irrigation areas in each calibration catchment were reduced by a percentage based on the proportion of the demand satisfied by groundwater abstractions in that catchment. Groundwater use for irrigation purposes in each catchment was based on the National Groundwater Database (NGDB), supplemented with data from the DWAF WARMS database (DWAF, 2007d).

iii) Following the adjustment for groundwater use in the catchment, a defined inflow representing estimates of the groundwater baseflow component was added to the catchment flows. This inflow was obtained from the GRDM database on a quaternary catchment scale as an annual average value, which was then disaggregated into 12 equal monthly values. These quaternary based GRDM inflows were adjusted proportionally for calibration catchment areas.

iv) The final addition to the calibration networks was the input of volumes required to fill the farm dams in winter as described in Section 4.6.
v) The Pitman parameters were then adjusted slightly in order to obtain the final calibration that is presented in Section 5.

The effect of this approach is that the Pitman parameters are devoid of the influence of the long-term groundwater contributions from the large regional aquifers, such as the Table Mountain Group (TMG).

Table 4.3: Description of Pitman parameters and predicted effects of parameter adjustments on simulated flows

Pitman Parameters		Effect on simulated flow of increasing parameter		
Name	**Description**	**MAR**	**SD**	**SI**
Zmin	Minimum absorption rate (mm/month)	Down	Up*	Up*
Zmax	Maximum absorption rate (mm/month)	Down	Down*	Down*
POW	Power of the runoff vs. soil moisture capacity	Down	Up	Up
TL	Time lag of Runoff (months)	None	None	Down
ST	Maximum soil moisture capacity (mm)	Down	Down	Down
FT	Runoff rate from soil when soil moisture is at full capacity (mm/month)	Up	Down	Down
R	Controls rate at which evaporation reduces as soil moisture is depleted (Coefficient in the evaporation-soil moisture equation)	Up		Down
GW	Maximum groundwater runoff (mm/month)	None	Down	Down
GL	Lag of subsurface flow in the lower zone (months)	None	Down	Down
SL	Soil moisture state below which no runoff occurs (mm)	Down	Up	Up
PI	Interception storage (mm)	Down	Up	Up

*Effect uncertain when Zmin and Zmax are used in conjunction with a non-zero value of FT

4.9 Naturalised runoff sequences

A subcatchment configuration in which the Pitman parameters have been calibrated enables the simulation of naturalised flows from the catchment at the calibration gauge for the period 1927 to 2004, assuming all demands on the system are ignored.

The observed flow record is naturalised by adding back the simulated demands and abstractions that were met in the simulation for the period of observed flow record. These include:

- Irrigation demand met by farm dams,
- Evaporation from farm dams,
- Irrigation demands met from run-of-river abstractions,
- Abstraction (urban and other specified flows),
- Afforestation and IAP streamflow reductions,
- Appropriate adjustments for inter-basin transfers.

Naturalised flows for each calibration subcatchment in the Peripheral Rivers catchments are included in Appendix D.

5 CALIBRATION RESULTS: DIEP RIVER CATCHMENT

5.1 G2H012: Diep River at Malmesbury

5.1.1 Subcatchment data

For a detailed assessment of land and water use in the Diep River catchment, the reader is referred to a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 5.1 presents a summary of the catchment data for the subcatchment G2H012 and detailed information is summarised in Table 5.2. Figure 5.1 shows detailed maps of the catchment.

Table 5.1: Summary of information for G2H012

G2H012	
Subcatchment area (km^2)	245.8
Above farm dams	24.6
Below farm dams	221.2
Forestry area (km^2)	0.0
Alien vegetation condensed area (km^2)	0.2
Irrigation Area (km^2)	7.2
From farm dams	1.4
From river	5.8
Farm dams: Area (km^2) / Volume (Mm^3)	2.1 / 2.4
Subcatchment MAP (mm)	546
Total GW contribution from baseflow (Mm^3)	2.0
Calibration period (Hydrological years)	1964 - 2004
Observed MAR for calibration period (Mm^3)	10.4
Patched observed MAR for calibration period (Mm^3)	11.1
Simulated MAR for calibration period (Mm^3)	11.1
Naturalised MAR (1927-2004) (Mm^3)	11.6
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	13.6
Naturalised runoff coefficient	10%

Table 5.2: Detailed catchment information for G2H012

APPENDIX	CONTENTS	FORMAT
A1	Hydrological information for model calibration	Table
B1	Catchment Rainfall File	Monthly time series
C1	Patched observed flow record (G2H012)	Monthly time series
D1	Naturalised flow sequence	Monthly time series

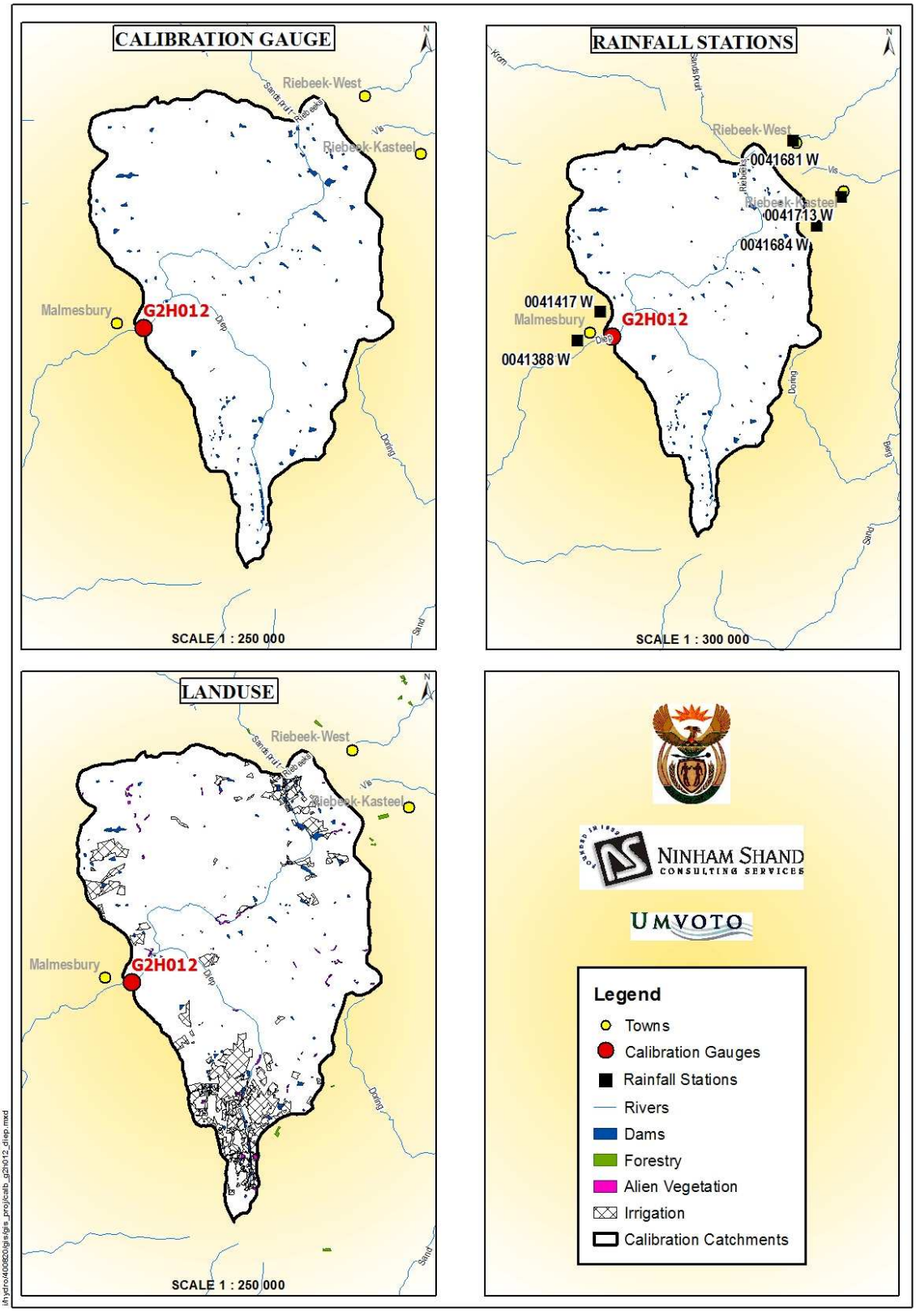


Figure 5.1: G2H012 Subcatchment hydrology information

5.1.2 Model configuration

Figure 5.2 shows the model configuration for subcatchment G2H012. There are no imports or exports of water in this catchment. The winter filling of farm dams was modelled although the volumes required to fill the farm dams were very small. The total groundwater contribution to baseflow in this catchment is estimated to be 1.95 Mm^3/a.

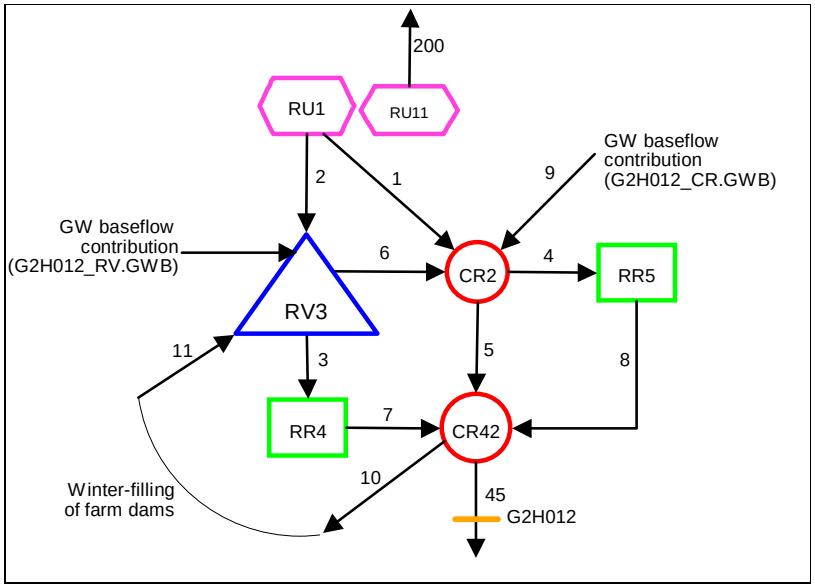


Figure 5.2: G2H012 Subcatchment Configuration

5.1.3 Evaluation and preparation of flow sequences

Detailed information for the flow gauge at G2H012 is presented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for G2H012 is shown in Appendix C1.

5.1.4 Calibration (1964 - 2004)

The observed flows at G2H012 were simulated for the period 1964-2004. Details of the rainfall stations used to generate catchment rainfall for G2H012 are shown in Table 5.3. The updated MAP for this catchment is estimated to be 546 mm compared to 518 mm in the WCSA (DWAF, 1994).

Table 5.3: Rainfall stations for calibration at G2H012

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
041388w	366	1993-2004	11
041417w	463	1927-2000	73
041681w	577	1969-1997	28
041684w	688	1927-1964	37
041713w	660	1937-1982	45

The WCSA (DWAF, 1994b) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters for G2H012 are shown in Table 5.4 and Table 5.5 displays the patched observed and simulated statistics for G2H012.

Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 5.3.

Table 5.4: G2H012 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	285	5	0	85	500	1.5	0.2	0	0

Table 5.5: G2H012 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	11.1	11.1	0.2%
Mean (Log)	0.8	0.9	9.5%
Std Dev	11.6	12.0	3.8%
Std Dev (Log)	0.5	0.3	-31.2%
Seasonal Index	56.6	50.5	-10.8%

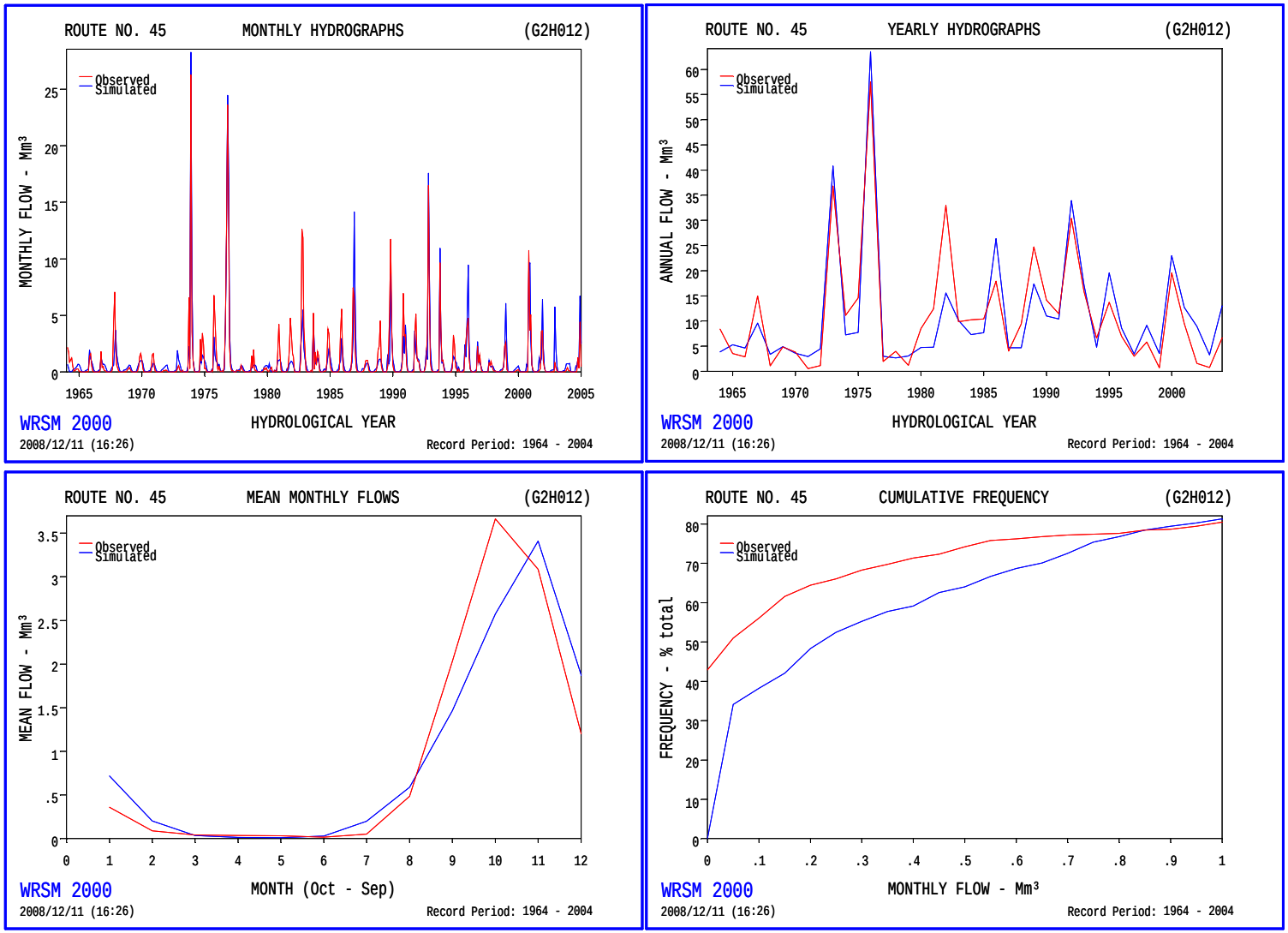


Figure 5.3: G2H012 Calibration Results (Graphical Comparison)

5.2 G2H013 : Mosselbank River at Klipheuwel

5.2.1 Subcatchment data

Land use in the Diep catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 5.6 presents a summary of the catchment data for the subcatchment G2H013 and detailed information is summarised in Table 5.7. Figure 5.4 shows detailed maps of the catchment.

Table 5.6: Summary of information for G2H013

G2H013	
Subcatchment area (km^2)	471.5
Above farm dams	117.9
Below farm dams	353.6
Forestry area (km^2)	0.0
Alien vegetation condensed area (km^2)	0.8
Irrigation Area (km^2)	64.1
From farm dams	42.3
From river	21.7
Farm dams: Area (km^2) / Volume (Mm^3)	5.4 / 25.6
Subcatchment MAP (mm)	521
Total GW contribution from baseflow (Mm^3)	3.3
Calibration period (Hydrological years)	1965 – 1985
Observed MAR for calibration period (Mm^3)	19.9
Patched observed MAR for calibration period (Mm^3)	20.5
Simulated MAR for calibration period (Mm^3)	20.6
Naturalised MAR (1927-2004) (Mm^3)	27.1
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	30.4
Naturalised runoff coefficient	12%

Table 5.7: Detailed catchment information for G2H013

APPENDIX	CONTENTS	FORMAT
A2	Hydrological information for model calibration	Table
B2	Catchment rainfall file	Monthly time series
C2	Patched observed flow record (G2H013)	Monthly time series
D2	Naturalised flow sequence	Monthly time series

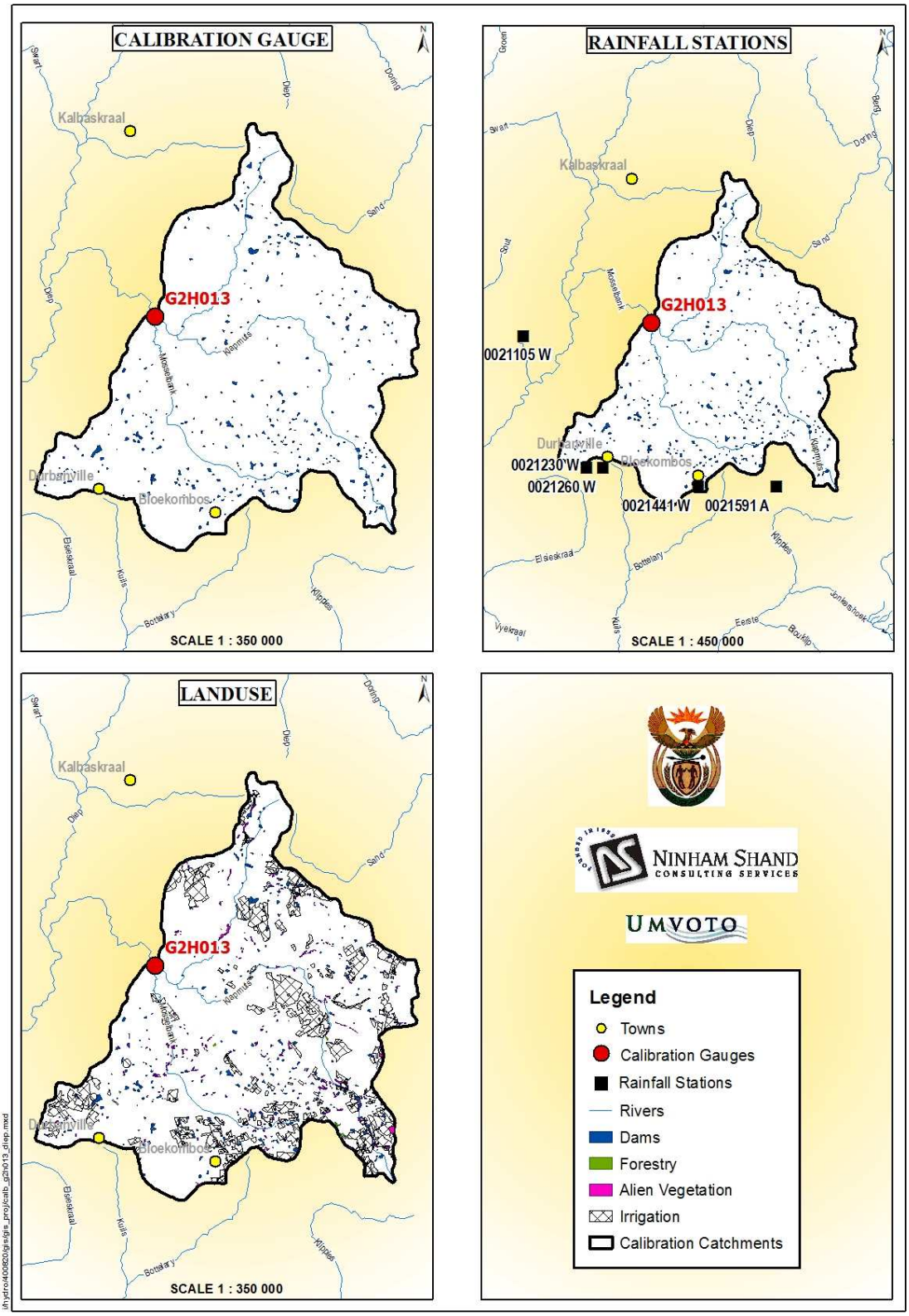


Figure 5.4: G2H013 Subcatchment hydrology information

5.2.2 Model configuration

The subcatchment configuration for G2H013 is shown in Figure 5.5. There are no transfers into or exports from the catchment, and as with the original configuration undertaken as part of the WCSA study, the catchment was again divided into a portion contributing runoff directly into farm dams and a portion downstream of the farm dams. The winter filling of farm dams was accounted for in the exercise. The total groundwater contribution to baseflow in this catchment is estimated to be 3.32 Mm^3/a.

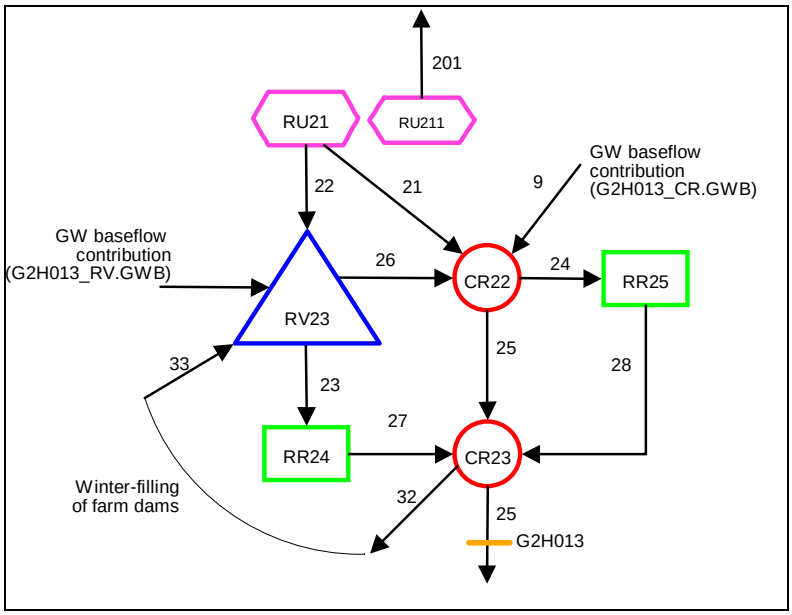


Figure 5.5: G2H013 Subcatchment Configuration

5.2.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for G2H013 is shown in Appendix C2.

5.2.4 Calibration (1965 - 1985)

Flows at G2H013 were simulated for the period 1965-1985. Details of the rainfall stations used to generate catchment rainfall for G2H013 are shown in Table 5.8. In the current study, the MAP surface was updated and therefore a new MAP value of 521 mm was used to calibrate flows at G2H013. An MAP value of 544 mm was used in the WCSA (DWAF, 1994b).

Table 5.8: Rainfall stations for calibration at G2H013

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
021441w	529	1927-1977	50
021591a	596	1963-1986	23
021105w	464	1967-1989	22
021230w	589	1927-2004	77
021260w	600	1927-1992	65

The WCSA (DWAF, 1994b) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 5.9 and Table 5.10 displays the patched observed and simulated statistics for G2H013. Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 5.6.

Table 5.9: G2H013 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	220	5	0	40	500	1.5	0	0	0

Table 5.10: G2H013 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	20.5	20.6	0.5%
Mean (Log)	0.9	1.1	15.2%
Std Dev	24.6	24.6	0.3%
Std Dev (Log)	0.7	0.4	-31.8%
Seasonal Index	55.9	57.8	3.4%

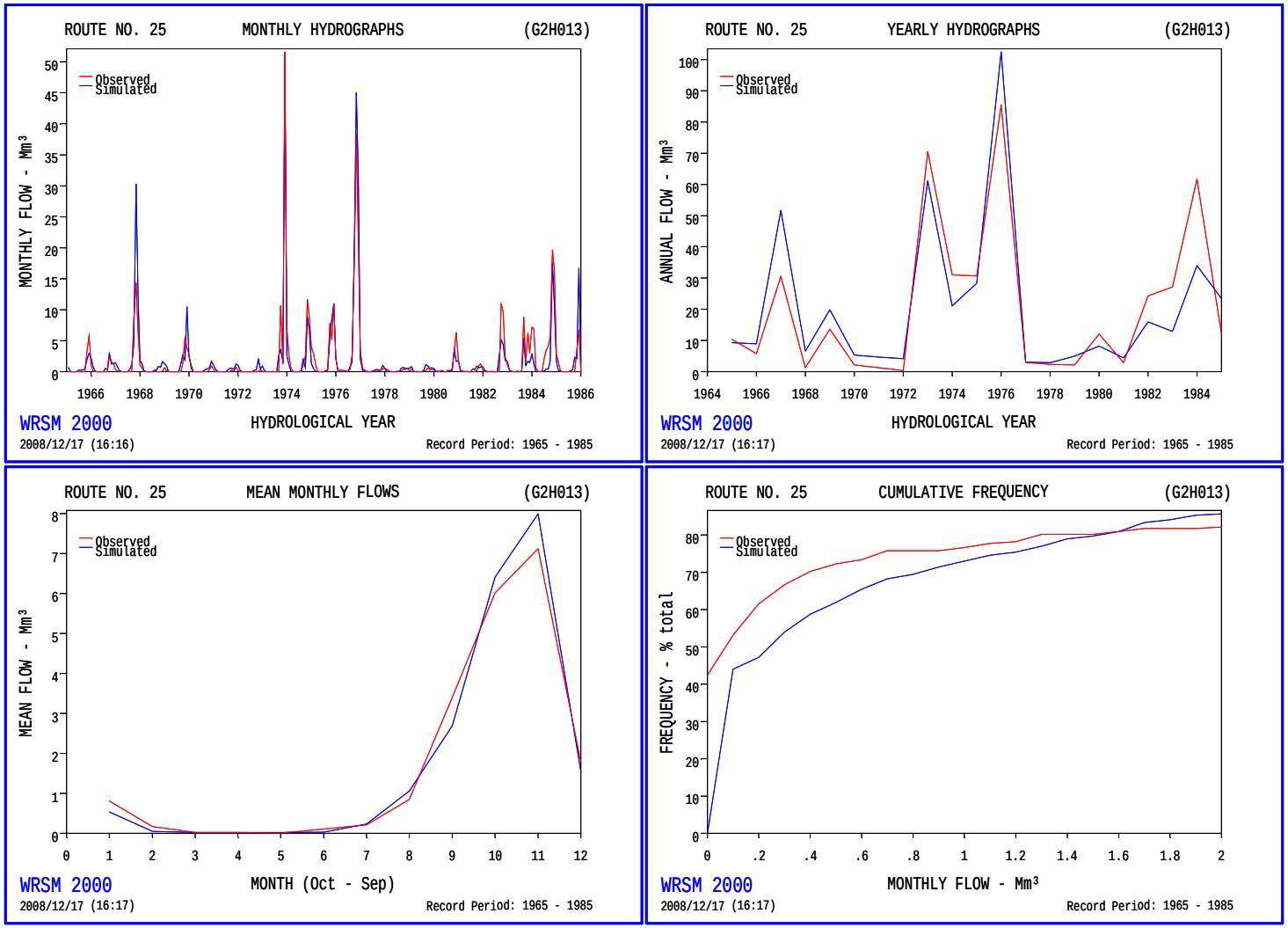


Figure 5.6: G2H013 Calibration Results (Graphical Comparison)

5.3 G2H042: Diep River at Vissershok

5.3.1 Subcatchment data

Land use in the Diep River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 5.11 presents a summary of the catchment data for the incremental subcatchment G2H042 and detailed information is summarised in Table 5.12. Figure 5.7 shows detailed maps of the catchment.

Table 5.11: Summary of information for incremental subcatchment G2H042

G2H042	
Incremental subcatchment area (km^2)	586.6
Above farm dams	203.3
Below farm dams	383.3
Forestry area (km^2)	0.0
Alien vegetation condensed area (km^2)	1.3
Irrigation Area (km^2)	36.4
From farm dams	23.7
From river	12.8
Farm dams: Area (km^2) / Volume (Mm^3)	2.8 / 7.4
Subcatchment MAP (mm)	369
Total GW contribution to baseflow (Mm^3)	0.6
Calibration period (Hydrological years)	1998 – 2004
Observed MAR for calibration period (Mm^3)	36.7
Patched observed MAR for calibration period (Mm^3)	39.4
Simulated incremental MAR for calibration period (Mm^3)	39.5
Naturalised incremental MAR (1927-2004) (Mm^3)	24.4
Naturalised incremental MAR including GW baseflow (1927-2004) (Mm^3)	25.0
Naturalised cumulative MAR (1927-2004) (Mm^3)	63.0
Naturalised runoff coefficient	12%

Table 5.12: Detailed catchment information for G2H042

APPENDIX	CONTENTS	FORMAT
A4	Hydrological information for model calibration	Table
B4	Catchment Rainfall File	Monthly time series
C4	Patched observed flow record (G2H042)	Monthly time series
D4	Naturalised flow sequence	Monthly time series

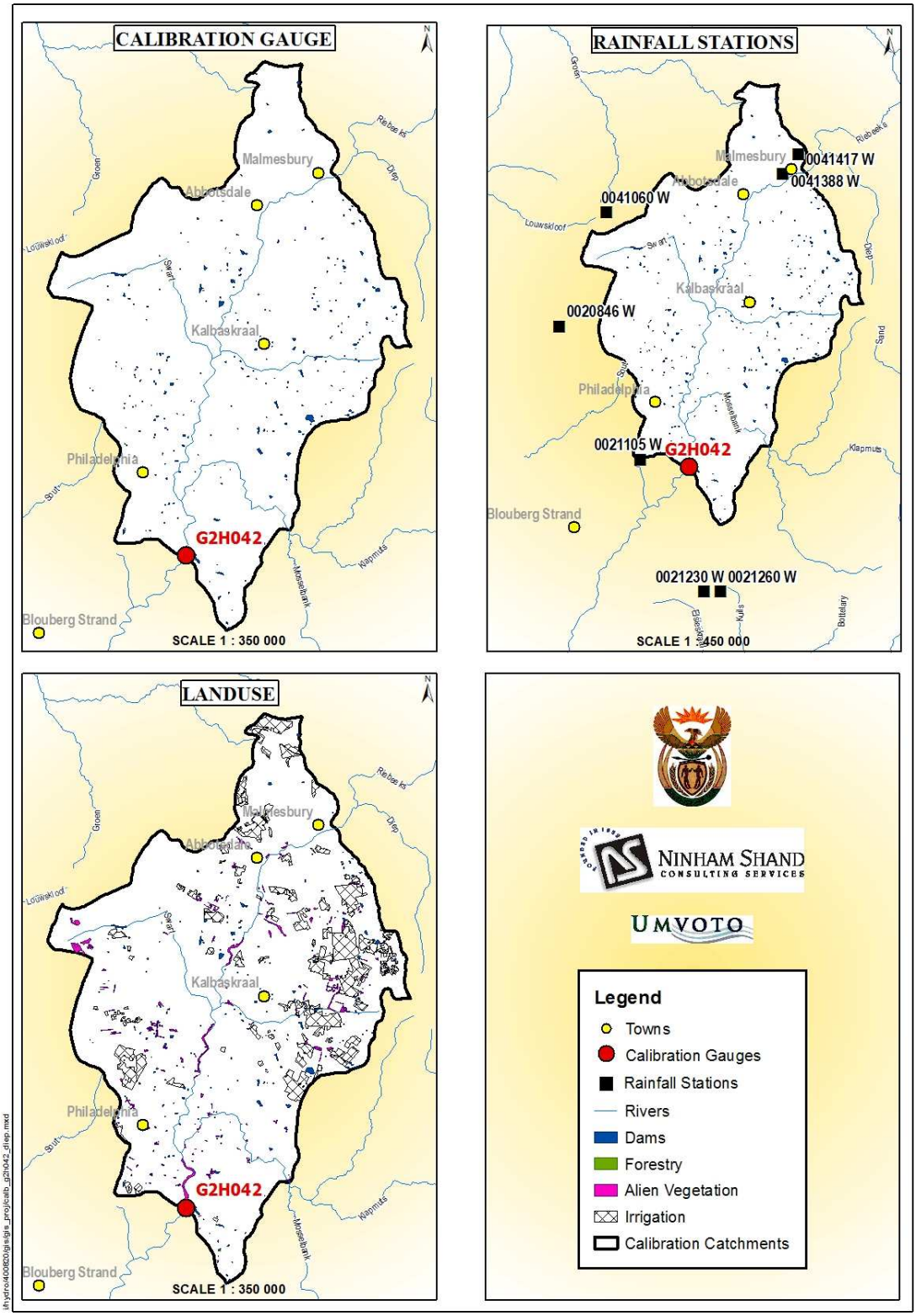


Figure 5.7: G2H042 Subcatchment hydrology information

5.3.2 Model configuration

Figure 5.8 shows the model configuration for subcatchment G2H042. An attempt was made to calibrate the flows at this gauge on an incremental basis, but this was unsuccessful because the available observed record at G2H042 (1998 – 2004) did not overlap with the observed flow record at G2H013 (1965 – 1985). Instead, a cumulative calibration using the patched observed flow record at gauging station G2H012 and a simulated flow record at gauging station G2H013 as inflows was undertaken. There are no transfers of water into or out of the catchment and it was divided into an area which contributed runoff upstream of the farm dams and a portion which contributed runoff downstream of the farm dams. .

The total groundwater contribution to baseflow in this catchment is estimated to be 0.6 Mm^3/a. Winter filling of farm dams is taken into consideration.

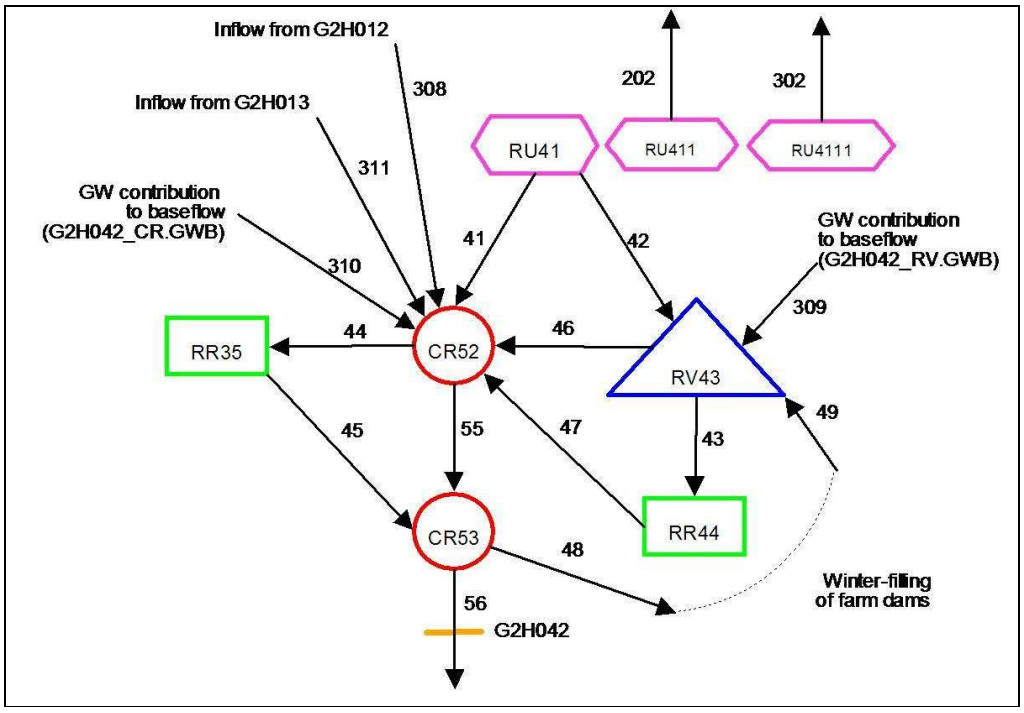


Figure 5.8: G2H042 Subcatchment Configuration

5.3.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record at G2H042 for the period 1998-2004 is included in Appendix C4.

5.3.4 Calibration (1998 - 2004)

Flows at G2H042 were simulated for the period 1998-2004. Details of the rainfall stations used to generate catchment rainfall for G2H042 are shown in Table 5.13. The MAP for this catchment is estimated to be 369 mm.

Table 5.13: Rainfall stations for calibration at G2H042

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
020846w	451	1979 - 2004	25
021105w	564	1967-1989	22
021230w	589	1927-2004	77
021260w	600	1927-1992	65
041060w	559	1927 – 1975	48
041388w	366	1993 - 2004	11
041417w	463	1927 – 2000	73

The WCSA (DWAF, 1994b) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 5.14 and Table 5.15 displays the patched observed and simulated statistics for G2H042. Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 5.9.

Table 5.14: G2H042 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	230	24	0	60	475	1.5	0	0	0

Table 5.15: G2H042 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	39.4	39.5	0.2%
Mean (Log)	1.4	1.5	1.8%
Std Dev	35.1	38.4	9.4%
Std Dev (Log)	0.4	0.3	-16.2%
Seasonal Index	61.6	64.3	4.3%

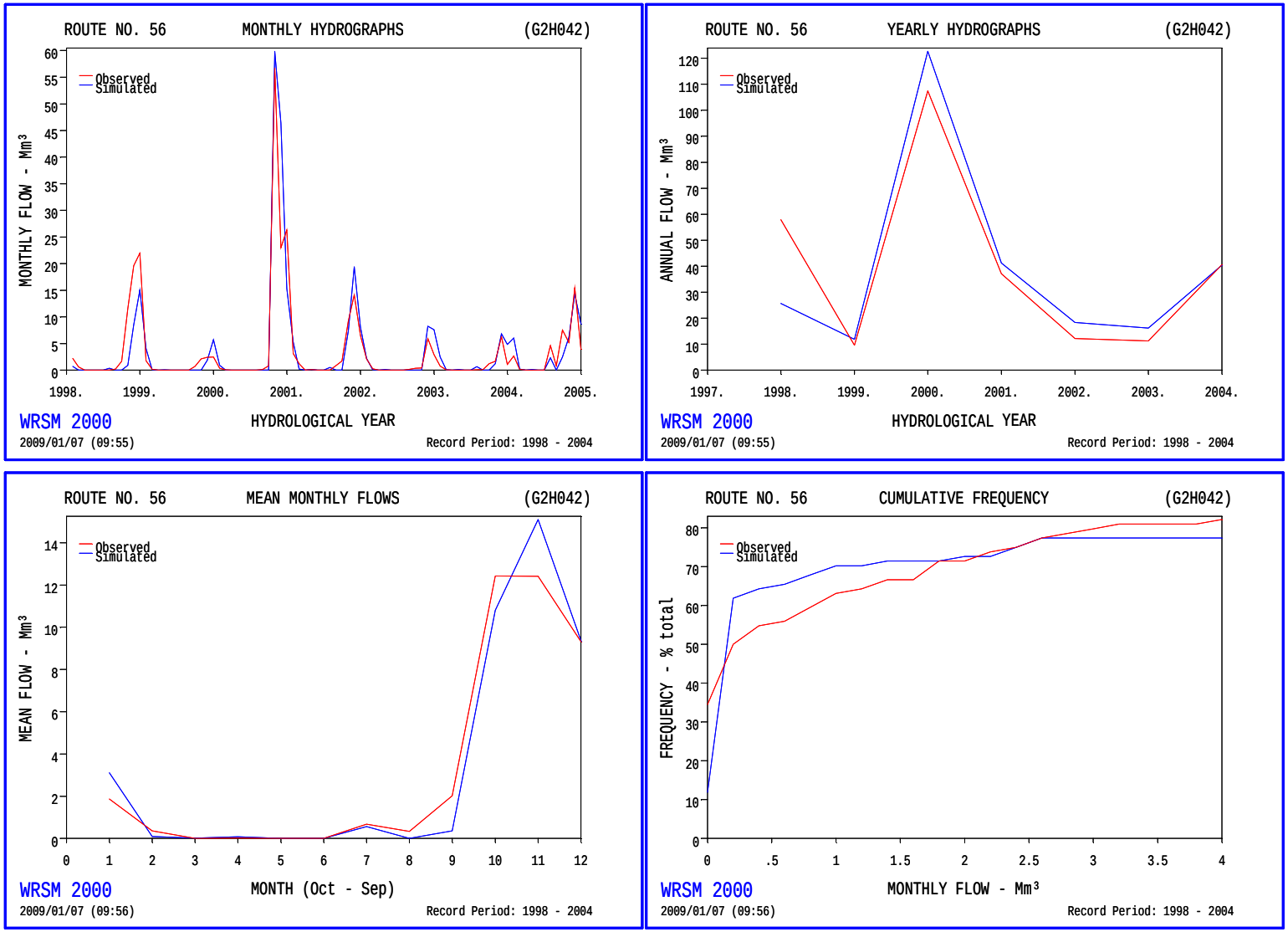


Figure 5.9: G2H042 Calibration Results (Graphical Comparison)

5.4 G2H014: Diep River at Adderley

5.4.1 Subcatchment data

Land use in the Diep River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 5.16 presents a summary of the catchment data for the incremental subcatchment G2H014 and detailed information is summarised in Table 5.17. Figure 5.10 shows detailed maps of the catchment.

Table 5.16: Summary of information for incremental subcatchment G2H014

G2H014	
Incremental subcatchment area (km^2)	87.9
Above farm dams	43.9
Below farm dams	43.9
Forestry area (km^2)	0.0
Alien vegetation condensed area (km^2)	0.0
Irrigation Area (km^2): From farm dams	1.5
Farm dams: Area (km^2) / Volume (Mm^3)	0.53 / 0.28
Subcatchment MAP (mm)	350
Total GW contribution to baseflow (Mm^3)	0.9
Calibration period (Hydrological years)	1966 – 1981
Observed MAR for calibration period (Mm^3)	39.6
Patched observed MAR for calibration period (Mm^3)	44.6
Simulated MAR for calibration period (Mm^3)	50.1
Naturalised incremental MAR (1927-2004) (Mm^3)	0.1
Naturalised incremental MAR including GW baseflow (1927-2004) (Mm^3)	1.0
Naturalised cumulative MAR (1927-2004) (Mm^3)	63.2
Naturalised runoff coefficient	3%

Table 5.17: Detailed catchment information for G2H014

APPENDIX	CONTENTS	FORMAT
A3	Hydrological information for model calibration	Table
B3	Catchment Rainfall File	Monthly time series
C3	Patched observed flow record (G2H014)	Monthly time series
D3	Naturalised flow sequence	Monthly time series

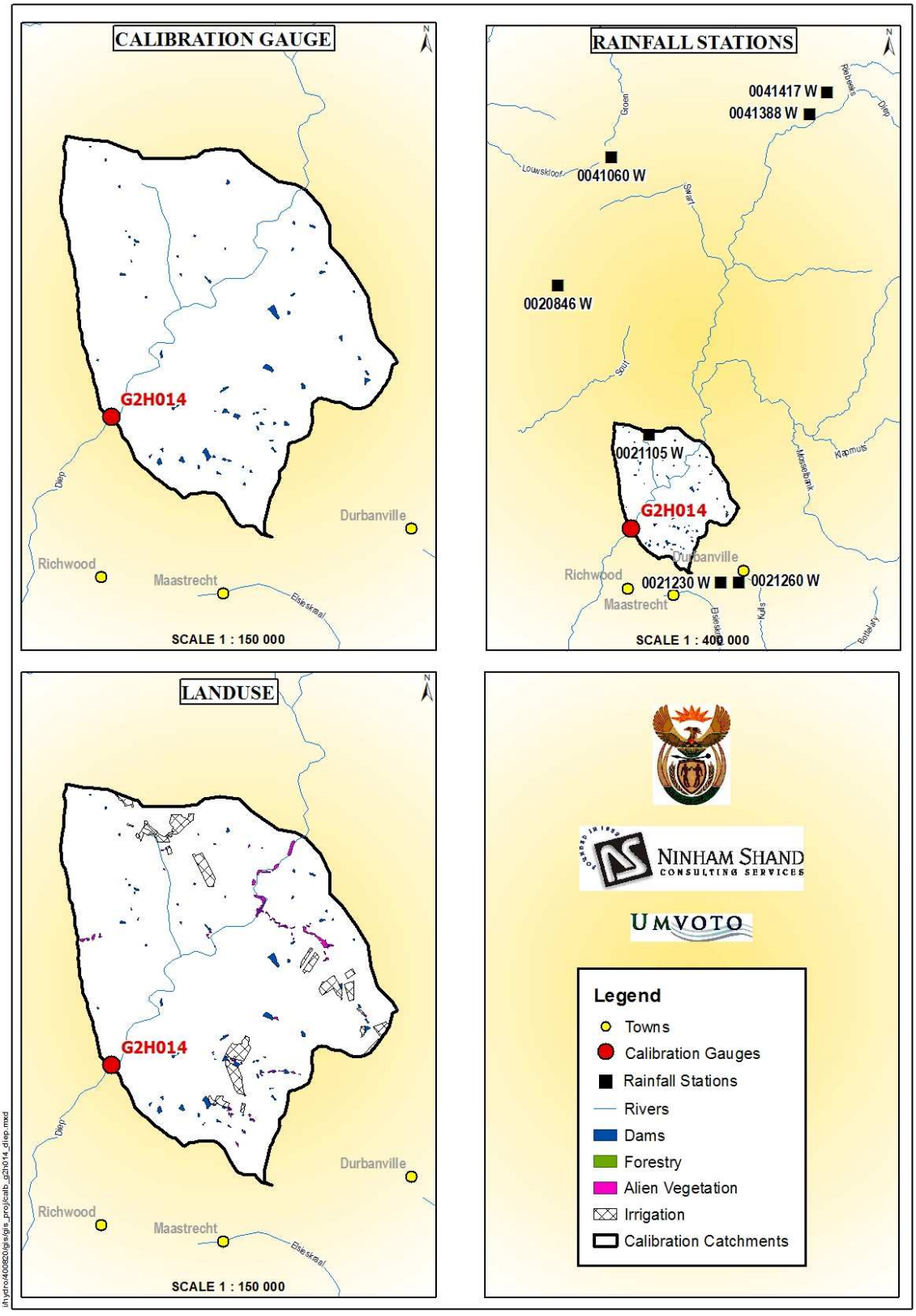


Figure 5.10: G2H014 Subcatchment hydrology information

5.4.2 Model configuration

Figure 5.11 shows the model configuration for subcatchment G2H014. There are no imports into or exports from the catchment. The total groundwater contribution to baseflow in this catchment is estimated to be 0.9 Mm^3/a. The only major land use in this subcatchment is irrigation. In the WCSA, subcatchment G2H014 was modelled on a cumulative basis because a large proportion of the flow record at gauging station G2H014 was missing and subtracting the observed flows at gauging stations G2H012 and G2H013 from this observed record would have resulted in an even shorter period that could be used for the calibration. Additionally, in this study, the observed record at gauging station G2H042 immediately upstream (1998-2005) did not overlap with the available observed record at gauging station G2H014 (1966 – 1982). A cumulative calibration was therefore completed by using the cumulative monthly simulated flows at G2H042 for the period 1966 to 1982.

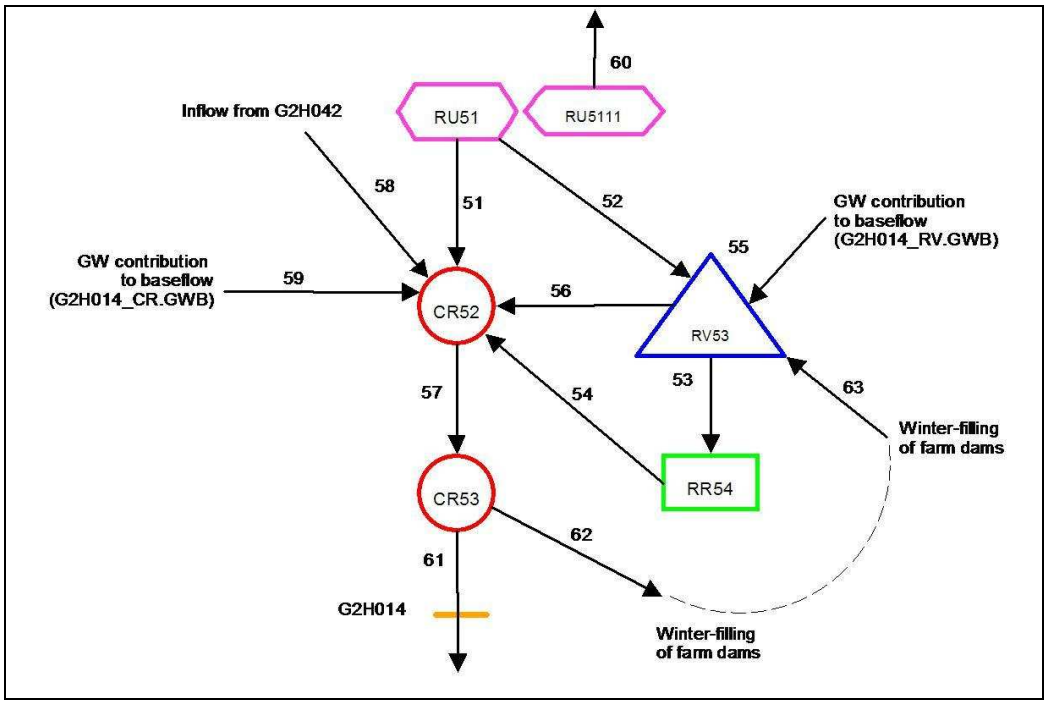


Figure 5.11: G2H014 Subcatchment Configuration

5.4.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for G2H014 is shown in Appendix C3.

5.4.4 Calibration (1966 - 1982)

Flows at G2H014 were simulated for the period 1966-1982. Details of the rainfall stations used to generate catchment rainfall for G2H014 are shown in Table 5.18. The MAP for this incremental catchment is estimated to be 350 mm compared to 477 mm that was used for the incremental catchment between gauging stations G2H012, G2H013 and G2H014 in the WCSA (DWAF, 1993).

Table 5.18: Rainfall stations for calibration at G2H014

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
020846w	451	1979-2004	25
021105w	564	1967-1989	22
021230w	589	1927-2004	77
021260w	600	1927-1992	65
041060w	559	1927-1975	48
041388w	366	1993-2004	11
041417w	463	1927-2000	73

The WCSA (DWAF, 1994b) Pitman parameters for subcatchment G2H014 were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The simulated flows at this flow gauge were strongly influenced by the upstream flow inputs and as a result, a poor calibration was obtained for this subcatchment. The final Pitman parameters are shown in Table 5.19 and Table 5.20 displays the patched observed and simulated statistics for G2H014. Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 5.12.

Table 5.19: G2H014 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	500	1	0	100	750	1.5	0	0	0

Table 5.20: G2H014 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	44.6	50.1	12.3%
Mean (Log)	1.3	1.5	13.7%
Std Dev	53.1	56.7	6.9%
Std Dev (Log)	0.6	0.4	-35.0%
Seasonal Index	56.6	54.4	-3.9%

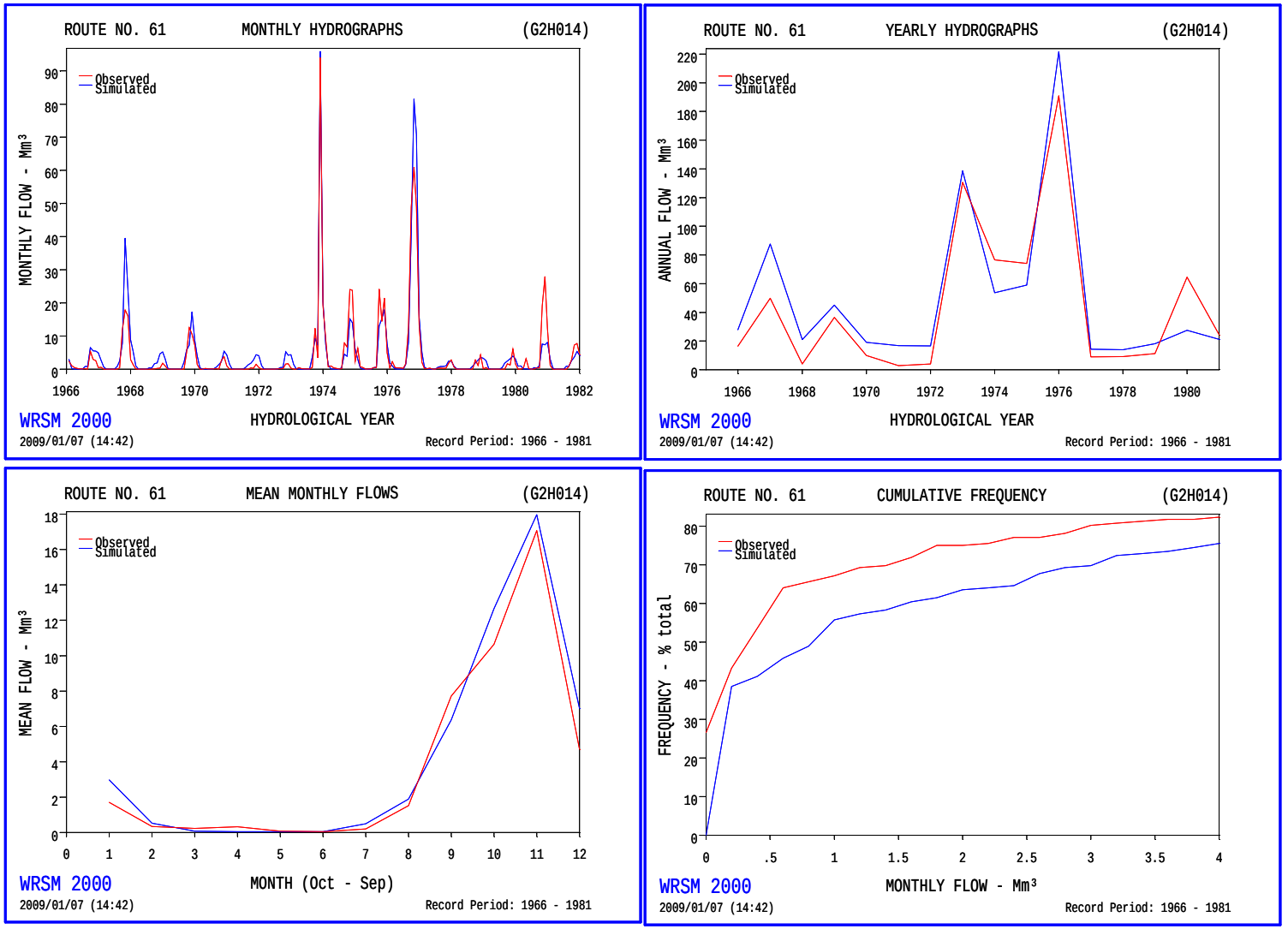


Figure 5.12: G2H014 Calibration Results (Graphical Comparison)

6 CALIBRATION RESULTS: EERSTE AND LOURENS CATCHMENTS

6.1 G2H037: Jonkershoek River at Kleinplaas

6.1.1 Subcatchment data

Land and water use in the Eerste River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 6.1 presents a summary of the catchment data for the subcatchment G2H037 and detailed information are summarised in Table 6.2. Figure 6.1 shows detailed maps of the catchment.

Table 6.1: Summary of information for G2H037

	G2H037
Subcatchment area (km^2)	24.0
Above farm dams	-
Below farm dams	24.0
Forestry area (km^2)	0.6
Alien vegetation condensed area (km^2)	0.2
Irrigation Area (km^2)	-
From farm dams	-
From river	-
Farm dams: Area (km^2) / Volume (Mm^3)	-
Subcatchment MAP (mm)	1900
Total GW contribution to baseflow (Mm^3)	1.0
Calibration period (Hydrological years)	1988-2004
Observed MAR for calibration period (Mm^3)	21.9
Patched observed MAR for calibration period (Mm^3)	22.3
Simulated MAR for calibration period (Mm^3)	22.3
Naturalised MAR (1927-2004) (Mm^3)	24.7
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	25.7
Naturalised runoff coefficient	56%

Table 6.2: Detailed catchment information for G2H037

APPENDIX	CONTENTS	FORMAT
A5	Hydrological information for model calibration (G2H005)	Table
A9	Hydrological information for model calibration (G2H037)	Table
B5	Catchment Rainfall File (G2H037)	Monthly time series
B6	Catchment Rainfall File (G2H005)	Monthly time series
C8	Patched observed flow record (G2H037)	Monthly time series
D5	Naturalised flow sequence (G2H005)	Monthly time series
D9	Naturalised flow sequence (G2H037)	Monthly time series

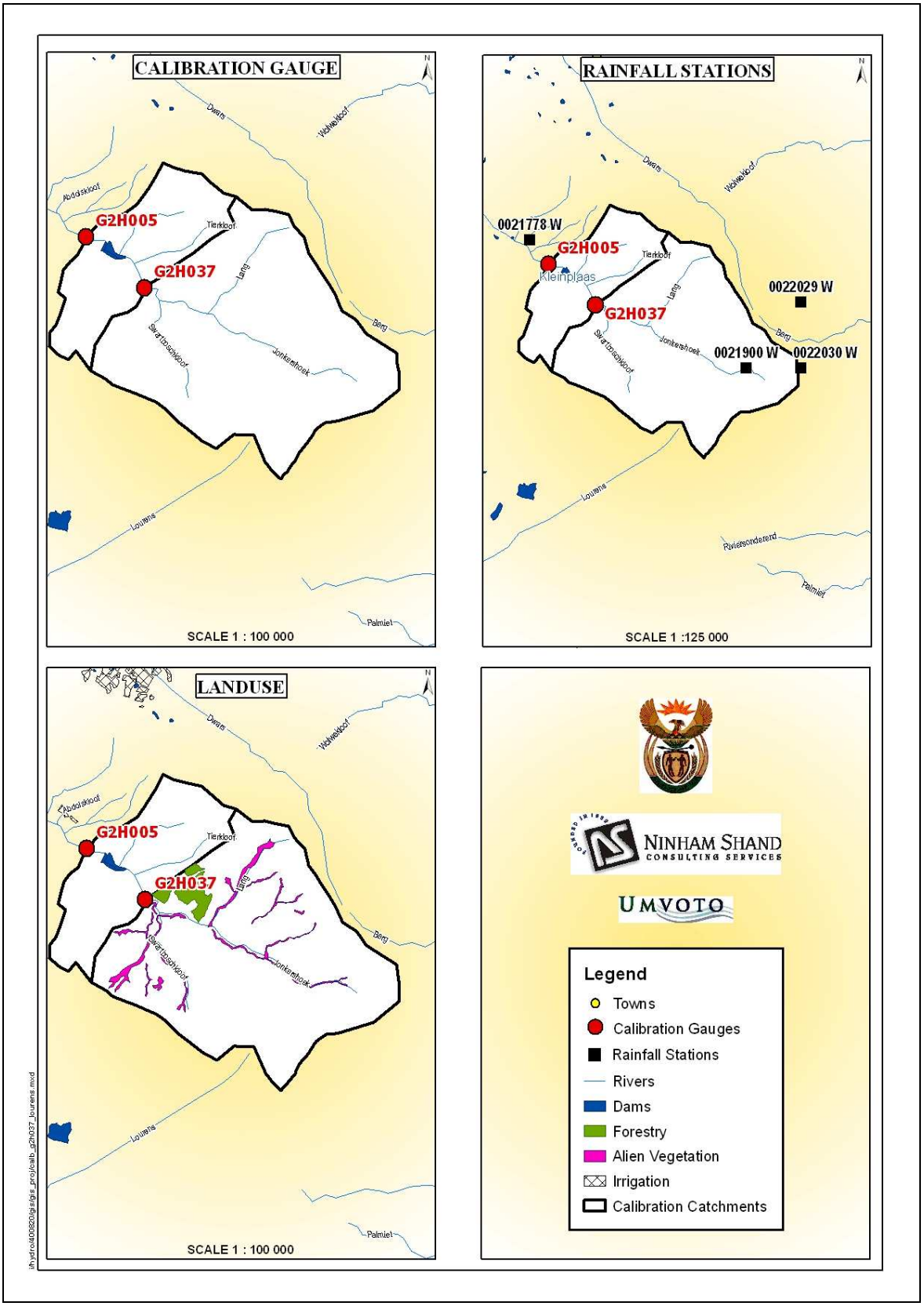


Figure 6.1: G2H037 Subcatchment hydrology information

6.1.2 Model configuration

Figure 6.2 shows the model configuration for subcatchment G2H037. This gauge was constructed as a replacement for gauge G2H008, which is located about 500 m upstream of G2H037. The catchment is located upstream of Kleinplaas Dam in the upper Jonkershoek Valley. There is an abstraction to Stellenbosch municipality upstream of the flow gauge. Kleinplaas Dam acts as a balancing dam for the inter-catchment transfer of water from Theewaterskloof Dam to the Cape Town basin via the Stellenboschberg and Jonkershoek tunnels. Another gauge, G2H005, is downstream of the dam and measures spills and compensation releases from the dam. The total groundwater contribution to baseflow in G2H037 is estimated to be 1.0 Mm^3/a.

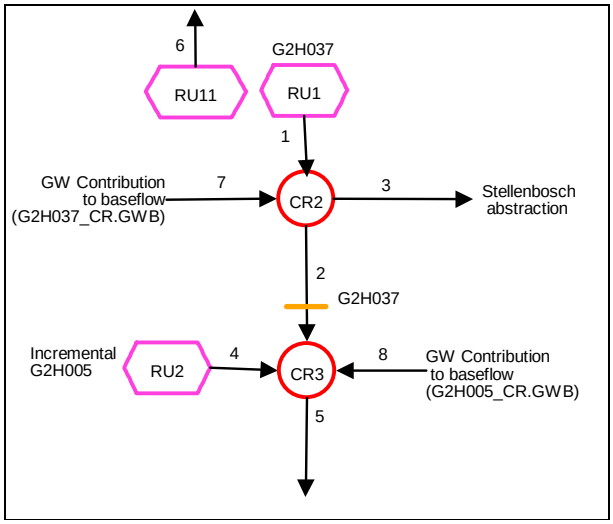


Figure 6.2: G2H037 Subcatchment Configuration

6.1.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for G2H037 is shown in Appendix C8.

6.1.4 Calibration (1988 - 2004)

Flows at G2H037 were simulated for the period 1988-2004. Details of the rainfall stations used to generate catchment rainfall for G2H037 are shown in Table 6.3. Gauge G2H037 had just opened at the time of the WCSA and therefore it was not included in that study. However, the flow gauge at G2H008, just upstream of G2H037, was calibrated during the WCSA and the hydrological information at these gauges could therefore be compared. The updated MAP for this catchment is estimated to be 2293 mm compared to 1900 mm in the WCSA (DWAF, 1993c). Although the updated MAP is higher than the MAP used in the WCSA, it is similar to the original MAP value from the CCWR (2239 mm). Using the final Pitman parameters obtained in the WCSA for G2H008, the simulated runoff in this catchment was 48% higher than the observed MAR. Attempts to reduce the MAR through changes to the Pitman parameters resulted in unrealistic deviations from the regional guidelines. It was therefore concluded that the updated MAP for G2H037 is too high and it was reduced to the final value of 1900 mm obtained in the WCSA.

Table 6.3: Rainfall stations for calibration at G2H037

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
021900w	2050	1971-1990	19
022029w	2060	1944-2004	60
022030w	2820	1971-2004	33
021778w	1076	1927-2004	77

The WCSA (DWAF, 1993c) final Pitman parameters for subcatchment G2H008 were used during the initial model calibration at flow gauge G2H037. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 6.4 and Table 6.5 displays the patched observed and simulated statistics for G2H037. Graphs showing the annual and monthly flows, the seasonal distribution, as well as the gross yield curve are also included in Figure 6.3.

Table 6.4: G2H037 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	340	15	0	50	650	1.5	0.15	0	0

Table 6.5: G2H037 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	22.3	22.3	0.0%
Mean (Log)	1.3	1.3	0.6%
Std Dev	7.1	5.4	-24.5%
Std Dev (Log)	0.1	0.1	-17.2%
Seasonal Index	37.5	45.4	20.8%

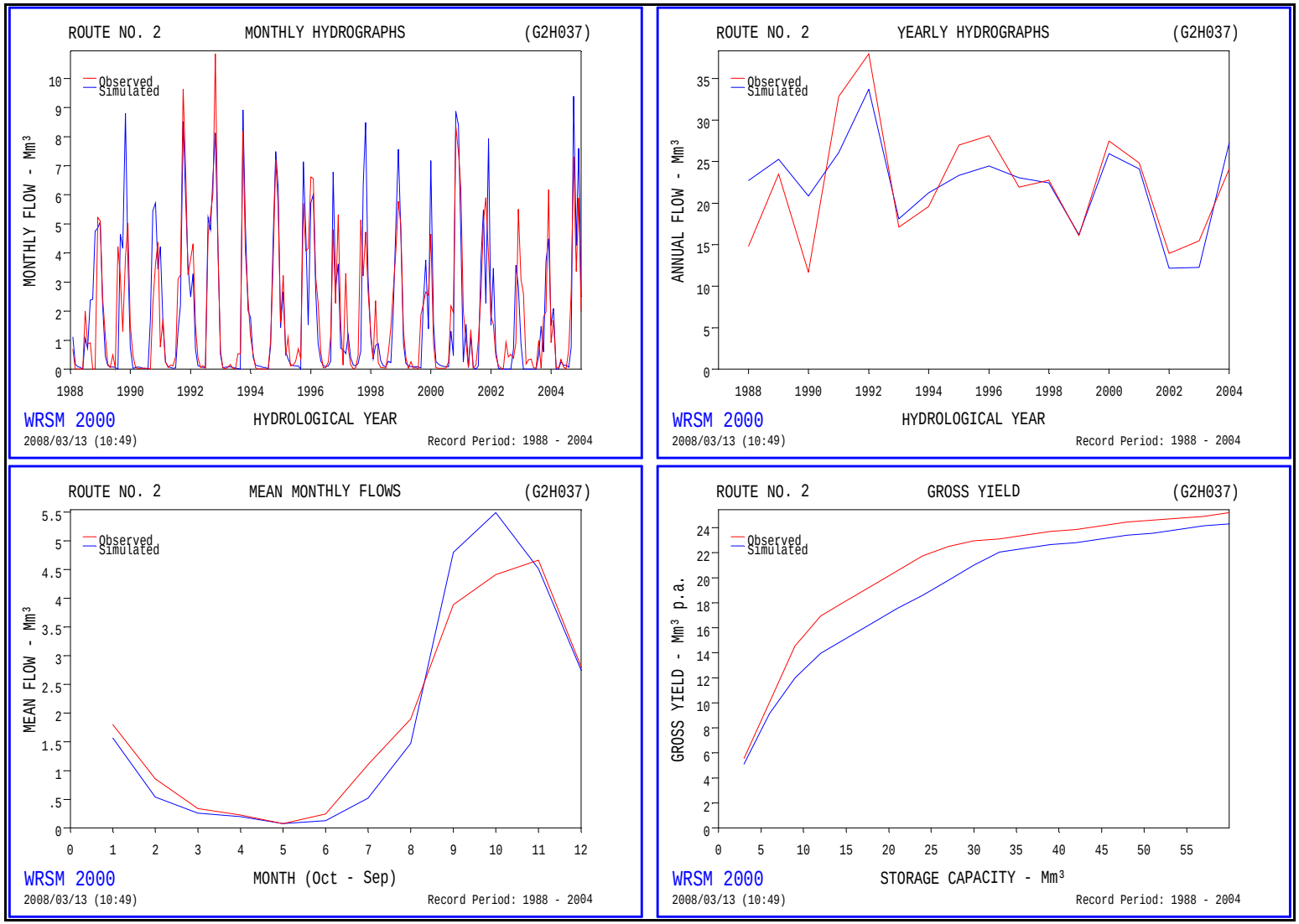


Figure 6.3: G2H037 Calibration Results (Graphical Comparison)

6.2 G2H020: Eerste River at Stellenbosch

6.2.1 Subcatchment data

Land and water use in the Eerste River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 6.6 presents a summary of the catchment data for the subcatchment G2H020 and detailed information are summarised in Table 6.7. Figure 6.4 shows detailed maps of the catchment. For the purpose of hydrological modelling, the catchment was divided into a High MAP and a Low MAP area.

Table 6.6: Summary of information for G2H020

G2H020	TOTAL	HIGH MAP	LOW MAP
Total upstream catchment area (km^2)	179.4	-	-
Incremental subcatchment area (km^2)	147.0	22.9	124.1
Above farm dams		2.1	72.5
Below farm dams		20.8	51.6
Forestry area (km^2)	7.4	3.8	3.6
Alien vegetation condensed area (km^2)	7.1	0.4	6.6
Irrigation Area (km^2)	44.6	0.7	43.9
From farm dams	37.8	0.5	37.3
From river	6.8	0.2	6.6
Farm dams: Area (km^2) / Volume (Mm^3)	2.3 / 12.2	0.1 / 0.04	2.2 / 12.1
Subcatchment MAP (mm)	873	1310	793
Total GW contribution to baseflow (Mm^3)	2.5		
Calibration period (Hydrological years)	1980-2004		
Observed cumulative MAR for calibration period (Mm^3)	36.8		
Observed incremental MAR for calibration period (Mm^3)	16.2		
Patched observed incremental MAR for calibration period (Mm^3)	21.0		
Simulated incremental MAR for calibration period (Mm^3)	20.8		
Naturalised incremental MAR (1927-2004) (Mm^3)	35.3	13.1	22.2
Naturalised incremental MAR (1927-2004) including GW baseflow (Mm^3)	37.8	13.5	24.3
Naturalised runoff coefficient	29%		

Table 6.7: Detailed catchment information for G2H020

APPENDIX	CONTENTS	FORMAT
A8	Hydrological information for model calibration	Table
B9	Catchment Rainfall File: High MAP	Monthly time series
B10	Catchment Rainfall File: Low MAP	Monthly time series
C7	Patched observed flow record (G2H020)	Monthly time series
D8	Naturalised flow sequence	Monthly time series

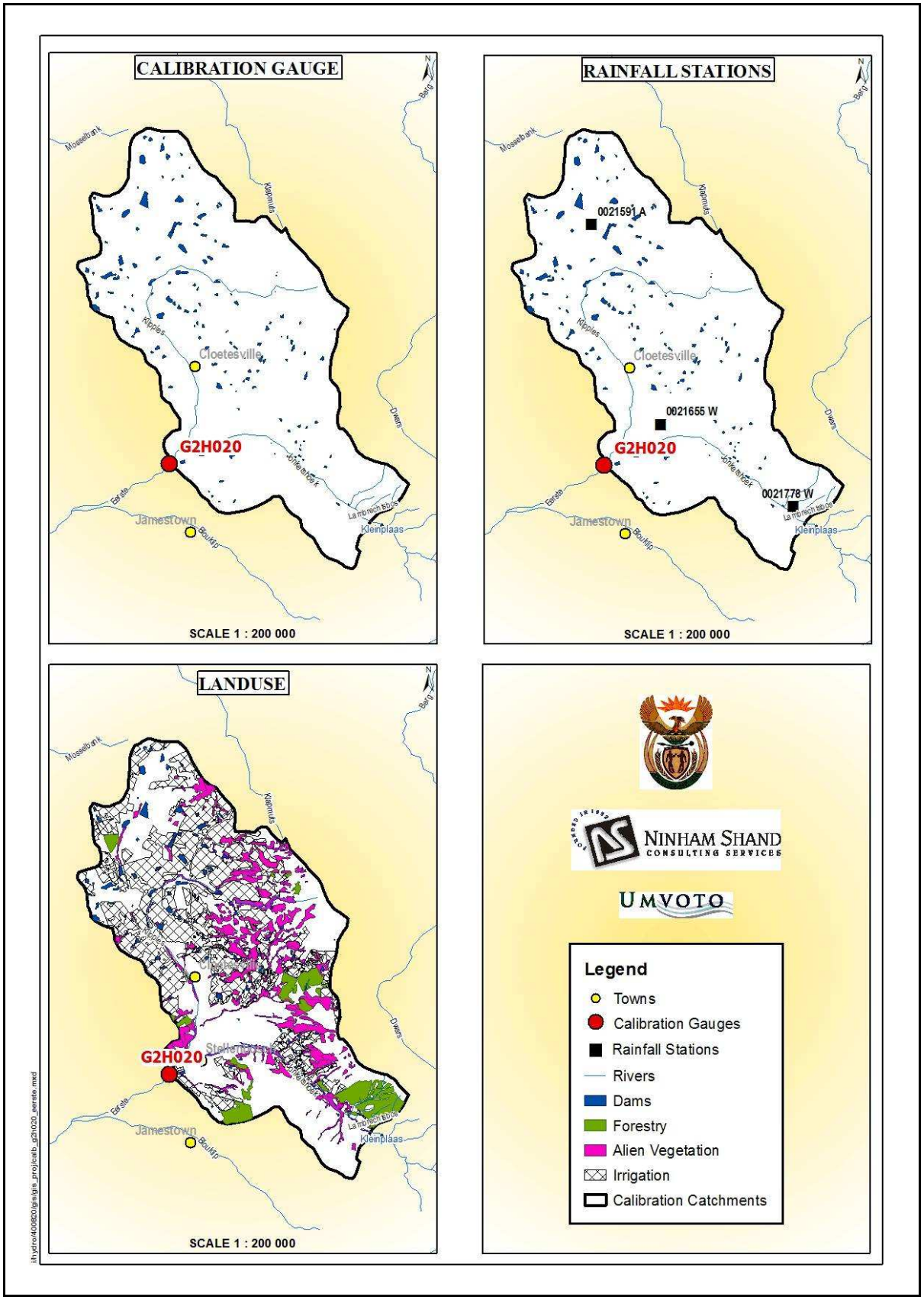


Figure 6.4: G2H020 Subcatchment hydrology information

6.2.2 Model configuration

Figure 6.5 shows the model configuration for subcatchment G2H020. This catchment is modelled incrementally and lies downstream of G2H005 and Kleinplaas Dam. The catchment is divided into High MAP and Low MAP areas. The High MAP catchment is the upper part of the Jonkershoek Valley to just downstream of Kleinplaas Dam. There is a gauged abstraction at the irrigation canal at G2H030 located just upstream of G2H020. This canal supplies water to irrigators in the downstream catchment.

Irrigation areas were reduced by 12% in order to account for groundwater abstractions for irrigation which are estimated to be 1.7 Mm^3/a. The total groundwater contribution to baseflow in this catchment is estimated to be 2.5 Mm^3/a and was added to farm dams and to the river respectively according to the same percentage split of catchment runoff. Winter filling of farm dams was taken into consideration.

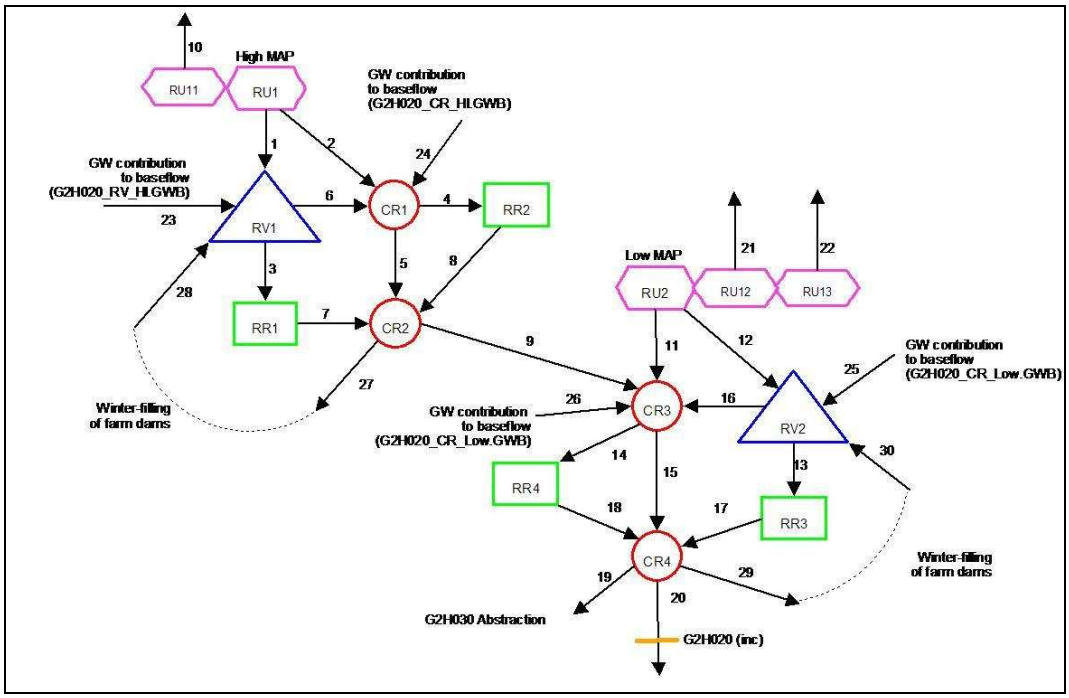


Figure 6.5: G2H020 Subcatchment Configuration

6.2.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched incremental observed flow record for G2H020 was calculated by subtracting the patched observed flows at G2H005 from the patched observed flows at G2H020, and is shown in Appendix C7.

6.2.4 Calibration (1980 - 2004)

Flows at G2H020 were simulated for the period 1980-2004. Details of the rainfall stations used to generate catchment rainfall for G2H020 are shown in Table 6.8. The updated MAP for the High MAP catchment is estimated to be 1310 mm compared to 1122 mm in the WCSA (DWAF, 1993c). The updated MAP for the Low MAP catchment is estimated to be 793 mm compared to 746 mm in the WCSA.

Table 6.8: Rainfall stations for calibration at G2H020

RAINFALL STATION NUMBER	MAP	HIGH / LOW	PERIOD OF RECORD	RECORD LENGTH
021655w	719	High MAP	1927-1985	58
021778w	1076	High MAP	1927-2004	77
021809w	1463	High MAP	1936-2004	68
021591a	596	Low MAP	1963-1986	23
021655w	719	Low MAP	1927-1985	58
021778w	1076	Low MAP	1927-2004	77

The final Pitman parameters for subcatchments G2H005 and G2H037 and the final Pitman parameters for G2H020 obtained in the WCSA (DWAF, 1993c) were used for the High MAP and Low MAP catchments respectively. The parameters for the Low MAP area were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 6.9 and Table 6.10 displays the patched observed and simulated statistics for G2H020. Graphs showing the annual and monthly flows, the seasonal distribution as well as the gross yield curve, are also included in Figure 6.6.

Table 6.9: G2H020 Final Pitman Parameters

MAP	POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
High	2	0	320	35	0	35	600	1.5	0	0	0
Low	2	0	400	35	0	40	700	1.5	0	0	0

Table 6.10: G2H020 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	21.0	20.8	-0.6%
Mean (Log)	1.3	1.3	0.0%
Std Dev	10.0	10.1	1.5%
Std Dev (Log)	0.2	0.2	-4.3%
Seasonal Index	44.7	45.3	1.4%

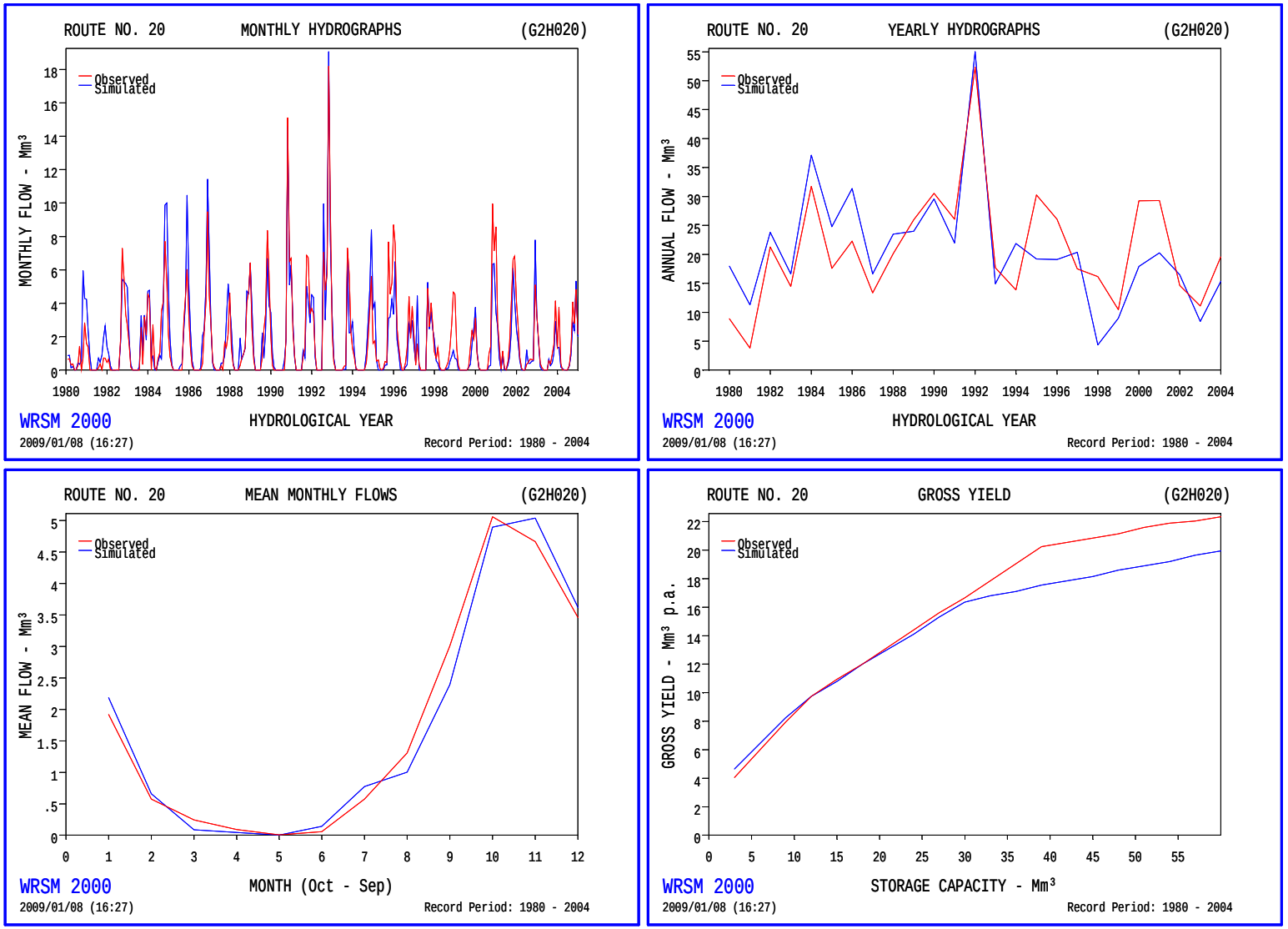


Figure 6.6: G2H020 Calibration Results (Graphical Comparison)

6.3 G2H015: Eerste River at Faure

6.3.1 Subcatchment data

Land use in the Eerste River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 6.11 presents a summary of the catchment data for the subcatchment G2H015 and detailed information is summarised in Table 6.12. Figure 6.7 shows detailed maps of the catchment.

Table 6.11: Summary of information for G2H015

G2H015	
Total upstream catchment area (km^2)	333.2
Incremental subcatchment area (km^2)	153.8
Above farm dams	93.9
Below farm dams	59.9
Forestry area (km^2)	2.0
Alien vegetation condensed area (km^2)	2.2
Irrigation Area (km^2)	71.5
From farm dams	60.7
From river	10.7
Farm dams: Area (km^2) / Volume (Mm^3/a)	3.9 / 13.2
Subcatchment MAP (mm)	844
Total GW contribution to baseflow	1.4
Calibration period (Hydrological years)	1967-1976
Observed cumulative MAR for calibration period (Mm^3)	102.6
Patched observed cumulative MAR for calibration period (Mm^3)	104.1
Simulated cumulative MAR for calibration period (Mm^3)	104.3
Naturalised incremental MAR (1927-2004) (Mm^3)	52.6
Naturalised incremental MAR (1927-2004) including GW baseflow (Mm^3)	54.0
Naturalised cumulative MAR (1927-2004) (Mm^3)	120.4
Naturalised runoff coefficient	42%

Table 6.12: Detailed catchment information for G2H015

APPENDIX	CONTENTS	FORMAT
A6	Hydrological information for model calibration	Table
B7	Catchment Rainfall File	Monthly time series
C5	Patched observed flow record (G2H015)	Monthly time series
D6	Naturalised flow sequence	Monthly time series

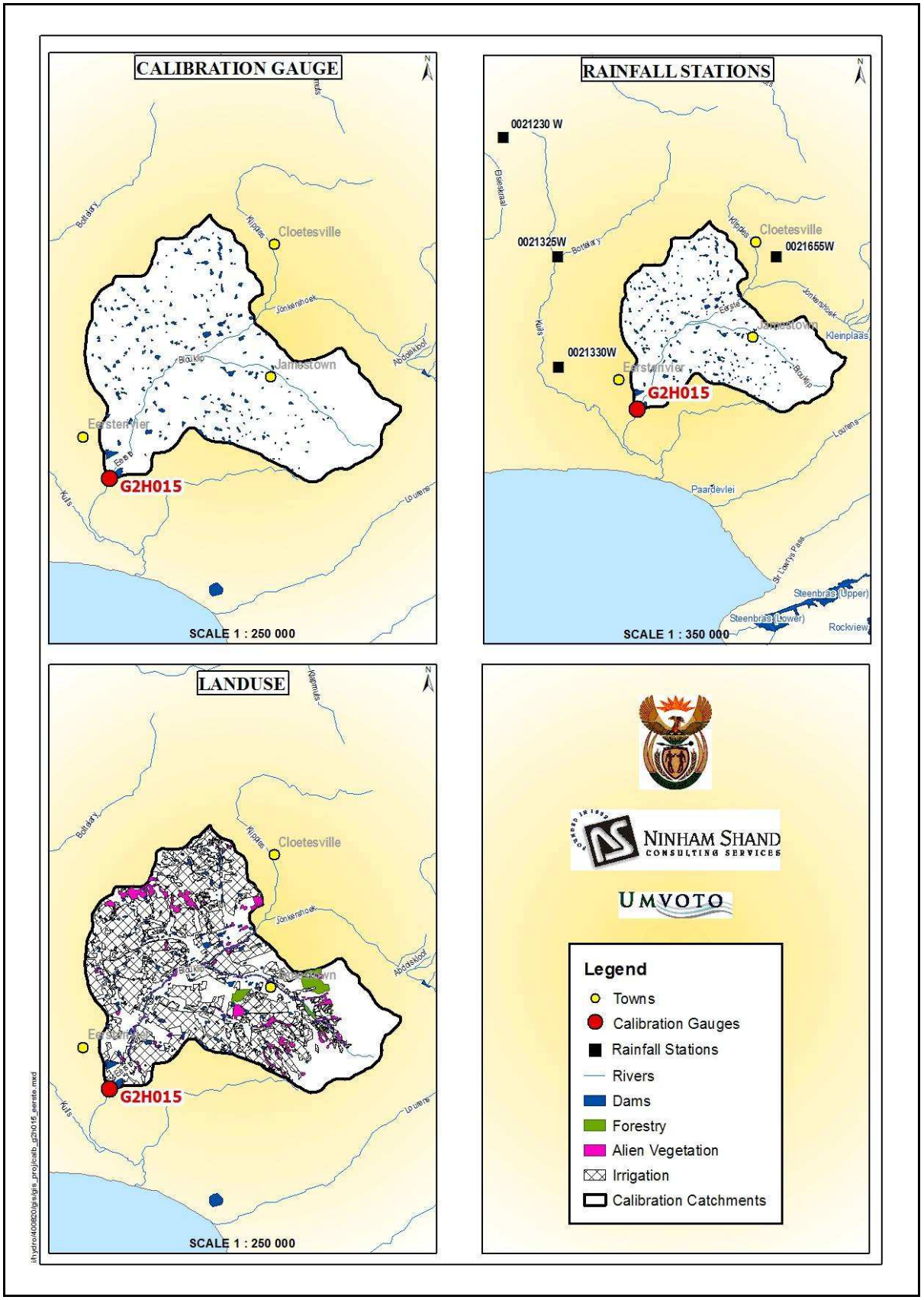


Figure 6.7: G2H015 Subcatchment hydrology information

6.3.2 Model configuration

Figure 6.8 shows the model configuration for subcatchment G2H015. This catchment is modelled cumulatively and lies downstream of the following flow gauges: G2H020 and G2H005. Return flows from Stellenbosch Municipality are discharged in this subcatchment. The return flow record was obtained from Stellenbosch Municipality for the period 1978 to 2004 and was extended back to 1968 in the WCSA by determining the average rate of increase for the period 1978-1988 and applying the same growth rate to the period 1968-1978 (DWAF, 1993c).

Irrigation areas were reduced by 5% in order to account for groundwater abstractions for irrigation which are estimated to be 0.9 Mm^3/a. The total groundwater contribution to baseflow in this catchment is estimated to be 1.4 Mm^3/a. Winter filling of farm dams is taken into consideration.

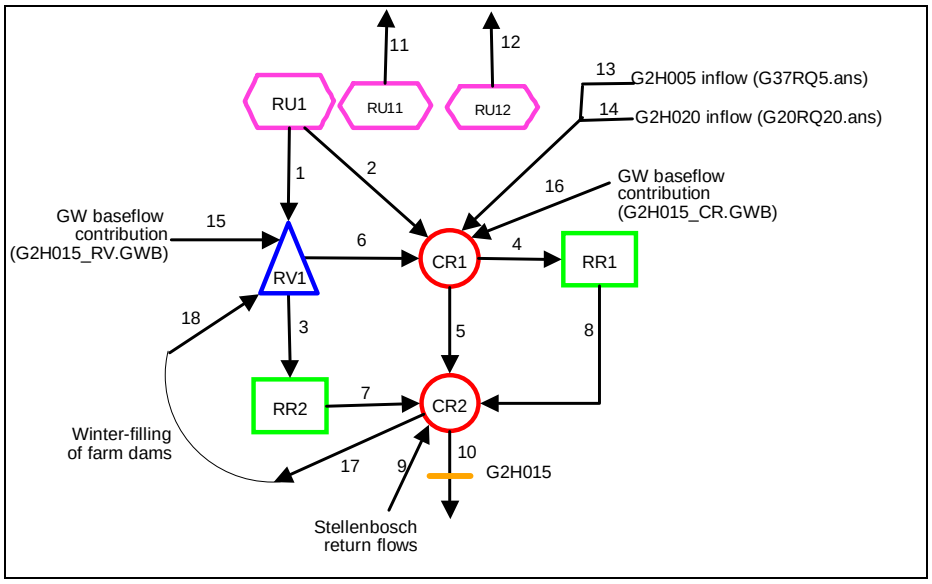


Figure 6.8: G2H015 Subcatchment Configuration

6.3.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed record for the period 1967-1976 is included in Appendix C5.

6.3.4 Calibration (1967-1976)

Flows at G2H015 were simulated for the period 1967-1976. Details of the rainfall stations used to generate catchment rainfall for G2H015 are shown in Table 6.13. The updated MAP for this catchment is estimated to be 844 mm compared to 720 mm in the WCSA (DWAF, 1993c).

Table 6.13: Rainfall stations for calibration at G2H015

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
021230w	589	1927-2004	77
021325w	630	1949-1993	44
021330w	520	1927-1979	52
021655w	719	1927-1985	58

The WCSA (DWAF, 1993c) final Pitman parameters for this catchment were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 6.14 and Table 6.15 displays the patched observed and simulated statistics for G2H015. Graphs showing the annual and monthly flows, the seasonal distribution as well as the gross yield curve, are also included in Figure 6.9. The simulated flows tend to over-estimate the high flows but low flows are captured adequately.

Table 6.14: G2H015 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	250	65	0	20	500	1.5	0	0	0

Table 6.15: G2H015 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	104.1	104.3	0.1%
Mean (Log)	2.0	2.0	-0.4%
Std Dev	60.9	59.7	-2.0%
Std Dev (Log)	0.2	0.2	13.8%
Seasonal Index	42.4	48.4	14.0%

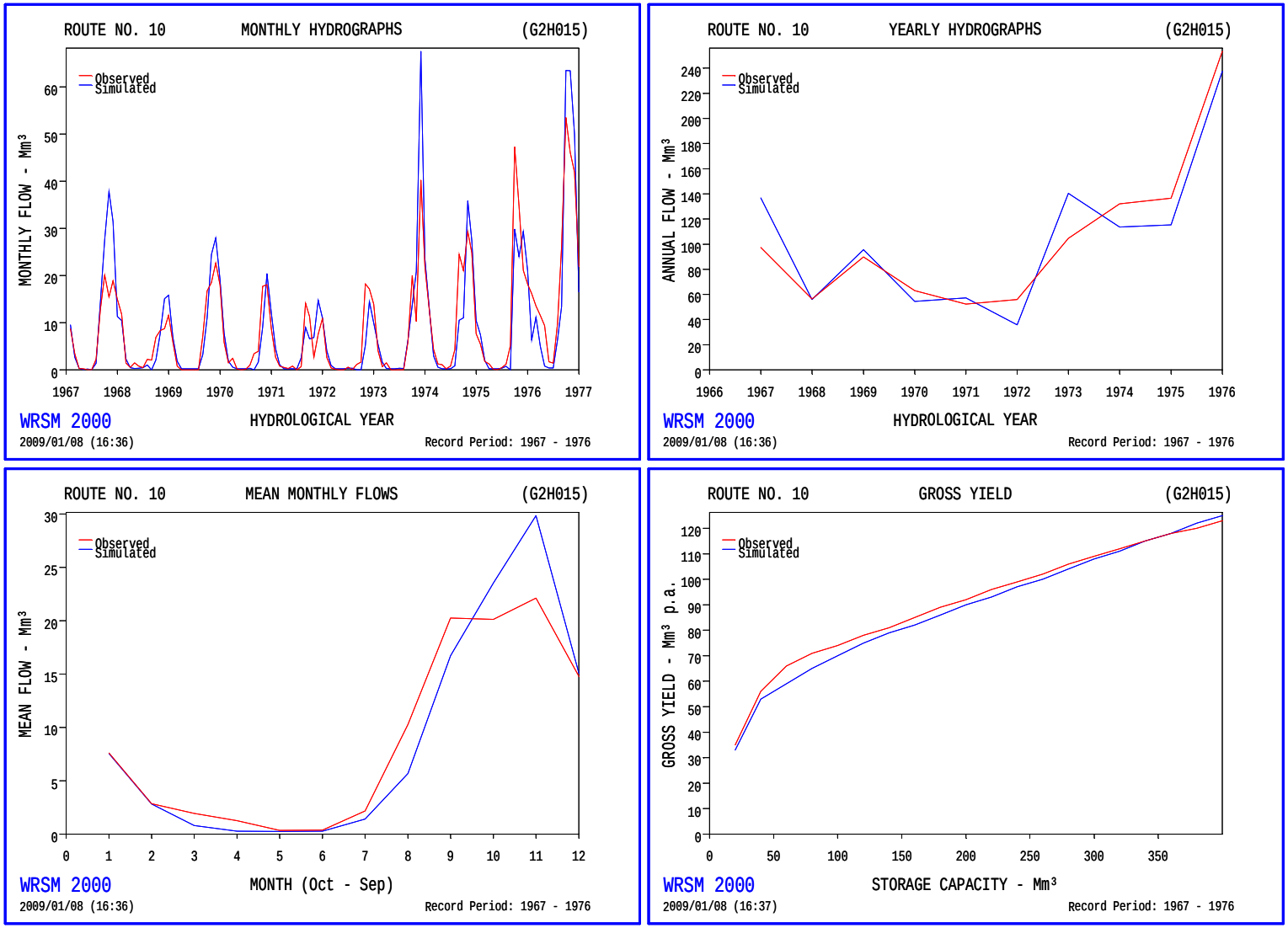


Figure 6.9: G2H015 Calibration Results (Graphical Comparison)

6.4 G2H016: Lourens River at Somerset West

6.4.1 Subcatchment data

Land and water use in the Lourens River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 6.16 presents a summary of the catchment data for the subcatchment G2H016 and detailed information are summarised in Table 6.17. Figure 6.10 shows detailed maps of the catchment. For the purposes of hydrological modelling, the catchment was divided into a High MAP and a Low MAP area.

Table 6.16: Summary of information for G2H016

G2H016	TOTAL	HIGH MAP	LOW MAP
Subcatchment area (km^2)	92.3	24.4	67.9
Above farm dams	33.7	5.1	28.6
Below farm dams	58.6	19.3	39.3
Forestry area (km^2)	21.6	1.5	20.1
Alien vegetation condensed area (km^2)	2.5	0.5	2.0
Irrigation Area (km^2)	10.4	-	10.4
From farm dams	8.6	-	8.6
From river	0.5	-	0.5
Farm dam: Area (km^2) / Volume (Mm^3)	1.1 / 6.6		
Subcatchment MAP (mm)	1124	1735	904
Total GW contribution to baseflow	1.1		
Calibration period (Hydrological years)	1969-1990		
Observed MAR for calibration period (Mm^3)	41.9		
Patched observed MAR for calibration period (Mm^3)	44.4		
Simulated MAR for calibration period (Mm^3)	44.3		
Naturalised MAR (1927-2004) (Mm^3)	47.1	23.9	23.2
Naturalised MAR including GW baseflow (1927-2004) (Mm3)	48.2	24.5	23.7
Naturalised runoff coefficient (%)	46%		

Table 6.17: Detailed catchment information for G2H016

APPENDIX	CONTENTS	FORMAT
A7	Hydrological information for model calibration	Table
B8	Catchment Rainfall File	Monthly time series
C6	Patched observed flow record (G2H016)	Monthly time series
D7	Naturalised flow sequence	Monthly time series

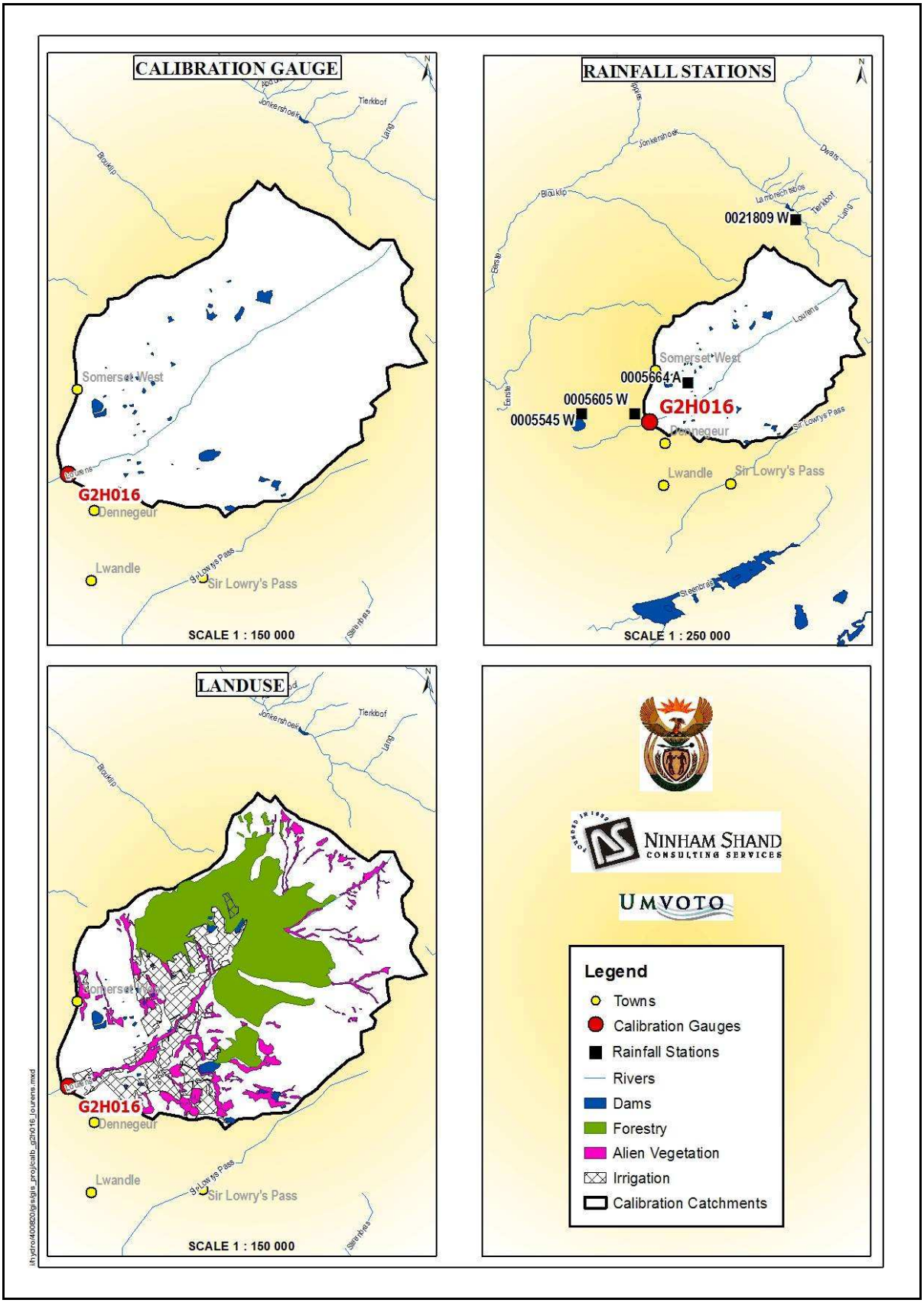


Figure 6.10: G2H016 Subcatchment hydrology information

6.4.2 Model configuration

Figure 6.11 shows the model configuration for subcatchment G2H016. The subcatchment is divided into High and Low MAP areas contributing to catchment runoff. Winter filling of farm dams was taken into consideration. The total groundwater contribution to baseflow in this catchment is estimated to be 1.1 Mm^3/a and was added to farm dams and to the river respectively, according to the same percentage split of catchment runoff. Irrigation areas were reduced by 13% in order to account for groundwater abstractions for irrigation which are estimated to be 0.5 Mm^3/a.

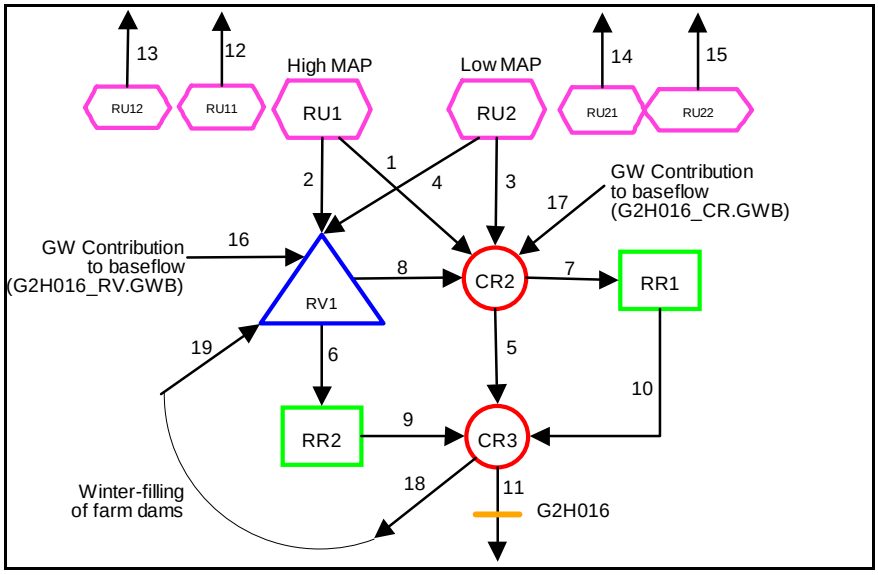


Figure 6.11: G2H016 Subcatchment Configuration

6.4.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for G2H016 is shown in Appendix C6.

6.4.4 Calibration (1969-1990)

Flows at G2H016 were simulated for the period 1969-1990. Details of the rainfall stations used to generate catchment rainfall for G2H016 are shown in Table 6.18. The updated MAP for the High MAP area of this catchment is estimated to be 1959 mm compared to 1735 mm in the WCSA, and for the Low MAP area, 1088 mm compared to 904 mm in the WCSA (DWAF, 1993c).

Table 6.18: Rainfall stations for calibration at G2H016

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
005545w	592	1958-1995	37
005605w	624	1927-1977	50
005664w	487	1941-1968	27
021809w	1463	1936-2004	68

The WCSA (DWAF, 1993c) final Pitman parameters for this catchment were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 6.19 and Table 6.20 displays the patched observed and simulated statistics for G2H016. Graphs showing the annual and monthly flows, the seasonal distribution as well as the gross yield curve, are also included in Figure 6.12.

Table 6.19: G2H016 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	260	60	0	50	650	1.5	0	0	0

Table 6.20: G2H016 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	44.4	44.3	-0.1%
Mean (Log)	1.6	1.6	2.7%
Std Dev	24.8	15.5	-37.4%
Std Dev (Log)	0.3	0.2	-39.0%
Seasonal Index	35.1	42.5	21.1%

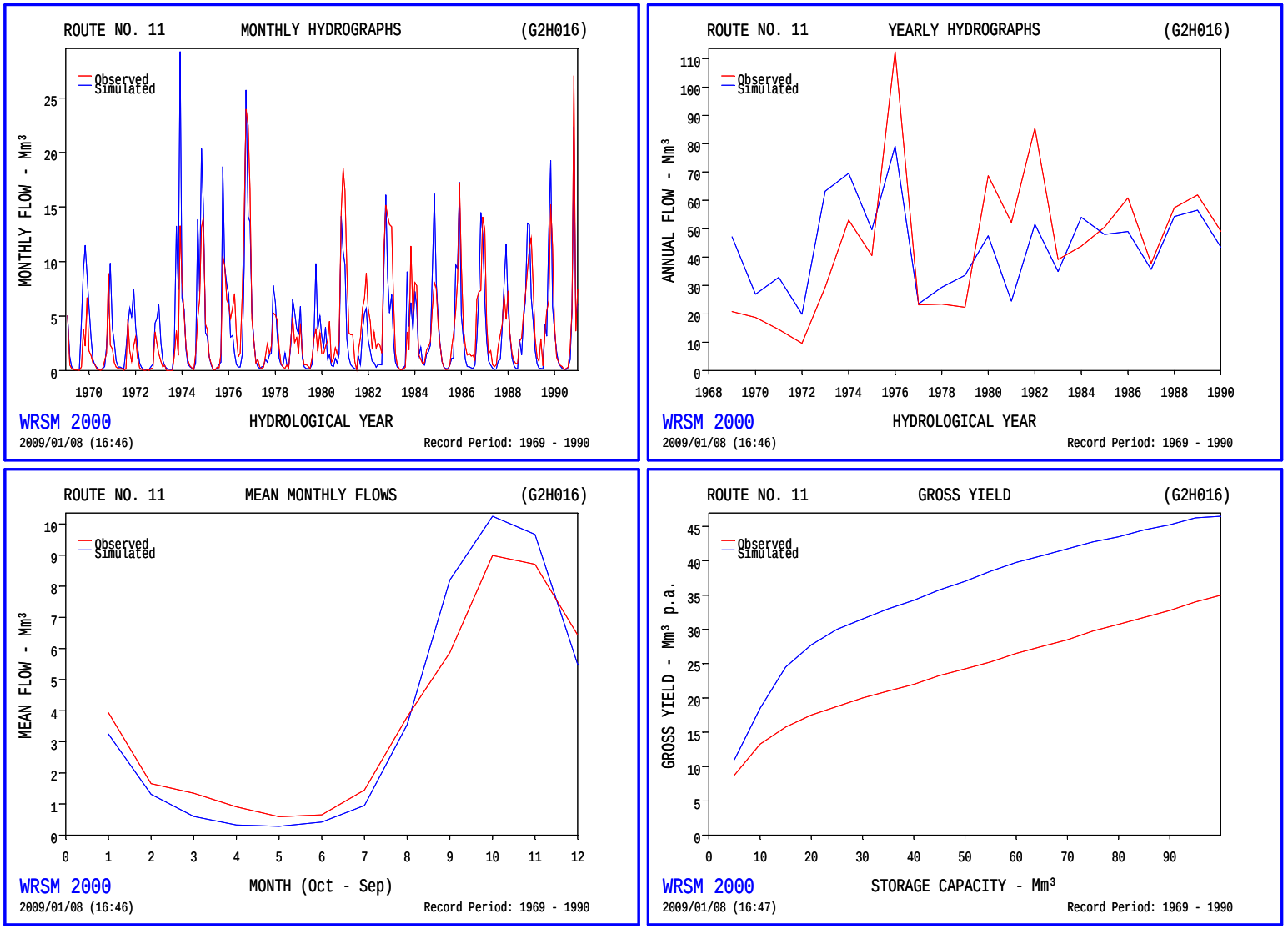


Figure 6.12: G2H016 Calibration Results (Graphical Comparison)

7 CALIBRATION RESULTS: PALMIET AND STEENBRAS CATCHMENTS

7.1 G4R002: Palmiet River at Eikenhof Dam

7.1.1 Subcatchment data

Land use in the Palmiet River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 7.1 presents a summary of the catchment data for the subcatchment G4R002 and detailed information are summarised in Table 7.2. Figure 7.1 shows detailed maps of the catchment.

Table 7.1: Summary of information for G4R002

G4R002	
Incremental subcatchment area (km^2)	65.3
Above Nuweberg Dam	16.6
Below Nuweberg Dam	48.7
Forestry area (km^2)	17.4
Alien vegetation condensed area (km^2)	0.0
Irrigation Area (km^2)	2.7
From farm dams	-
From river	2.7
Farm dams: Area (km^2) / Volume (Mm^3)	- / -
Nuweberg Dam: Area (km^2) / Volume (Mm^3)	0.5 / 3.9
Subcatchment MAP (mm)	1671
Total GW contribution to baseflow	2.8
Calibration period (Hydrological years)	1978-1997
Observed MAR for calibration period (Mm^3)	50.8
Patched observed MAR for calibration period (Mm^3)	54.9
Simulated MAR for calibration period (Mm^3)	54.7
Naturalised MAR (1927-2004) (Mm^3)	51.8
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	54.6
Runoff Coefficient (%)	50%

Table 7.2: Detailed catchment information for G4R002

APPENDIX	CONTENTS	FORMAT
A13	Hydrological information for model calibration	Table
B15	Catchment Rainfall File	Monthly time series
C12	Patched observed flow record (G4R002)	Monthly time series
D15	Naturalised flow sequence	Monthly time series

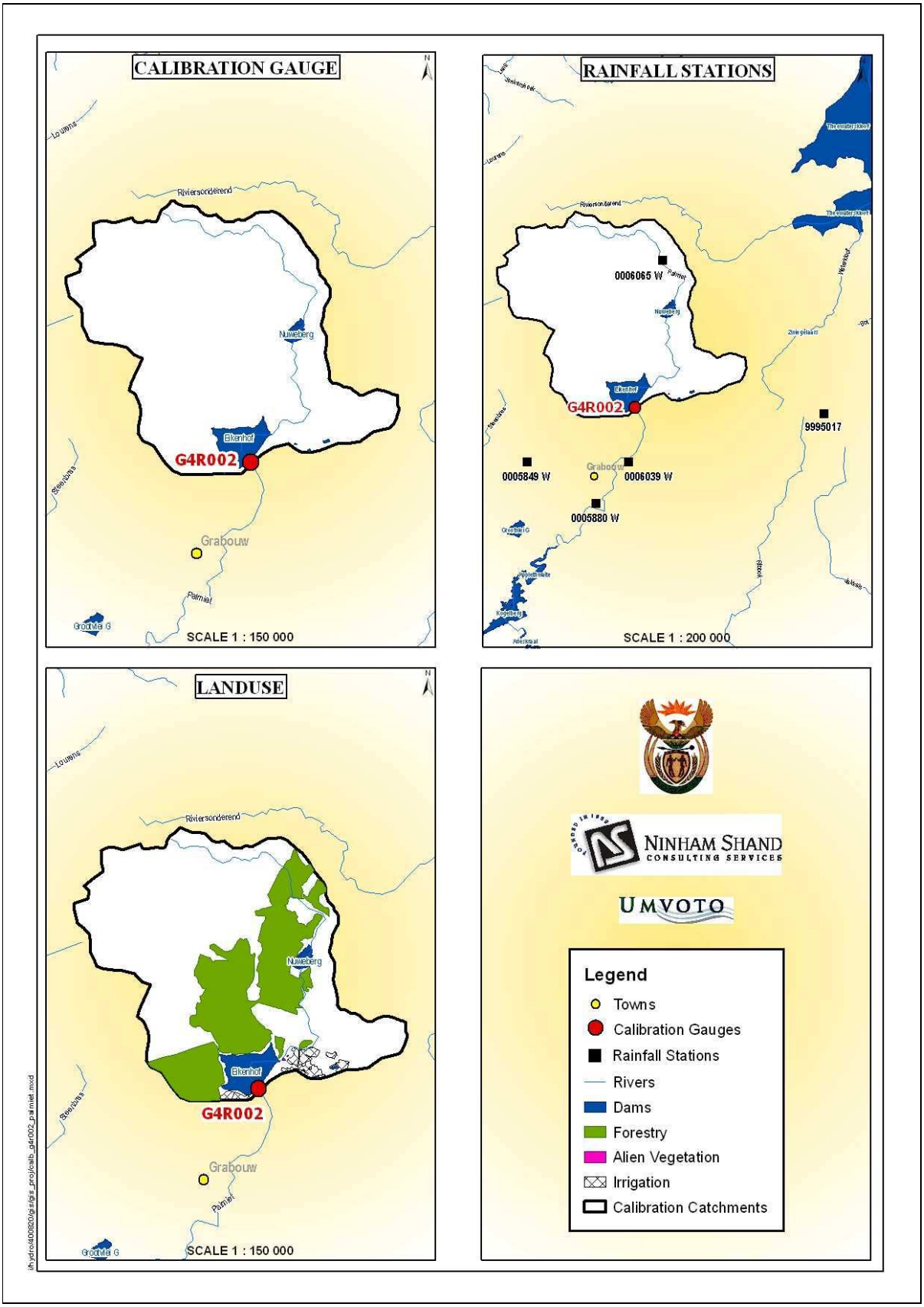


Figure 7.1: G4R002 Subcatchment hydrology

7.1.2 Model configuration

Figure 7.2 shows the model configuration for the catchment upstream of Eikenhof Dam (G4R002). There are no imports to the catchment. An export from the Nuweberg Dam is made for irrigation in the Applethwaite subcatchment (G4H005). Further abstractions also exist, namely the Applegarth, Groenland, Elfco, Oak Valley and Highlands pipelines. These are drawn directly from the Eikenhof Dam and are as such included in the dam balance and not directly in the system model. The total groundwater contribution to baseflow in this catchment is estimated to be 2.8 Mm^3/a, which was split between the catchments upstream and downstream of Nuweberg Dam according to catchment area.

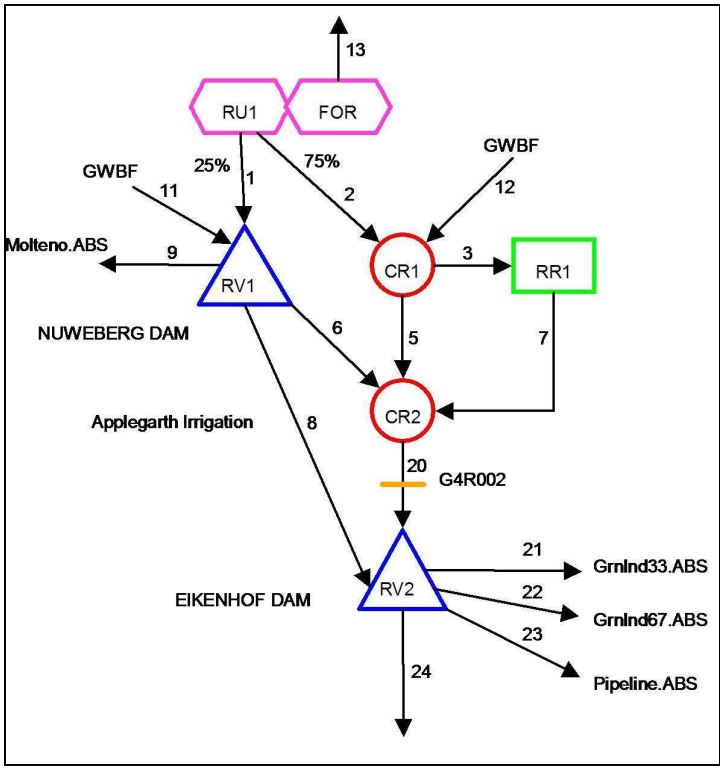


Figure 7.2: G4R002 Subcatchment Configuration

7.1.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Palmiet catchment was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for G4R002 is shown in Appendix C12.

7.1.4 Calibration (1978-1997)

Inflows to Eikenhof Dam at G4R002 were simulated for the period 1978-1997. Details of the rainfall stations used to generate catchment rainfall for G4R002 are shown in Table 7.3. The updated MAP for this catchment is estimated to be 1510 mm compared to 1671 mm in the WCSA (DWAF, 1993a). Although the updated MAP is slightly lower than the MAP used in the WCSA, the WCSA MAP was eventually used in the final calibration. It is also important to note that the natural MAR is lower than the simulated MAR but this is only due to the difference in period over which the MAR is calculated. The simulated MAR over the entire period is equal to 49.8 Mm^3 which is less than its natural counterpart.

Table 7.3: Rainfall stations for calibration at G4R002

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
006065W	1595	1927-2004	77
006039W	1018	1928-2004	76
005880W	1068	1927-1972	45
005849W	1036	1955-1985	30
995017	1013	1963-1988	25

The WCSA (DWAF, 1993a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 7.4 and Table 7.5 displays the patched observed and simulated statistics for G4R002. Graphs showing monthly, annual and mean monthly flows as well as a gross yield plot for each calibration are also included in Figure 7.3.

Table 7.4: G4R002 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	510	35	0	0	800	1.5	0	0	0

Table 7.5: G4R002 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	54.9	54.7	-0.4%
Mean (Log)	1.7	1.7	-0.5%
Std Dev	12.4	15.7	26.7%
Std Dev (Log)	0.1	0.1	32.3%
Seasonal Index	31.1	41.1	32.0%

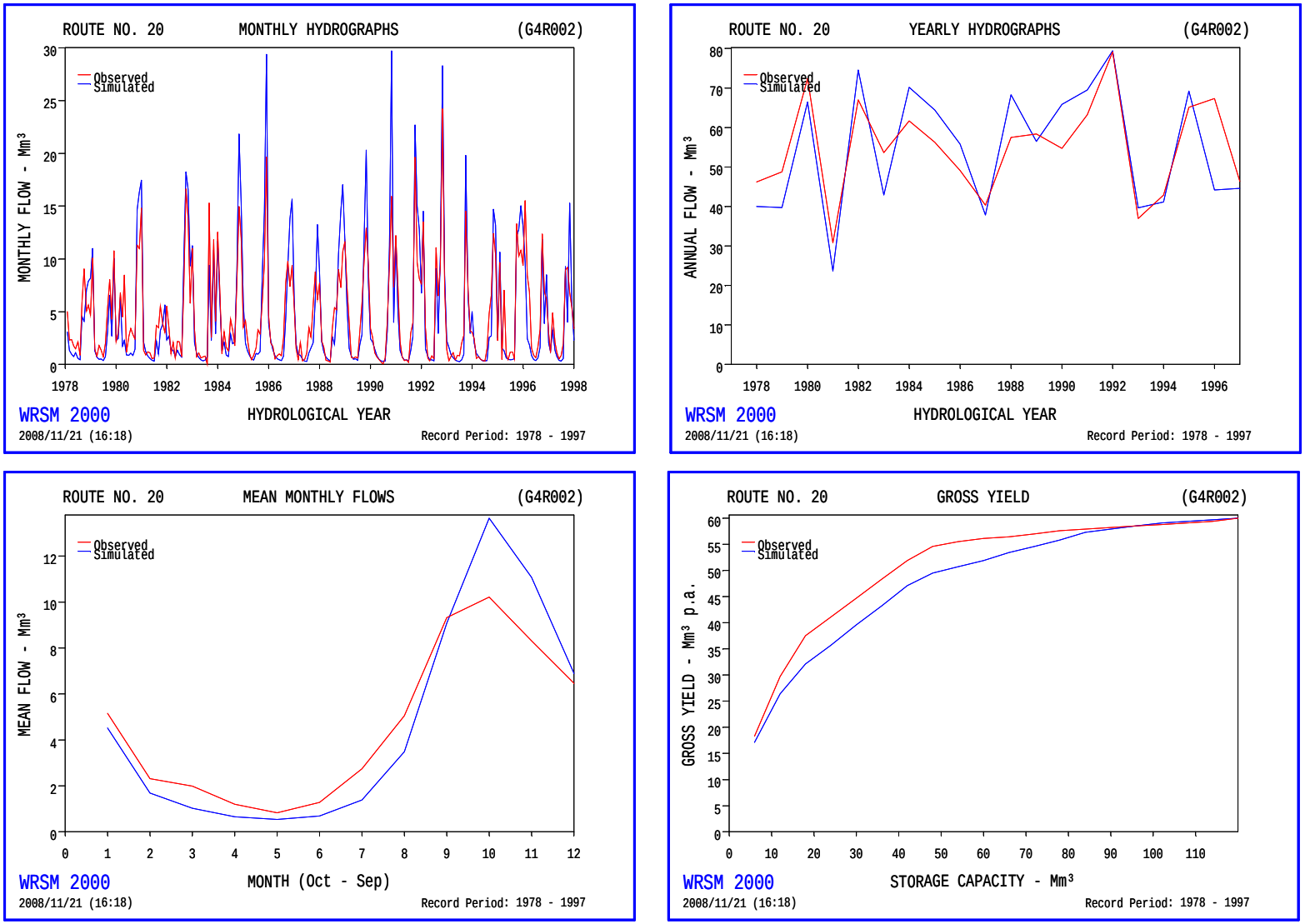


Figure 7.3: G4R002 Calibration Results (Graphical Comparison)

7.2 G4H005: Palmiet River at Applethwaite

7.2.1 Subcatchment data

Land use in the Palmiet River catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 7.6 presents a summary of the catchment data for the subcatchment G4H005 and detailed information are summarised in Table 7.7. Figure 7.4 shows detailed maps of the catchment.

Table 7.6: Summary of information for G4H005

G4H005		Kogelberg catchment
Incremental subcatchment area (km^2)	83.0	33.5
Above farm dams	30.0	-
Below farm dams	53.0	33.5
Forestry area (km^2)	10.9	0.0
Alien vegetation condensed area (km^2)	0.2	0.0
Irrigation Area (km^2)	36.0	0.0
From farm dams	18.0	-
From river	14.2	-
From Applethwaite Dam	2.1	-
Farm dams: Area (km^2) / Volume (Mm^3)	1.3 / 3.9	- / -
Applethwaite Dam: Area (km^2) / Volume (Mm^3)	0.2 / 2.9	-
Kogelberg Dam: Area (km^2) / Volume (Mm^3)	-	1.4 / 16.8
Subcatchment MAP (mm)	1073	
Total GW contribution to baseflow	3.6	-
Calibration period (Hydrological years)	1978-1997	
Observed incremental MAR for calibration period (Mm^3)	41.6	
Patched observed incremental MAR for calibration period (Mm^3)	41.6	
Simulated incremental MAR for calibration period (Mm^3)	41.7	
Naturalised incremental MAR (1927-2004) (Mm^3)	46.3	18.7
Naturalised incremental MAR including GW baseflow (1927-2004) (Mm^3)	49.9	18.7
Runoff Coefficient (%)	56%	52%

Table 7.7: Detailed catchment information for G4H005

APPENDIX	CONTENTS	FORMAT
A10	Hydrological information for model calibration	Table
B11	Catchment Rainfall File	Monthly time series
C9	Patched observed flow record (G4H005)	Monthly time series
D10	Naturalised flow sequence	Monthly time series

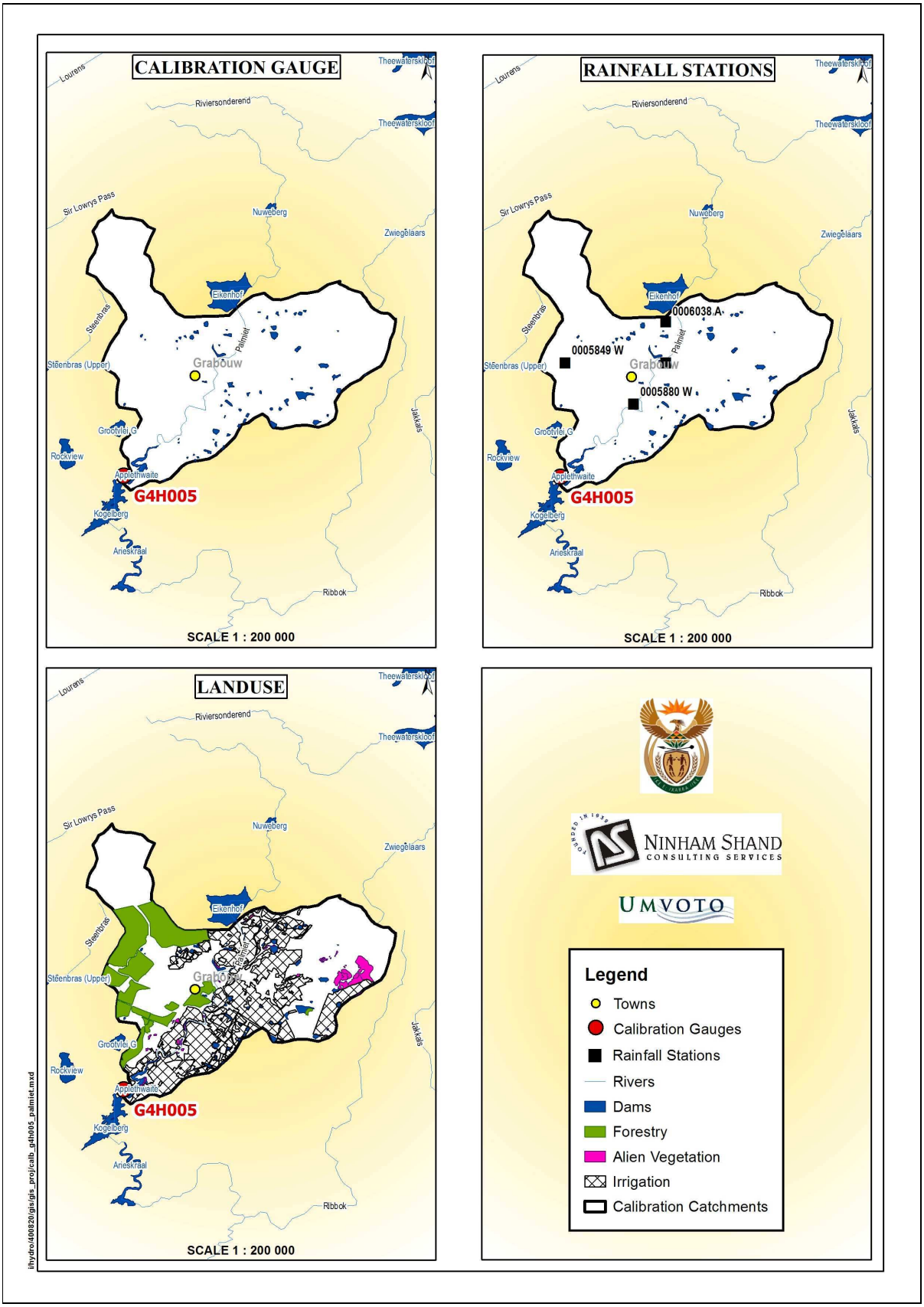


Figure 7.4: G4H005 Subcatchment hydrology

7.2.2 Model configuration

Figure 7.5 shows the model configuration for subcatchment G4H005. Water is imported from the Nuweberg Dam for the Molteno irrigators for various irrigation schemes. Some water from the Groenland pipeline is released from Eikenhof Dam to irrigators in the Applethwaite catchment. The flow gauge is situated on the spillway of the Applethwaite Dam so this dam was included in the model. The Kogelberg and Rockview dams are included for completeness however, the actual transfers between these two dams are not accurately known. The winter filling of farm dams was modelled though the volumes involved are small. Significant areas within the catchment are under forestation.

The total groundwater contribution to baseflow in this catchment is estimated to be 3.6 Mm^3/a.

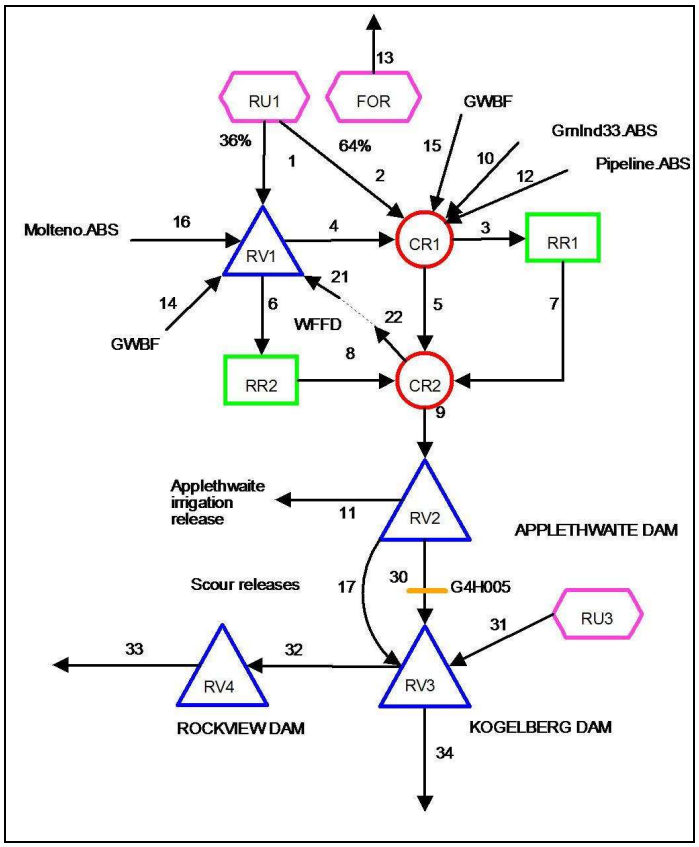


Figure 7.5: G4H005 Subcatchment Configuration

7.2.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Palmiet catchment was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record at G4H005 is included in Appendix C9.

7.2.4 Calibration (1978 - 1997)

Observed flows at G4H005 are available from 1978 to the present-day. An incremental calibration was undertaken at this gauge and the length of the calibration period was dependent upon the period of overlap between G4R002 and G4H005. Furthermore, changes to the outlet structure at Eikenhof Dam in 1998, have not yet been reflected in the discharge table and this

also had to be taken into consideration. Consequently, the calibration period only extended from 1978-1997. Details of the rainfall stations used to generate catchment rainfall for G4H005 are shown in Table 7.8. The updated MAP for this catchment is estimated to be 1073 mm, equal to the MAP used in the WCSA (DWAF, 1993a).

Table 7.8: Rainfall stations for calibration at G4H005

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
006192W	677	1927-1990	63
006039W	1018	1928-2004	76
005880W	1068	1927-1972	45
005849W	1036	1955-1985	30
995017	1013	1963-1988	25

The WCSA (DWAF, 1993a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The flow gauge at this location is often submerged at high flows, therefore it may give inaccurate readings during high flow periods. The final Pitman parameters are shown in Table 7.9 and Table 7.10 displays the patched observed and simulated statistics for G4H005. Graphs showing monthly, annual and mean monthly flows as well as a gross yield plot for each calibration are also included in Figure 7.6.

Table 7.10 indicates that the results look reasonable. The seasonal distribution is not ideal but is the best that could be achieved with the available rainfall data.

Table 7.9: G4H005 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	120	60	0	35	280	1.5	0.25	0	0

Table 7.10: G4H005 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	41.6	41.7	0.3%
Mean (Log)	1.6	1.6	0.9%
Std Dev	15.4	11.7	-24.0%
Std Dev (Log)	0.2	0.1	-24.5%
Seasonal Index	39.7	35.0	-11.8%

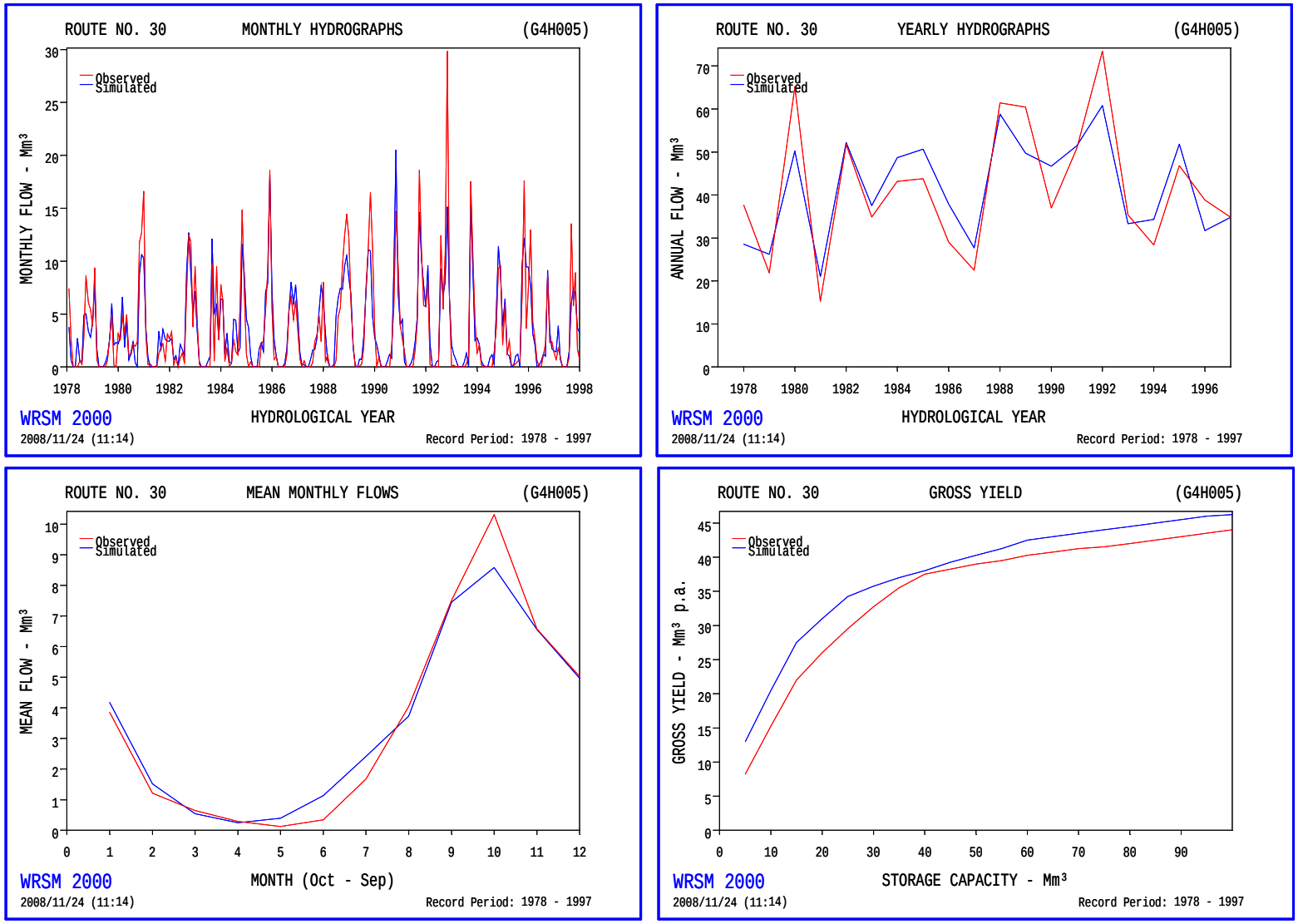


Figure 7.6: G4H005 Calibration Results (Graphical Comparison)

7.3 G4H007: Palmiet River at Welgemoed

7.3.1 Subcatchment data

Land use in the Palmiet catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 7.11 presents a summary of the catchment data for the subcatchment G4H007 and detailed information are summarised in Table 7.12. Figure 7.7 shows detailed maps of the catchment. For the purposes of hydrological modelling, the catchment has been divided into a High MAP and a Low MAP area.

Table 7.11: Summary of information for G4H007

G4H007	TOTAL	HIGH MAP	LOW MAP
Incremental subcatchment area to G4H030 (km^2)	**217.0**		
Above farm dams	148.0	-	148.0
Below farm dams	59.3	59.3	-
Arieskraal catchment	9.7		-
Incremental subcatchment area to G4H007 (km^2)	**102.3**		
Dwars catchment	63.9	-	-
Incremental catchment	38.4	-	38.4
Forestry area (km^2)	18.6		18.6
Alien vegetation condensed area (km^2)	0.2		
Irrigation Area (km^2)	75.6		
From farm dams	57.9	-	57.9
From river	6.0	6.0	-
Arieskraal Dam	12.7	12.7	-
Farm dams: Area (km^2) / Volume (Mm^3)	3.7 / 18.2	-	3.7 / 18.2
Arieskraal Dam	0.5 / 4.5	0.5 / 4.5	-
Subcatchment MAP (mm)		1037	803
Arieskraal MAP (mm)	1266	-	-
Dwars catchment MAP (mm)	1240	-	-
Total GW contribution to baseflow	9.3		
Calibration period (Hydrological years)	1987-2004		
Observed incremental MAR for calibration period (Mm^3)	136.6		
Patched observed incremental MAR for calibration period (Mm^3)	141.7		
Simulated incremental MAR for calibration period (Mm^3)	141.4		
Naturalised incremental MAR (1927-2004) (Mm^3)	136.8		
Naturalised incremental MAR including GW baseflow (1927-2004) (Mm^3)	146.1		
Runoff Coefficient (%)	48%		

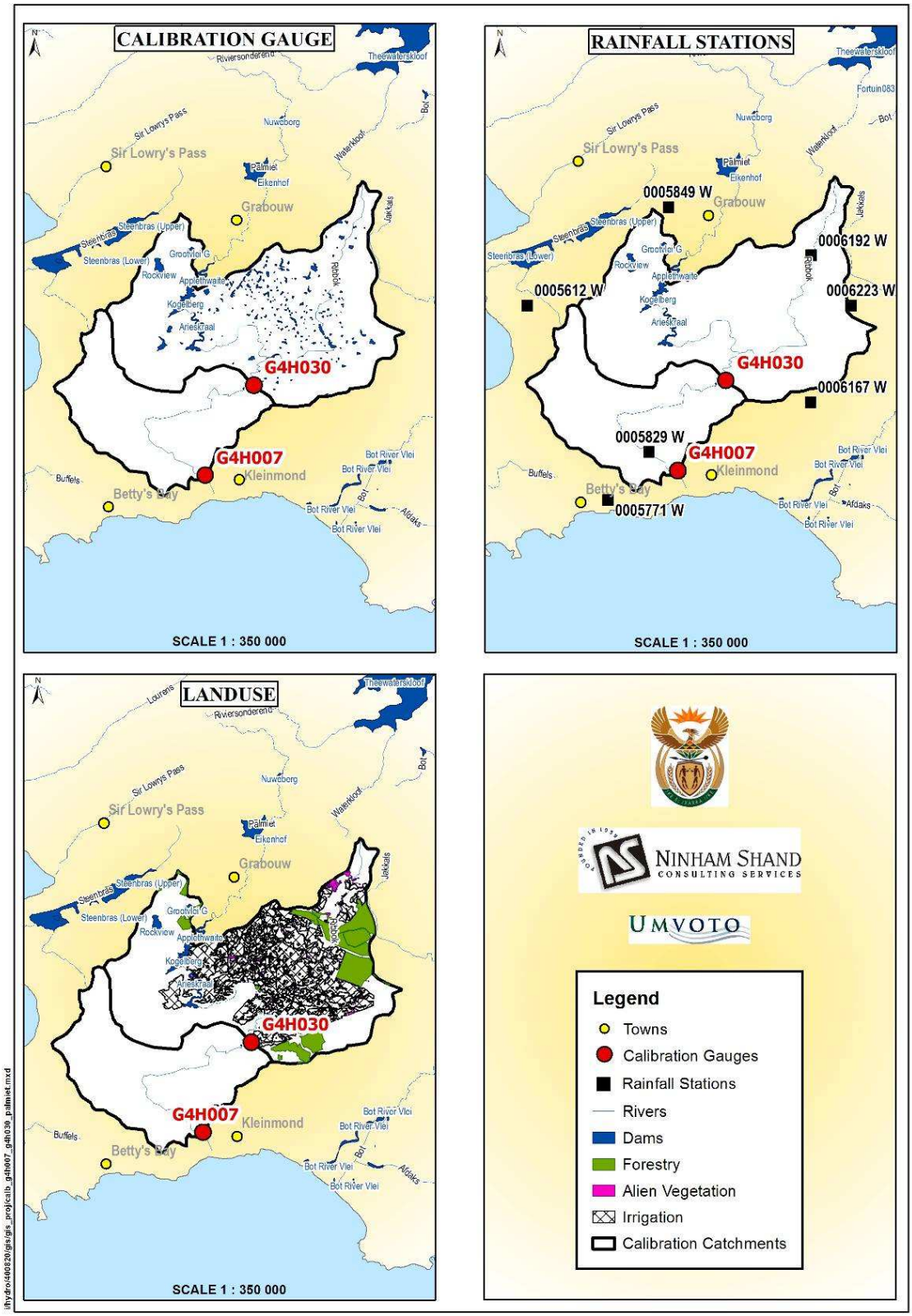


Figure 7.7: G4H007 Subcatchment hydrology

Table 7.12: Detailed catchment information for G4H007

APPENDIX	CONTENTS	FORMAT
A11	Hydrological information for model calibration	Table
B12	Catchment Rainfall File High MAP	Monthly time series
B13	Catchment Rainfall File Low MAP	Monthly time series
C10	Patched observed flow record (G4H007)	Monthly time series
D11	Naturalised flow sequence (excluding G4H030)	Monthly time series
D12	Naturalised flow sequence (including G4H030)	Monthly time series
D13	Naturalised flow sequence (G4H030)	Monthly time series

7.3.2 Model configuration

Figure 7.8 shows the model configuration for subcatchment G4H007. Catchment G4H030 lies upstream of G4H007 and has a relatively short but accurate flow gauging record compared to G4H007, which has a longer record with a lower accuracy rating. An attempt was made to calibrate flows at G4H030, despite the short record period (1998-2004), but it was not possible to obtain an acceptable calibration. This is of concern because this is a relatively new flow gauge with an accurate record. Therefore, an incremental calibration was undertaken for the incremental catchment from just downstream of the Kogelberg Dam to G4H007. In other words the gauge which measures spills and discharges from the Kogelberg Dam (G4H029) was used to create the incremental flow record at G4H007. This was done to remove the influence of Kogelberg Dam on the calibration as this dam forms part of the Palmiet hydro-electric pumped storage scheme which makes accurate modelling on a monthly scale very difficult.

The catchment was configured to include the flow gauge at G4H030 but no acceptable calibration was achieved at this point. The catchment was divided into three modelling units upstream of G4H030, namely the Arieskraal catchment, and a high and low MAP area, and into two modelling units downstream of G4H030 to G4H007, namely the Dwars River catchment and a low MAP area. There is an import from the Groenland Irrigation Board as well as irrigation releases from the Applethwaite Dam upstream. The total groundwater contribution to baseflow in this incremental catchment is estimated to be 9.3 Mm^3/a. Winter-filling of farm dams was also taken into consideration.

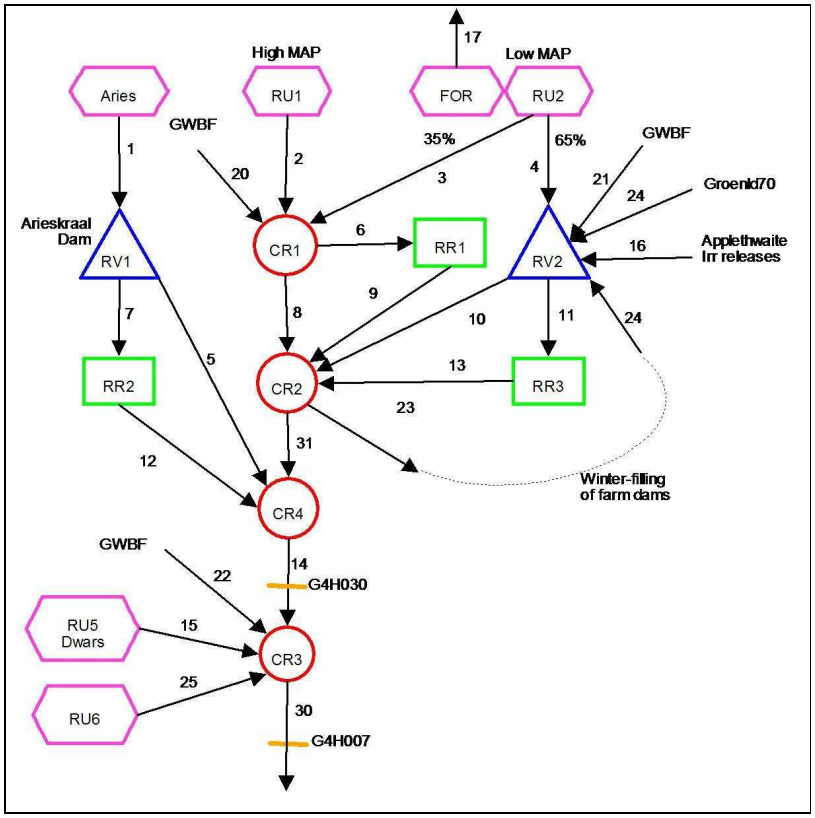


Figure 7.8: G4H007 Subcatchment Configuration

7.3.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Palmiet catchment was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The incremental patched observed flow record at G4H007 is included in Appendix C10.

7.3.4 Calibration (1987 - 2004)

Flows at G4H007 were simulated for the period 1987-2004. Details of the rainfall stations used to generate catchment rainfall for the High and Low MAP areas of the catchment at G4H007 are shown in Table 7.13. The updated MAP for the High MAP catchment is estimated to be 1037 mm compared to 1233 mm in the WCSA (DWAF, 1993a) and the updated MAP for the Low MAP catchment is estimated to be 803 mm compared to 772 mm in the WCSA. The WCSA MAP was found to produce the most acceptable calibration in this catchment.

Table 7.13: Rainfall stations for calibration at G4H007

RAINFALL STATION NUMBER	HIGH / LOW MAP	MAP	PERIOD OF RECORD	RECORD LENGTH
005880W	High	1068	1927-1972	45
005849W	High	1036	1955-1985	30
005771W	High	1056	1966-2004	38
9158104	High	1083	1928-1988	60
006192W	Low	677	1927-1990	63
006167W	Low	928	1938-1991	53
005771W	Low	1056	1966-2004	38

The WCSA (DWAF, 1993a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 7.14 and Table 7.15 displays the patched observed and simulated statistics for G4H007. Graphs showing monthly, annual and mean monthly flows as well as a gross yield plot for each calibration are also included in Figure 7.9.

Table 7.14: G4H007 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	150	45	0	0	300	1.5	0.35	0	0

Table 7.15: G4H007 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	141.7	141.4	-0.2%
Mean (Log)	2.1	2.1	-0.2%
Std Dev	35.4	39.8	12.2%
Std Dev (Log)	0.1	0.1	10.2%
Seasonal Index	36.6	38.3	4.8%

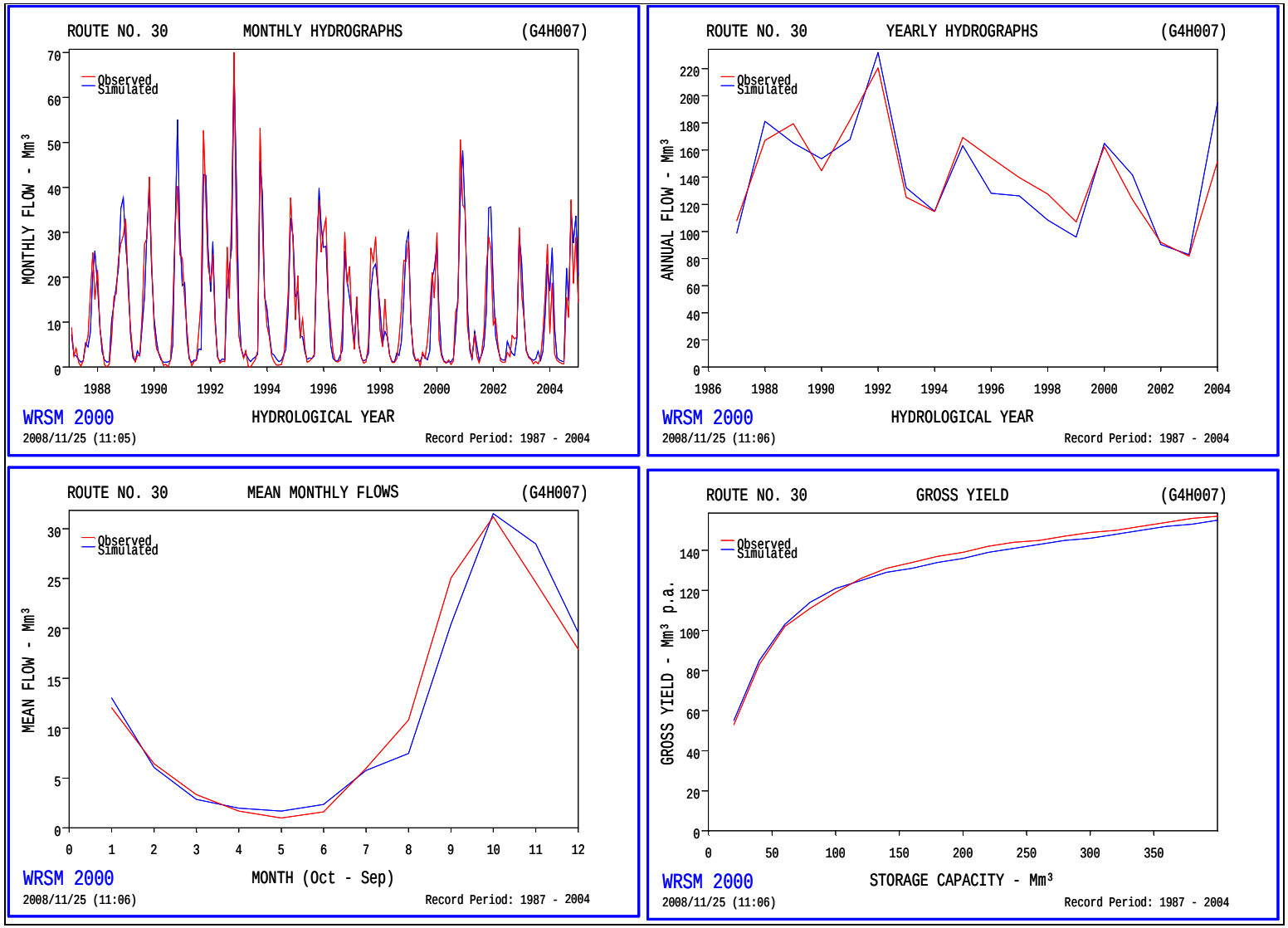


Figure 7.9: G4H007 Calibration Results (Graphical Comparison)

7.4 G4R001: Steenbras River at Lower Steenbras Dam

7.4.1 Subcatchment data

Land use in the Steenbras catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 7.16 presents a summary of the catchment data for the subcatchment G4R001 and detailed information are summarised in Table 7.17. Figure 7.10 shows detailed maps of the catchment.

Table 7.16: Summary of information for G4R001

G4R001	
Subcatchment area (km^2)	60.5
Above farm dams	60.5
Below farm dams	-
Forestry area (km^2)	14.2
Alien vegetation condensed area (km^2)	0.2
Irrigation Area (km^2)	-
Farm dams: Area (km^2) / Volume (Mm^3)	-
Steenbras Dam: Area (km^2) / Volume (Mm^3)	6.3 /36.2
Subcatchment MAP (mm)	1169
Total GW contribution to baseflow (Mm^3/a)	2.9
Calibration period (Hydrological years)	1927-1987
Observed MAR for calibration period (Mm^3/a)	44.7
Patched observed MAR for calibration period (Mm^3/a)	44.8
Simulated MAR for calibration period (Mm^3/a)	44.5
Naturalised MAR (1927-2004) (Mm^3)	43.7
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	46.6
Runoff Coefficient (%)	66%

Table 7.17: Detailed catchment information for G4R001

APPENDIX	CONTENTS	FORMAT
A12	Hydrological information for model calibration	Table
B14	Catchment Rainfall File	Monthly time series
C11	Patched observed flow record (G4R001)	Monthly time series
D14	Naturalised flow sequence	Monthly time series

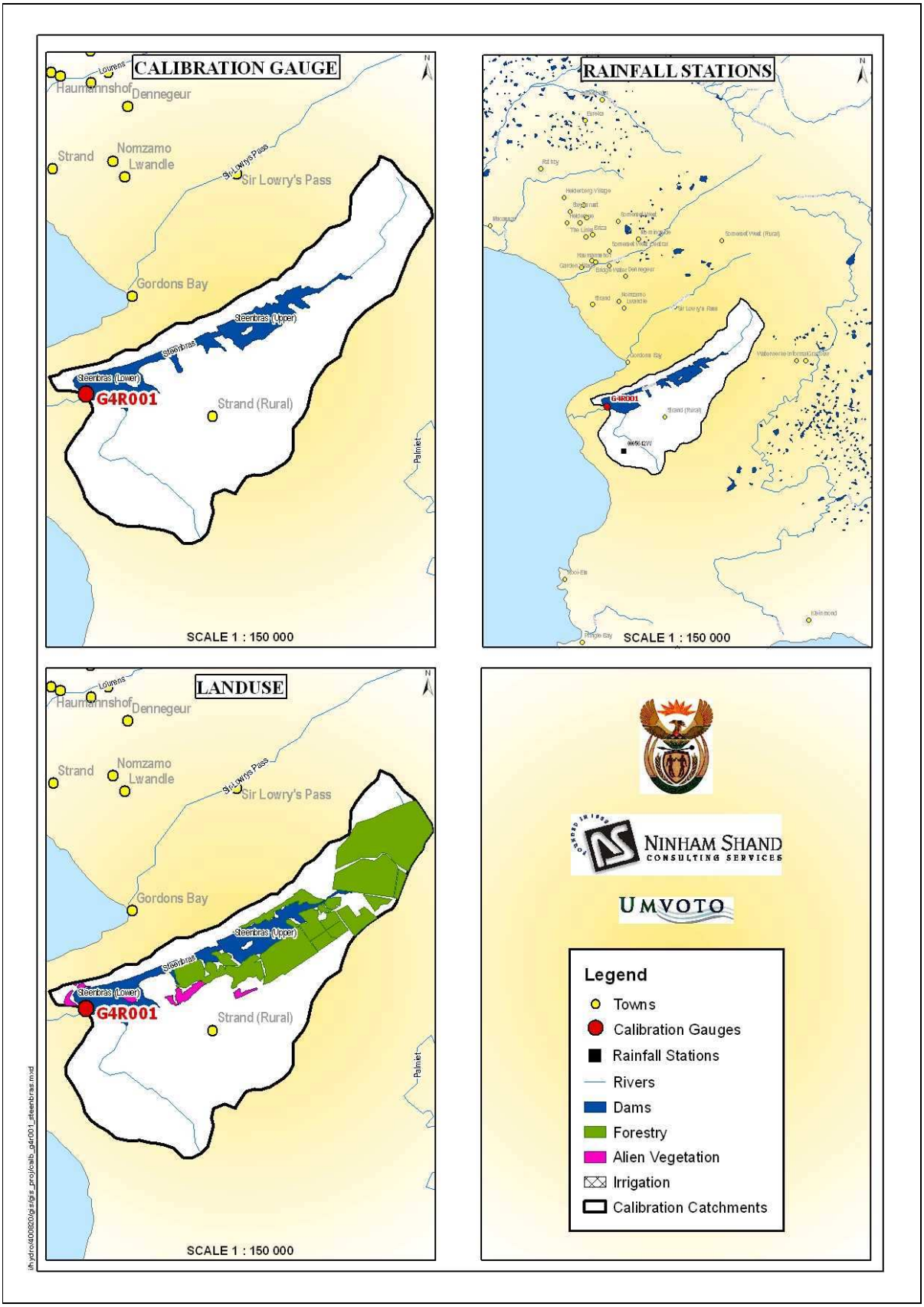


Figure 7.10: G4R001 Subcatchment hydrology information

7.4.2 Model configuration

Figure 7.11 shows the model configuration for subcatchment G4R001. The catchment has no water transfers or development, except for afforestation upstream of the inflow to the dam. The Pitman model was calibrated on the inflows to the Steenbras dam. It was initially attempted to model the entire 1927 to 2004 record but due to problems with obtaining reliable data only the data set used in the WCSA, from 1927 to 1987, was calibrated on.

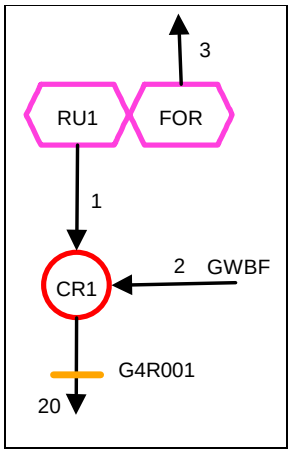


Figure 7.11: G4R001 Subcatchment Configuration

7.4.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). An attempt was made to extend the record at gauge G4R001, as used in the WCSA, from 1987 to 2004. However, difficulties related to data quality and inadequate dam balance records supplied by the City of Cape Town, resulted in the original WCSA record having to be used for the current calibrations. A detailed description of how this record was compiled is provided in DWAF (1993a). The patched observed inflow record at G4R001 is included in Appendix C11.

7.4.4 Calibration (1927 - 2004)

Inflows to Steenbras Dam were simulated for the period 1927-2004. Details of the rainfall stations used to generate catchment rainfall for G4R001 are shown in Table 7.18. The updated MAP for this catchment is estimated to be 1057 mm compared to 1169 mm in the WCSA (DWAF, 1993a). However, the WCSA MAP was eventually used for the final calibration.

Table 7.18: Rainfall stations for calibration at G4R001

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
9158101	955	1928-1988	60
9158102	1276	1928-1988	60
9158104	1083	1928-1988	60
005612W	1242	1954-2004	50

The WCSA (DWAF, 1993a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 7.19 and Table 7.20 displays the patched observed and simulated statistics for G4R001. Graphs

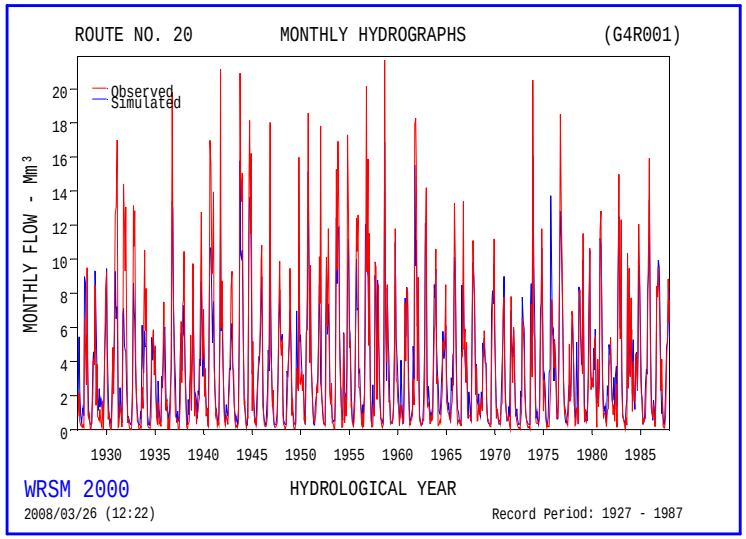
showing monthly, annual and mean monthly flows as well as a gross yield plot for each calibration are also included in Figure 7.12.

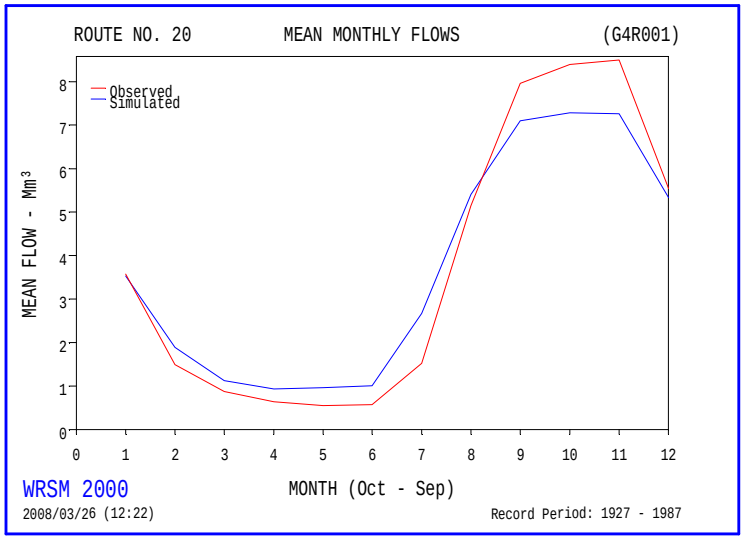
Table 7.19: G4R001 Final Pitman Parameters

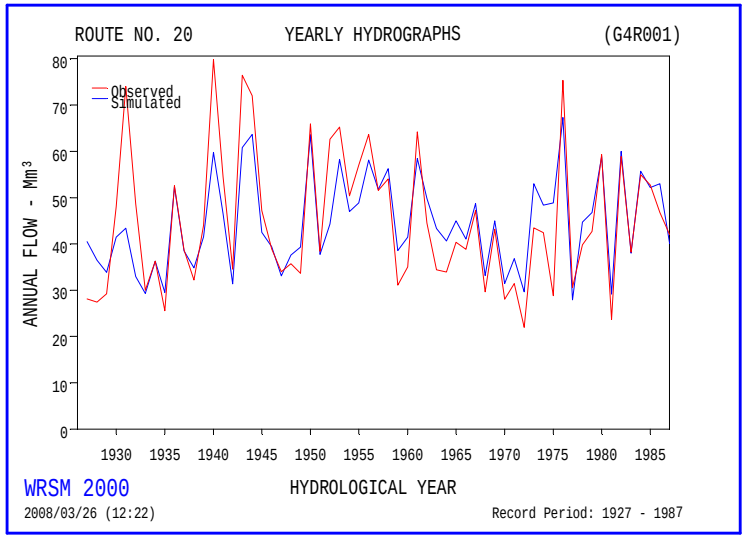
POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	150	80	0	0	180	1.5	0.25	0	0

Table 7.20: G4R001 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm3)	44.8	44.5	-0.6%
Mean (Log)	1.6	1.6	0.5%
Std Dev	14.5	10.1	-30.5%
Std Dev (Log)	0.1	0.1	-28.4%
Seasonal Index	37.7	31.1	-17.5%







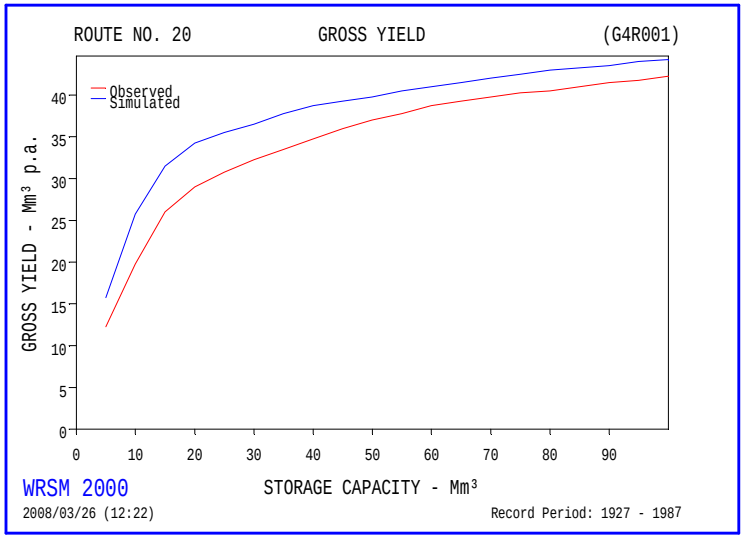


Figure 7.12: G4R001 Calibration Results (Graphical Comparison)

8 CALIBRATION RESULTS: RIVIERSONDEREND CATCHMENT

8.1 H6H007: Du Toit's River at Purgatory Uitspan

8.1.1 Subcatchment data

Land use in the Riviersonderend catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 8.1 presents a summary of the catchment data for the subcatchment H6H007 and detailed information are summarised in Table 8.2. Figure 8.1 shows detailed maps of the catchment.

Table 8.1: Summary of information for H6H007

H6H007	
Subcatchment area (km^2)	46.0
Above farm dams	-
Below farm dams	46.0
Forestry area (km^2)	-
Alien vegetation condensed area (km^2)	-
Irrigation Area (km^2)	-
From farm dams	-
From river	-
Farm dams: Area (km^2) Volume (Mm^3)	- / -
Subcatchment MAP (mm)	1455
Total GW contribution to baseflow	1.6
Calibration period (Hydrological years)	1963-1991
Observed MAR for calibration period (Mm^3)	37.1
Patched observed MAR for calibration period (Mm^3)	39.5
Simulated MAR for calibration period (Mm^3)	39.5
Naturalised MAR (1927-2004) (Mm^3)	37.0
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	38.6
Runoff Coefficient (%)	58%

Table 8.2: Detailed catchment information for H6H007

APPENDIX	CONTENTS	FORMAT
A14	Hydrological information for model calibration	Table
B16	Catchment Rainfall File	Monthly time series
C13	Patched observed flow record (H6H007)	Monthly time series
D16	Naturalised flow sequence	Monthly time series

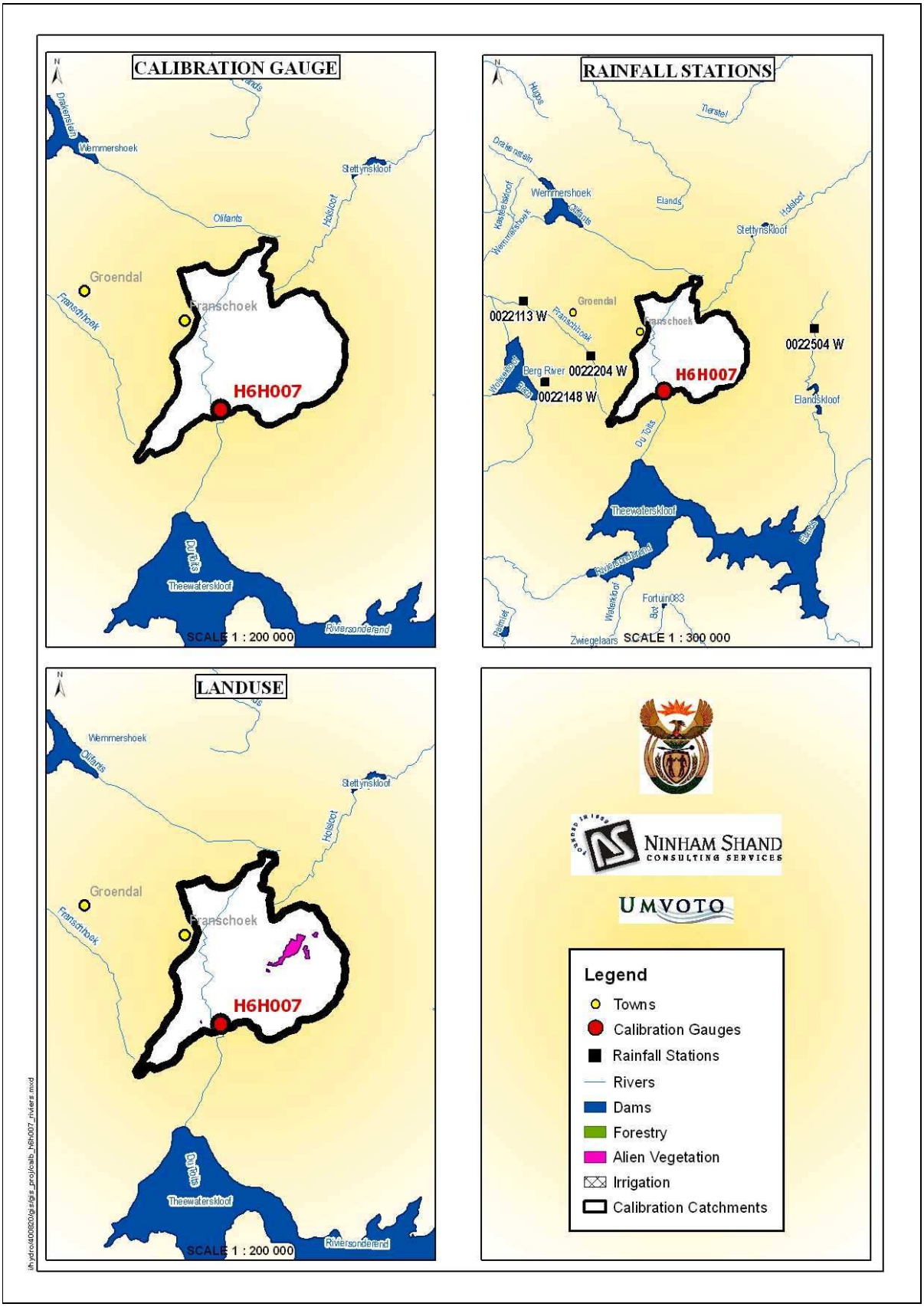


Figure 8.1: H6H007 Subcatchment hydrology information

8.1.2 Model configuration

Figure 8.2 shows the model configuration for subcatchment H6H007. There are no imports or exports to the catchment. The total groundwater contribution to baseflow in this catchment is estimated to be 1.6 Mm^3/a.

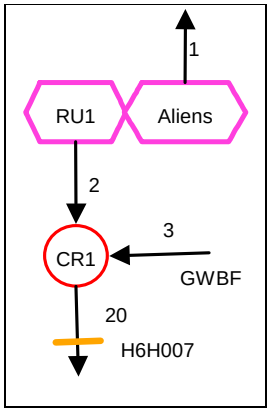


Figure 8.2: H6H007 Subcatchment Configuration

8.1.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for H6H007 is shown in Appendix C13.

8.1.4 Calibration (1963-1991)

Flows at H6H007 were simulated for the period 1963-1991. Details of the rainfall stations used to generate catchment rainfall for H6H007 are shown in Table 8.3. The updated MAP for this catchment is estimated to be 1238 mm compared to 1455 mm in the WCSA (DWAF, 1994a). However, the higher value was eventually used and results in an acceptable calibration for this catchment.

Table 8.3: Rainfall stations for calibration at H6H007

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
022113W	838	1927-2002	75
022148W	1985	1961-2004	43
022204W	878	1942-1969	27
022504W	760	1932-2000	68

The WCSA (DWAF, 1994a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 8.4 and Table 8.5 displays the patched observed and simulated statistics for H6H007. Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 8.3.

Note that the natural MAR is lower than the simulated MAR but this is only due to the difference in period over which the MAR is calculated. The simulated MAR over the entire period is equal to 35.6 Mm^3 which is less than its natural counterpart.

Table 8.4: H6H007 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	400	99	0	0	500	1.5	0	0	0

Table 8.5: H6H007 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	39.5	39.5	-0.1%
Mean (Log)	1.6	1.6	-0.1%
Std Dev	11.8	13.5	14.1%
Std Dev (Log)	0.1	0.1	1.2%
Seasonal Index	32.7	35.7	9.1%

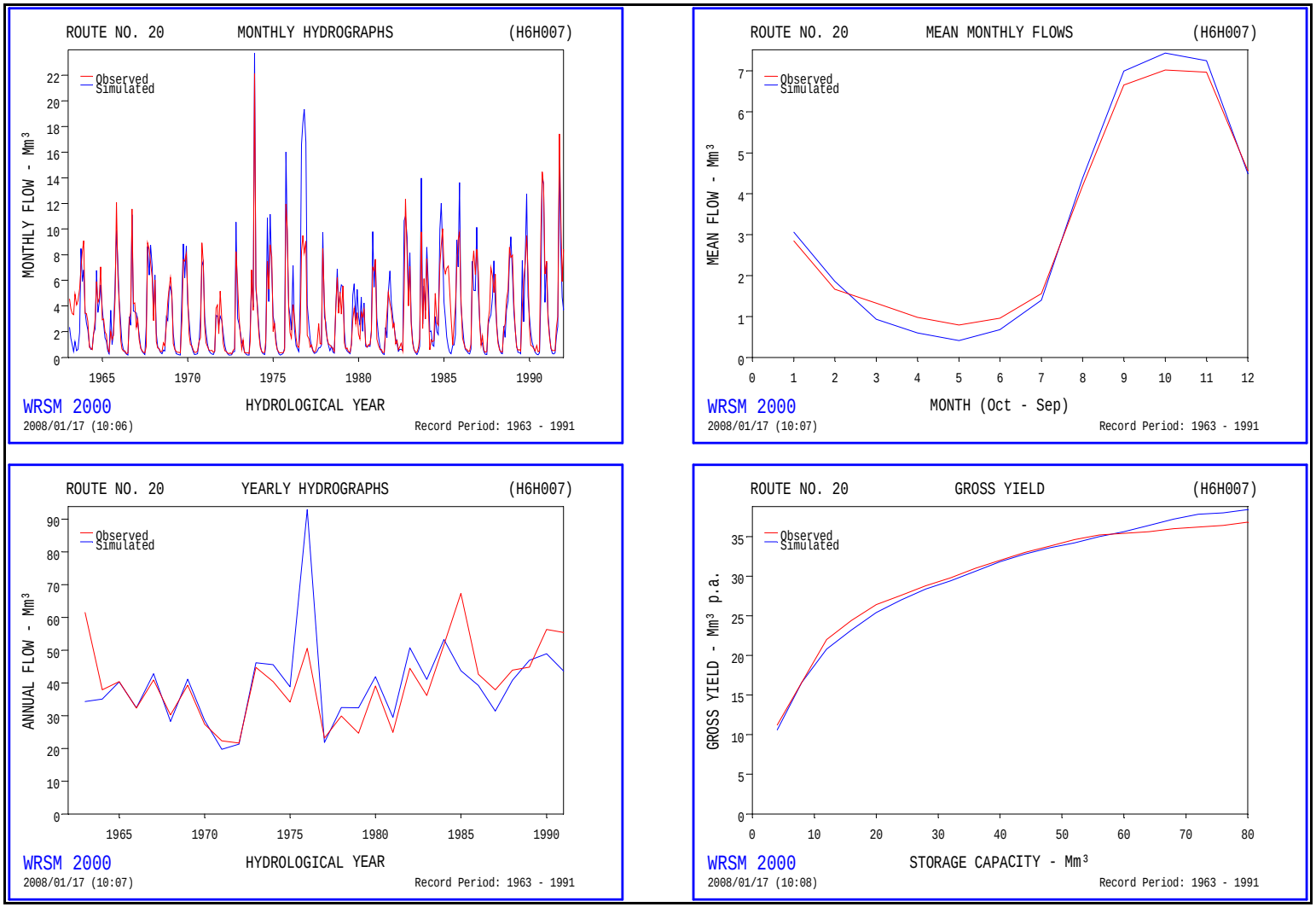


Figure 8.3: H6H007 Calibration Results (Graphical Comparison)

8.2 H6H008: Riviersonderend at Nuweberg Forest

8.2.1 Subcatchment data

Land use in the Riviersonderend catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 8.6 presents a summary of the catchment data for the subcatchment H6H008 and detailed information are summarised in Table 8.7. Figure 8.4 shows detailed maps of the catchment.

Table 8.6: Summary of information for H6H008

H6H008	
Subcatchment area (km^2)	39.1
Above farm dams	-
Below farm dams	39.1
Forestry area (km^2)	0.2
Alien vegetation condensed area (km^2)	-
Irrigation Area (km^2)	-
From farm dams	-
From river	-
Farm dams: Area (km^2) / Volume (Mm^3)	- / -
Subcatchment MAP (mm)	2320
Total GW contribution to baseflow	1.4
Calibration period (Hydrological years)	1963-1991
Observed MAR for calibration period (Mm^3)	60.5
Patched observed MAR for calibration period (Mm^3)	63.9
Simulated MAR for calibration period (Mm^3)	64.3
Naturalised MAR (1927-2004) (Mm^3)	61.8
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	63.2
Runoff Coefficient (%)	70%

Table 8.7: Detailed catchment information for H6H008

APPENDIX	CONTENTS	FORMAT
A15	Hydrological information for model calibration	Table
B17	Catchment Rainfall File	Monthly time series
C14	Patched observed flow record (H6H008)	Monthly time series
D17	Naturalised flow sequence	Monthly time series

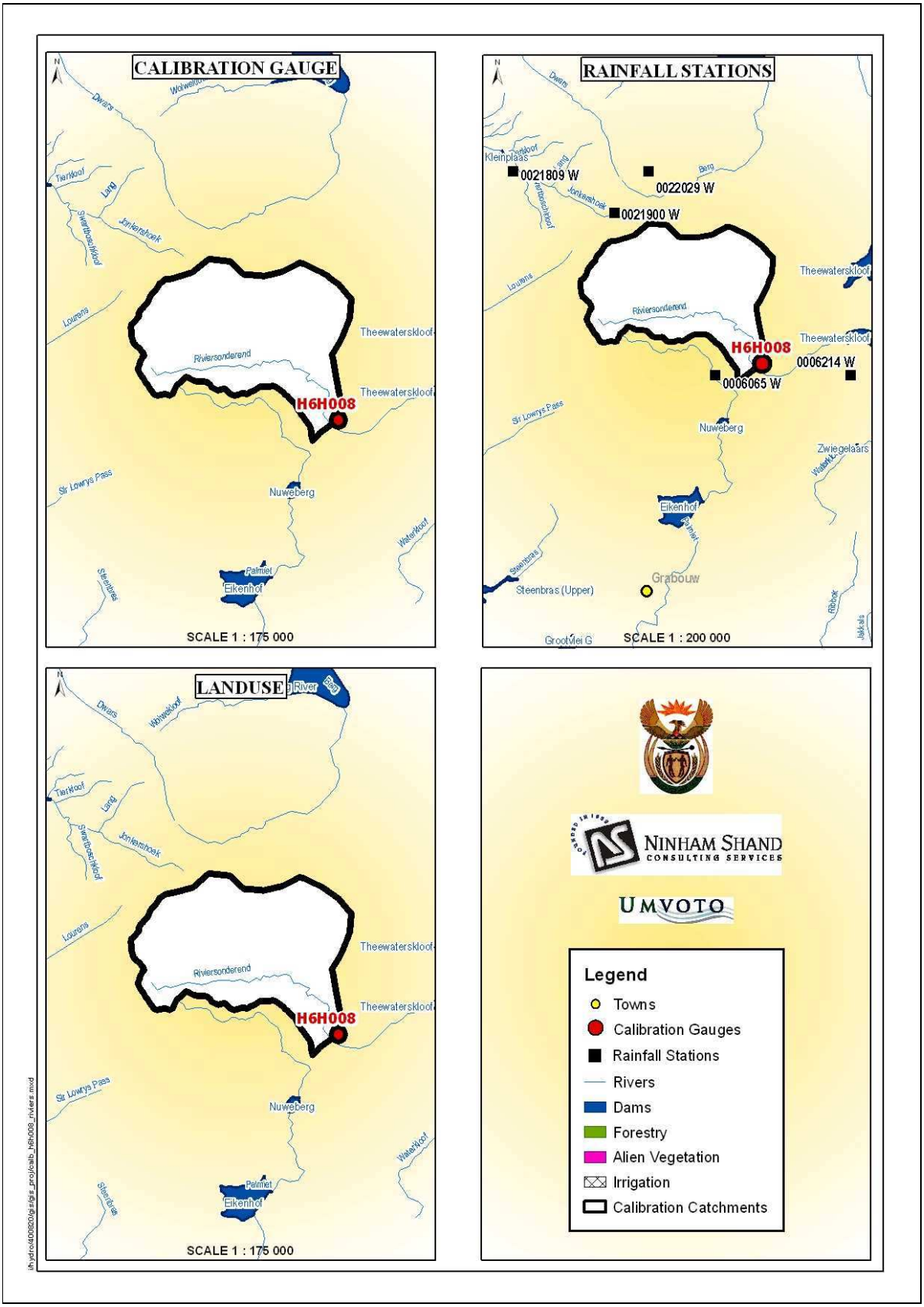


Figure 8.4: H6H008 Subcatchment hydrology information

8.2.2 Model configuration

Figure 8.5 shows the model configuration for subcatchment H6H008. There are no imports or exports to the catchment. The total groundwater contribution to baseflow in this catchment is estimated to be 1.4 Mm^3/a.

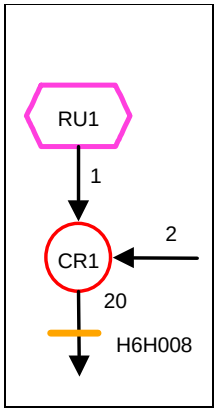


Figure 8.5: H6H008 Subcatchment Configuration

8.2.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The patched observed flow record for H6H008 is shown in Appendix C14.

8.2.4 Calibration (1963-1991)

Flows at H6H008 were simulated for the period 1963-1991. Details of the rainfall stations used to generate catchment rainfall for H6H008 are shown in Table 8.8. The updated MAP for this catchment is estimated to be 2133 mm compared to 2320 mm in the WCSA (DWAF, 1994a). The higher MAP value was eventually used and produces an acceptable calibration for this catchment.

Table 8.8: Rainfall stations for calibration at H6H008

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
006065w	1595	1927-2004	77
006214w	820	1932-1994	64
021809w	1463	1936-2004	68
021900w	2050	1971-1990	21
022029w	2060	1944-2004	60

The WCSA (DWAF, 1994a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 8.9 and Table 8.10 displays the patched observed and simulated statistics for H6H008. Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 8.6.

Note that even though the natural MAR appears lower than the simulated MAR, this is only due to the different periods over which the two values are calculated. The simulated MAR over the entire period is equal to 63.2 Mm^3 which is less than its natural counterpart.

Table 8.9: H6H008 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	400	30	0	0	200	1.5	0.25	0	0

Table 8.10: H6H008 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm3)	63.9	64.3	0.7%
Mean (Log)	1.8	1.8	-0.1%
Std Dev	14.5	18.1	24.3%
Std Dev (Log)	0.1	0.1	18.6%
Seasonal Index	31.8	33.6	5.7%

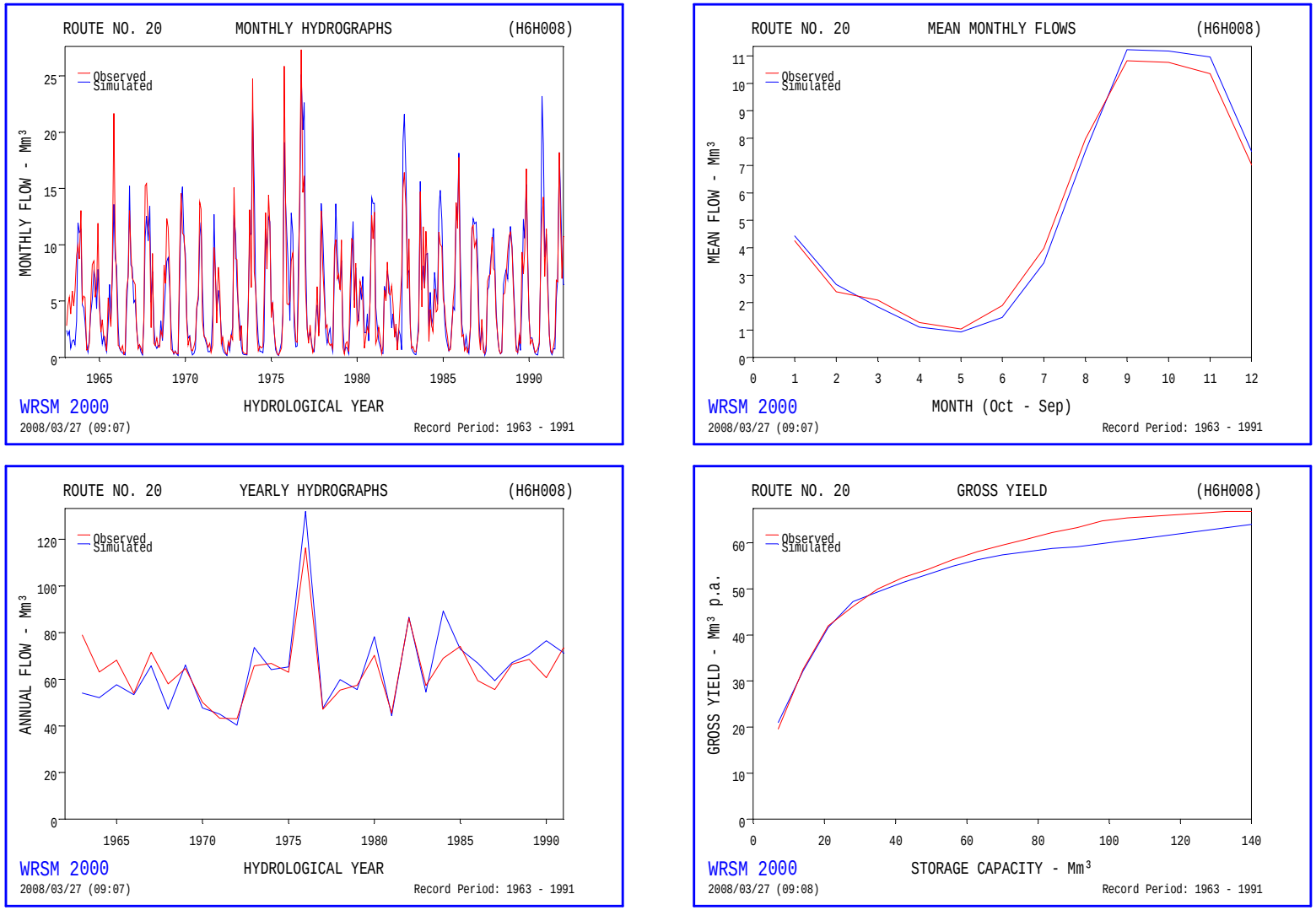


Figure 8.6: H6H008 Calibration Results (Graphical Comparison)

8.3 H6R002: Elands River at Elandskloof Dam

8.3.1 Subcatchment data

Land use in the Riviersonderend catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 8.11 presents a summary of the catchment data for the subcatchment H6R002 and detailed information are summarised in Table 8.12. Figure 8.7 shows detailed maps of the catchment.

Table 8.11: Summary of information for H6R002

H6R002	
Subcatchment area (km^2)	49.9
Above farm dams	7.2
Below farm dams	42.7
Forestry area (km^2)	2.9
Alien vegetation condensed area (km^2)	0.3
Irrigation Area (km^2)	6.0
From farm dams	3.9
From river	1.7
Farm dams: Area (km^2) / Volume (Mm^3)	0.4 / 1.9
Subcatchment MAP (mm)	1042
Total GW contribution to baseflow (Mm^3)	0.5
Calibration period (Hydrological years)	1979-2004
Observed MAR for calibration period (Mm^3)	21.0
Patched observed MAR for calibration period (Mm^3)	22.0
Simulated MAR for calibration period (Mm^3)	21.9
Naturalised MAR (1927-2004) (Mm^3)	21.6
Naturalised MAR including GW baseflow (1927-2004) (Mm^3)	22.1
Runoff Coefficient (%)	43%

Table 8.12: Detailed catchment information for H6R002

APPENDIX	CONTENTS	FORMAT
A16	Hydrological information for model calibration	Table
B18	Catchment Rainfall File	Monthly time series
C16	Patched observed flow record (H6R002)	Monthly time series
D18	Naturalised flow sequence	Monthly time series

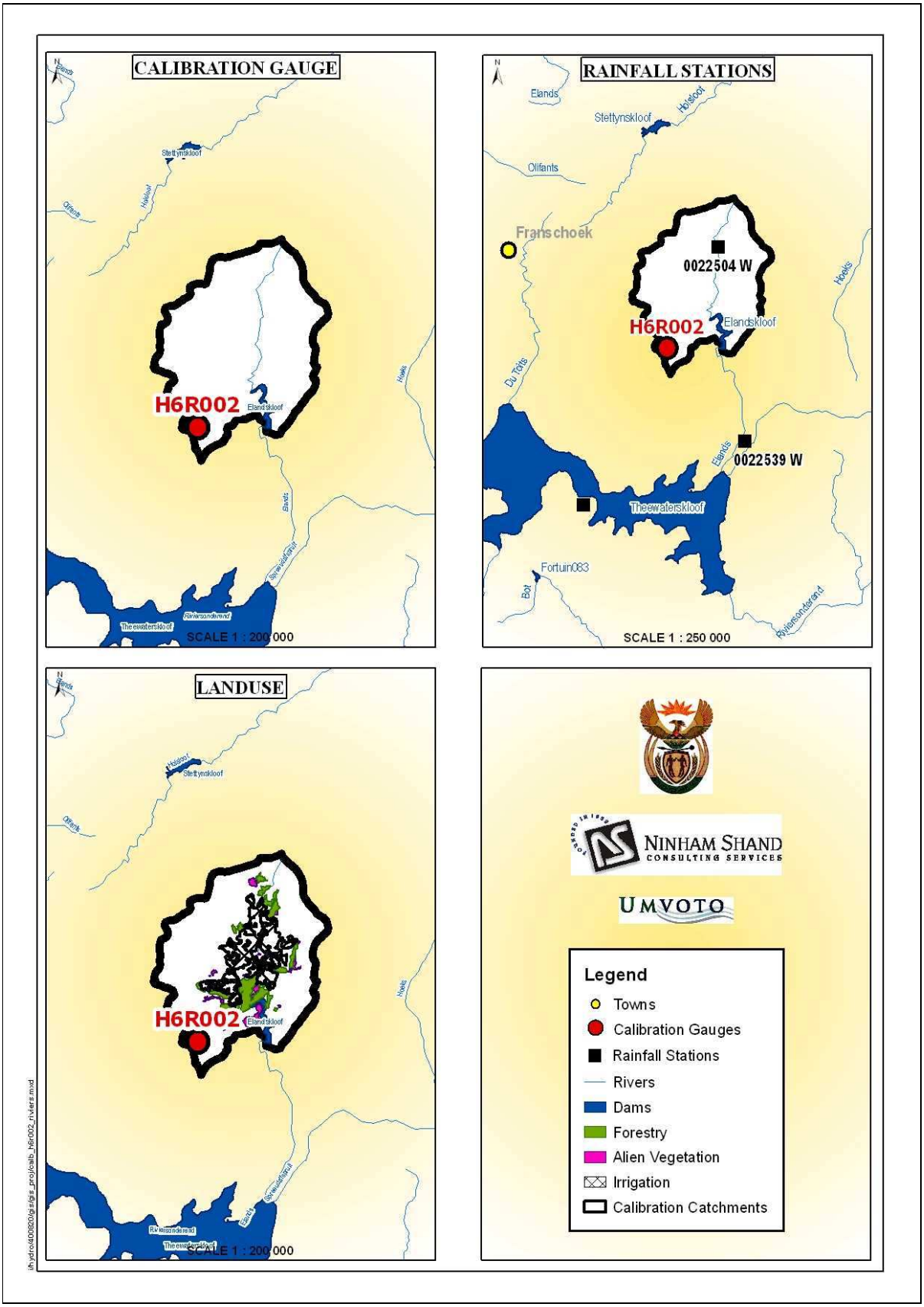


Figure 8.7: H6R002 Subcatchment hydrology information

8.3.2 Model configuration

Figure 8.8 shows the model configuration for the catchment upstream of the Elandskloof Dam. There are no imports or exports from the system. The total groundwater contribution to baseflow in this catchment is estimated to be 0.5 Mm^3/a. Winter filling of the farm dams is taken into consideration.

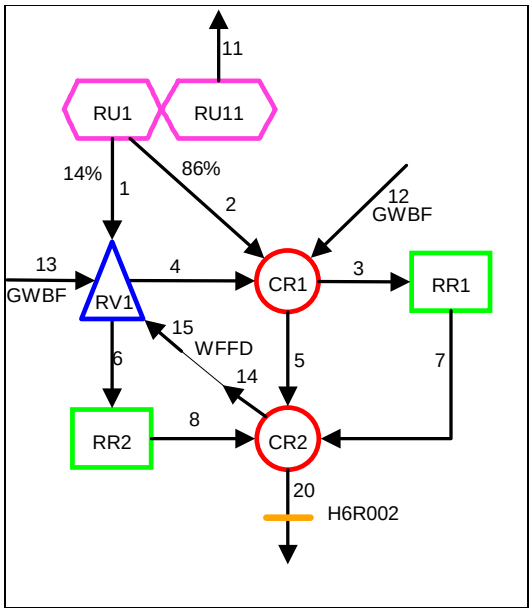


Figure 8.8: H6R002 Subcatchment Configuration

8.3.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3 : The Assessment of Flow Gauging Stations* (DWAF, 2007c). The observed inflows to Elandskloof Dam were obtained from dam balance data obtained from DWAF. The patched observed flow record for H6R002 is shown in Appendix C16.

8.3.4 Calibration (1979 - 2004)

Inflows to Elandskloof Dam were simulated for the period 1979-2004. Details of the rainfall stations used to generate catchment rainfall for H6R002 are shown in Table 8.13. The updated MAP for this catchment is estimated to be 1042 mm compared to 1165 mm in the WCSA (DWAF, 1994a). The updated MAP is slightly lower than the MAP used in the WCSA but still produces an acceptable calibration in this catchment.

Table 8.13: Rainfall stations for calibration at H6R002

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
006332w	794	1932-2004	72
022504w	760	1932-2000	68
022539w	624	1927-2004	77

The WCSA (DWAF, 1994a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 8.14

and Table 8.15 displays the patched observed and simulated statistics for H6R002. Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 8.9. Note that the natural MAR appears lower than the simulated MAR but this is only due to the difference in period over which the MAR is calculated. The simulated MAR over the entire period is equal to 20.8 Mm^3 which is less than its natural counterpart.

Table 8.14: H6R002 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	375	50	0	0	500	1.5	0	0	0

Table 8.15: H6R002 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	22.0	21.9	-0.5%
Mean (Log)	1.3	1.3	-1.2%
Std Dev	7.8	9.5	20.8%
Std Dev (Log)	0.2	0.2	18.6%
Seasonal Index	35.5	41.2	16.1%

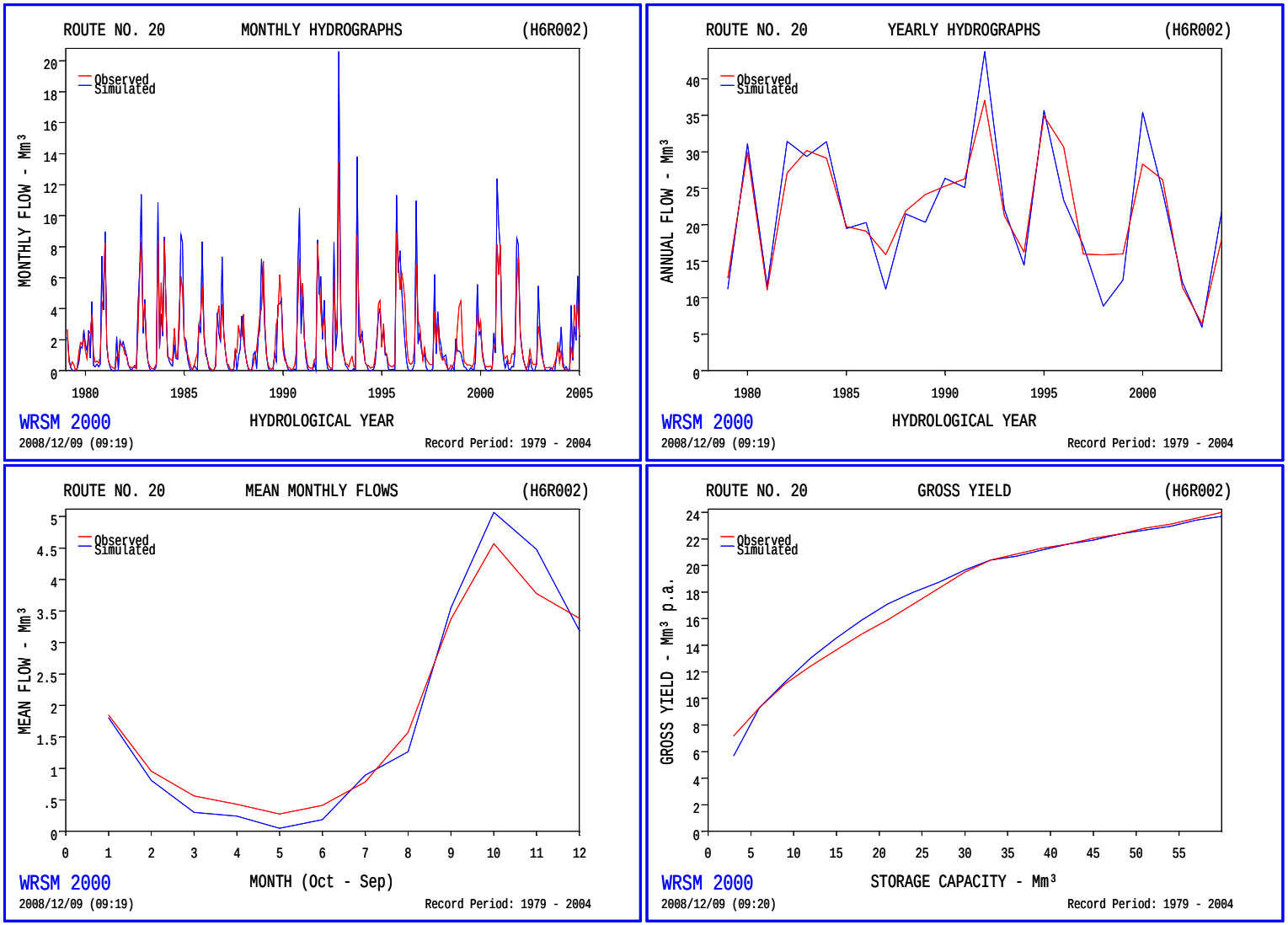


Figure 8.9: H6R002 Calibration Results (Graphical Comparison)

8.4 H6R001: Riviersonderend at Theewaterskloof Dam

8.4.1 Subcatchment data

Land use in the Riviersonderend catchment has been documented in a separate report entitled *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling)* (DWAF, 2007d). Table 8.16 presents a summary of the catchment data for the subcatchment H6R001 and detailed information are summarised in Table 8.17. Figure 8.10 shows detailed maps of the catchment.

Table 8.16: Summary of information for H6R001

H6R001	TOTAL	HIGH MAP (Vyeboom)	HIGH MAP (H6R001)	LOW MAP (d/s Elandskloof)
Subcatchment area (km^2)	306.2	111.8	67.9	126.5
Above farm dams	139.5	30.2	-	109.3
Below farm dams	166.7	77.9	67.9	88.9
Forestry area (km^2)	3.3	2.5	-	0.8
Alien vegetation condensed area (km^2)	5.4	3.9	-	1.5
Irrigation Area (km^2)	44.6	9.8	-	34.8
From farm dams	48.8	24.3	-	24.5
From river	10.4	10.4	-	-
Farm dams: Area (km^2) / Volume (Mm^3)	2.5 / 8.9	1.7 / 6.9	- / -	0.8 / 2.0
Subcatchment MAP (mm)	1099	1300	1094	925
Total GW contribution to baseflow (Mm^3)	8.2	3.9		4.3
Calibration period (Hydrological years)	1987-2004			
Observed cumulative MAR for calibration period (Mm^3)	305.3			
Patched observed cumulative MAR for calibration period (Mm^3)	316.0			
Simulated cumulative MAR for calibration period (Mm^3)	315.6			
Naturalised incremental MAR (1927-2004) (Mm^3)	222.4			
Naturalised incremental MAR including GW baseflow (1927-2004) (Mm^3)	230.6			
Naturalised cumulative MAR (1927-2004) (Mm^3)	354.5			
Runoff Coefficient (%)	69%			

Table 8.17: Detailed catchment information for H6R001

APPENDIX	CONTENTS	FORMAT
A17	Hydrological information for model calibration	Table
B19	Catchment Rainfall File	Monthly time series
C15	Patched observed flow record (H6R001)	Monthly time series
D16	Naturalised flow sequence	Monthly time series

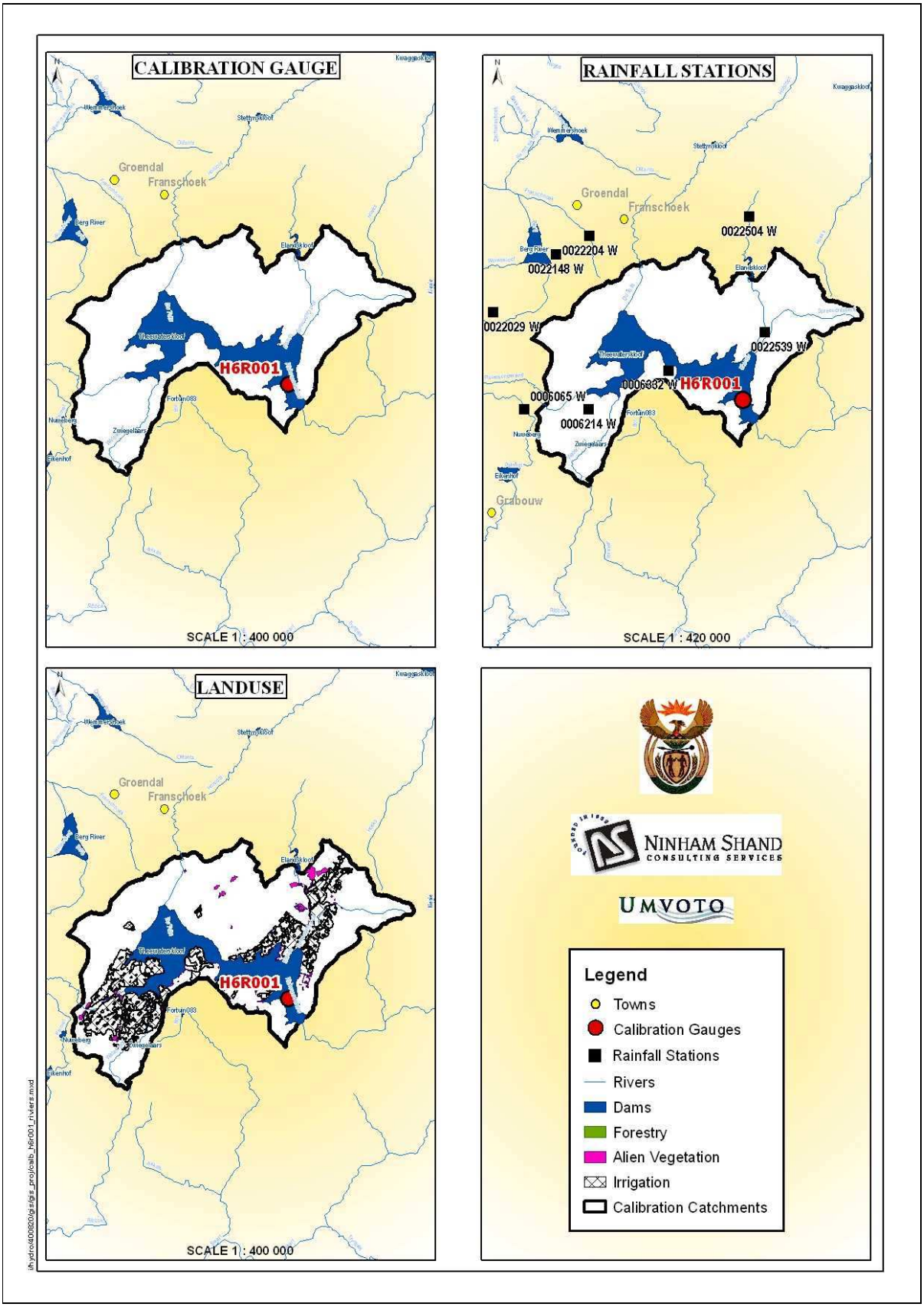


Figure 8.10: H6R001 Subcatchment hydrology information

8.4.2 Model configuration

Figure 8.11 shows the model configuration for subcatchment H6R001. The catchment is divided into High and Low MAP areas. The high MAP catchment encompasses the Vyeboom irrigation scheme area as well as the catchment downstream of flow gauge H6H007. Water is transferred from the Theewaterskloof Dam to the Vyeboom irrigation scheme via the Vyeboom pipeline which is metered at H6H020. The Low MAP catchment is the incremental area downstream of the Elandskloof Dam, where the Elandskloof Irrigation Scheme is located and for which a release is made from the Elandskloof Dam. A cumulative calibration was undertaken, i.e. the upstream flows from the Du Toits River (H6H007) and the Riviersonderend (H6H008), as well as the spills from the Elandskloof Dam (H6R002). The total groundwater contribution to baseflow in this catchment is estimated to be 8.2 Mm^3/a. Winter filling of farm dams is taken into consideration.

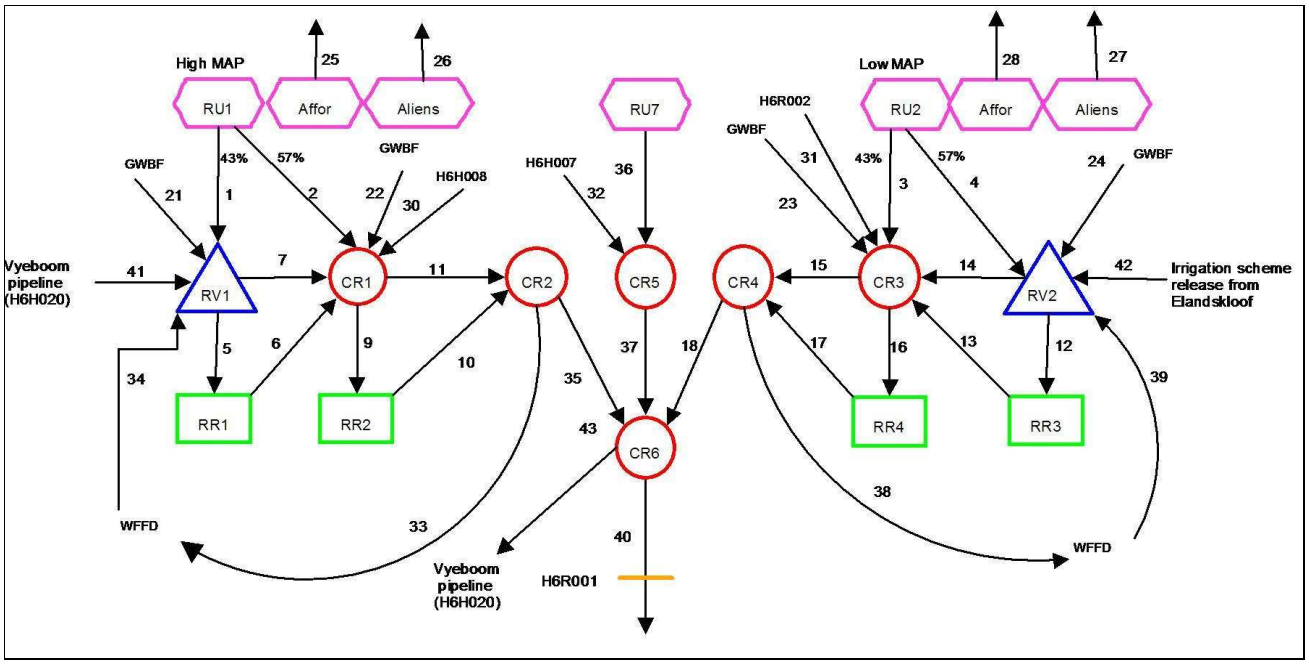


Figure 8.11: H6R001 Subcatchment Configuration

8.4.3 Evaluation and preparation of flow sequences

A detailed assessment of the flow gauges in the Berg WAAS area was made and is documented in *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models, Report No. 3: The Assessment of Flow Gauging Stations* (DWAF, 2007c). The observed inflow record at Theewaterskloof Dam was obtained from DWAF dam balance data. The abstraction for the Vyeboom irrigation scheme was included in the inflow calculation in the dam balance and thus it was necessary to subtract it again because the Vyeboom irrigation scheme is modelled explicitly. The patched observed flow record at H6R001 is included in Appendix C15.

8.4.4 Calibration (1987 - 2004)

Inflows to Theewaterskloof Dam were simulated for the period 1987-2004. Details of the rainfall stations used to generate catchment rainfall for H6R001 are shown in Table 8.18. The updated MAP for this catchment is estimated to be 1399 mm for the high MAP zone and 843 mm for the low MAP zone. This compares to 1144 mm in the WCSA (DWAF, 1993). The updated MAP produces an acceptable calibration in this catchment.

Table 8.18: Rainfall stations for calibration at H6R001

RAINFALL STATION NUMBER	MAP	PERIOD OF RECORD	RECORD LENGTH
006065w	1595	1927-2004	77
006214w	820	1932-1994	62
006332w	794	1932-2004	72
022029w	2060	1944-2004	60
022148w	1985	1961-2004	43
022204w	878	1942-1969	27
022504w	760	1932-2000	68
022539w	624	1927-2004	77

The WCSA (DWAF, 1994a) Pitman parameters were used during initial model calibration. These parameters were then improved until an acceptable fit between the observed and simulated stream flow data was obtained. The final Pitman parameters are shown in Table 8.19 and Table 8.20 displays the patched observed and simulated statistics for H6R001. Graphs showing monthly, annual and mean monthly flows as well as a cumulative frequency plot for each calibration are also included in Figure 8.12.

Table 8.19: H6R001 Final Pitman Parameters

POW	SL	ST	FT	GW	ZMIN	ZMAX	PI	TL	GL	R
2	0	100	75	0	0	165	1.5	0.25	0	0

Table 8.20: H6R001 Calibration Results (Statistical Indices)

	OBSERVED	SIMULATED	DIFFERENCE (%)
MAR (Mm^3)	316.0	315.6	0%
Mean (Log)	2.5	2.5	0%
Std Dev	88.7	95.9	8%
Std Dev (Log)	0.1	0.1	4%
Seasonal Index	37.8	39.0	3%

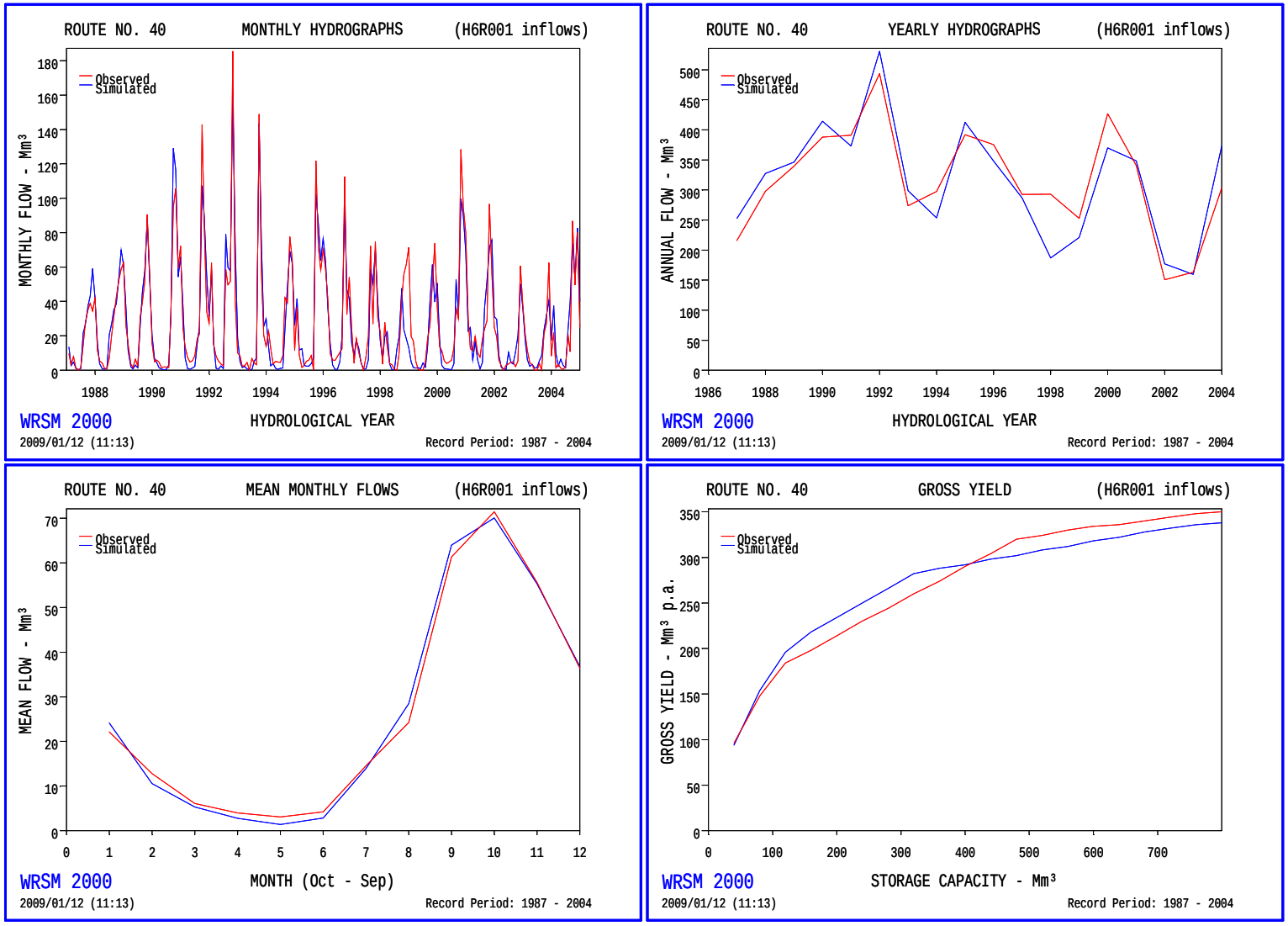


Figure 8.12: H6R001 Calibration Results (Graphical Comparison)

9 FLOW SEQUENCE GENERATION

9.1 Naturalised runoff sequences

Naturalised flows were generated in the WRSM2000 model for each of the Peripheral Rivers calibration subcatchments. In WRSM2000, naturalised flows are generated from each runoff module, ignoring all demands and abstractions on the network. These include:

- Irrigation demands met by farm dams
- Evaporation from the farm dams
- Irrigation demands met by the river
- Abstractions (urban or other)
- Transfers out of the system

Similarly, imports into the catchment and irrigation return flows are also not taken into account. To these sequences, groundwater baseflows were then added back, as these also form part of the natural flows in the catchment. The observed flow record was naturalised by adding back all the water use in the catchment, which was calculated as the difference between simulated natural flows and simulated calibrated flows during the period of observation. Naturalised flows for each subcatchment are presented in Appendix D.

Mass balances for all of the Peripheral River catchments, comparing naturalised flows obtained in this study (1927-2004) with those obtained in the WCSA (1926-1988) are shown in Figure 9.1, Figure 9.2, Figure 9.3 and Figure 9.4.

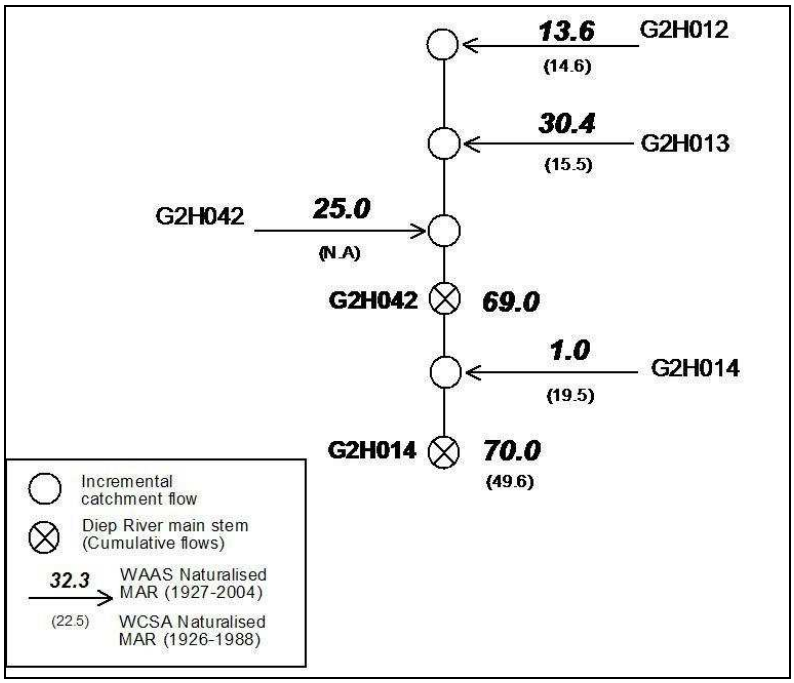


Figure 9.1: Diep River Mass Balance

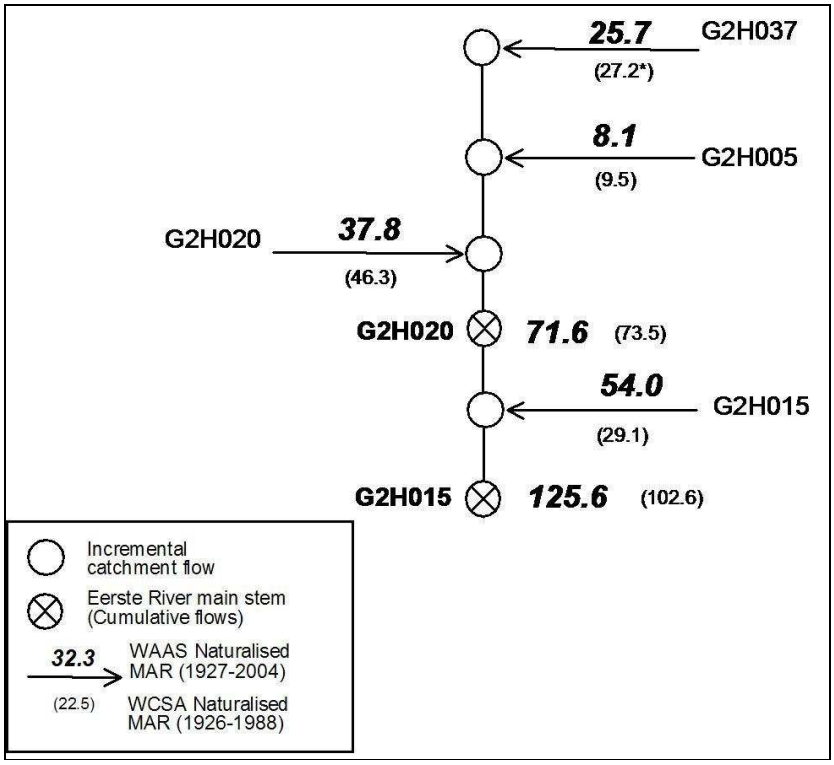


Figure 9.2: Eerste and Lourens Rivers Mass Balance

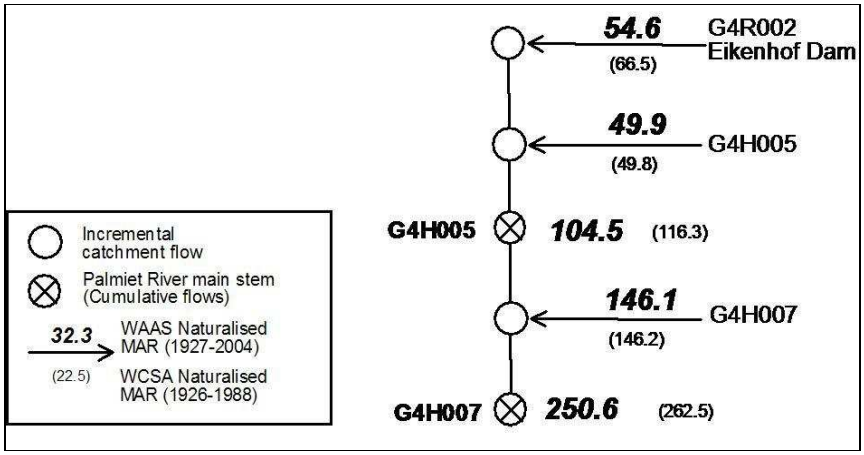


Figure 9.3: Palmiet and Steenbras Rivers Mass Balance

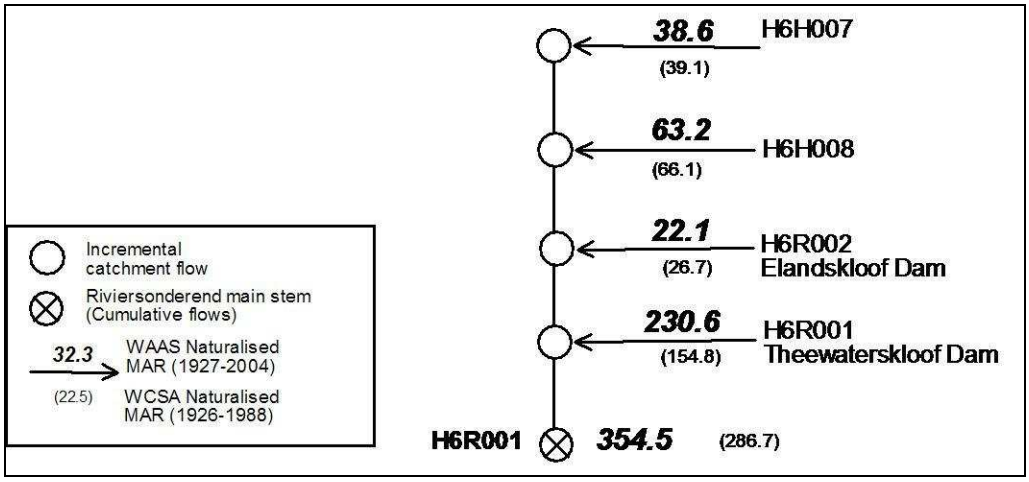


Figure 9.4: Riviersonderend Mass Balance

10 CONCLUSIONS

This report presents the results of the hydrological modelling that was undertaken with the updated WRSM2000 model for the Peripheral River catchments in the Berg WAAS area. These catchments include the Diep, the Eerste and Lourens, the Palmiet and Steenbras and the Riviersonderend catchments. The key objective of this task, which was to extend the naturalisation of streamflow to the 2004 hydrological year, has been achieved. Wherever possible, the calibration of streamflow was based on the most up-to-date period of record available at each flow gauge and most gauges had sufficient record length on which to calibrate. Additionally, groundwater contributions to streamflow have been accommodated in the monthly modelling process.

As verification, the naturalised flows obtained in this study (1927-2004), were compared to those obtained in the WCSA (1926-1988).

Figure 9.1 displays the mass balance for the Diep River catchment, while Table 10.1 summarises the cumulative naturalised MARs per calibration subcatchment. It shows that the upper reaches of the Diep River to flow gauge G2H012 compares favourably whereas the lower reaches and the Klipheuwel tributary show the largest difference with simulated flows 96% higher than in the previous study. The incremental flows on the main stem are approximately 33% higher compared to the WCSA (DWAF, 1993). Overall, the difference in cumulative flows on the Diep River at flow gauge G2H014 is 41% higher.

Table 10.1: Comparison of cumulative naturalised flow sequences in the Diep River catchment

Site	WCSA (DWAF,1993) (Mm^3/a)	WAAS (DWAF, 2007) (Mm^3/a)	Difference (%)
G2H012 – Malmesbury	14.6	13.6	-7%
G2H013 – Klipheuwel	15.5	30.4	96%
G2H042 – Vissershok	N.A.*	69.0 (25.0)	-
G2H014 – Adderley	49.6 (19.5)	70.0 (1.0)	41% (33%)

( ) Incremental flows

* The incremental catchments used in the studies do not correspond

Figure 9.2 displays the mass balance for the Eerste and Lourens River catchments, while

Table 10.2 summarises the cumulative naturalised MARs per calibration subcatchment. It shows that the flows in the upper reaches of the Lourens river to flow gauge G2H020 are slightly lower than in the WCSA. The incremental flows to the flow gauge at Faure are 86% higher than in the WCSA resulting in an overall higher cumulative naturalised flow of 12%. The naturalised flows in the Lourens River are lower by 11% overall in the current study.

Table 10.2: Comparison of cumulative naturalised flow sequences in the Eerste and Lourens River catchments

Site	WCSA (DWAF,1993) (Mm^3/a)	WAAS (DWAF, 2007) (Mm^3/a)	Difference (%)
G2H037 – Kleinplaas	27.2*	25.7	-6%
G2H005 - Jonkershoek	9.5	8.1	-15%
G2H020 – Stellenbosch	83.0 (46.3)	71.6 (37.8)	-14% (-18%)
G2H015 – Faure	112.1 (29.1)	125.6 (54.0)	12% (86%)
G2H016 – Somerset West	54.0	48.2	-11%

( ) Incremental flows

* The incremental catchments used in the studies do not correspond

Figure 9.3 displays the mass balance for the Palmiet and Steenbras River catchments, while Table 10.3 summarises the cumulative naturalised MARs per calibration subcatchment. It shows that the flows in the upper Palmiet catchment at Eikenhof Dam are 18% lower than in the WCSA. The incremental flows on the middle and lower reaches of the Palmiet River at Applethwaite and Welgemoed respectively, compare favourably with the WCSA flows. Naturalised flows in the Steenbras River at Steenbras Dam are lower than in the previous study.

Table 10.3: Comparison of cumulative naturalised flow sequences in the Palmiet and Steenbras River catchments

Site	WCSA (DWAF,1993) (Mm^3/a)	WAAS (DWAF, 2007) (Mm^3/a)	Difference (%)
G4R002 – Eikenhof Dam	66.5	54.6	-18%
G4H005 – Applethwaite	116.3 (49.8)	104.5 (49.9)	-10% (0%)
G4H007 – Welgemoed	262.5 (146.2)	250.6 (146.1)	-5% (0%)
G4R001 – Lower Steenbras Dam	50.7	46.7	-8%

( ) Incremental flows

Figure 9.4 displays the mass balance for the Riviersonderend catchment, while Table 10.4 summarises the naturalised MARs per calibration subcatchment. It shows that the upper catchments, namely Purgatory Uitspan and Nuweberg Forest subcatchments compare favourably with the WCSA, with a larger difference in the Elandskloof subcatchment where naturalised flows in the current study are approximately 17% lower than in the WCSA. The incremental flows in the Theewaterskloof catchment are about 50% higher than in the WCSA which results in an overall increase in cumulative naturalised flows of 24% in the current study.

Table 10.4: Comparison of cumulative naturalised flow sequences in the Riviersonderend catchment

Site	WCSA (DWAF,1993) (Mm^3/a)	WAAS (DWAF, 2007) (Mm^3/a)	Difference (%)
H6H007 – Purgatory Uitspan	39.1	38.6	-1%
H6H008 – Nuweberg Forest	66.1	63.2	-4%
H6R002 – Elandskloof	26.7	22.1	-17%
H6R001 – Theewaterskloof	286.7 (154.8)	354.5 (230.6)	24% (49%)

( ) Incremental flows

11 REFERENCES

Department of Water Affairs and Forestry, South Africa. 1993a. *Hydrology of the Palmiet/Steenbras River Basin*. Prepared by G Howard of Ninham Shand Inc., in association with BKS Inc., as part of the Western Cape System Analysis. DWAF Report No. P G000/00/2391.

Department of Water Affairs and Forestry, South Africa. 1993b. *Hydrology of the Berg River Basin*. Prepared by R R Berg of Ninham Shand Inc., in association with BKS Inc., as part of the Western Cape System Analysis. DWAF Report No. P G000/00/2491.

Department of Water Affairs and Forestry, South Africa. 1993c. *Hydrology of the Eerste, Lourens and Sir Lowry's Pass River Basins*. Prepared by C R Whittemore of Ninham Shand Inc., in association with BKS Inc., as part of the Western Cape System Analysis. DWAF Report No. P G000/00/2691.

Department of Water Affairs and Forestry, South Africa. 1994a. *Hydrology of the Riviersonderend Basin, Upper Molenaars and Elandspad River catchments*. Prepared by W George and P Dunn of Ninham Shand Inc., in association with BKS Inc., as part of the Western Cape System Analysis. DWAF Report No. P G000/00/2791.

Department of Water Affairs and Forestry, South Africa. 1994b. *Hydrology of the Diep River Basin*. Prepared by C Richards and P Dunn of Ninham Shand Inc., in association with BKS Inc., as part of the Western Cape System Analysis. DWAF Report No. P G000/00/3593.

Department of Water Affairs and Forestry, South Africa. 2005. *Inception Report for: The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models.* Prepared by Ninham Shand (Pty) Ltd in association with Umvoto Africa on behalf of the Directorate : National Water Resource Planning.

Department of Water Affairs and Forestry, South Africa. 2007a. *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Applicability of Sami Groundwater Module to the Berg WAAS area*. Prepared by Ninham Shand (Pty) Ltd in association with Umvoto Africa (Pty) Ltd on behalf of the Directorate : National Water Resource Planning. DWAF Report No. P WMA 19/000/00/0407.

Department of Water Affairs and Forestry, South Africa. 2007b. *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models. Report No. 2: Rainfall Data Preparation and MAP Surface.* Prepared by Ninham Shand (Pty) Ltd in association with Umvoto Africa on behalf of the Directorate : National Water Resource Planning. DWAF Ref No. P WMA19/000/00/0407.

Department of Water Affairs and Forestry, South Africa. 2007c. *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models. Report No. 3: The Assessment of Flow Gauging Stations*. Prepared by Ninham Shand (Pty) Ltd in association with Umvoto Africa on behalf of the Directorate : National Water Resource Planning. DWAF Ref No. P WMA19/000/00/0407.

Department of Water Affairs and Forestry, South Africa. 2007d. *The Assessment of Water Availability in the Berg Catchment (WMA 19) by means of Water Resource Related Models: Report 4 (Land Use and Water Requirements): Volume 1 (Data in Support of Catchment Modelling).* Prepared by Ninham Shand (Pty) Ltd in association with Umvoto Africa on behalf of the Directorate: National Water Resource Planning. DWAF Report No P WMA19/000/00/0407.

Krous, W.W., de Kock, F.C., Pretorius, P.F., van Robbroek, T.P.C. 1979. Dieprivierskema : Moontlike aanwending van die Dieprivier as waterbron vir die stedelike gebied van Suidwes-Kaapland. Departement van Waterwese. DWW Report No. P 0720/00/0179.

Pitman, WMV, Kakebeeke, JP and Bailey AK. 2007. *WRSM2000: Water Resources Simulation Model for Windows. Simulation of the movement of water through an interlinked system of catchments, river reaches, reservoirs and irrigation areas. Users Guide*. Compiled by Stewart Scott Consulting Engineers in collaboration with TiSD.

APPENDIX A:

HYDROLOGICAL INFORMATION FOR MODEL CALIBRATION

APPENDIX NUMBER	BASIN	CALIBRATION GAUGE
A1	DIEP	G2H012
A2	DIEP	G2H013
A3	DIEP	G2H014
A4	DIEP	G2H042
A5	EERSTE	G2H005
A6	EERSTE	G2H015
A7	LOURENS	G2H016
A8	EERSTE	G2H020
A9	EERSTE	G2H037
A10	PALMIET	G4H005
A11	PALMIET	G4H007
A12	STEENBRAS	G4R001
A13	PALMIET	G4R002
A14	RIVIERSONDEREND	H6H007
A15	RIVIERSONDEREND	H6H008
A16	RIVIERSONDEREND	H6R002
A17	RIVIERSONDEREND	H6R001

GAUGE: **G2H012**

Main Catchment:	Diep	**SUB-CATCHMENT AREAS (km^2)**			
Subcatchment:	Malmesbury	Above farm dam boundary	24.6	10%	
River:	Diep	Below farm dam boundary	221.2	90%	
Location:	Malmesbury	**TOTAL AREA**	**245.8**		
Subcatchment area:	245.8 km^2				

LANDUSE	**YEAR**							
	1920	**1971**	**1972**	**1976**	**1986**	**1989**	**2004**	
Irrigation (km^2)	1.31	1.96	5.04	1.94	3.72	3.72	7.22	
Source = Farm dams	0.26	0.39	1.01	0.39	0.74	0.74	1.44	20%
Source = River	1.05	1.56	4.03	1.55	2.97	2.97	5.78	80%
Afforestation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Alien Vegetation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.20	

	1920	**1972**	**1973**	**1981**	**1984**	**1986**	**1989**	**2004**
Farm Dams (Mm^3)	0.10	0.20	0.50	0.53	0.78	0.92	1.03	2.41
Farm dam area (km^2)	0.05	0.05	0.08	0.12	0.36	0.42	0.45	2.10

Area:	**a(cap)[b]**
a	0.160
b	0.753

S-PAN (G10A)	137	191	224	230	194	169	106	61	47	52	61	89
A-PAN (G10A)	173	241	283	290	245	214	133	77	59	65	77	113

Data Sources
1950-1990 (WCSA)
1996 (VASF)
2004 (Berg WAAS)

Notes: Condensed alien veg area

GAUGE:	**G2H013**			
Main Catchment:	Diep		**SUB-CATCHMENT AREAS (km^2)**	
Subcatchment:	Mosselbank		Below farm dam boundary	**117.9**
River:	Mosselbank		Below farm dam boundary	**353.6**
Location:	Klipheuwel			
Subcatchment area:	471.5	km^2	**TOTAL AREA**	**471.5**

LANDUSE						**YEAR**							
		1920	**1942**	**1968**	**1976**	**1986**	**1989**	**2000**	**2004**				
Irrigation (km^2)		**7.50**	**11.15**	**7.53**	**30.46**	**27.21**	**33.07**	**33.07**	**64.08**				
Source = Farm dams		3.00	4.46	3.01	12.19	10.89	13.23	13.23	42.35				
Source = River		4.50	6.69	4.52	18.28	16.33	19.84	19.84	21.73				
Afforestation (km^2)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Alien Vegetation (km^2)		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80				
		1920	**1954**	**1955**	**1964**	**1965**	**1973**	**1984**	**1989**	**2004**			
Farm Dams (Mm^3)		0.50	1.00	3.60	5.10	5.40	12.00	15.54	15.54	25.55			
Farm dam area (km^2)		0.05	0.15	0.20	0.30	0.40	0.90	1.00	1.20	5.35			
Area:	**a(cap)^b**												
a	0.1857												
b	0.6800												
S-PAN (G10A)	130	182	214	219	185	161	100	58	45	49	58	85	
A-PAN (G10A)	163	228	268	275	232	203	126	73	56	62	73	107	

Data Sources
1950-1990 (WCSA)
1993 (SDFS)
2004 (Berg WAAS)

Notes: Condensed alien veg area

GAUGE:	**G2H014**	
Main Catchment:	Diep	
Subcatchment:	Adderley	
River:	Diep	
Location:	Adderley	
Subcatchment area:	87.9	km^2

SUB-CATCHMENT AREAS (km^2)		
Above farm dam boundary	43.9	50%
Below farm dam boundary	43.9	50%
TOTAL AREA	**87.9**	

LANDUSE	**YEAR**							
	1920	**1942**	**1968**	**1976**	**1986**	**1989**	**2000**	**2004**
Irrigation (km^2)	**0.58**	**0.86**	**1.40**	**0.64**	**1.27**	**1.27**	**1.47**	**1.47**

	1920	**1940**	**1960**	**1989**	**2000**	**2004**
Afforestation (km^2)	4.30	3.00	3.00	2.90	2.30	1.30
Alien Vegetation (km^2)	**0**	**0**	**0**	**0**	**0**	**0**

	1920	**1989**	**2000**	**2004**
Farm Dams: Volume (Mm^3)	0.00	0.00	0.28	0.28
Farm Dams: Area (km^2)	0.00	0.00	0.53	0.53

Area:	**A(cap)[b]**
Coefficient a	1.259
Coefficient b	0.680

S-PAN (G10E)	125	175	206	211	178	155	97	56	43	47	56	82
A-PAN (G10E)	157	219	257	264	223	194	121	70	54	59	70	103

Data Sources
1950-1990 (WCSA)
1996 (VASF)
2004 (Berg WAAS)

Notes: Condensed alien veg area

GAUGE:	**G2H042**	
Main Catchment:	Diep	
Subcatchment:	Vissershok	
River:	Diep	
Location:	Vissershok	
Subcatchment area:	586.6	km^2

SUB-CATCHMENT AREAS (km^2)		
Above farm dam boundary	203.3	*35%*
Below farm dam boundary	383.3	*65%*
TOTAL AREA	**586.6**	

LANDUSE	**YEAR**							
	1920	**1942**	**1968**	**1986**	**1989**	**2000**	**2004**	
Irrigation (km^2)	**9.48**	**14.03**	**22.95**	**25.47**	**25.47**	**36.43**	**36.43**	
Source = Farm dams	6.16	9.12	14.92	16.56	16.56	23.68	23.68	*65%*
Source = River	3.32	4.91	8.03	8.92	8.92	12.75	12.75	*35%*

	1920	**1940**	**1960**	**1989**	**2000**	**2004**
Afforestation (km^2)	1.30	0.90	0.90	0.90	0.00	0.00

	1920	**1989**	**2000**	**2004**
Alien Vegetation (km^2)	0	0	1.30	1.30

	1920	**1985**	**1989**	**2000**	**2004**
Farm Dams: Volume (Mm^3)	0.00	0.14	1.38	7.43	7.43
Farm Dams: Area (km^2)	0.00	0.19	0.20	2.84	2.84

Area:	**a(cap)[b]**
a	0.6311
b	0.7500

S-PAN (G10E)	130	182	214	219	185	161	100	58	45	49	58	85
A-PAN (G10E)	164	229	269	276	233	203	127	73	56	62	73	107

Data Sources
1950-1990 (WCSA)
1996 (VASF)
2004 (Berg WAAS)

Notes: Condensed alien veg area

GAUGE:	**G2H005**			
			SUBCATCHMENT AREAS (KM2)	
Main Catchment:	Eerste		Above Farm dam boundary	0.00
Subcatchment:	Jonkershoek (incremental)		Below Farm dam boundary	8.37
River:	Jonkershoek			
Location:	Jonkershoek			
Subcatchment area:	8.37	km^2		

LANDUSE	**YEAR**												
	1948	**1965**	**1970**	**1974**	**1980**	**1990**	**2004**						
Irrigation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Afforestation (km^2)	2.28	2.28	2.28	2.28	2.28	3.90	1.86						
Alien Vegetation (km^2)	-	-	-	-	-	-	0.14						
Farm Dams: Volume (Mm^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Farm Dams: Area (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
Coefficient a	-												
Coefficient b	-												
S-PAN (G22F)	127	177	209	214	180	157	98	57	44	48	57	83	1450
A-PAN (G22F)	163	218	251	257	221	196	132	87	73	78	87	116	1880

Data Sources
1950-1990 (WCSA)
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE:	**G2H015**													
					SUBCATCHMENT AREAS (KM2)									
Main Catchment:	Eerste				Above Farm dam	93.92	61%							
Subcatchment:	Eerste (incremental)				Below Farm dam boundary	59.89	39%							
River:	Eerste													
Location:	Faure													
Subcatchment area:	153.8	km^2												
LANDUSE					**YEAR**									
	1965	**1968**	**1970**	**1978**	**1980**	**1990**	**2004**							
Irrigation (km^2)	**22.00**	**22.00**	**22.50**	**24.50**	**25.00**	**29.10**	**75.35**							
Source = Farm dam	18.70	18.70	19.13	20.83	21.25	24.74	64.05							
Source = River	3.30	3.30	3.38	3.68	3.75	4.37	11.30							
Afforestation (km^2)	**1.67**	**5.86**	**6.26**	**6.26**	**6.26**	**6.26**	**1.99**							
Alien Vegetation (km^2)	**-**	**-**	**-**	**-**	**-**	**-**	**2.15**							
Farm Dams: Volume (Mm^3)	6.78	6.78	9.55	10.75	11.09	11.41	13.19							
Farm Dams: Area (km^2)	2.23	2.23	2.59	2.73	2.77	2.80	3.86							
Coefficient a	0.960													
Coefficient b	0.440													
S-PAN (G22H)	124	173	203	208	176	154	96	55	42	47	55	81	1415	
A-PAN (G22H)	160	213	246	251	216	192	130	86	72	77	86	114	1843	

Data Sources
1950-1990 (WCSA)
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE:	**G2H016**					
			SUBCATCHMENT AREAS (KM2)			
Main Catchment:	Lourens		Above Farm dam boundary	5.12	High MAP	21%
Subcatchment:	Lourens		Below Farm dam boundary	19.30	High MAP	79%
River:	Lourens		Above Farm dam boundary	28.60	Low MAP	42%
Location:	Somerset West		Below Farm dam boundary	39.26	Low MAP	58%
Subcatchment area:	92.3	km^2				
High MAP Area	24.4	km^2				
Low MAP Area	67.9	km^2				

LANDUSE	**YEAR**					
	1965	**1970**	**1980**	**1988**	**1990**	**2004**
Irrigation (km^2)	**No data**	**6.59**	**7.87**	**No data**	**8.68**	**10.36**
Low MAP Fdam		6.26	7.48		8.25	9.84
Low MAP River		0.33	0.39		0.43	0.52
Afforestation (km^2)	**10.56**	**10.38**	**14.90**	**19.19**	**20.26**	**21.61**
High MAP	0.47	0.47	0.73	0.93	0.98	1.53
Low MAP	10.09	9.91	14.17	18.26	19.28	20.08
Alien Vegetation (km^2)	**-**	**-**	**-**	**-**	**-**	**2.47**
High MAP	0.00	0.00	0.00	0.00	0.00	0.50
Low MAP	0.00	0.00	0.00	0.00	0.00	1.97
Farm Dams: Volume (Mm^3)	8.45	8.50	9.06	9.06	9.06	13.24
Farm Dams: Area (km^2)	0.830	0.833	0.864	0.864	0.864	1.080
Coefficient a	0.239					
Coefficient b	0.584					

S-PAN (G22J)	124	172	203	208	175	153	95	55	42	47	55	81	1410
A-PAN (G22J)	160	212	245	250	215	192	129	86	72	77	86	114	1837

Data Sources
1950-1990 (WCSA)
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE:	**G2H020**													
						SUBCATCHMENT AREAS (KM2)								
Main Catchment:	Eerste					Above Farm dam boundary	2.06	High MAP	9%					
Subcatchment:	Eerste and Jonkershoek (incremental)					Below Farm dam boundary	20.83	High MAP	91%					
River:	Eerste					Above Farm dam boundary	72.53	Low MAP	58%					
Location:	Stellenbosch					Below Farm dam boundary	51.57	Low MAP	42%					
Subcatchment area:	147	km^2												
High MAP Area	22.9	km^2												
Low MAP Area	124.1	km^2												

LANDUSE		**YEAR**												
		1965	**1968**	**1970**	**1978**	**1980**	**1990**	**2004**						
Irrigation (km^2)	**TOTAL**	**25.69**	**25.76**	**25.81**	**25.96**	**26.06**	**26.42**	**44.57**						
Source = Farm dam	High MAP	0.9	0.95	0.99	1.1	1.17	1.34	0.45						
Source = River	High MAP	0.39	0.41	0.42	0.47	0.5	0.58	0.2						
Source = Farm dam	Low MAP	20.74	20.74	20.74	20.74	20.83	20.83	37.33						
Source = River	Low MAP	3.66	3.66	3.66	3.66	3.68	3.68	6.59						
Afforestation (km^2)	**TOTAL**	**4.03**	**8.11**	**10.94**	**11.92**	**12.28**	**15.57**	**7.38**						
High MAP		2.81	2.8	2.89	3.18	3.36	5.69	3.75						
Low MAP		1.22	5.31	8.04	8.74	8.92	9.88	3.63						
Alien Vegetation (km^2)	**TOTAL**	**-**	**-**	**-**	**-**	**-**	**-**	**7.08**						
High MAP		0	0	0	0	0	0	0.44						
Low MAP		0	0	0	0	0	0	6.64						
Farm Dams: Volume (Mm^3)	**TOTAL**	**10.03**	**10.03**	**10.03**	**10.03**	**10.03**	**10.03**	**12.2**						
Farm Dams: Area (km^2)	**TOTAL**	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**	**2.01**	**2.7**						
Volume (Mm^3)	High MAP	0.03	0.03	0.03	0.03	0.03	0.03	0.04						
Area (Mm^3)	High MAP	0.11	0.11	0.11	0.11	0.11	0.11	0.1						
Volume (Mm^3)	Low MAP	0	10	10	10	10	10	12.1						
Area (Mm^3)	Low MAP	0	2.01	2.01	2.01	2.01	2.01	2.2						
Coefficient a	0.624													
Coefficient b	0.508													
S-PAN (G22G)	127	178	209	214	181	158	98	57	44	48	57	83	1455	
A-PAN (G22G)	164	218	252	258	221	197	132	88	73	78	88	116	1886	

Data Sources
1950-1990 (WCSA)
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE:	**G2H037**			
			SUBCATCHMENT AREAS (KM2)	
Main Catchment:	Eerste		Above Farm dam boundary	0.00
Subcatchment:	Eerste	(including G2H008)	Below Farm dam boundary	24.00
River:	Eerste			
Location:				
Subcatchment area:	24.0	km^2		

LANDUSE	**YEAR**						
	1965	**1968**	**1978**	**1980**	**1988**	**1990**	**2004**
Irrigation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Afforestation (km^2)	0.38	0.41	0.00	0.45	0.49	0.50	0.57
Alien Vegetation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.24
Farm Dams: Volume (Mm^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Farm Dams: Area (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Coefficient a							
Coefficient b							

S-PAN (G22F)	127	177	209	214	180	157	98	57	44	48	57	83	1450
A-PAN (G22F)	163	218	251	257	221	196	132	87	73	78	87	116	1880

Data Sources
1950-1990 (WCSA)
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE: G4H005

Main Catchment:	Palmiet			**SUB-CATCHMENT AREAS (km²)**			
Subcatchment:	Palmiet (incremental)	*G4R002*		Above farm dam boundary	30.00	36%	
River:	Palmiet			Below farm dam boundary	53.00	64%	
Location:	Van Aries Kraal			**TOTAL AREA**	**83.00**		
Subcatchment area:	83.0 km²			Kogelberg catchment	33.50		

LANDUSE	**YEAR**												
	1962	**1965**	**1967**	**1973**	**1980**	**1987**	**1989**	**2004**					
Irrigation (km²)	0.00	13.64	14.74	15.54	20.93	20.33	21.72	22.18					
Source = Farm dams	0.00	6.45	7.07	7.52	10.52	10.19	10.97	11.22	82%	orchard	1%	vegetable	
Source = River	0.00	5.09	5.58	5.92	8.31	8.04	8.65	8.85	2%	pasture	15%	vineyard	
Source = Applethwaite dam	2.10	2.10	2.10	2.10	2.10	2.10	2.10	2.10	All vineyard				
Afforestation (km²)	**16.70**	**18.10**	**19.10**	**17.10**	**19.10**	**16.80**	**13.40**	**10.94**					
Alien Vegetation (km²)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.21**					
Farm Dams: Volume (Mm³)	2.30	2.80	3.20	4.00	4.10	3.80	3.70	3.92			MAP		
Farm Dams: Area (km²)	1.28	1.44	1.56	1.79	1.81	1.73	1.71	1.32		WCSA	1073	mm	
										WR90	1367	mm	

Farm Dams	**Area:**	**a(cap)[b]**			**Applethwaite Dam**		from 1957							
Coefficient a		0.776			FSC-Mm³	2.91	Coeff a	0.03						
Coefficient b		0.602			Area-km²	0.191	Coeff b	1.014						
S-PAN (G40C)		124	172	203	208	175	153	95	55	42	47	55	81	
A-PAN (G40C)		154	216	254	260	219	191	119	69	53	59	69	101	

Data Sources
1950-1989 (WCSA)
2004 (Berg WAAS)

Some of the irrigation in this catchment is supplied by dams outside this catchment
namely the Grootvlei and Nuweberg Dams
Also take note that the Applethwaite irrigation demand for 2.1km² was abstracted as a demand file
This 2.1 km² was then added to the rest of the area supplied by Applethwaite in G4H007

Notes
Condensed alien veg area

GAUGE: **G4H030 / G4H007**

			SUB-CATCHMENT AREAS (km^2)				
			Incremental subcatchment to G4H030				
Main Catchment:	Palmiet		Arieskraal catchment	9.70	3%	High MAP	1266
Subcatchment:	Palmiet (incremental)	*G4H029*	Above farm dam boundary	148.0	46%	Low MAP	803
River:	Palmiet		Below farm dam boundary	59.3	19%	High MAP	1093
Location:	Welgemoed		**Incremental subcatchment to G4H007**				
Subcatchment area:	285.5 km^2		Dwars catchment	63.9	20%	High MAP	1240
			Below farm dam boundary	38.4	12%	Low MAP	803
			TOTAL AREA	**319.3**			

LANDUSE	**YEAR**											
	1962	**1965**	**1967**	**1973**	**1980**	**1987**	**1989**	**2004**				
Irrigation (km^2)	**25.70**	**29.22**	**35.24**	**46.02**	**51.82**	**48.89**	**48.01**	**76.49**				
Source = Farm dams	23.42	26.60	28.74	35.91	38.57	37.17	36.72	57.89	add 2.1 km^2 from G4H005			
Source = River	2.28	2.62	2.85	3.61	3.89	3.74	3.70	5.95	78% orchard			
Source = Arieskraal Dam	0.00	0.00	3.65	6.50	9.36	7.98	7.59	12.65	22% vineyard			
Afforestation (km^2)	**27.90**	**27.00**	**26.30**	**27.70**	**28.50**	**25.02**	**27.30**	**18.59**				
Alien Vegetation (km^2)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.17**				
Farm Dams: Volume (Mm^3)	6.90	9.00	10.10	12.60	13.60	13.10	13.00	18.2				
Farm Dams: Area (km^2)	2.48	2.91	3.12	3.57	3.73	3.65	3.63	3.74				
Farm Dams **Area:**	**a(cap)^b**			**Arieskraal Dam**		from 1967						
Coefficient a	0.776			FSC-Mm^3	4.46	Coeff a	0.143					
Coefficient b	0.602			Area-km^2	0.50	Coeff b	0.833					
S-PAN (G40D)	124	173	204	209	176	154	96	55	43	47	55	81
A-PAN (G40D)	155	217	255	261	221	193	120	69	53	59	69	102

Data Sources
1950-1989 (WCSA) There is an import from Applethwaite Dam into the catchment Also increase the irr area by 2.1 km
2004 (Berg WAAS) Assume same record as WCSA

Notes
Condensed alien veg area

GAUGE: **G4R001**

Main Catchment:	Steenbras	**SUB-CATCHMENT AREAS (km^2)**	
Subcatchment:	Steenbras	Catchment area	66.80
River:	Steenbras	Steenbras Dams area	6.30
Location:	Lower Steenbras Dam	**TOTAL AREA**	**60.50**
Subcatchment area:	60.5 km^2		

This area is correct for present-day change if not able to go beyond gerald's data

LANDUSE	**YEAR**				
	1926	**1940**	**1954**	**1987**	**2004**
Irrigation (km^2)	0.00	0.00	0.00	0.00	0.00
Afforestation (km^2)	**0.00**	**0.40**	**9.40**	**15.60**	**14.23**
Alien Vegetation (km^2)	**0.00**	**0.00**	**0.00**	**0.00**	**0.22**
Farm Dams: Volume (Mm^3)	0.00	0.00	0.00	0.00	0.00
Farm Dams: Area (km^2)	0.00	0.00	0.00	0.00	0.00

MAP
WCSA 1169 mm
WR90 1121 mm

Farm Dams	**Area:**	**a(cap)[b]**
Coefficient a		-
Coefficient b		-

S-PAN (G40A)	123	172	202	207	175	153	95	55	42	47	55	81
A-PAN (G40A)	154	215	253	259	218	191	119	68	53	58	68	101

Data Sources
1950-1987 (WCSA)
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE: **G4R002**

Main Catchment:	Palmiet	**SUB-CATCHMENT AREAS (km^2)**			
Subcatchment:	Palmiet	Above Nuweberg Dam	16.60	25%	
River:	Palmiet	Below Nuweberg Dam	48.70	75%	
Location:	Eikenhof Dam	**TOTAL AREA**	**65.30**		
Subcatchment area:	65.3 km^2				

LANDUSE	**YEAR**											
	1962	**1965**	**1967**	**1973**	**1980**	**1987**	**1989**	**2004**				
Irrigation (km^2)	0.00	0.20	0.40	0.30	0.50	0.40	0.40	2.67	(Diffuse)	54%	orchard	
										46%	vineyard	
Afforestation (km^2)	19.00	18.90	18.90	18.80	17.70	17.90	18.00	17.43				
Alien Vegetation (km^2)	-	-	-	-	-	-	-	-				
											MAP	
Farm Dams: Volume (Mm^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		WCSA	1671	mm
Farm Dams: Area (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		WR90	1367	mm

Farm Dams	**Area:**	**a(cap)[b]**			**Nuweberg Dam**		from 1973						
Coefficient a		-			FSC-Mm^3	3.86	Coeff a	0.202					
Coefficient b		-			Area-km^2	0.45	Coeff b	0.601					
S-PAN (G40C)		124	172	203	208	175	153	95	55	42	47	55	81
A-PAN (G40C)		154	216	254	260	219	191	119	69	53	59	69	101

Data Sources
1950-1989 (WCSA)
2004 (Berg WAAS)

Demand off Nuweberg

Notes
Condensed alien veg area

GAUGE: **H6H007**

Main Catchment:	Riviersonderend	**SUB-CATCHMENT AREAS (km^2)**	
Subcatchment:	Du Toits	Above farm dam boundary	0.00 0%
River:	Du Toits	Below farm dam boundary	46.02 100%
Location:	Purgatory Uitspan	**TOTAL AREA**	**46.02**
Subcatchment area:	46.02 km^2		

LANDUSE	**YEAR**											
	1950	**1961**	**1967**	**1973**	**1980**	**1989**	**1991**	**2004**				
Irrigation (km^2)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				
Afforestation (km^2)	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**				
Alien Vegetation (km^2)	**0.00**	**0.96**	**1.51**	**2.01**	**2.60**	**3.35**	**3.52**	**0.02**	**0% Riparian**	**9% TT**	**91% MT**	
Farm Dams: Volume (Mm^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Farm Dams: Area (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				

	a(cap)^b									**MAP (WR90)**	**1455**	**mm**
Coefficient a	-									**MAP (surface)**	**1238**	**mm**
Coefficient b	-									**MAE**	**1465**	**mm**
S-PAN (H60B)	128	182	227	236	197	165	90	47	35	32	47	78
A-PAN (H60B)	161	228	284	296	247	208	113	60	44	41	60	97

Data Sources
1950-1989 (WCSA)
1991 (SDFS); Alien Veg - Only Mountain Catchment Areas and Densities > 25%
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE: **H6H008**

Main Catchment:	Riviersonderend		**SUB-CATCHMENT AREAS (km^2)**		
Subcatchment:	Riviersonderend		Above farm dam boundary	0.00	0%
River:	Riviersonderend		Below farm dam boundary	39.06	100%
Location:	Swarte Water		**TOTAL AREA**	**39.06**	
Subcatchment area:	39.1	km^2			

LANDUSE	**YEAR**							
	1950	**1961**	**1967**	**1973**	**1980**	**1989**	**1991**	**2004**
Irrigation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Afforestation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.16
Alien Vegetation (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Farm Dams: Volume (Mm^3)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Farm Dams: Area (km^2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

	a(cap)^b											
Coefficient a	-									**MAP (WR90)**	**2320**	**mm**
Coefficient b	-									**MAP (surface)**	**2133**	**mm**
										MAE	**1440**	**mm**
S-PAN (H60A)	126	179	223	232	194	163	88	47	35	32	47	76
A-PAN (H60A)	158	224	279	291	243	204	110	58	43	40	58	96

Data Sources
1950-1989 (WCSA)
1991 (SDFS)
2004 (Berg WAAS)

Notes
Condensed alien veg area

GAUGE:	**H6R002**

Main Catchment:	Riviersonderend	**SUB-CATCHMENT AREAS (km^2)**	
Subcatchment:	Elands	Above farm dam boundary	7.18 (14%)
River:	Elands	Below farm dam boundary	42.74 (86%)
Location:	Elandskloof Dam	**TOTAL AREA**	**49.92**
Subcatchment area:	49.9 km^2		

LANDUSE	**YEAR**											
	1950	**1961**	**1967**	**1973**	**1980**	**1989**	**1992**	**2004**				
Irrigation (km^2)	1.15	2.86	2.87	4.36	2.75	4.90	4.90	5.95	**100% vineyard**			
Source = Farm dams	0.81	2.00	2.01	3.05	1.92	3.43	3.43	4.17	**70%**			
Source = River	0.35	0.86	0.86	1.31	0.82	1.47	1.47	1.79	**30%**			
Afforestation (km^2)	0.14	0.24	0.24	0.88	1.91	1.68	1.48	2.89				
Alien Vegetation (km^2)	0.00	0.08	0.12	0.16	0.21	0.27	0.29	0.34	**26.3%**	**93% TT**	**7% MT**	
Farm Dams: Volume	0.02	0.26	0.24	1.25	1.37	1.48	1.48	1.9				
Farm Dams: Area (km^2)	0.01	0.09	0.08	0.24	0.26	0.27	0.27	0.38				

	a(cap)^b											
Coefficient a	0.208									**MAP (WR90)**	**1165**	**mm**
Coefficient b	0.643									**MAP (surface)**	**1042**	**mm**
										MAE	**1470**	**mm**
S-PAN (H60C)	129	182	227	237	198	166	90	48	35	32	48	78
A-PAN (H60C)	162	229	286	298	248	208	113	60	44	41	60	98

Data Sources
1950-1989 (WCSA)
1992 (SDFS); Alien Veg - Only Mountain Catchment Areas and Densities > 25%
2004 (Berg WAAS)

Notes	
Condensed alien veg area	Note there is an irrigation scheme in this catchment which abstracts from Elandskloof This 15.3km^2 is located near villiersdorp in the H6R001 subcatchment (LOW MAP) See WR90

GAUGE:	H6R001					
		SUB-CATCHMENT AREAS (km^2)				MAP (mm)
		Above farm dam boundary	67.9	18%	High MAP d/s H6H007	1094
Main Catchment:	Riviersonderend	Above farm dam boundary	30.22	8%	High MAP Vyeboom	1300
Subcatchment:	Riviersonderend	Below farm dam boundary	77.86	21%	High MAP Vyeboom	1300
River:	Riviersonderend	Above farm dam boundary	109.28	29%	Low MAP d/s H6R002	925
Location:	Theewaterskloof Dam	Below farm dam boundary	88.86	24%	Low MAP d/s H6R002	925
Subcatchment area:	374.2 km^2	**TOTAL AREA**	**374.2**			

LANDUSE					**YEAR**								
Irrigation (km^2)		**1953**	**1961**	**1967**	**1973**	**1980**	**1989**	**1992**	**2004**		orchard	vineyard	
Source = Farm dams	High MAP Vyeboom	9.04	10.62	11.99	15.74	21.23	24.92	24.92	24.28				
Source = River	High MAP Vyeboom	3.87	4.55	5.14	6.75	9.1	10.68	10.68	10.41				
Total Vyeboom	**High MAP**	**12.91**	**15.17**	**17.13**	**22.49**	**30.33**	**35.6**	**35.6**	**34.69**		**100%**	**0%**	
Source = Farm dams	Low MAP	6.39	7.51	8.48	11.13	15.01	17.63	17.63	17.17				
Source = River	Low MAP	2.74	3.22	3.63	4.77	6.43	7.55	7.55	7.36				
Total d/s Elandskloof	**Low MAP**	**9.13**	**10.73**	**12.11**	**15.9**	**21.44**	**25.18**	**25.18**	**24.53**		**98%**	**2%**	
TOTAL Theewaterskloof		**22.04**	**25.9**	**29.24**	**38.39**	**51.77**	**60.78**	**60.78**	**59.22**				
Afforestation (km^2)	**High MAP**	2.29	3.85	2.81	0.53	4.23	2.74	2.19	2.53				
Afforestation (km^2)	**Low MAP**	0.73	1.23	0.90	0.17	1.35	0.88	0.70	0.81				
Alien Vegetation (km^2)	**High MAP**	0.00	0.04	1.46	2.04	2.72	3.59	3.89	0.23	**11% Rip**	**62% TT**	**14% TS**	**24% MT**
Alien Vegetation (km^2)	**Low MAP**	0.00	0.24	9.44	13.22	17.62	23.29	25.17	1.49	**8% Rip**	**46% TT**	**0% TS**	**54% MT**
Farm Dams													
Volume (Mm^3)	**High MAP**	1.75	4.5	5.51	6.49	6.49	6.51	6.51	6.87		**a(cap)^b**		
Area (km^2)	**High MAP**	1.28	2.09	2.32	2.53	2.53	2.54	2.54	1.73	**Coefficient a**	0.952		
Volume (Mm^3)	**Low MAP**	0.52	1.33	1.62	1.91	1.91	1.92	1.92	2.02	**Coefficient b**	0.523		
Area (km^2)	**Low MAP**	0.67	1.1	1.23	1.34	1.34	1.34	1.34	0.83				
S-PAN (H60A,B,C)	128	181	226	235	196	165	89	47	35	32	47	77	1458
A-PAN (H60A,B,C)	160	227	283	295	246	207	112	59	44	40	59	97	1829

Data Sources
1950-1989 (WCSA)
1992 (SDFS); Alien Veg - Only Mountain Catchment Areas and Densities > 25%
2004 (Berg WAAS)

Notes
Condensed alien veg area

The irrigation excludes the irrigation scheme supplied by Elandskloof
The total catchment area was decreased by 50.822 km2 which is equal to the surface area of the Theewaterskloof dam - this area is already accounted for in the dam balance

APPENDIX B:

CATCHMENT RAINFALL FILES

APPENDIX NUMBER	BASIN	CALIBRATION GAUGE
B1	DIEP	G2H012
B2	DIEP	G2H013
B3	DIEP	G2H014
B4	DIEP	G2H042
B5	EERSTE	G2H005
B6	EERSTE	G2H037
B7	EERSTE	G2H015
B8	LOURENS	G2H016
B9	EERSTE	G2H020 High MAP
B10	EERSTE	G2H020 Low MAP
B11	PALMIET	G4H005
B12	PALMIET	G4H007 High MAP
B13	PALMIET	G4H007 Low MAP
B14	STEENBRAS	G4R001
B15	STEENBRAS	G4R002
B16	RIVIERSONDEREND	H6H007
B17	RIVIERSONDEREND	H6H008
B18	RIVIERSONDEREND	H6R002
B19	RIVIERSONDEREND	H6R001

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H012

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
41	417	463	1927 TO 2000	33.27	18.44
41	684	688	1927 TO 1964	33.24	18.53
41	713	663	1937 TO 1982	33.23	18.54
41	388	366	1993 TO 2004	33.28	18.43
41	681	577	1969 TO 1997	33.21	18.53

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	2	1.75	7.99	3.11	3.31	0.00	3.15	0.71	0.85	28.54	9.48	11.81	11.46	82.17
1928	2	1.39	1.41	5.50	0.00	0.56	2.38	14.60	16.17	10.31	19.78	11.36	4.74	88.18
1929	2	2.63	1.60	5.84	2.70	3.08	1.79	5.49	1.03	3.20	13.07	11.90	25.57	77.89
1930	2	4.67	8.03	1.42	0.00	3.39	0.41	15.91	11.99	6.14	8.96	20.48	14.45	95.84
1931	2	6.01	0.00	0.94	3.15	12.75	1.00	0.81	22.42	16.23	13.38	8.26	13.44	98.39
1932	2	1.93	0.49	2.50	2.83	1.05	1.70	0.64	9.71	29.37	23.05	12.34	3.84	89.43
1933	2	8.07	3.28	5.06	1.34	3.24	10.49	2.39	12.71	9.04	7.80	10.84	13.91	88.18
1934	2	6.37	7.99	0.00	0.30	0.00	4.55	9.81	11.13	8.09	12.36	13.33	10.75	84.67
1935	2	2.15	3.75	0.69	7.18	2.47	1.51	0.12	11.38	5.39	14.12	14.85	12.40	76.01
1936	2	1.45	2.47	5.69	0.63	0.09	8.04	8.27	15.00	22.63	23.11	4.37	2.07	93.81
1937	3	4.02	0.46	0.30	5.27	1.39	0.84	11.83	12.99	7.74	6.91	10.56	11.20	73.50
1938	3	3.50	3.71	4.20	0.14	2.15	1.60	4.74	20.01	5.56	11.34	17.41	8.23	82.58
1939	3	0.94	2.52	1.13	1.25	7.34	4.83	11.47	13.42	19.82	8.13	8.47	8.97	88.31
1940	3	5.36	9.15	1.04	3.96	1.06	0.18	17.31	36.34	27.71	17.87	19.95	24.54	164.46
1941	3	5.85	1.33	1.79	0.21	0.18	0.42	4.59	23.25	39.69	10.10	18.73	2.78	108.93
1942	3	4.14	0.13	1.96	2.18	2.21	7.95	3.44	7.48	10.11	19.97	22.53	12.43	94.53
1943	3	4.28	7.55	0.00	3.04	0.00	1.45	7.00	16.94	34.71	15.79	17.98	6.86	115.62
1944	3	8.81	4.82	9.07	0.00	0.00	0.96	7.01	22.88	27.29	24.70	17.87	0.95	124.35
1945	3	2.60	2.63	1.52	0.39	0.13	2.93	7.42	13.88	10.27	14.59	15.52	22.58	94.44
1946	3	7.92	4.46	0.57	0.00	0.00	8.54	1.62	10.04	8.26	30.23	11.13	3.65	86.43
1947	3	5.90	3.07	0.00	0.36	0.17	5.90	5.27	15.31	9.10	25.72	11.92	13.95	96.68
1948	3	9.08	1.07	1.39	1.70	0.20	0.74	14.55	7.83	13.37	15.49	16.81	9.84	92.07
1949	3	7.04	4.74	3.03	0.56	0.00	0.39	21.21	3.56	7.21	39.87	3.61	10.92	102.13
1950	3	5.17	6.60	5.20	3.00	0.00	0.09	17.21	9.91	32.30	12.93	18.18	6.12	116.71
1951	3	6.06	9.01	0.05	0.43	1.32	3.82	5.68	19.43	10.44	15.67	22.23	12.88	107.02
1952	3	3.72	10.30	0.52	0.44	0.51	2.78	22.61	30.16	8.89	19.75	21.43	1.16	122.28
1953	3	2.25	5.49	2.47	2.33	1.31	2.19	12.18	36.78	14.39	38.84	17.55	5.29	141.08
1954	3	8.28	0.29	5.61	0.03	8.41	1.01	4.93	4.71	16.83	17.26	32.20	5.78	105.34
1955	3	8.91	5.48	1.10	0.94	2.34	1.24	5.37	11.46	29.21	19.41	23.85	3.14	112.46
1956	3	5.71	0.00	1.85	0.53	11.95	2.41	2.70	21.88	21.52	28.97	13.61	6.26	117.38
1957	3	19.08	1.48	0.00	0.97	6.74	0.86	4.91	17.70	9.94	3.73	19.29	5.42	90.11
1958	3	6.65	2.86	0.00	1.28	3.17	3.15	11.83	42.23	5.03	3.55	17.61	5.84	103.20
1959	3	8.11	0.17	0.53	0.10	0.88	4.04	5.29	18.85	19.70	4.27	4.36	4.16	70.46
1960	3	3.41	0.00	2.51	1.40	0.85	1.38	3.65	9.11	21.63	7.46	14.93	18.76	85.08
1961	3	2.26	0.00	1.11	1.82	5.81	4.50	10.05	3.11	54.00	11.71	20.17	4.96	119.50
1962	3	14.75	3.04	0.14	2.04	0.13	1.95	0.47	2.94	9.58	21.02	22.99	7.66	86.70
1963	3	1.00	4.85	6.61	0.00	7.48	0.75	5.59	7.80	22.72	10.86	17.15	4.86	89.68
1964	3	6.79	5.06	0.53	3.75	10.22	12.94	7.78	12.37	8.76	6.10	15.56	3.69	93.56
1965	2	3.12	0.16	4.76	0.36	0.00	10.68	5.08	4.91	11.12	26.19	11.32	8.99	86.68
1966	2	0.32	0.27	1.41	2.28	0.16	0.11	9.79	6.65	24.42	8.25	8.00	8.53	70.20
1967	2	8.45	5.97	0.68	2.91	0.15	0.00	16.77	17.87	14.77	24.68	11.87	2.62	106.73
1968	2	14.25	1.13	1.87	3.93	0.00	1.13	9.14	1.89	13.79	7.18	14.45	12.19	80.95
1969	3	8.20	0.52	0.07	1.75	1.41	0.05	0.13	17.99	20.22	17.15	13.14	9.25	89.87
1970	3	3.32	2.07	1.88	0.25	0.07	2.34	0.72	3.35	18.81	14.14	16.34	2.08	65.38
1971	3	1.75	0.56	0.81	1.84	2.14	1.57	8.55	15.03	10.26	10.06	9.82	6.65	69.04
1972	3	2.44	0.00	6.66	0.00	0.28	10.73	0.53	8.14	2.96	26.61	13.22	12.86	84.44
1973	3	2.41	2.45	5.07	0.75	0.00	1.89	0.00	20.28	27.67	10.10	46.35	8.11	125.09
1974	3	11.94	2.33	1.26	5.16	1.08	0.28	11.03	24.49	11.07	22.06	10.97	1.81	103.47
1975	3	10.51	3.72	0.40	0.00	0.00	2.73	15.46	5.80	29.76	12.06	8.57	5.21	94.22
1976	3	0.62	18.74	6.87	2.28	5.16	2.17	13.99	32.43	34.41	28.29	19.50	7.15	171.60
1977	3	4.52	2.52	4.86	1.12	1.24	4.77	8.57	8.75	1.43	2.72	17.94	9.66	68.11
1978	3	2.52	2.29	4.75	4.01	8.54	0.27	2.70	14.11	14.87	6.35	12.32	7.78	80.51
1979	3	10.29	0.47	0.00	4.61	2.54	0.65	9.19	15.21	14.41	5.17	10.86	2.87	76.29
1980	3	3.68	20.47	7.52	8.38	0.00	3.51	6.15	4.66	7.26	22.13	17.07	16.38	117.22
1981	3	2.70	3.31	3.12	5.17	0.52	6.96	16.12	11.45	17.82	13.27	11.36	1.13	92.92
1982	3	9.55	2.36	9.27	1.12	7.02	4.22	4.40	28.74	28.36	15.52	8.39	9.24	128.19
1983	2	1.48	4.28	2.43	1.71	0.26	10.65	5.29	33.75	6.48	10.27	6.98	19.42	103.00
1984	2	13.65	0.13	13.12	3.28	5.83	15.97	8.53	8.45	18.64	20.84	14.28	7.16	129.85
1985	2	7.25	1.20	1.87	2.28	0.96	6.87	5.74	9.08	20.62	19.42	20.25	9.95	105.49
1986	2	0.76	5.15	0.32	6.60	1.29	1.91	9.15	20.69	19.23	24.29	21.40	15.15	125.94
1987	2	3.18	1.81	6.22	0.02	0.00	2.53	16.43	9.44	12.55	14.80	12.79	9.72	89.47
1988	2	5.05	2.21	2.85	0.32	4.44	10.88	9.03	13.21	12.04	18.87	17.01	13.54	109.47
1989	2	6.33	7.44	0.42	2.05	6.50	0.63	25.99	18.06	20.10	21.75	8.37	4.87	122.50
1990	2	0.50	1.98	2.48	1.64	2.06	2.28	4.30	13.77	22.56	29.27	6.27	17.72	104.82
1991	2	13.02	1.85	1.74	0.00	4.60	5.60	8.23	11.33	31.73	18.29	7.13	10.67	114.19
1992	2	15.85	1.80	1.13	1.80	4.88	0.79	20.06	26.80	14.55	33.19	12.60	7.76	141.23
1993	3	0.24	1.49	2.15	1.57	1.18	2.61	9.40	5.94	43.49	8.00	3.65	12.45	92.17
1994	3	1.81	1.05	1.33	1.78	0.83	2.65	1.30	8.80	21.16	22.98	16.52	2.29	82.50
1995	3	13.99	0.54	20.76	0.42	9.29	3.20	6.24	11.18	28.47	15.33	18.54	20.19	148.16
1996	3	9.62	7.56	5.80	2.01	0.11	0.39	6.62	9.89	29.55	7.29	13.93	1.00	93.77
1997	3	1.10	5.76	1.10	0.84	0.00	0.87	5.33	24.06	6.84	10.20	8.75	3.67	68.52
1998	2	2.56	10.63	2.67	0.00	0.35	0.28	9.66	8.50	14.58	12.66	24.84	21.59	108.32
1999	2	0.28	3.17	1.34	0.68	0.03	3.07	0.44	5.58	10.14	15.16	9.13	13.61	62.61
2000	2	0.57	3.08	0.30	1.38	0.93	0.16	5.36	21.67	5.33	40.66	19.40	11.69	110.53
2001	1	4.37	2.46	1.20	9.78	3.60	1.04	7.84	25.23	12.94	20.70	18.68	0.27	108.11
2002	1	4.04	1.45	2.24	0.22	2.08	5.24	5.95	5.02	2.46	5.63	36.05	12.94	83.32
2003	1	6.14	0.00	7.05	3.52	0.00	4.21	6.99	0.66	17.09	19.44	12.83	7.32	85.25
2004	1	15.84	0.33	0.16	6.28	0.33	0.76	19.99	14.15	21.96	8.96	24.52	9.34	122.61
AVERAGE		5.59	3.49	2.88	1.97	2.34	3.22	8.11	14.25	17.19	16.38	15.24	9.11	99.77
ADJUSTED		5.61	3.49	2.89	1.97	2.34	3.23	8.13	14.29	17.23	16.41	15.27	9.13	100.00
STD.DEV.		4.30	3.77	3.33	2.06	3.07	3.39	5.84	8.99	10.30	8.55	6.96	5.77	21.78

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H013

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
21	441	529	1927 TO 1977	33.51	18.45
21	591	596	1963 TO 1986	33.51	18.50
21	105	464	1967 TO 1989	33.45	18.34
21	230	589	1927 TO 2004	33.50	18.38
21	260	600	1927 TO 1992	33.50	18.39

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	3	3.57	7.43	5.40	3.71	0.16	3.60	2.55	0.89	23.20	7.62	13.13	12.69	83.95
1928	3	4.54	2.72	3.10	0.05	1.85	0.88	13.90	10.78	8.00	15.86	12.60	4.65	78.93
1929	3	3.11	2.47	4.40	3.66	3.42	1.70	5.30	2.32	5.12	10.33	11.23	23.97	77.03
1930	3	5.03	5.43	1.64	0.00	6.06	0.05	13.56	12.88	5.45	9.67	18.72	12.78	91.28
1931	3	10.22	0.42	1.73	1.60	13.29	2.11	2.63	21.81	17.67	8.15	10.32	9.07	99.01
1932	3	2.87	0.78	6.02	3.05	1.29	1.99	2.22	11.20	23.26	19.51	10.27	2.33	84.77
1933	3	7.59	5.26	0.20	1.56	0.71	2.76	2.04	18.71	8.31	9.03	15.61	10.21	81.98
1934	3	6.15	3.44	0.11	1.50	0.29	2.06	11.83	13.93	6.65	18.90	12.63	10.11	87.59
1935	3	5.14	4.19	0.49	7.99	2.09	4.47	1.62	12.32	10.86	12.68	12.63	11.89	86.38
1936	3	3.82	1.43	4.93	3.10	0.76	3.93	8.55	15.28	23.49	25.54	7.54	5.14	103.51
1937	3	5.71	1.47	0.53	4.96	0.36	2.46	14.43	13.18	8.56	10.77	9.21	11.39	83.03
1938	3	4.36	3.60	3.13	0.03	9.97	0.72	8.98	21.18	7.12	17.85	14.76	2.61	94.30
1939	3	2.83	4.64	4.87	0.03	10.47	6.72	9.66	11.33	16.85	8.51	7.11	7.92	90.94
1940	3	7.06	8.12	1.75	3.70	2.47	1.35	21.94	23.72	21.20	13.26	11.72	17.12	133.42
1941	3	8.18	2.31	3.42	2.12	0.45	0.48	7.81	22.91	27.74	5.95	16.93	5.04	103.33
1942	3	6.25	0.42	0.90	5.27	3.14	5.80	3.64	9.14	10.44	16.79	19.72	7.03	88.55
1943	3	7.14	4.43	0.17	2.91	0.20	1.14	5.35	20.44	27.99	13.90	20.15	7.07	110.88
1944	3	8.13	4.50	6.71	0.00	0.05	0.95	6.26	27.40	28.07	28.02	12.95	0.40	123.45
1945	3	3.61	1.85	2.33	1.07	0.55	3.17	5.66	10.80	6.67	15.41	9.32	21.40	81.83
1946	3	6.99	2.80	1.16	0.32	0.00	7.24	4.65	14.53	8.18	28.64	11.44	4.14	90.08
1947	3	4.21	1.05	1.01	0.72	0.74	5.41	6.47	17.21	13.26	21.90	8.10	11.71	91.77
1948	3	7.67	1.23	2.85	2.66	0.00	0.57	11.96	9.06	10.30	13.05	12.81	12.60	84.77
1949	3	4.36	4.25	1.25	1.08	0.39	0.70	21.30	3.54	8.84	33.32	3.77	15.75	98.55
1950	3	4.23	8.16	4.63	4.07	0.11	0.10	30.43	10.33	39.56	13.94	6.61	8.08	130.25
1951	3	5.37	8.53	0.12	0.22	0.52	3.75	5.13	10.12	10.62	15.98	19.02	18.41	97.80
1952	3	5.68	12.50	0.58	0.00	0.05	3.27	28.20	25.12	12.91	15.63	14.37	2.45	120.77
1953	3	2.04	5.36	0.72	2.26	2.33	1.35	11.14	25.03	15.74	31.45	14.92	5.88	118.21
1954	3	6.32	0.91	3.98	0.00	13.46	0.85	4.95	3.24	14.74	25.05	28.16	6.97	108.64
1955	3	9.52	5.55	1.34	0.74	1.23	6.24	7.29	22.19	23.58	14.73	20.11	6.59	119.11
1956	3	5.81	0.17	3.83	0.72	5.84	4.32	3.49	27.89	24.43	22.68	19.52	7.62	126.33
1957	3	17.65	1.41	0.00	1.05	7.84	3.28	8.90	17.97	14.84	3.84	15.92	5.86	98.57
1958	3	6.94	3.07	0.00	2.38	1.10	4.89	21.11	38.12	4.77	5.07	14.82	6.31	108.58
1959	3	6.44	0.13	1.15	1.37	0.93	3.56	5.10	17.41	29.79	5.00	6.41	6.99	84.27
1960	3	2.25	0.07	2.31	4.35	1.15	1.76	2.89	9.27	20.12	10.74	16.98	17.26	89.14
1961	3	3.69	0.00	0.86	1.49	7.17	8.00	10.46	4.21	48.27	14.54	19.69	7.78	126.16
1962	3	19.17	5.16	0.14	0.92	0.26	1.40	1.44	5.60	13.78	17.56	18.19	6.69	90.30
1963	4	2.45	7.26	4.52	0.00	8.40	0.18	3.91	8.84	22.56	15.57	18.00	4.57	96.27
1964	4	7.56	8.65	1.14	3.33	5.97	8.47	11.86	11.88	11.63	7.20	17.59	5.47	100.77
1965	4	4.58	1.70	7.31	0.07	2.17	12.62	5.12	9.07	10.98	18.86	17.33	9.45	99.26
1966	4	1.92	3.36	3.29	3.06	0.07	1.77	13.95	9.15	22.41	9.36	6.49	6.88	81.71
1967	5	8.77	6.82	1.05	3.11	1.66	0.04	11.23	19.40	24.15	24.27	13.56	2.29	116.35
1968	5	13.56	0.34	3.02	5.68	1.40	2.56	8.43	1.37	16.34	9.34	16.67	10.91	89.62
1969	5	7.91	2.03	0.99	1.16	3.33	0.45	1.34	18.09	21.71	15.73	15.86	11.71	100.30
1970	5	5.79	1.38	4.97	1.19	0.15	2.51	3.76	10.28	12.07	13.30	15.95	3.81	75.17
1971	5	4.04	0.73	2.01	6.35	2.39	2.62	9.75	13.38	12.64	8.40	12.05	7.25	81.60
1972	5	1.71	0.25	3.59	0.15	0.46	3.06	1.29	8.16	3.71	20.39	9.02	8.08	59.87
1973	5	2.88	1.41	5.50	1.26	1.21	1.91	1.06	22.68	23.60	11.31	37.11	11.41	121.35
1974	5	9.10	6.03	1.49	4.59	0.61	1.56	8.26	24.52	12.27	23.12	11.10	1.96	104.60
1975	5	8.10	4.67	0.48	0.01	0.37	5.18	7.28	7.77	30.83	20.18	12.99	8.28	106.13
1976	5	0.63	13.38	9.22	0.90	7.35	1.96	16.12	22.97	30.99	26.42	21.74	7.48	159.16
1977	5	2.60	1.58	3.72	2.48	2.52	4.80	9.14	8.12	2.43	3.41	15.93	8.78	65.51
1978	4	5.83	0.60	3.75	4.54	7.89	2.95	1.61	13.39	13.23	9.17	7.28	7.82	78.06
1979	4	12.92	0.81	0.51	3.09	2.21	0.42	9.56	16.96	14.99	5.17	10.79	4.16	81.58
1980	4	2.05	12.56	4.88	11.90	0.02	6.59	8.53	2.73	11.18	24.08	12.68	13.20	110.39
1981	4	1.62	3.28	3.55	4.27	0.84	0.91	12.56	6.70	15.47	12.02	11.98	2.66	75.83
1982	4	6.58	4.01	7.44	1.02	7.71	6.11	1.74	22.58	26.32	12.59	8.94	8.91	113.93
1983	4	2.36	0.95	3.24	1.17	0.93	6.84	7.11	27.68	8.74	14.86	6.68	18.39	98.95
1984	4	11.50	0.13	10.39	5.61	4.67	12.50	11.01	6.35	18.97	29.90	13.99	10.17	135.18
1985	4	0.57	0.81	0.55	2.86	1.85	7.60	6.99	7.88	21.13	17.65	21.26	7.10	96.27
1986	4	3.16	3.09	2.38	8.26	2.48	3.22	6.34	17.51	17.79	22.57	19.06	11.11	116.99
1987	3	2.88	3.74	5.14	0.16	0.00	3.85	13.16	9.68	10.27	15.71	16.54	9.31	90.45
1988	3	4.69	1.33	3.16	1.93	4.46	12.28	12.87	11.64	10.10	20.22	19.06	15.22	116.96
1989	3	8.31	8.61	1.56	1.23	7.16	0.00	24.95	13.42	23.37	31.39	5.97	5.45	131.41
1990	2	0.27	3.33	5.13	0.21	2.62	0.87	3.91	16.02	29.91	33.00	5.15	17.90	118.33
1991	2	6.53	1.33	3.86	0.21	8.57	2.05	14.86	14.18	28.99	13.57	8.98	9.13	112.26
1992	2	11.21	2.30	1.30	1.30	3.68	0.74	34.35	26.39	14.91	25.44	10.92	4.27	136.79
1993	1	0.07	1.00	4.08	2.04	0.17	1.87	4.96	10.04	37.84	16.69	4.08	7.32	90.15
1994	1	3.28	2.55	0.82	1.78	3.94	4.28	2.51	9.77	17.44	20.58	13.91	4.28	85.14
1995	1	4.28	3.40	3.70	0.68	7.47	5.94	7.17	9.83	21.08	25.65	16.53	19.60	125.32
1996	1	18.34	5.86	7.39	2.72	0.68	0.00	13.91	13.77	23.18	3.82	13.91	0.39	103.97
1997	1	1.60	9.17	0.15	1.56	0.05	1.05	5.23	27.26	15.29	17.32	8.58	5.26	92.53
1998	1	2.89	10.67	8.88	0.03	0.12	0.41	8.49	13.91	13.91	11.29	13.91	15.57	100.08
1999	1	0.00	5.08	2.89	2.75	0.00	1.72	1.83	11.04	14.72	18.43	7.73	18.92	85.11
2000	1	0.00	1.51	1.24	2.72	1.19	0.02	7.66	22.35	11.46	42.60	22.55	12.92	126.22
2001	1	7.34	4.06	0.76	10.29	3.53	1.87	11.36	12.08	15.96	19.80	14.05	7.78	108.88
2002	1	6.13	4.16	3.92	1.75	1.34	7.63	2.73	6.37	4.77	10.05	21.88	16.02	86.75
2003	1	7.00	0.48	6.86	4.28	0.17	1.49	12.60	2.12	19.65	17.75	15.49	4.79	92.68
2004	1	18.68	1.70	1.04	4.64	0.63	1.04	18.87	16.92	18.26	7.51	14.47	6.54	110.28
AVERAGE		5.84	3.61	2.93	2.40	2.73	3.17	9.13	14.17	17.15	16.49	13.91	9.06	100.58
ADJUSTED		5.80	3.59	2.91	2.38	2.72	3.15	9.08	14.09	17.05	16.40	13.83	9.00	100.00
STD.DEV.		4.15	3.15	2.40	2.36	3.25	2.90	6.87	7.53	8.80	7.96	5.53	5.09	18.46

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H014

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
20	846	451	1979 TO 2004	33.36	18.29
21	105	464	1967 TO 1989	33.45	18.34
21	230	589	1927 TO 2004	33.50	18.38
21	260	600	1927 TO 1992	33.50	18.39
41	60	559	1927 TO 1975	33.30	18.32
41	388	366	1993 TO 2004	33.28	18.43
41	417	463	1927 TO 2000	33.27	18.44

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	4	2.78	7.02	4.29	3.12	0.12	3.25	2.06	0.91	25.31	8.25	13.48	11.83	82.43
1928	4	2.72	2.01	4.62	0.03	1.48	1.34	12.26	12.86	8.67	16.17	10.16	5.66	77.97
1929	4	2.86	2.12	5.48	2.86	3.40	1.49	5.49	1.98	2.09	10.49	9.48	25.11	72.84
1930	4	4.41	6.91	1.70	0.00	4.50	0.03	14.49	12.14	5.41	9.18	18.53	15.08	92.38
1931	4	8.99	0.20	1.27	2.34	14.00	1.67	2.28	24.54	18.55	11.37	9.90	11.15	106.27
1932	4	3.51	0.48	4.37	3.18	1.57	1.75	1.78	10.31	25.54	22.71	11.98	3.13	90.32
1933	4	8.20	2.95	1.36	1.82	1.81	5.87	2.09	17.73	8.79	8.78	15.42	11.23	86.05
1934	4	6.74	3.99	0.08	0.69	0.22	2.98	10.02	13.56	7.04	16.65	12.10	11.75	85.81
1935	4	4.16	5.10	0.47	8.10	2.28	3.46	1.09	12.10	7.66	12.61	11.77	12.36	81.18
1936	4	2.43	1.52	4.76	1.97	0.35	6.18	8.91	13.60	26.17	23.12	6.99	3.74	99.75
1937	4	4.90	0.90	0.50	5.75	0.74	1.76	12.89	12.22	8.04	9.49	9.48	10.75	77.45
1938	4	4.17	2.80	4.52	0.03	6.53	0.96	6.39	19.80	6.57	16.17	14.18	4.08	86.20
1939	4	1.70	4.17	3.78	0.28	10.41	5.21	9.56	11.48	19.11	9.68	6.77	7.38	89.51
1940	4	7.15	7.69	1.48	3.70	2.18	0.79	18.78	29.76	23.24	15.22	16.54	20.52	147.06
1941	4	8.90	1.98	4.23	1.16	0.25	0.52	7.01	20.88	34.78	8.03	16.37	4.21	108.31
1942	4	6.44	0.36	1.50	4.36	2.74	6.67	3.15	8.16	11.15	17.56	16.92	8.23	87.22
1943	4	5.86	4.28	0.13	3.10	0.15	1.11	5.91	23.07	32.33	16.62	22.15	8.01	122.70
1944	4	8.95	4.45	6.59	0.00	0.03	0.91	7.04	27.37	27.41	26.79	16.05	0.63	126.20
1945	4	2.79	1.42	1.74	0.67	0.24	3.19	4.72	11.53	7.53	15.14	9.43	22.52	80.93
1946	4	6.47	2.70	0.94	0.18	0.00	7.28	3.63	13.01	7.88	27.51	10.99	3.10	83.68
1947	4	5.39	1.91	0.40	0.45	0.56	5.73	5.74	15.52	11.27	20.74	9.77	13.47	90.94
1948	4	6.76	1.33	1.98	2.17	0.10	0.51	12.44	8.74	12.16	14.71	13.89	12.01	86.81
1949	4	4.22	5.20	0.60	0.61	0.20	0.44	20.12	3.68	9.78	37.25	4.20	14.04	100.36
1950	4	4.65	7.15	4.04	3.64	0.02	0.15	23.93	11.37	37.22	13.91	10.27	8.49	124.85
1951	4	6.14	9.11	0.04	0.49	0.71	3.38	5.83	13.69	11.59	16.71	24.67	17.38	109.73
1952	4	4.38	10.79	0.55	0.18	0.25	1.84	29.78	26.35	9.86	15.98	18.66	2.14	120.76
1953	4	1.70	5.34	1.05	2.78	2.52	1.79	11.61	36.20	16.08	36.72	18.32	7.49	141.62
1954	4	7.36	0.93	5.03	0.00	13.43	1.06	5.29	4.22	14.29	25.16	31.25	7.20	115.21
1955	4	9.39	5.14	1.39	0.94	1.45	4.62	6.79	20.07	24.23	18.76	20.28	5.27	118.32
1956	4	6.11	0.17	2.33	0.89	7.92	3.59	3.07	26.35	22.45	24.86	17.91	5.81	121.47
1957	4	18.08	1.46	0.00	0.66	7.36	2.06	8.47	18.29	12.10	3.47	15.04	6.18	93.18
1958	4	6.86	3.36	0.00	1.76	1.27	4.25	17.15	39.73	4.82	6.14	17.06	6.72	109.12
1959	4	7.68	0.06	1.35	0.61	1.23	4.29	5.34	16.74	24.46	5.11	5.11	5.40	77.39
1960	4	2.84	0.10	3.22	2.48	0.77	2.40	4.50	9.23	19.90	10.25	16.12	18.40	90.21
1961	4	2.99	0.00	0.57	1.99	5.61	6.19	9.50	3.66	47.43	13.21	19.98	6.86	118.01
1962	4	17.39	4.80	0.18	2.19	0.19	2.80	1.29	4.57	11.75	16.61	20.13	6.62	88.52
1963	4	1.73	6.02	4.76	0.01	6.16	0.03	2.96	8.46	22.72	15.20	18.61	4.82	91.47
1964	4	6.92	7.44	0.57	4.46	6.56	9.13	11.23	12.69	10.71	7.26	17.89	5.33	100.19
1965	4	3.48	1.16	6.86	0.29	1.57	12.27	5.40	7.20	11.73	21.00	15.00	9.41	95.38
1966	4	1.38	2.14	3.02	2.99	0.15	1.12	11.18	8.90	24.21	9.28	6.82	7.41	78.60
1967	5	8.54	5.99	0.88	3.17	1.01	0.00	13.26	17.09	20.65	25.26	13.71	2.14	111.69
1968	5	12.99	0.06	2.27	5.23	0.77	1.59	8.03	1.40	15.82	8.50	16.37	11.06	84.09
1969	5	8.06	1.54	0.98	1.24	2.95	0.44	1.01	18.96	22.96	16.10	14.44	8.96	97.63
1970	5	5.37	1.37	4.36	1.09	0.26	2.54	3.53	8.22	12.38	12.55	16.19	3.52	71.38
1971	5	3.53	0.99	2.21	5.73	2.58	2.84	8.11	13.43	11.26	8.10	10.91	6.89	76.56
1972	5	1.82	0.25	4.06	0.00	0.38	4.73	1.00	7.29	3.16	23.69	9.28	9.03	64.69
1973	5	3.35	2.53	5.46	1.00	0.83	1.75	0.56	20.38	26.31	10.49	40.41	9.61	122.68
1974	5	9.85	5.90	1.12	4.90	0.85	1.36	9.88	23.89	11.75	20.83	11.22	1.97	103.51
1975	5	8.01	3.77	0.27	0.00	0.13	4.53	8.60	6.84	31.80	16.57	10.91	7.00	98.43
1976	4	0.38	12.86	9.15	1.20	8.45	2.21	16.30	24.82	28.61	27.72	22.30	8.27	162.28
1977	4	3.21	2.77	2.87	2.30	2.23	5.12	10.12	7.29	2.32	3.90	13.89	8.29	64.31
1978	4	5.30	1.08	4.30	4.31	6.02	2.83	1.65	13.40	14.62	9.43	7.04	8.00	77.99
1979	5	10.20	0.61	0.39	3.24	2.19	0.27	8.30	15.94	13.93	5.94	11.41	3.85	76.28
1980	5	2.80	15.86	6.54	12.10	0.00	6.78	8.52	2.52	10.04	25.75	14.92	13.44	119.28
1981	5	1.68	2.75	3.55	3.93	1.08	1.65	11.67	7.78	15.74	12.55	13.06	2.41	77.84
1982	5	6.17	3.30	7.34	1.41	7.21	6.13	2.08	23.95	24.88	13.32	8.12	9.38	113.31
1983	5	2.33	1.57	3.29	1.18	0.70	7.84	7.58	29.51	8.21	14.26	6.01	18.75	101.22
1984	5	13.15	0.00	10.16	5.05	5.25	12.38	10.36	6.69	16.15	27.31	13.73	10.67	130.91
1985	5	3.07	0.81	0.69	2.80	1.29	7.04	5.64	7.34	23.01	18.90	20.37	7.90	98.86
1986	5	2.57	4.02	1.89	7.18	2.32	3.03	6.71	20.34	17.52	23.66	20.63	11.65	121.51
1987	5	3.03	2.94	5.09	0.23	0.00	4.18	13.77	8.94	10.13	15.22	16.37	9.62	89.51
1988	5	4.93	1.78	3.07	1.56	4.11	11.61	11.52	11.66	10.50	20.70	18.00	16.10	115.54
1989	5	7.89	6.95	1.20	1.74	6.01	0.02	25.23	14.97	22.52	26.86	7.79	5.18	126.37
1990	4	0.32	2.70	4.81	1.05	1.97	1.57	3.57	15.23	24.86	31.81	5.57	16.74	110.20
1991	4	9.87	1.77	2.72	0.18	6.12	3.47	11.31	13.12	33.30	15.74	8.96	8.15	114.69
1992	4	11.94	1.95	0.98	1.08	4.27	1.23	29.81	24.32	15.21	30.93	11.25	5.94	138.91
1993	4	0.15	1.50	3.73	1.73	0.93	0.81	7.78	8.00	42.67	10.98	4.24	10.61	93.13
1994	4	1.81	1.57	1.51	2.04	1.53	3.01	1.70	9.36	21.07	22.37	14.66	3.13	83.76
1995	4	11.34	1.28	13.33	0.59	8.86	3.66	5.72	10.66	26.80	16.91	15.89	19.99	135.05
1996	4	13.05	7.66	6.39	2.42	0.33	0.36	8.07	11.19	25.02	7.18	13.82	1.02	96.50
1997	4	0.84	5.98	1.05	0.81	0.02	1.38	5.34	24.47	9.88	12.38	7.94	4.65	74.76
1998	4	2.51	10.13	4.67	0.01	0.21	0.24	9.94	9.71	15.61	12.46	23.98	19.52	109.00
1999	4	0.18	3.99	2.55	2.17	0.01	1.96	0.84	7.35	10.93	14.87	8.94	14.90	68.69
2000	4	0.43	2.69	0.69	1.87	1.09	0.09	5.94	21.40	8.30	41.25	20.53	11.88	116.15
2001	3	6.54	2.90	1.31	11.20	3.96	1.45	8.86	17.51	13.59	18.99	15.88	5.54	107.74
2002	3	5.59	2.80	3.55	1.08	1.44	6.03	4.23	5.80	3.21	7.27	29.77	13.43	84.20
2003	3	5.77	0.20	6.30	4.50	0.18	3.23	10.89	1.31	17.97	17.96	12.81	5.77	86.89
2004	3	18.23	1.16	0.57	5.19	0.56	0.82	18.68	15.96	20.15	7.52	19.48	8.40	116.72
AVERAGE		5.72	3.39	2.91	2.30	2.55	3.13	8.56	14.11	17.11	16.54	14.49	9.16	99.98
ADJUSTED		5.72	3.39	2.91	2.30	2.55	3.13	8.56	14.11	17.12	16.54	14.50	9.16	100.00
STD.DEV.		4.02	3.10	2.56	2.36	3.12	2.81	6.28	8.13	9.42	8.00	6.22	5.25	20.51

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H042

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
20	846	451	1979 TO 2004	33.36	18.29
21	105	464	1967 TO 1989	33.45	18.34
21	230	589	1927 TO 2004	33.50	18.38
21	260	600	1927 TO 1992	33.50	18.39
41	60	559	1927 TO 1975	33.30	18.32
41	388	366	1993 TO 2004	33.28	18.43
41	417	463	1927 TO 2000	33.27	18.44

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	4	2.78	7.02	4.29	3.12	0.12	3.25	2.06	0.91	25.31	8.25	13.48	11.83	82.43
1928	4	2.72	2.01	4.62	0.03	1.48	1.34	12.26	12.86	8.67	16.17	10.16	5.66	77.97
1929	4	2.86	2.12	5.48	2.86	3.40	1.49	5.49	1.98	2.09	10.49	9.48	25.11	72.84
1930	4	4.41	6.91	1.70	0.00	4.50	0.03	14.49	12.14	5.41	9.18	18.53	15.08	92.38
1931	4	8.99	0.20	1.27	2.34	14.00	1.67	2.28	24.54	18.55	11.37	9.90	11.15	106.27
1932	4	3.51	0.48	4.37	3.18	1.57	1.75	1.78	10.31	25.54	22.71	11.98	3.13	90.32
1933	4	8.20	2.95	1.36	1.82	1.81	5.87	2.09	17.73	8.79	8.78	15.42	11.23	86.05
1934	4	6.74	3.99	0.08	0.69	0.22	2.98	10.02	13.56	7.04	16.65	12.10	11.75	85.81
1935	4	4.16	5.10	0.47	8.10	2.28	3.46	1.09	12.10	7.66	12.61	11.77	12.36	81.18
1936	4	2.43	1.52	4.76	1.97	0.35	6.18	8.91	13.60	26.17	23.12	6.99	3.74	99.75
1937	4	4.90	0.90	0.50	5.75	0.74	1.76	12.89	12.22	8.04	9.49	9.48	10.75	77.45
1938	4	4.17	2.80	4.52	0.03	6.53	0.96	6.39	19.80	6.57	16.17	14.18	4.08	86.20
1939	4	1.70	4.17	3.78	0.28	10.41	5.21	9.56	11.48	19.11	9.68	6.77	7.38	89.51
1940	4	7.15	7.69	1.48	3.70	2.18	0.79	18.78	29.76	23.24	15.22	16.54	20.52	147.06
1941	4	8.90	1.98	4.23	1.16	0.25	0.52	7.01	20.88	34.78	8.03	16.37	4.21	108.31
1942	4	6.44	0.36	1.50	4.36	2.74	6.67	3.15	8.16	11.15	17.56	16.92	8.23	87.22
1943	4	5.86	4.28	0.13	3.10	0.15	1.11	5.91	23.07	32.33	16.62	22.15	8.01	122.70
1944	4	8.95	4.45	6.59	0.00	0.03	0.91	7.04	27.37	27.41	26.79	16.05	0.63	126.20
1945	4	2.79	1.42	1.74	0.67	0.24	3.19	4.72	11.53	7.53	15.14	9.43	22.52	80.93
1946	4	6.47	2.70	0.94	0.18	0.00	7.28	3.63	13.01	7.88	27.51	10.99	3.10	83.68
1947	4	5.39	1.91	0.40	0.45	0.56	5.73	5.74	15.52	11.27	20.74	9.77	13.47	90.94
1948	4	6.76	1.33	1.98	2.17	0.10	0.51	12.44	8.74	12.16	14.71	13.89	12.01	86.81
1949	4	4.22	5.20	0.60	0.61	0.20	0.44	20.12	3.68	9.78	37.25	4.20	14.04	100.36
1950	4	4.65	7.15	4.04	3.64	0.02	0.15	23.93	11.37	37.22	13.91	10.27	8.49	124.85
1951	4	6.14	9.11	0.04	0.49	0.71	3.38	5.83	13.69	11.59	16.71	24.67	17.38	109.73
1952	4	4.38	10.79	0.55	0.18	0.25	1.84	29.78	26.35	9.86	15.98	18.66	2.14	120.76
1953	4	1.70	5.34	1.05	2.78	2.52	1.79	11.61	36.20	16.08	36.72	18.32	7.49	141.62
1954	4	7.36	0.93	5.03	0.00	13.43	1.06	5.29	4.22	14.29	25.16	31.25	7.20	115.21
1955	4	9.39	5.14	1.39	0.94	1.45	4.62	6.79	20.07	24.23	18.76	20.28	5.27	118.32
1956	4	6.11	0.17	2.33	0.89	7.92	3.59	3.07	26.35	22.45	24.86	17.91	5.81	121.47
1957	4	18.08	1.46	0.00	0.66	7.36	2.06	8.47	18.29	12.10	3.47	15.04	6.18	93.18
1958	4	6.86	3.36	0.00	1.76	1.27	4.25	17.15	39.73	4.82	6.14	17.06	6.72	109.12
1959	4	7.68	0.06	1.35	0.61	1.23	4.29	5.34	16.74	24.46	5.11	5.11	5.40	77.39
1960	4	2.84	0.10	3.22	2.48	0.77	2.40	4.50	9.23	19.90	10.25	16.12	18.40	90.21
1961	4	2.99	0.00	0.57	1.99	5.61	6.19	9.50	3.66	47.43	13.21	19.98	6.86	118.01
1962	4	17.39	4.80	0.18	2.19	0.19	2.80	1.29	4.57	11.75	16.61	20.13	6.62	88.52
1963	4	1.73	6.02	4.76	0.01	6.16	0.03	2.96	8.46	22.72	15.20	18.61	4.82	91.47
1964	4	6.92	7.44	0.57	4.46	6.56	9.13	11.23	12.69	10.71	7.26	17.89	5.33	100.19
1965	4	3.48	1.16	6.86	0.29	1.57	12.27	5.40	7.20	11.73	21.00	15.00	9.41	95.38
1966	4	1.38	2.14	3.02	2.99	0.15	1.12	11.18	8.90	24.21	9.28	6.82	7.41	78.60
1967	5	8.54	5.99	0.88	3.17	1.01	0.00	13.26	17.09	20.65	25.26	13.71	2.14	111.69
1968	5	12.99	0.06	2.27	5.23	0.77	1.59	8.03	1.40	15.82	8.50	16.37	11.06	84.09
1969	5	8.06	1.54	0.98	1.24	2.95	0.44	1.01	18.96	22.96	16.10	14.44	8.96	97.63
1970	5	5.37	1.37	4.36	1.09	0.26	2.54	3.53	8.22	12.38	12.55	16.19	3.52	71.38
1971	5	3.53	0.99	2.21	5.73	2.58	2.84	8.11	13.43	11.26	8.10	10.91	6.89	76.56
1972	5	1.82	0.25	4.06	0.00	0.38	4.73	1.00	7.29	3.16	23.69	9.28	9.03	64.69
1973	5	3.35	2.53	5.46	1.00	0.83	1.75	0.56	20.38	26.31	10.49	40.41	9.61	122.68
1974	5	9.85	5.90	1.12	4.90	0.85	1.36	9.88	23.89	11.75	20.83	11.22	1.97	103.51
1975	5	8.01	3.77	0.27	0.00	0.13	4.53	8.60	6.84	31.80	16.57	10.91	7.00	98.43
1976	4	0.38	12.86	9.15	1.20	8.45	2.21	16.30	24.82	28.61	27.72	22.30	8.27	162.28
1977	4	3.21	2.77	2.87	2.30	2.23	5.12	10.12	7.29	2.32	3.90	13.89	8.29	64.31
1978	4	5.30	1.08	4.30	4.31	6.02	2.83	1.65	13.40	14.62	9.43	7.04	8.00	77.99
1979	5	10.20	0.61	0.39	3.24	2.19	0.27	8.30	15.94	13.93	5.94	11.41	3.85	76.28
1980	5	2.80	15.86	6.54	12.10	0.00	6.78	8.52	2.52	10.04	25.75	14.92	13.44	119.28
1981	5	1.68	2.75	3.55	3.93	1.08	1.65	11.67	7.78	15.74	12.55	13.06	2.41	77.84
1982	5	6.17	3.30	7.34	1.41	7.21	6.13	2.08	23.95	24.88	13.32	8.12	9.38	113.31
1983	5	2.33	1.57	3.29	1.18	0.70	7.84	7.58	29.51	8.21	14.26	6.01	18.75	101.22
1984	5	13.15	0.00	10.16	5.05	5.25	12.38	10.36	6.69	16.15	27.31	13.73	10.67	130.91
1985	5	3.07	0.81	0.69	2.80	1.29	7.04	5.64	7.34	23.01	18.90	20.37	7.90	98.86
1986	5	2.57	4.02	1.89	7.18	2.32	3.03	6.71	20.34	17.52	23.66	20.63	11.65	121.51
1987	5	3.03	2.94	5.09	0.23	0.00	4.18	13.77	8.94	10.13	15.22	16.37	9.62	89.51
1988	5	4.93	1.78	3.07	1.56	4.11	11.61	11.52	11.66	10.50	20.70	18.00	16.10	115.54
1989	5	7.89	6.95	1.20	1.74	6.01	0.02	25.23	14.97	22.52	26.86	7.79	5.18	126.37
1990	4	0.32	2.70	4.81	1.05	1.97	1.57	3.57	15.23	24.86	31.81	5.57	16.74	110.20
1991	4	9.87	1.77	2.72	0.18	6.12	3.47	11.31	13.12	33.30	15.74	8.96	8.15	114.69
1992	4	11.94	1.95	0.98	1.08	4.27	1.23	29.81	24.32	15.21	30.93	11.25	5.94	138.91
1993	4	0.15	1.50	3.73	1.73	0.93	0.81	7.78	8.00	42.67	10.98	4.24	10.61	93.13
1994	4	1.81	1.57	1.51	2.04	1.53	3.01	1.70	9.36	21.07	22.37	14.66	3.13	83.76
1995	4	11.34	1.28	13.33	0.59	8.86	3.66	5.72	10.66	26.80	16.91	15.89	19.99	135.05
1996	4	13.05	7.66	6.39	2.42	0.33	0.36	8.07	11.19	25.02	7.18	13.82	1.02	96.50
1997	4	0.84	5.98	1.05	0.81	0.02	1.38	5.34	24.47	9.88	12.38	7.94	4.65	74.76
1998	4	2.51	10.13	4.67	0.01	0.21	0.24	9.94	9.71	15.61	12.46	23.98	19.52	109.00
1999	4	0.18	3.99	2.55	2.17	0.01	1.96	0.84	7.35	10.93	14.87	8.94	14.90	68.69
2000	4	0.43	2.69	0.69	1.87	1.09	0.09	5.94	21.40	8.30	41.25	20.53	11.88	116.15
2001	3	6.54	2.90	1.31	11.20	3.96	1.45	8.86	17.51	13.59	18.99	15.88	5.54	107.74
2002	3	5.59	2.80	3.55	1.08	1.44	6.03	4.23	5.80	3.21	7.27	29.77	13.43	84.20
2003	3	5.77	0.20	6.30	4.50	0.18	3.23	10.89	1.31	17.97	17.96	12.81	5.77	86.89
2004	3	18.23	1.16	0.57	5.19	0.56	0.82	18.68	15.96	20.15	7.52	19.48	8.40	116.72
AVERAGE		5.72	3.39	2.91	2.30	2.55	3.13	8.56	14.11	17.11	16.54	14.49	9.16	99.98
ADJUSTED		5.72	3.39	2.91	2.30	2.55	3.13	8.56	14.11	17.12	16.54	14.50	9.16	100.00
STD.DEV.		4.02	3.10	2.56	2.36	3.12	2.81	6.28	8.13	9.42	8.00	6.22	5.25	20.51

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H005

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
21	900	2050	1971 TO 1990	33.60	18.60
21	778	1076	1927 TO 2004	33.58	18.56
21	809	1463	1936 TO 2004	33.59	18.57

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	1.99	10.05	7.10	3.86	0.07	3.53	2.59	1.35	21.37	7.11	16.60	16.42	92.04
1928	1	4.37	2.91	4.06	0.09	0.81	1.09	15.77	13.16	8.04	16.72	14.21	5.28	86.50
1929	1	1.58	4.96	12.35	4.04	4.25	3.90	4.79	1.33	4.64	13.61	17.67	22.90	96.02
1930	1	7.68	8.24	0.51	0.00	4.03	0.00	15.27	14.99	9.66	14.53	18.27	17.28	110.47
1931	1	16.88	0.57	3.22	3.50	12.52	3.68	4.69	15.04	19.75	13.90	8.68	9.56	111.98
1932	1	4.69	1.82	4.15	2.75	2.19	1.47	2.75	8.05	19.11	14.96	17.18	3.55	82.68
1933	1	6.56	1.41	0.00	1.25	2.56	4.61	2.07	19.59	9.05	5.79	12.73	11.05	76.67
1934	1	8.85	9.66	0.85	2.70	1.65	4.19	9.66	16.23	5.64	15.69	11.74	7.82	94.68
1935	1	5.81	11.04	0.59	6.64	2.70	8.11	1.43	13.71	6.64	10.05	12.51	13.20	92.44
1936	2	3.29	5.63	5.12	3.97	0.75	5.76	7.86	12.44	29.05	22.17	9.40	6.69	112.14
1937	2	7.07	4.20	0.09	8.51	1.88	2.18	13.60	17.89	8.63	10.56	10.02	16.36	100.99
1938	2	6.62	5.62	1.26	0.00	7.09	1.07	11.21	13.46	5.58	9.70	14.10	5.06	80.77
1939	2	2.50	6.15	7.43	1.83	3.92	6.79	13.97	8.91	18.69	7.97	5.65	8.82	92.63
1940	2	7.71	8.47	2.24	4.21	2.67	2.53	21.69	20.22	20.62	14.51	14.38	23.00	142.25
1941	2	7.93	4.87	3.38	3.26	0.55	0.68	4.79	22.11	27.80	8.00	16.88	5.45	105.70
1942	2	4.18	0.37	1.43	6.37	3.99	4.43	8.31	11.10	9.64	15.97	16.95	7.71	90.46
1943	2	7.62	6.45	1.73	1.88	0.53	1.46	7.25	24.66	28.03	15.03	16.42	14.65	125.71
1944	2	7.69	4.36	4.90	0.10	0.01	1.17	7.85	31.09	27.27	22.01	15.94	1.39	123.79
1945	2	8.36	5.35	2.58	1.78	0.32	4.73	6.29	8.71	8.42	14.13	12.94	20.25	93.86
1946	2	6.38	2.62	2.21	0.47	0.00	6.55	5.99	17.08	8.22	27.10	9.58	6.82	93.03
1947	2	4.49	1.61	0.75	0.50	1.78	4.03	6.66	14.45	14.76	18.81	9.14	15.40	92.38
1948	2	9.39	1.80	4.68	2.38	0.44	0.95	12.03	7.37	8.01	12.79	12.63	9.61	82.09
1949	2	5.21	7.62	2.18	0.47	0.46	1.55	21.69	2.99	7.11	30.63	3.34	12.95	96.22
1950	2	5.86	8.38	5.96	5.75	0.34	0.50	10.91	11.68	32.38	18.01	10.23	10.71	120.72
1951	2	7.57	8.75	0.37	0.36	1.72	4.09	7.09	10.05	6.67	10.46	12.52	13.75	83.42
1952	2	6.60	9.55	1.23	1.29	1.30	2.90	22.16	19.47	10.96	17.90	12.98	2.23	108.58
1953	2	4.78	10.04	1.40	2.87	2.29	3.57	11.40	24.32	11.46	31.86	19.63	5.70	129.32
1954	2	6.45	3.63	3.98	0.08	17.39	1.24	5.45	3.24	12.50	24.01	25.29	8.21	111.47
1955	2	12.23	10.14	2.19	1.52	1.01	3.59	8.23	17.64	21.87	13.14	16.93	4.94	113.42
1956	2	6.38	1.28	4.47	1.51	7.36	3.68	6.63	23.53	20.46	18.87	13.37	7.53	115.07
1957	2	19.98	1.84	0.01	1.22	10.16	3.16	8.61	27.25	12.65	2.85	20.48	5.03	113.24
1958	2	7.79	3.64	0.05	3.12	1.49	3.41	20.51	31.69	6.50	3.93	14.68	8.28	105.11
1959	2	11.01	0.88	3.64	3.83	1.76	5.86	7.16	19.61	21.22	3.30	5.92	6.46	90.65
1960	2	3.05	0.63	2.83	7.93	1.24	2.20	3.62	9.86	17.75	6.90	16.75	12.09	84.86
1961	2	6.00	0.01	2.15	2.47	5.04	8.19	9.27	5.21	35.86	13.62	27.28	6.75	121.86
1962	2	12.46	4.86	1.72	4.01	0.02	1.64	2.25	7.29	10.80	23.65	20.65	5.89	95.24
1963	2	1.84	7.42	7.13	0.50	6.40	0.37	4.57	11.50	18.98	13.72	14.74	5.37	92.54
1964	2	7.98	8.11	1.50	4.18	6.20	12.63	11.55	13.66	6.12	6.94	11.83	5.83	96.54
1965	2	4.07	1.20	6.81	1.05	3.46	14.61	8.43	10.44	10.04	18.96	12.77	8.47	100.30
1966	2	1.01	4.10	2.69	4.23	0.03	2.57	16.16	9.66	23.54	10.08	9.45	7.64	91.16
1967	2	11.60	6.15	1.81	7.02	3.43	0.00	10.41	20.37	17.02	16.92	14.02	3.80	112.56
1968	2	11.39	0.94	4.71	6.49	3.89	3.63	6.95	3.57	13.08	8.86	13.29	11.75	88.56
1969	2	9.56	1.85	1.58	1.80	1.97	0.56	1.22	21.52	17.92	13.28	19.90	9.67	100.82
1970	2	4.70	3.13	5.07	1.84	0.02	2.71	2.46	9.74	11.68	13.34	16.39	5.00	76.08
1971	3	4.21	3.32	3.10	3.01	1.56	2.25	13.77	21.11	10.87	6.97	12.01	7.56	89.73
1972	3	3.87	0.39	3.41	0.50	0.69	4.43	1.22	7.69	5.72	18.89	9.03	9.42	65.27
1973	3	7.14	4.32	3.22	0.86	1.36	1.77	1.55	18.83	15.48	14.55	27.22	10.94	107.25
1974	3	11.02	6.21	2.83	3.26	2.26	1.93	6.77	21.10	10.77	20.91	14.57	2.64	104.26
1975	3	7.91	2.43	2.00	0.03	0.78	4.80	5.69	7.66	32.95	15.78	15.02	13.04	108.08
1976	3	4.77	18.75	13.94	2.26	2.98	3.55	16.85	17.75	34.63	19.41	18.94	7.95	161.80
1977	3	3.70	1.45	5.15	2.85	2.77	3.15	9.01	9.28	3.99	5.97	15.98	11.66	74.97
1978	3	9.19	2.62	4.50	3.32	7.72	2.38	2.67	12.50	16.10	9.74	6.84	7.70	85.30
1979	3	14.98	2.30	0.53	4.20	3.28	0.67	9.45	14.39	19.40	3.36	10.86	5.46	88.89
1980	3	5.81	10.83	6.22	11.69	0.39	5.50	9.59	3.43	12.52	20.30	15.78	13.20	115.26
1981	3	2.61	7.44	3.88	4.37	0.82	1.76	13.85	6.36	12.07	10.99	8.62	3.58	76.34
1982	3	6.82	5.03	7.18	1.85	8.53	4.69	2.23	30.75	23.50	13.23	7.86	10.55	122.22
1983	3	1.63	1.52	1.90	1.57	1.30	5.85	6.76	22.22	5.67	12.13	6.31	13.65	80.52
1984	3	12.36	1.52	13.94	4.15	8.63	11.67	10.97	6.96	21.34	17.49	11.13	7.60	127.76
1985	3	4.00	2.85	3.29	2.79	4.21	6.96	10.58	9.11	17.98	13.94	24.83	9.60	110.15
1986	3	3.19	2.75	1.59	7.27	1.70	2.71	6.92	17.70	16.37	17.28	15.00	12.15	104.63
1987	3	4.17	2.45	7.28	0.74	0.25	2.89	11.72	9.29	14.33	16.04	17.94	11.57	98.70
1988	3	6.53	3.10	2.78	0.45	2.42	16.65	9.11	11.75	8.86	16.45	15.42	12.23	105.76
1989	3	9.78	6.61	0.68	2.26	4.42	0.60	15.36	16.17	16.32	22.83	8.51	4.20	107.73
1990	3	1.96	3.75	3.54	1.24	1.25	1.52	4.30	13.69	13.56	31.00	6.33	12.72	94.86
1991	2	5.88	2.02	1.28	0.08	4.50	4.21	15.10	9.01	24.84	13.74	9.17	9.07	98.91
1992	2	12.48	4.34	2.37	1.49	4.91	0.98	35.35	18.16	20.33	22.84	10.01	1.77	135.03
1993	2	0.66	1.44	1.93	3.94	0.57	0.27	4.01	6.04	27.27	10.34	7.61	6.06	70.14
1994	2	3.54	1.89	1.67	2.93	0.69	0.98	4.49	15.14	17.07	15.71	19.11	4.61	87.83
1995	2	13.13	1.78	7.48	0.39	5.51	4.94	6.86	3.35	23.29	13.07	14.50	11.77	106.07
1996	2	17.24	9.40	12.91	0.46	0.52	1.01	6.87	9.34	17.08	10.63	11.19	2.60	99.24
1997	2	1.82	24.56	2.35	1.60	0.00	2.18	8.06	30.86	12.49	12.77	7.60	2.55	106.83
1998	2	2.91	9.33	5.96	0.50	0.23	0.02	8.50	5.25	12.16	0.00	0.00	0.00	44.86
1999	2	2.05	3.20	0.10	0.89	2.11	2.52	1.25	10.39	7.67	15.97	12.05	16.08	74.28
2000	2	2.33	1.39	1.58	1.27	1.42	0.35	4.38	12.69	6.81	30.86	20.42	11.28	94.78
2001	2	9.05	3.52	2.05	15.29	2.67	1.67	6.54	13.20	17.84	21.09	11.73	7.47	112.12
2002	2	7.22	3.86	3.31	1.57	1.28	16.40	4.39	8.68	6.37	7.27	26.14	11.43	97.90
2003	2	6.66	0.06	6.03	4.74	0.00	3.18	12.94	1.00	11.16	10.40	15.41	6.53	78.10
2004	2	9.07	1.38	1.84	4.82	3.01	2.61	8.01	12.27	18.88	9.64	17.87	5.14	94.54
AVERAGE		6.78	4.75	3.54	2.85	2.78	3.62	8.83	13.59	15.40	14.54	13.81	8.98	99.45
ADJUSTED		6.82	4.77	3.56	2.87	2.79	3.64	8.87	13.67	15.48	14.62	13.89	9.03	100.00
STD.DEV.		3.93	4.10	3.04	2.68	3.06	3.43	5.84	7.29	7.72	6.65	5.30	4.71	18.07

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H015

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
21	230	589	1927 TO 2004	33.50	18.38
21	325	630	1949 TO 1993	33.55	18.41
2	1330	520	1927 TO 1979	34.40	19.75
21	655	719	1927 TO 1985	33.55	18.52

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	3	1.86	7.62	4.87	3.40	0.39	3.23	1.92	1.44	20.99	6.94	12.21	10.65	75.52
1928	3	4.15	2.18	2.22	0.13	1.73	1.39	12.09	11.10	8.54	14.34	13.48	5.42	76.78
1929	3	3.14	3.35	5.44	3.56	4.47	3.80	6.32	1.16	4.75	12.39	12.66	22.54	83.58
1930	3	4.21	6.10	1.23	0.00	5.26	0.13	15.48	11.03	7.50	9.98	19.98	13.18	94.09
1931	3	11.78	0.26	2.92	3.06	13.54	2.21	2.47	23.75	18.09	10.06	9.93	10.07	108.14
1932	3	3.26	1.33	4.70	2.59	1.46	1.77	2.20	10.16	22.20	17.98	12.57	3.12	83.34
1933	3	6.41	3.85	0.22	2.02	1.88	3.17	1.55	19.19	8.77	7.49	13.01	9.81	77.38
1934	3	6.95	5.11	0.06	1.41	1.28	3.41	10.49	13.72	8.17	16.59	12.15	10.32	89.67
1935	3	3.51	6.16	0.38	11.19	2.07	4.76	2.14	12.18	7.75	11.27	13.39	11.35	86.13
1936	3	3.19	2.16	6.16	2.79	0.65	5.54	8.31	12.62	27.21	21.98	8.92	6.69	106.22
1937	3	5.19	2.36	0.44	4.23	0.82	2.90	14.16	15.62	10.79	10.57	10.32	11.55	88.95
1938	3	7.66	3.45	2.40	0.03	8.32	1.19	8.30	17.58	7.07	16.49	14.06	3.31	89.87
1939	3	2.05	4.52	3.91	0.55	6.89	6.46	11.01	11.46	20.88	10.07	8.95	9.41	96.18
1940	3	7.37	8.11	2.10	4.89	1.86	0.95	22.24	23.16	20.66	14.78	12.63	21.76	140.50
1941	3	9.10	3.90	3.53	3.76	0.69	0.30	7.34	21.05	32.34	6.86	15.53	6.92	111.32
1942	3	5.72	0.70	2.05	7.17	4.03	5.66	3.94	9.50	8.36	14.36	18.09	6.65	86.22
1943	3	6.36	6.83	0.79	3.60	0.27	1.47	6.62	20.88	32.12	16.41	18.60	11.92	125.87
1944	3	7.50	3.99	7.10	0.00	0.13	1.17	7.14	31.99	28.29	27.47	15.05	1.02	130.84
1945	3	4.27	2.21	1.89	2.56	0.30	4.90	8.51	10.73	7.75	14.64	10.45	21.00	89.22
1946	3	5.85	1.79	1.74	0.12	0.00	9.06	5.05	15.71	7.87	28.49	9.69	4.97	90.34
1947	3	4.19	2.03	0.79	1.04	1.98	5.41	6.86	15.17	12.92	19.73	8.06	11.46	89.63
1948	3	9.00	1.35	2.56	2.29	0.36	1.00	12.79	7.42	9.42	15.01	13.25	10.63	85.08
1949	4	5.56	4.45	1.70	1.05	0.32	1.11	19.72	3.60	8.07	33.14	4.08	12.95	95.75
1950	4	4.88	8.48	5.24	4.87	0.31	0.36	24.01	8.58	34.59	12.84	8.40	9.23	121.79
1951	4	6.74	7.73	0.14	0.25	0.78	4.54	5.91	11.75	9.84	16.36	20.29	16.76	101.10
1952	4	5.24	12.60	0.94	0.39	0.12	2.36	36.76	24.23	14.17	16.81	14.34	2.13	130.10
1953	4	2.35	7.93	0.73	3.45	3.32	2.65	11.90	35.51	17.28	32.48	16.78	8.52	142.90
1954	4	6.81	1.36	4.10	0.10	18.70	0.82	6.48	3.17	13.31	22.63	27.20	6.89	111.57
1955	4	9.33	6.62	1.89	0.91	1.80	5.31	5.70	19.22	23.04	14.09	18.11	5.35	111.36
1956	4	7.78	0.66	6.95	1.26	6.37	5.11	4.72	26.36	26.99	22.55	18.78	7.62	135.15
1957	4	16.17	1.17	0.03	1.18	10.16	3.83	7.58	19.25	12.49	3.45	20.45	5.31	101.06
1958	4	8.11	5.51	0.00	3.27	1.46	6.11	20.50	35.34	5.06	4.46	17.38	8.31	115.52
1959	4	8.54	0.16	2.65	1.52	1.43	5.02	6.39	13.37	31.37	7.50	7.77	4.96	90.70
1960	4	2.35	0.17	2.61	6.29	1.38	1.57	2.32	8.55	17.07	11.04	16.61	15.89	85.85
1961	4	5.37	0.00	1.31	1.62	7.82	8.24	14.42	4.24	44.60	13.40	18.62	6.18	125.82
1962	4	17.95	5.95	1.13	1.79	0.26	1.37	1.91	6.91	11.96	24.92	19.00	6.83	99.98
1963	4	2.58	8.23	7.81	0.03	9.17	0.29	4.26	8.96	21.36	14.22	18.17	5.78	100.88
1964	4	6.89	6.75	1.12	2.79	6.16	8.82	10.36	11.78	9.85	6.13	15.91	4.09	90.66
1965	4	5.05	1.44	6.41	0.31	1.62	11.22	6.02	9.20	11.38	18.51	15.66	8.99	95.81
1966	4	1.93	2.71	2.40	3.42	0.03	1.77	14.09	8.52	21.35	10.62	8.05	6.45	81.34
1967	4	7.30	6.88	1.51	2.78	1.93	0.00	11.18	21.44	21.73	20.84	13.00	1.78	110.37
1968	4	12.27	0.29	3.37	6.35	2.14	3.89	7.73	2.32	15.25	8.86	13.73	11.05	87.25
1969	4	8.51	1.39	1.04	1.01	2.62	0.42	0.91	18.35	18.25	15.81	16.83	9.44	94.58
1970	4	7.29	1.52	5.50	1.27	0.21	2.30	2.86	9.81	12.12	13.58	15.00	4.66	76.13
1971	4	4.36	0.88	2.26	5.47	1.49	2.63	10.16	13.52	12.55	6.63	11.48	7.30	78.73
1972	4	2.59	0.32	4.55	0.34	0.56	3.02	1.46	7.95	3.76	19.86	9.42	9.15	62.99
1973	4	3.06	1.33	4.94	0.93	0.82	1.37	0.77	21.77	23.62	10.19	33.67	10.66	113.13
1974	4	8.41	4.25	0.90	4.01	0.65	1.91	7.83	23.23	11.82	24.09	11.74	2.22	101.06
1975	4	7.89	4.44	0.36	0.00	0.61	5.59	6.86	7.70	30.20	16.13	11.22	9.68	100.69
1976	4	1.03	12.58	9.23	1.61	7.94	2.53	16.41	21.31	31.28	24.43	19.62	6.25	154.24
1977	4	3.58	2.22	2.75	2.40	3.01	4.71	10.92	8.00	3.94	3.35	15.53	9.15	69.56
1978	4	6.11	1.21	3.94	4.07	7.12	2.15	2.03	14.12	13.41	8.63	7.34	7.06	77.20
1979	4	12.53	0.66	0.54	3.50	2.42	0.35	9.71	16.17	11.64	4.44	9.76	4.13	75.86
1980	3	2.54	11.69	4.33	9.20	0.15	6.15	9.29	2.65	9.96	23.33	11.44	14.58	105.30
1981	3	2.88	4.07	3.54	4.32	0.47	1.13	9.29	6.88	14.34	10.98	11.69	2.03	71.62
1982	3	6.58	5.18	6.37	1.28	8.48	5.30	2.01	21.22	24.62	12.13	8.26	9.09	110.51
1983	3	1.87	2.42	3.06	1.24	1.35	5.88	7.48	26.73	8.91	13.03	5.78	15.28	93.03
1984	3	11.87	0.26	11.68	4.69	4.64	10.98	9.46	6.59	20.29	22.48	13.22	8.80	124.95
1985	3	0.64	0.89	0.84	2.96	2.08	7.78	7.08	8.40	20.29	16.20	21.02	6.51	94.68
1986	2	4.00	2.89	2.29	9.57	2.75	4.10	6.24	16.00	17.36	22.16	18.03	11.55	116.95
1987	2	2.91	3.50	4.78	0.15	0.02	4.00	12.43	10.51	9.73	15.54	15.68	8.99	88.24
1988	2	3.95	1.45	2.81	2.54	5.48	12.92	10.56	14.57	12.19	20.61	21.42	13.81	122.32
1989	2	9.32	7.32	1.44	1.66	8.03	0.29	24.09	12.43	19.85	24.48	6.19	4.87	119.97
1990	2	0.39	3.40	4.74	0.21	1.65	1.43	3.92	13.89	19.59	30.49	5.33	16.69	101.73
1991	2	7.35	1.72	1.96	0.36	6.19	1.39	13.93	12.57	23.28	12.95	12.85	9.88	104.43
1992	2	10.96	1.73	1.07	0.93	3.66	0.76	31.43	21.06	11.30	19.56	9.70	2.14	114.30
1993	2	0.13	0.90	3.60	2.95	0.47	1.84	4.80	8.58	38.76	14.03	4.97	6.94	87.94
1994	1	3.28	2.55	0.82	1.78	3.94	4.28	2.51	9.77	17.44	20.58	13.91	4.28	85.14
1995	1	4.28	3.40	3.70	0.68	7.47	5.94	7.17	9.83	21.08	25.65	16.53	19.60	125.32
1996	1	18.34	5.86	7.39	2.72	0.68	0.00	13.91	13.77	23.18	3.82	13.91	0.39	103.97
1997	1	1.60	9.17	0.15	1.56	0.05	1.05	5.23	27.26	15.29	17.32	8.58	5.26	92.53
1998	1	2.89	10.67	8.88	0.03	0.12	0.41	8.49	13.91	13.91	11.29	13.91	15.57	100.08
1999	1	0.00	5.08	2.89	2.75	0.00	1.72	1.83	11.04	14.72	18.43	7.73	18.92	85.11
2000	1	0.00	1.51	1.24	2.72	1.19	0.02	7.66	22.35	11.46	42.60	22.55	12.92	126.22
2001	1	7.34	4.06	0.76	10.29	3.53	1.87	11.36	12.08	15.96	19.80	14.05	7.78	108.88
2002	1	6.13	4.16	3.92	1.75	1.34	7.63	2.73	6.37	4.77	10.05	21.88	16.02	86.75
2003	1	7.00	0.48	6.86	4.28	0.17	1.49	12.60	2.12	19.65	17.75	15.49	4.79	92.68
2004	1	18.68	1.70	1.04	4.64	0.63	1.04	18.87	16.92	18.26	7.51	14.47	6.54	110.28
AVERAGE		5.98	3.79	3.02	2.61	2.89	3.34	9.14	13.95	16.69	15.88	13.92	9.00	100.22
ADJUSTED		5.96	3.78	3.02	2.61	2.89	3.33	9.12	13.92	16.66	15.85	13.89	8.98	100.00
STD.DEV.		4.04	3.07	2.46	2.42	3.45	2.84	6.78	7.56	8.50	7.49	5.13	4.93	18.54

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H016

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
5	545	592	1958 TO 1995	34.05	18.49
5	605	624	1927 TO 1977	34.05	18.51
5	664	487	1941 TO 1968	34.04	18.53
21	809	1463	1936 TO 2004	33.59	18.57

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	2.02	8.96	3.57	4.47	0.00	3.25	1.01	0.40	19.98	7.18	14.10	12.40	77.33
1928	1	5.70	3.44	2.00	0.00	2.03	2.13	18.02	15.01	9.34	15.99	14.21	7.77	95.66
1929	1	1.01	7.16	4.47	5.50	4.60	2.24	9.20	0.40	9.56	9.93	14.50	19.51	88.08
1930	1	0.37	9.40	1.03	0.00	6.46	0.00	14.50	12.66	8.14	8.96	22.56	14.40	98.46
1931	1	33.64	0.00	0.29	3.43	11.61	3.19	1.95	19.16	18.23	14.79	8.03	10.49	124.82
1932	1	3.67	5.37	3.96	3.25	2.07	1.51	3.57	7.77	18.90	20.47	13.95	6.02	90.52
1933	1	5.96	3.09	0.40	1.54	2.40	3.41	1.06	20.89	5.99	7.47	5.83	10.49	68.54
1934	1	0.45	3.46	0.00	1.44	1.17	6.10	9.42	11.81	5.38	8.55	10.12	10.30	68.22
1935	1	1.43	8.22	0.53	15.27	2.31	4.17	2.96	11.12	9.95	11.13	13.02	12.18	92.28
1936	2	3.59	5.76	5.54	3.65	1.05	5.69	8.51	12.23	25.98	21.01	9.16	6.70	108.86
1937	2	5.89	3.80	0.45	6.57	1.69	2.71	13.58	15.61	9.32	10.59	10.35	14.66	95.23
1938	2	7.17	4.46	2.31	0.19	9.35	2.21	8.42	12.14	6.09	8.80	11.75	7.02	79.91
1939	2	2.93	5.31	4.51	1.42	6.15	5.17	16.10	10.98	15.66	9.43	4.34	8.74	90.74
1940	2	6.69	11.24	2.10	4.95	2.95	3.00	18.81	20.36	17.02	14.13	11.58	13.55	126.37
1941	3	6.47	5.45	4.63	2.64	0.51	1.51	5.69	18.23	24.70	9.48	14.09	6.58	99.98
1942	3	5.21	0.68	1.83	7.08	2.88	4.55	6.42	9.18	7.24	11.50	13.74	6.37	76.69
1943	3	6.16	5.04	1.07	3.15	0.45	1.26	4.90	16.65	23.81	15.27	15.05	14.16	106.98
1944	3	6.49	3.84	3.95	0.10	0.05	0.97	6.48	23.19	20.65	17.97	16.39	1.31	101.39
1945	3	6.83	2.95	1.64	2.35	0.66	5.09	7.63	9.14	7.82	13.08	10.98	18.64	86.81
1946	3	5.47	1.90	1.33	1.16	0.12	6.36	4.00	12.61	6.95	24.34	9.16	5.53	78.94
1947	3	3.62	1.63	0.50	1.69	1.47	4.00	7.29	12.28	12.86	16.46	9.47	14.05	85.34
1948	3	8.59	1.20	2.81	2.07	0.38	1.44	9.60	7.84	7.61	11.42	14.36	8.65	75.97
1949	3	4.77	5.58	2.02	0.83	0.57	1.80	17.75	5.32	9.04	27.06	4.71	10.96	90.41
1950	3	5.12	7.96	4.51	5.25	0.20	1.32	15.52	10.60	27.99	14.63	7.51	11.17	111.79
1951	3	5.86	8.18	0.29	0.68	0.79	4.67	6.75	12.23	8.14	12.92	19.96	15.11	95.57
1952	3	7.28	10.10	1.15	0.86	0.65	2.69	23.51	21.61	11.13	15.36	11.03	2.84	108.22
1953	3	5.98	8.35	1.48	5.20	3.31	5.46	17.22	41.98	20.66	44.77	24.76	8.13	187.30
1954	3	9.73	3.40	5.44	0.13	18.12	2.44	10.68	4.67	10.26	29.82	33.36	9.64	137.68
1955	3	17.16	9.60	4.83	1.27	1.21	3.96	6.26	18.11	21.82	14.92	16.61	5.44	121.20
1956	3	8.59	0.91	4.47	1.40	4.78	3.71	4.61	24.05	20.75	19.60	21.13	8.20	122.19
1957	3	18.73	1.65	0.09	3.08	10.37	5.83	11.40	23.86	13.60	3.35	23.52	7.06	122.54
1958	4	11.12	4.04	0.01	2.95	1.44	4.19	20.96	34.25	4.47	5.13	11.06	8.70	108.32
1959	4	8.50	0.51	2.14	2.49	1.39	5.72	7.16	15.30	22.38	5.75	6.06	5.27	82.66
1960	4	3.23	0.30	3.24	6.87	0.86	2.60	2.27	8.41	16.47	8.02	11.27	14.06	77.59
1961	4	6.90	0.01	3.01	2.50	4.42	6.61	10.61	4.28	35.46	13.57	18.33	6.78	112.47
1962	4	17.61	5.85	1.04	2.57	0.19	1.54	1.78	5.52	11.95	20.59	19.90	6.81	95.35
1963	4	4.23	6.02	5.39	0.30	7.48	0.64	4.45	10.58	18.37	11.42	16.94	5.35	91.19
1964	4	8.90	8.07	1.09	3.72	5.74	9.23	10.67	12.53	10.51	7.69	12.55	4.00	94.69
1965	4	6.74	1.88	4.85	1.03	2.12	10.75	7.27	10.64	9.21	17.72	14.42	8.57	95.21
1966	4	2.20	2.83	3.99	3.90	0.43	1.98	14.30	9.20	17.47	10.71	8.78	5.81	81.60
1967	4	8.67	6.14	1.61	5.34	2.80	0.00	10.60	21.90	21.41	20.07	16.51	3.64	118.68
1968	4	14.76	2.82	5.28	6.85	2.60	3.06	8.60	3.39	13.40	8.07	11.31	11.04	91.18
1969	3	11.21	1.76	1.12	1.46	2.80	0.66	0.66	22.84	19.93	15.22	12.65	10.03	100.33
1970	3	4.96	2.53	5.45	2.39	0.05	2.40	2.72	9.01	12.52	12.15	16.33	5.41	75.91
1971	3	6.07	1.62	2.14	6.45	2.06	2.77	15.00	15.28	10.93	7.80	13.07	6.11	89.31
1972	3	3.49	0.65	3.92	0.70	0.48	2.57	1.34	9.85	5.86	15.45	8.75	11.99	65.06
1973	3	4.20	3.60	3.75	1.53	0.74	1.53	1.14	18.80	25.97	10.37	34.85	10.00	116.49
1974	3	11.55	4.76	2.20	5.33	1.37	1.55	9.77	31.80	11.33	25.36	19.01	1.58	125.60
1975	3	9.91	4.02	0.74	0.09	1.06	5.59	8.11	9.62	32.68	12.41	11.83	12.09	108.16
1976	3	4.66	12.77	9.55	1.82	4.58	3.79	12.68	23.30	31.93	17.40	17.45	8.38	148.31
1977	3	2.89	1.72	3.46	2.19	6.68	5.68	9.74	7.45	4.53	4.78	16.86	11.63	77.62
1978	2	7.70	2.23	5.32	5.00	13.69	1.63	2.12	15.35	15.28	8.79	5.86	6.80	89.77
1979	2	14.19	0.87	1.36	3.22	3.79	2.09	8.72	17.87	18.82	3.32	9.78	4.52	88.52
1980	2	5.77	15.26	4.75	12.24	0.27	5.80	10.64	2.56	8.25	25.63	14.87	15.30	121.34
1981	2	3.34	5.50	2.98	4.74	0.75	1.41	12.92	6.60	13.49	9.61	10.27	2.29	73.90
1982	2	5.41	4.27	8.08	0.95	9.04	5.91	3.78	27.44	22.84	11.84	7.67	12.70	119.93
1983	2	2.20	1.44	2.89	1.49	1.19	5.73	6.49	28.29	5.97	11.44	5.24	14.39	86.76
1984	2	12.47	0.92	14.29	3.76	6.19	12.73	10.77	6.21	17.73	22.10	11.67	7.90	126.75
1985	2	3.26	0.63	2.49	3.29	3.89	8.32	9.98	9.74	20.99	12.97	22.88	7.40	105.85
1986	2	5.17	2.56	2.04	6.44	2.57	2.75	7.31	17.55	15.73	20.00	17.11	10.49	109.72
1987	2	3.00	2.14	5.63	0.79	0.03	4.12	10.70	11.29	11.63	14.85	16.46	10.11	90.76
1988	2	7.00	2.64	3.42	1.21	4.28	18.00	8.92	14.61	11.93	19.49	18.10	11.00	120.60
1989	2	8.95	6.38	0.72	2.94	4.00	0.21	21.55	12.42	21.58	24.61	7.70	4.76	115.82
1990	2	1.57	3.87	4.47	1.53	0.59	1.61	5.85	15.16	15.85	29.97	5.73	11.73	97.93
1991	2	6.89	1.52	0.64	0.06	4.13	3.48	14.26	10.70	25.08	11.36	9.85	13.96	101.95
1992	2	15.24	3.62	2.12	0.82	5.56	0.86	30.93	15.67	21.05	23.96	10.20	1.17	131.21
1993	2	0.62	2.91	2.84	3.87	0.46	1.03	4.34	5.53	29.49	9.81	5.24	6.58	72.71
1994	2	3.25	1.39	3.26	1.86	0.36	0.83	3.46	13.45	15.23	16.01	18.45	3.79	81.34
1995	2	12.40	2.68	6.44	0.36	3.92	5.00	5.68	2.92	17.29	14.69	13.78	8.98	94.12
1996	1	18.92	7.78	15.06	0.24	0.63	1.05	6.42	10.45	10.41	13.96	11.12	3.75	99.79
1997	1	1.92	25.03	2.24	2.72	0.00	2.30	7.95	28.90	15.97	12.61	10.18	4.01	113.84
1998	1	3.70	9.89	4.96	0.48	0.26	0.04	8.75	5.54	11.70	0.00	0.00	0.00	45.32
1999	1	2.30	3.33	0.19	1.77	4.23	1.39	0.94	11.72	8.21	14.38	11.71	16.14	76.31
2000	1	2.93	1.63	0.66	1.57	1.73	0.36	4.25	15.73	6.75	33.01	20.97	11.18	100.77
2001	1	9.27	3.61	2.09	14.48	4.01	1.52	5.68	12.66	18.35	25.41	7.82	7.66	112.54
2002	1	9.14	3.58	3.15	1.71	1.22	16.45	4.10	8.21	7.47	7.96	24.60	10.82	98.39
2003	1	8.00	0.12	5.62	4.77	0.00	2.94	13.29	1.06	11.76	7.57	17.12	6.58	78.82
2004	1	11.50	1.52	1.44	2.06	5.59	1.89	7.19	8.58	18.32	10.53	18.35	5.20	92.18
AVERAGE		7.06	4.45	3.16	3.02	2.97	3.64	8.84	13.62	15.24	14.56	13.59	8.78	98.93
ADJUSTED		7.13	4.50	3.19	3.05	3.01	3.68	8.94	13.77	15.40	14.72	13.74	8.87	100.00
STD.DEV.		5.24	3.95	2.71	2.92	3.36	3.27	5.79	7.90	7.18	7.47	6.12	4.12	21.25

AVERAGE RAINFALL ON CATCHMENT OF CODE G2h020 High MAP

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
21	655	719	1927 TO 1985	33.55	18.52
21	778	1076	1927 TO 2004	33.58	18.56
21	809	1463	1936 TO 2004	33.59	18.57

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	2	1.71	9.40	6.61	4.22	0.16	3.39	2.16	1.41	20.76	6.96	14.95	13.86	85.61
1928	2	4.86	2.32	3.74	0.17	0.78	1.80	16.52	14.35	8.66	15.96	14.38	5.43	88.99
1929	2	2.18	4.12	8.90	3.61	4.33	4.00	5.31	0.95	6.09	14.08	16.54	22.46	92.57
1930	2	6.53	7.50	0.61	0.00	4.51	0.13	14.64	13.33	8.60	12.66	17.48	16.26	102.24
1931	2	14.11	0.28	2.66	3.61	13.79	3.43	3.23	18.31	17.65	12.34	8.83	9.59	107.83
1932	2	3.96	1.68	3.44	2.56	1.80	1.62	2.37	8.68	20.46	15.36	15.24	3.26	80.44
1933	2	6.48	1.81	0.00	1.47	2.51	4.46	1.98	18.34	8.93	6.43	11.73	10.88	75.02
1934	2	8.24	10.05	0.43	1.95	1.95	3.86	10.10	15.17	5.61	15.69	12.01	8.78	93.84
1935	2	4.92	9.62	0.33	8.04	2.57	7.17	1.76	12.95	5.85	10.90	11.41	12.18	87.69
1936	3	3.13	4.31	5.53	3.46	0.63	5.21	8.03	12.75	27.92	22.20	9.18	6.55	108.90
1937	3	6.62	3.37	0.14	7.57	1.55	2.43	14.27	17.84	9.03	10.05	9.55	15.19	97.62
1938	3	6.43	4.76	1.24	0.00	7.17	0.79	10.16	13.96	4.92	10.91	13.23	4.37	77.92
1939	3	2.15	5.94	6.47	1.52	3.94	7.27	12.85	9.89	19.00	8.26	6.44	8.92	92.65
1940	3	7.13	7.84	2.01	4.23	2.45	1.97	22.04	21.42	21.50	14.67	14.82	23.06	143.14
1941	3	7.76	5.11	3.60	3.77	0.65	0.54	4.76	21.43	29.44	7.66	17.58	5.70	107.98
1942	3	4.74	0.29	1.52	7.03	4.13	5.08	6.96	10.69	10.07	15.19	17.54	7.28	90.51
1943	3	6.49	7.18	1.32	2.23	0.42	1.43	6.98	22.96	28.92	15.80	15.26	14.35	123.34
1944	3	8.08	4.11	5.23	0.07	0.09	1.08	7.69	30.39	28.16	24.89	16.45	1.39	127.62
1945	3	7.18	4.50	2.24	2.05	0.22	5.20	6.27	9.54	7.43	15.08	12.48	20.46	92.64
1946	3	6.43	2.69	2.16	0.32	0.00	7.09	5.83	15.53	8.66	26.61	10.30	6.26	91.87
1947	3	4.90	1.73	0.82	0.76	1.51	3.81	6.67	15.19	14.15	19.39	9.55	14.96	93.44
1948	3	9.56	2.07	4.07	2.57	0.46	1.18	12.17	7.23	8.27	13.09	12.87	9.96	83.49
1949	3	5.47	6.49	2.19	0.70	0.52	1.46	20.55	3.19	7.60	31.51	3.69	13.32	96.68
1950	3	5.97	9.10	6.54	5.24	0.32	0.47	14.35	10.88	35.53	16.42	9.55	11.27	125.65
1951	3	7.53	9.06	0.25	0.30	1.42	3.81	7.01	10.95	7.12	12.38	15.16	14.19	89.18
1952	3	7.14	10.97	1.12	1.28	0.94	3.10	25.86	20.94	11.06	17.21	13.21	1.78	114.61
1953	3	3.88	9.76	1.14	2.63	2.57	3.31	12.62	24.80	11.81	29.25	18.35	5.95	126.08
1954	3	6.80	2.73	4.24	0.19	17.94	1.27	5.49	3.46	13.42	23.45	26.36	7.58	112.91
1955	3	10.63	9.42	1.92	1.01	1.02	3.72	7.18	17.95	21.37	13.28	17.57	5.35	110.43
1956	3	6.53	1.18	4.14	1.36	7.06	3.73	6.00	24.57	21.08	20.02	13.62	7.76	117.03
1957	3	19.05	1.53	0.01	1.21	9.58	3.61	7.64	25.13	12.34	2.86	19.53	5.06	107.55
1958	3	7.35	4.42	0.03	2.76	1.55	3.15	19.29	34.70	5.84	3.76	13.91	8.19	104.96
1959	3	10.56	0.59	3.26	3.02	1.73	5.07	6.49	18.46	23.29	3.98	5.65	6.79	88.88
1960	3	2.97	0.42	2.91	6.65	1.36	2.03	3.04	9.61	17.33	7.13	17.61	13.37	84.41
1961	3	5.48	0.01	1.86	2.11	5.33	8.18	10.31	5.10	38.80	14.43	24.87	6.63	123.10
1962	3	12.87	5.19	1.77	3.53	0.01	1.44	2.20	7.60	11.60	24.42	19.71	6.22	96.56
1963	3	2.06	8.80	6.28	0.33	7.37	0.39	4.76	11.56	20.00	13.86	14.44	5.07	94.92
1964	3	7.99	7.45	1.37	3.83	6.48	11.66	11.29	12.87	7.10	7.04	13.56	5.70	96.34
1965	3	4.34	1.10	6.65	0.75	2.79	13.62	7.26	10.44	10.61	19.41	12.97	8.91	98.85
1966	3	0.91	3.78	2.58	4.19	0.05	2.06	15.94	9.41	22.90	10.61	8.96	7.02	88.42
1967	3	9.82	6.51	1.95	5.86	3.35	0.00	10.47	22.25	17.98	18.91	13.90	3.23	114.25
1968	3	12.04	0.80	4.60	6.48	3.68	4.28	6.87	3.19	13.32	8.95	13.29	11.81	89.31
1969	3	9.07	1.82	1.33	1.89	1.83	0.53	1.06	21.18	18.63	13.52	19.50	10.22	100.60
1970	3	5.08	2.88	5.54	1.67	0.06	2.62	2.13	10.06	12.19	12.95	16.05	4.80	76.02
1971	3	5.83	1.90	2.74	4.91	1.97	2.06	17.46	15.00	10.64	8.02	11.74	7.05	89.30
1972	3	3.69	0.01	4.78	0.74	0.30	4.08	1.38	8.41	2.92	19.44	9.41	10.97	66.13
1973	3	4.22	3.82	4.85	1.20	1.26	1.64	1.15	21.32	17.57	12.60	33.28	10.52	113.44
1974	3	12.78	4.72	1.46	3.67	1.46	2.13	9.16	23.07	11.00	22.99	14.51	2.17	109.12
1975	3	7.87	3.94	0.68	0.03	1.15	5.68	5.68	8.28	33.33	17.75	12.94	13.77	111.10
1976	3	5.77	15.72	12.86	2.18	4.08	3.47	16.38	21.64	32.21	22.01	16.95	7.24	160.52
1977	3	4.58	1.92	4.32	1.83	2.69	4.36	9.44	8.85	4.96	4.65	18.11	10.55	76.25
1978	3	8.21	1.84	6.44	3.64	8.68	1.57	2.44	13.81	15.06	9.39	7.14	8.72	86.94
1979	3	14.39	1.10	0.46	4.09	2.79	0.64	9.40	14.15	16.51	3.54	11.18	5.15	83.39
1980	3	4.45	11.68	5.59	9.66	0.23	5.89	9.95	3.74	11.52	22.51	13.78	14.17	113.19
1981	3	3.78	6.71	3.88	4.89	0.60	1.44	13.22	6.53	13.37	10.51	9.98	2.56	77.48
1982	3	6.94	5.69	7.14	1.57	8.83	4.77	2.53	26.63	22.26	12.51	8.37	9.60	116.84
1983	3	1.38	2.60	2.30	1.47	1.29	6.01	7.64	24.70	7.81	11.99	6.07	13.61	86.87
1984	3	12.67	0.82	14.20	4.13	6.99	11.05	11.28	7.55	20.61	19.39	11.97	8.55	129.21
1985	3	2.76	0.76	2.43	2.80	3.58	8.01	9.32	8.72	18.72	13.94	22.26	7.81	101.11
1986	2	3.35	2.62	1.89	7.52	1.49	2.91	6.82	18.71	16.36	17.26	16.28	12.53	107.74
1987	2	3.34	2.20	7.04	0.86	0.01	2.79	11.18	10.10	13.40	15.95	17.85	11.68	96.40
1988	2	6.05	2.83	3.00	0.68	2.46	19.20	7.21	12.99	9.56	17.14	13.76	12.74	107.62
1989	2	9.69	6.65	0.69	2.55	4.22	0.42	19.89	10.18	18.74	22.01	7.14	3.99	106.17
1990	2	2.05	3.77	4.57	0.65	1.15	1.83	4.33	15.10	16.84	35.46	6.82	11.74	104.31
1991	2	5.88	2.02	1.28	0.08	4.50	4.21	15.10	9.01	24.84	13.74	9.17	9.07	98.91
1992	2	12.48	4.34	2.37	1.49	4.91	0.98	35.35	18.16	20.33	22.84	10.01	1.77	135.03
1993	2	0.66	1.44	1.93	3.94	0.57	0.27	4.01	6.04	27.27	10.34	7.61	6.06	70.14
1994	2	3.54	1.89	1.67	2.93	0.69	0.98	4.49	15.14	17.07	15.71	19.11	4.61	87.83
1995	2	13.13	1.78	7.48	0.39	5.51	4.94	6.86	3.35	23.29	13.07	14.50	11.77	106.07
1996	2	17.24	9.40	12.91	0.46	0.52	1.01	6.87	9.34	17.08	10.63	11.19	2.60	99.24
1997	2	1.82	24.56	2.35	1.60	0.00	2.18	8.06	30.86	12.49	12.77	7.60	2.55	106.83
1998	2	2.91	9.33	5.96	0.50	0.23	0.02	8.50	5.25	12.16	0.00	0.00	0.00	44.86
1999	2	2.05	3.20	0.10	0.89	2.11	2.52	1.25	10.39	7.67	15.97	12.05	16.08	74.28
2000	2	2.33	1.39	1.58	1.27	1.42	0.35	4.38	12.69	6.81	30.86	20.42	11.28	94.78
2001	2	9.05	3.52	2.05	15.29	2.67	1.67	6.54	13.20	17.84	21.09	11.73	7.47	112.12
2002	2	7.22	3.86	3.31	1.57	1.28	16.40	4.39	8.68	6.37	7.27	26.14	11.43	97.90
2003	2	6.66	0.06	6.03	4.74	0.00	3.18	12.94	1.00	11.16	10.40	15.41	6.53	78.10
2004	2	9.07	1.38	1.84	4.82	3.01	2.61	8.01	12.27	18.88	9.64	17.87	5.14	94.54
AVERAGE		6.60	4.54	3.42	2.79	2.76	3.64	8.89	13.66	15.61	14.78	13.74	8.88	99.31
ADJUSTED		6.65	4.57	3.45	2.80	2.78	3.66	8.95	13.76	15.72	14.88	13.84	8.94	100.00
STD.DEV.		3.78	4.04	2.93	2.59	3.16	3.51	6.11	7.31	7.88	6.89	5.33	4.70	18.10

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H020 Low MAP

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
21	591	596	1963 TO 1986	33.51	18.50
21	655	719	1927 TO 1985	33.55	18.52
21	778	1076	1927 TO 2004	33.58	18.56

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	2	1.71	9.40	6.61	4.22	0.16	3.39	2.16	1.41	20.76	6.96	14.95	13.86	85.61
1928	2	4.86	2.32	3.74	0.17	0.78	1.80	16.52	14.35	8.66	15.96	14.38	5.43	88.99
1929	2	2.18	4.12	8.90	3.61	4.33	4.00	5.31	0.95	6.09	14.08	16.54	22.46	92.57
1930	2	6.53	7.50	0.61	0.00	4.51	0.13	14.64	13.33	8.60	12.66	17.48	16.26	102.24
1931	2	14.11	0.28	2.66	3.61	13.79	3.43	3.23	18.31	17.65	12.34	8.83	9.59	107.83
1932	2	3.96	1.68	3.44	2.56	1.80	1.62	2.37	8.68	20.46	15.36	15.24	3.26	80.44
1933	2	6.48	1.81	0.00	1.47	2.51	4.46	1.98	18.34	8.93	6.43	11.73	10.88	75.02
1934	2	8.24	10.05	0.43	1.95	1.95	3.86	10.10	15.17	5.61	15.69	12.01	8.78	93.84
1935	2	4.92	9.62	0.33	8.04	2.57	7.17	1.76	12.95	5.85	10.90	11.41	12.18	87.69
1936	2	3.08	2.29	5.91	3.20	0.61	5.29	8.12	13.62	28.46	22.55	9.00	6.78	108.90
1937	2	6.70	2.75	0.19	6.86	1.30	2.68	14.88	18.13	9.83	9.65	9.42	14.04	96.46
1938	2	6.60	4.59	1.26	0.00	7.43	0.53	9.56	14.63	4.61	11.90	12.83	4.00	77.94
1939	2	1.94	5.63	6.10	1.10	4.23	7.62	11.85	10.36	20.09	8.57	6.77	9.40	93.65
1940	2	6.92	7.22	1.94	4.33	2.06	1.90	22.73	21.41	22.93	14.99	14.74	23.63	144.79
1941	2	7.86	4.68	3.85	4.24	0.66	0.38	4.69	21.43	31.21	7.33	18.50	5.86	110.69
1942	2	5.13	0.23	1.49	7.30	4.23	5.73	6.65	10.34	10.85	14.66	18.24	7.58	92.42
1943	2	6.01	7.81	1.06	2.46	0.30	1.47	7.00	21.70	30.38	16.47	15.17	14.43	124.25
1944	2	8.72	3.96	5.40	0.04	0.14	1.00	7.75	29.49	29.33	27.23	17.11	1.54	131.70
1945	2	6.07	4.15	1.75	2.19	0.23	5.40	5.95	9.88	6.26	15.22	11.68	20.72	89.51
1946	2	6.67	2.86	2.24	0.20	0.00	7.44	5.57	14.65	8.66	26.40	10.65	5.95	91.29
1947	2	5.07	1.73	0.84	0.94	1.36	3.66	6.28	15.98	13.27	20.25	9.83	14.26	93.46
1948	2	9.92	1.85	3.81	2.64	0.42	1.35	12.53	7.14	8.53	13.54	13.40	10.46	85.58
1949	2	5.72	4.96	2.13	0.84	0.44	1.47	20.67	3.37	8.27	33.03	3.68	13.62	98.18
1950	2	6.26	9.52	6.72	4.98	0.30	0.48	15.95	10.36	36.79	14.90	9.45	11.58	127.29
1951	2	7.53	9.25	0.18	0.26	1.27	3.63	6.83	11.29	7.20	10.81	13.98	15.32	87.55
1952	2	7.61	11.40	0.94	1.25	0.73	3.14	27.64	21.62	10.48	16.59	13.60	1.56	116.57
1953	2	3.42	9.54	0.98	2.48	2.69	3.16	13.11	24.97	12.35	27.85	18.20	6.09	124.85
1954	2	7.00	2.25	4.36	0.21	18.06	1.26	5.36	3.42	13.72	22.51	27.11	7.21	112.46
1955	2	9.90	8.95	1.76	0.75	1.03	3.78	6.51	18.01	20.73	13.13	17.49	5.57	107.61
1956	2	6.60	1.10	3.95	1.25	6.86	3.77	5.54	25.01	21.39	20.61	13.87	7.83	117.80
1957	2	18.47	1.34	0.01	1.20	9.15	3.84	7.02	24.00	12.09	2.98	18.70	5.03	103.82
1958	2	7.10	4.82	0.03	2.81	1.62	2.93	18.84	36.42	5.68	3.55	14.31	8.09	106.21
1959	2	10.33	0.39	3.10	2.46	1.65	4.71	5.83	17.55	23.76	4.40	5.67	6.82	86.67
1960	2	2.94	0.30	2.81	5.86	1.43	1.84	3.16	8.99	16.93	7.21	18.50	14.11	84.08
1961	2	4.79	0.01	1.62	1.77	5.86	8.04	10.82	4.83	41.51	14.43	23.57	6.67	123.91
1962	2	13.09	4.91	1.71	3.61	0.01	1.28	2.16	7.84	11.73	25.54	18.22	6.55	96.67
1963	3	2.21	8.84	4.92	0.12	8.09	0.39	4.96	10.45	19.79	14.09	13.48	4.49	91.83
1964	3	8.21	7.74	1.51	3.48	6.80	11.32	11.42	11.48	8.74	6.77	14.98	5.98	98.43
1965	3	4.90	1.11	7.02	0.45	2.54	13.59	5.81	10.10	10.77	19.14	13.94	9.94	99.32
1966	3	0.88	3.58	2.33	3.61	0.08	1.66	16.07	8.53	22.50	10.11	8.11	6.70	84.15
1967	3	8.96	7.03	1.77	4.62	2.80	0.07	10.68	23.92	20.02	19.27	13.00	2.89	115.02
1968	3	12.70	0.76	4.25	6.24	3.02	4.29	7.10	2.35	12.81	9.24	12.38	12.17	87.31
1969	3	8.71	1.95	1.07	1.71	2.37	0.51	1.01	20.23	19.34	13.29	17.68	11.34	99.20
1970	3	5.55	2.23	5.19	1.30	0.07	2.57	1.84	10.64	11.75	12.73	15.49	4.46	73.81
1971	3	4.89	1.39	2.48	5.34	1.84	2.20	15.19	14.47	11.14	8.51	10.87	7.65	85.96
1972	3	3.09	0.00	4.04	0.62	0.32	3.76	1.45	8.29	3.15	19.68	9.37	9.63	63.41
1973	3	4.06	3.12	5.42	1.25	1.33	1.39	0.64	22.54	18.81	12.68	35.42	11.96	118.63
1974	3	12.45	5.01	1.52	4.13	1.15	1.84	9.28	25.00	11.19	23.49	12.91	2.17	110.13
1975	3	8.58	4.64	0.79	0.05	1.06	7.02	6.05	8.28	32.03	21.31	12.98	12.91	115.70
1976	3	3.76	15.95	11.04	1.90	4.66	2.97	16.38	22.38	31.65	23.66	19.18	6.69	160.22
1977	3	4.41	2.32	3.33	2.10	2.75	4.95	9.11	8.02	4.09	3.98	18.67	10.03	73.77
1978	3	7.38	2.00	5.22	3.77	10.30	1.62	1.98	13.69	14.87	9.03	8.17	8.53	86.56
1979	3	14.29	1.13	0.38	4.06	2.37	0.62	10.47	14.69	14.96	3.92	11.41	4.58	82.87
1980	3	3.45	11.94	6.13	9.83	0.20	6.16	9.60	3.97	10.61	23.77	13.75	14.15	113.56
1981	3	4.02	5.99	3.33	5.35	0.63	1.27	15.10	6.80	13.81	10.82	10.19	3.01	80.32
1982	3	7.45	5.49	6.84	1.69	8.25	4.86	2.74	24.62	23.79	12.62	8.42	9.60	116.36
1983	3	1.64	2.70	2.62	1.17	1.14	6.48	7.47	26.22	8.19	12.64	6.43	14.81	91.50
1984	3	12.52	0.68	13.29	4.50	5.15	12.29	11.27	7.75	20.94	22.18	13.27	9.27	133.13
1985	3	1.54	0.68	1.95	2.74	2.71	8.51	8.43	8.28	20.31	15.50	22.03	7.88	100.57
1986	2	4.23	2.65	1.95	6.86	1.84	3.00	7.53	20.82	15.77	17.75	19.49	12.65	114.55
1987	1	2.86	1.88	7.06	0.71	0.00	2.82	10.33	10.23	12.39	15.97	18.10	10.73	93.09
1988	1	6.24	2.59	3.40	0.75	2.19	20.24	8.00	13.62	9.20	16.52	13.85	12.42	109.03
1989	1	9.22	6.02	0.76	2.52	4.05	0.55	20.10	10.36	16.14	20.70	7.69	4.13	102.25
1990	1	1.71	3.35	5.14	0.20	1.12	2.14	3.96	14.82	18.89	36.69	7.26	13.53	108.80
1991	1	6.50	1.79	1.28	0.05	4.89	4.08	18.07	11.29	23.79	13.76	8.70	6.99	101.20
1992	1	12.04	3.30	2.40	1.42	4.86	1.13	38.60	20.37	13.85	23.13	11.04	1.98	134.12
1993	1	0.44	1.66	2.09	4.07	0.57	0.04	4.17	6.92	36.91	11.58	9.28	6.04	83.77
1994	1	3.40	2.04	2.03	3.37	0.89	1.58	5.25	16.90	23.52	19.78	16.98	4.66	100.41
1995	1	12.39	1.93	7.30	0.29	5.57	5.10	6.54	5.77	26.40	11.14	15.85	10.81	109.10
1996	1	15.56	11.01	10.75	0.68	0.41	0.98	7.31	8.23	23.75	7.30	11.25	1.45	98.69
1997	1	1.71	24.08	2.46	0.47	0.00	2.06	8.17	32.82	9.00	12.93	5.02	1.09	99.81
1998	1	2.12	8.78	6.96	0.52	0.20	0.00	8.25	4.95	12.62	0.00	0.00	0.00	44.40
1999	1	1.81	3.07	0.00	0.00	0.00	3.64	1.55	9.07	7.12	17.55	12.40	16.03	72.24
2000	1	1.72	1.15	2.50	0.98	1.12	0.33	4.51	9.66	6.88	28.71	19.87	11.37	88.79
2001	1	8.82	3.43	2.01	16.10	1.34	1.83	7.40	13.74	17.33	16.77	15.65	7.28	111.70
2002	1	5.30	4.14	3.47	1.42	1.34	16.36	4.67	9.16	5.26	6.58	27.67	12.05	97.42
2003	1	5.32	0.00	6.43	4.71	0.00	3.41	12.59	0.95	10.56	13.23	13.70	6.48	77.38
2004	1	6.64	1.25	2.24	7.57	0.43	3.32	8.83	15.96	19.45	8.75	17.39	5.09	96.91
AVERAGE		6.39	4.43	3.33	2.74	2.65	3.73	8.99	13.82	15.95	14.92	13.84	8.88	99.67
ADJUSTED		6.41	4.45	3.34	2.75	2.66	3.74	9.02	13.87	16.00	14.97	13.89	8.91	100.00
STD.DEV.		3.73	4.08	2.73	2.69	3.23	3.64	6.45	7.51	8.56	7.10	5.46	4.83	18.56

AVERAGE RAINFALL ON CATCHMENT OF CODE G2H037

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
21	900	2050	1971 TO 1990	33.60	18.60
22	29	2060	1944 TO 2004	33.59	19.01
22	30	2820	1971 TO 2004	33.60	19.01
21	778	1076	1927 TO 2004	33.58	18.56

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	1.99	10.05	7.10	3.86	0.07	3.53	2.59	1.35	21.37	7.11	16.60	16.42	92.04
1928	1	4.37	2.91	4.06	0.09	0.81	1.09	15.77	13.16	8.04	16.72	14.21	5.28	86.50
1929	1	1.58	4.96	12.35	4.04	4.25	3.90	4.79	1.33	4.64	13.61	17.67	22.90	96.02
1930	1	7.68	8.24	0.51	0.00	4.03	0.00	15.27	14.99	9.66	14.53	18.27	17.28	110.47
1931	1	16.88	0.57	3.22	3.50	12.52	3.68	4.69	15.04	19.75	13.90	8.68	9.56	111.98
1932	1	4.69	1.82	4.15	2.75	2.19	1.47	2.75	8.05	19.11	14.96	17.18	3.55	82.68
1933	1	6.56	1.41	0.00	1.25	2.56	4.61	2.07	19.59	9.05	5.79	12.73	11.05	76.67
1934	1	8.85	9.66	0.85	2.70	1.65	4.19	9.66	16.23	5.64	15.69	11.74	7.82	94.68
1935	1	5.81	11.04	0.59	6.64	2.70	8.11	1.43	13.71	6.64	10.05	12.51	13.20	92.44
1936	1	3.37	2.91	5.45	3.96	0.83	6.47	7.87	13.86	31.28	22.84	9.25	7.29	115.38
1937	1	7.68	3.78	0.14	8.04	1.72	2.43	14.16	18.53	9.84	10.28	10.22	15.22	102.04
1938	1	7.15	6.14	1.33	0.00	7.54	0.85	11.07	14.32	5.62	10.47	14.15	5.02	83.66
1939	1	2.43	5.72	7.66	1.30	4.46	7.00	13.07	8.89	20.57	8.30	5.51	9.69	94.60
1940	1	7.87	7.87	2.31	4.39	2.13	2.96	22.71	19.00	22.60	14.98	13.77	24.06	144.65
1941	1	8.31	3.77	3.66	3.68	0.47	0.47	4.70	22.80	29.73	7.68	18.04	5.53	108.85
1942	1	4.40	0.35	1.28	6.24	4.06	5.06	9.02	10.82	10.79	15.67	17.78	8.75	94.22
1943	1	7.78	6.96	1.63	1.98	0.40	1.59	7.57	23.83	30.04	15.59	17.41	15.11	129.89
1944	2	7.46	5.67	3.67	0.56	0.01	1.53	6.57	15.00	28.95	11.90	14.91	1.64	97.87
1945	2	7.51	17.10	2.65	0.88	1.82	4.70	6.81	6.80	10.32	12.21	5.89	18.32	95.02
1946	2	9.51	5.04	2.28	0.57	0.00	6.55	2.82	16.46	3.89	28.51	4.77	8.88	89.28
1947	2	5.05	3.25	1.72	0.84	1.49	4.19	2.93	10.28	10.61	18.45	4.66	11.73	75.21
1948	2	13.02	0.55	4.16	2.08	0.40	1.29	7.07	6.49	9.09	11.05	6.71	10.83	72.75
1949	2	10.95	6.70	8.47	0.70	0.12	2.17	11.53	10.24	3.98	27.31	4.94	6.59	93.69
1950	2	12.08	8.54	5.84	6.32	0.16	0.95	9.68	10.66	15.88	20.43	10.20	5.38	106.13
1951	2	14.24	9.20	0.18	0.46	2.37	2.01	8.73	10.86	6.44	9.66	3.77	16.37	84.29
1952	2	6.49	4.50	6.32	1.49	0.86	2.47	25.34	19.34	4.86	27.34	6.76	15.00	120.78
1953	2	4.61	10.08	1.36	2.77	1.12	4.47	11.84	12.10	19.96	32.81	20.10	4.89	126.11
1954	2	8.19	1.79	6.22	0.00	8.85	10.60	7.25	2.13	12.06	19.67	12.86	20.03	109.66
1955	2	17.01	8.17	1.06	4.36	1.33	4.40	3.97	19.77	10.54	17.13	27.75	6.73	122.23
1956	2	3.20	4.31	2.21	3.61	9.77	2.53	7.72	19.83	10.23	23.99	27.57	3.73	118.69
1957	2	24.48	0.89	0.01	0.60	7.61	9.92	4.17	17.54	25.91	4.80	9.88	14.50	120.31
1958	2	9.81	1.83	2.73	3.51	0.79	2.81	14.30	30.95	19.32	4.02	8.12	11.50	109.70
1959	2	11.65	2.86	3.90	1.77	3.04	3.91	9.28	17.77	21.80	1.72	4.73	9.67	92.09
1960	2	3.62	0.30	1.63	5.89	3.22	1.89	3.43	7.09	24.40	3.42	17.57	18.04	90.50
1961	2	8.10	0.01	0.98	2.73	4.39	9.39	9.97	5.25	19.16	14.20	28.78	3.47	106.43
1962	2	10.60	13.19	1.75	3.45	0.01	1.12	3.58	7.47	9.88	12.57	32.72	3.11	99.45
1963	2	6.82	7.13	6.46	0.68	3.16	5.81	4.58	10.62	17.71	12.52	15.10	2.44	93.03
1964	2	11.78	4.08	5.32	2.01	5.86	9.72	11.78	11.91	13.60	6.47	17.18	6.63	106.34
1965	2	4.34	2.08	3.79	4.62	3.46	7.48	15.79	5.21	8.56	25.11	6.34	16.21	102.99
1966	2	0.46	3.21	2.88	3.62	2.16	1.69	10.08	16.47	27.36	4.95	15.94	3.66	92.47
1967	2	11.75	3.41	4.85	6.23	1.76	1.94	5.28	24.65	19.52	8.84	24.59	4.22	117.03
1968	2	11.44	1.00	4.87	3.09	4.83	5.02	7.23	3.11	6.41	13.68	12.66	13.75	87.09
1969	2	4.74	5.57	2.01	0.92	3.41	0.64	1.53	10.32	19.28	24.69	9.87	18.62	101.60
1970	2	2.71	5.06	5.19	2.44	0.02	1.91	4.73	9.09	5.66	15.89	16.78	11.48	80.96
1971	4	1.26	4.78	3.87	1.16	3.26	2.94	6.56	25.51	5.53	8.92	12.89	9.34	86.02
1972	4	3.80	0.29	1.71	0.15	1.35	4.91	0.58	4.79	8.90	9.61	20.98	4.13	61.21
1973	4	9.60	7.23	1.25	0.33	1.49	1.59	1.54	15.10	16.36	20.26	18.53	17.11	110.38
1974	4	5.29	8.58	4.53	1.87	3.59	2.37	4.41	19.21	14.28	18.89	14.59	3.26	100.89
1975	4	8.47	1.07	3.59	0.02	0.76	3.60	2.72	7.23	34.27	8.04	22.89	10.75	103.41
1976	4	1.51	22.38	14.13	2.53	2.79	3.85	18.82	14.46	34.22	26.23	28.24	8.60	177.75
1977	4	4.25	1.35	5.64	5.29	2.18	2.27	10.03	10.27	3.40	6.84	22.70	12.99	87.20
1978	4	10.28	4.40	3.90	5.43	4.80	4.01	3.19	10.96	22.80	9.62	7.88	6.77	94.04
1979	4	14.89	3.26	0.51	4.35	3.26	0.68	9.71	15.14	16.84	3.11	13.29	5.33	90.37
1980	4	5.81	9.66	7.67	11.21	0.64	5.79	8.53	2.82	11.48	20.43	18.77	15.98	118.79
1981	4	2.09	8.11	3.54	4.65	0.84	1.90	12.40	7.58	10.34	13.34	9.14	5.54	79.47
1982	4	8.65	5.13	6.14	2.60	7.50	4.47	2.33	24.29	19.05	15.75	6.49	15.26	117.64
1983	4	2.44	2.18	2.12	1.51	1.50	5.36	6.24	26.36	3.85	17.99	8.33	13.83	91.72
1984	4	11.84	2.03	12.85	5.22	7.72	12.66	8.46	7.24	22.75	16.52	13.54	7.96	128.80
1985	4	3.68	4.63	2.37	2.33	3.88	5.56	11.18	8.88	23.15	16.07	26.98	9.70	118.41
1986	4	3.04	3.02	1.74	6.75	2.05	3.38	6.98	16.41	16.04	19.20	14.46	13.82	106.88
1987	4	4.27	2.95	7.35	0.62	0.55	2.55	12.60	8.86	14.71	15.83	18.17	10.84	99.31
1988	4	7.25	3.26	3.44	0.25	2.80	13.13	11.09	12.37	9.85	16.12	15.10	15.85	110.51
1989	4	9.04	6.54	1.10	2.07	5.53	0.94	6.60	25.27	12.87	25.41	10.40	4.91	110.66
1990	4	2.01	3.92	2.94	2.27	1.40	1.82	4.72	17.23	19.84	16.38	10.58	14.24	97.36
1991	3	7.41	1.98	1.14	0.56	4.15	1.36	14.62	14.97	25.43	15.36	10.91	9.27	107.16
1992	3	13.26	4.08	2.28	1.42	4.03	0.74	26.68	18.27	19.14	21.59	10.89	2.48	124.88
1993	3	1.32	2.01	3.18	3.66	0.97	1.11	6.59	6.75	32.76	11.82	7.07	7.97	85.20
1994	3	3.41	2.83	2.35	3.29	0.75	2.32	4.41	13.15	17.87	20.44	16.59	4.57	91.98
1995	3	12.21	1.79	8.02	0.50	5.36	3.68	6.38	6.69	25.51	11.71	5.28	18.94	106.07
1996	3	18.17	12.46	9.34	3.68	0.51	1.36	6.70	9.35	23.74	6.46	11.98	0.48	104.24
1997	3	9.17	8.03	12.40	4.13	0.52	3.12	7.28	10.94	20.05	21.47	7.26	5.41	109.78
1998	3	0.71	11.07	10.67	0.27	0.33	0.25	8.34	7.31	12.27	0.00	0.00	0.00	51.23
1999	3	0.60	1.02	1.02	1.63	1.47	2.69	1.92	3.02	17.18	13.28	4.13	22.34	70.32
2000	3	2.32	1.69	2.89	1.50	1.45	0.54	1.50	13.81	4.41	9.57	6.62	3.79	50.11
2001	3	2.94	15.38	2.44	14.95	1.90	0.61	2.47	23.27	16.98	5.59	22.98	2.43	111.94
2002	3	15.25	1.38	1.16	2.56	2.16	6.98	1.56	6.94	11.87	12.31	9.22	5.48	76.87
2003	3	1.77	7.64	2.14	5.69	0.32	7.00	4.20	10.37	4.33	4.41	4.57	2.16	54.60
2004	3	11.74	4.54	4.87	7.14	4.41	5.23	7.06	10.95	27.99	9.49	22.02	5.82	121.25
AVERAGE		7.29	5.18	3.89	2.98	2.70	3.71	7.89	12.93	15.77	14.10	13.59	9.78	99.81
ADJUSTED		7.31	5.19	3.89	2.98	2.71	3.72	7.91	12.96	15.80	14.12	13.62	9.79	100.00
STD.DEV.		4.74	4.14	3.14	2.61	2.48	2.85	5.32	6.49	8.27	6.88	6.92	5.78	20.04

AVERAGE RAINFALL ON CATCHMENT OF CODE G4H005

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
6	38	1001	1962 TO 1987	34.08	19.02
6	39	1018	1928 TO 2004	34.09	19.02
5	880	1068	1927 TO 1972	34.10	18.60
5	849	1036	1955 TO 1985	34.09	18.59

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	5.39	14.06	4.66	4.23	0.86	5.44	5.39	1.88	22.04	13.97	2.35	13.46	93.73
1928	2	1.69	5.18	4.70	0.20	3.50	1.31	13.42	8.79	8.92	17.01	14.67	2.75	82.14
1929	2	2.33	3.83	3.43	2.88	4.76	4.01	4.41	3.11	2.94	9.89	12.78	24.51	78.89
1930	2	5.30	7.86	2.15	1.70	1.98	0.75	13.17	10.73	7.92	10.91	22.26	15.35	100.09
1931	2	10.06	0.41	6.52	3.63	8.02	2.96	4.24	19.03	15.80	14.85	7.91	14.76	108.21
1932	2	5.15	3.69	2.83	3.09	3.20	2.29	3.35	10.26	27.04	15.71	14.59	5.20	96.40
1933	2	8.12	1.31	0.56	1.19	3.58	2.10	0.87	12.04	12.16	7.98	13.67	12.08	75.65
1934	2	9.21	1.54	1.67	0.31	3.09	8.10	9.31	15.15	13.10	11.60	7.33	10.55	90.98
1935	2	4.00	8.15	0.57	10.51	2.49	3.10	3.62	15.38	9.46	13.25	11.66	7.76	89.95
1936	2	5.09	7.50	9.66	3.64	0.60	5.46	8.03	11.95	27.49	23.87	7.88	7.17	118.35
1937	2	7.59	2.79	0.88	5.77	2.50	3.60	10.47	9.45	6.31	8.34	11.61	16.44	85.74
1938	2	5.86	4.44	2.82	0.06	8.13	2.01	9.85	13.08	3.96	11.65	14.71	3.64	80.21
1939	2	3.03	5.09	3.52	1.90	9.12	5.07	15.85	12.05	19.42	9.56	3.16	11.24	99.01
1940	2	3.81	9.40	2.63	6.39	3.78	0.90	18.79	22.33	21.79	14.47	13.18	23.45	140.93
1941	2	10.12	3.52	5.84	3.85	1.09	2.48	5.13	16.02	26.30	7.02	14.72	5.39	101.48
1942	2	3.15	0.60	3.57	13.65	3.67	5.33	7.87	6.12	7.36	15.49	18.46	7.75	93.04
1943	2	6.55	6.53	0.50	4.39	1.16	3.72	5.40	17.17	39.98	11.22	17.76	15.19	129.56
1944	2	10.88	5.81	4.88	0.11	0.29	0.68	7.47	23.24	28.86	31.60	16.85	1.15	131.82
1945	2	9.46	6.39	3.20	1.91	1.29	6.97	6.05	8.70	8.66	10.94	15.10	16.83	95.49
1946	2	4.07	1.21	1.59	0.26	0.36	8.65	5.92	11.14	4.94	29.63	11.08	5.74	84.58
1947	2	4.43	3.07	1.07	2.24	1.62	7.84	5.01	10.04	11.45	15.17	6.41	16.65	85.01
1948	2	11.83	2.63	2.48	4.47	1.47	1.15	11.32	9.29	10.45	12.07	13.34	12.11	92.59
1949	2	5.59	10.02	3.43	1.97	0.23	1.22	15.16	1.53	4.79	28.22	4.52	17.42	94.10
1950	2	9.47	14.86	7.89	6.48	0.31	1.40	18.70	9.15	31.37	16.61	11.13	22.27	149.64
1951	2	7.89	10.00	0.86	0.45	1.23	6.26	4.94	13.84	7.14	16.61	19.81	12.77	101.79
1952	2	5.92	7.85	2.47	3.66	1.96	1.13	18.09	15.51	9.12	16.12	11.10	2.78	95.71
1953	2	6.45	7.14	2.49	1.74	2.70	4.12	10.10	27.13	16.13	28.77	20.95	8.01	135.73
1954	2	5.40	4.54	4.51	1.41	15.94	1.76	8.05	2.37	13.36	22.40	27.85	7.85	115.44
1955	3	14.22	6.47	1.98	1.74	1.95	5.70	4.17	15.94	19.40	12.68	13.00	3.25	100.50
1956	3	8.28	0.56	5.14	1.62	8.53	5.87	6.80	28.19	21.24	19.84	18.08	8.93	133.07
1957	3	20.57	1.53	0.04	1.75	9.72	6.32	4.81	14.52	13.28	1.15	20.66	4.41	98.74
1958	3	7.78	4.66	0.37	3.16	1.32	4.02	21.36	31.41	6.22	7.54	17.50	6.53	111.88
1959	3	7.91	0.46	2.23	1.87	1.83	5.42	5.33	12.04	21.63	5.43	7.34	6.36	77.83
1960	3	4.28	1.31	4.28	11.66	1.57	2.43	3.21	9.95	13.29	12.34	18.64	11.53	94.49
1961	3	6.22	0.21	2.48	2.98	4.22	5.65	11.10	3.30	27.97	8.85	19.40	5.61	97.98
1962	4	13.73	4.93	1.71	5.35	0.49	3.10	3.44	10.02	14.38	23.02	22.49	6.16	108.81
1963	4	4.49	4.28	5.25	1.77	6.61	2.68	6.20	6.99	17.99	16.70	21.64	7.10	101.69
1964	4	12.98	9.84	0.65	3.69	6.52	8.04	9.92	12.90	7.92	10.29	12.09	4.93	99.78
1965	4	7.01	3.31	7.44	1.53	2.85	10.75	6.75	10.70	8.56	18.57	15.30	9.63	102.41
1966	4	1.31	2.72	1.85	1.85	0.24	4.16	20.75	7.28	19.38	10.19	9.00	4.95	83.68
1967	4	11.38	5.53	1.41	6.11	4.33	0.48	8.03	17.57	16.46	14.66	14.03	3.37	103.34
1968	4	12.67	1.47	5.08	6.42	3.89	4.04	7.89	2.40	12.65	10.50	10.82	11.53	89.36
1969	4	11.27	1.67	1.25	2.12	2.81	1.49	1.11	15.42	20.49	14.68	17.35	9.44	99.13
1970	4	5.08	4.47	5.61	2.46	1.12	2.37	1.47	8.07	9.43	14.83	14.09	4.14	73.14
1971	4	3.43	3.65	3.32	3.97	4.50	3.10	12.89	13.36	8.57	9.54	11.44	5.19	82.97
1972	4	3.09	1.11	4.25	2.29	1.02	2.73	3.42	7.38	4.25	21.28	9.11	10.68	70.61
1973	3	5.01	2.89	4.11	1.67	1.19	2.06	0.64	15.33	15.64	10.68	38.86	11.25	109.34
1974	3	15.32	4.39	2.73	4.85	1.83	1.40	7.43	19.07	12.32	23.33	15.68	3.01	111.38
1975	3	10.56	3.99	0.64	0.29	2.32	5.02	8.18	8.66	28.49	13.86	8.12	10.15	100.28
1976	3	2.46	14.99	10.60	2.76	3.60	5.22	11.36	25.07	23.27	21.05	17.24	9.90	147.52
1977	3	5.03	3.76	2.52	3.23	2.75	5.31	7.82	5.19	5.09	7.97	17.15	12.29	78.11
1978	3	8.08	2.55	4.69	5.71	10.71	0.88	0.26	16.96	13.11	8.61	8.70	9.91	90.17
1979	3	15.91	0.73	0.74	4.01	6.20	0.58	8.39	14.44	15.83	3.81	11.61	3.67	85.90
1980	3	8.13	17.51	7.54	12.92	0.80	6.82	8.26	1.67	6.58	22.69	16.62	19.08	128.63
1981	3	3.62	4.50	3.64	3.55	0.85	2.17	15.20	5.40	13.99	7.87	8.14	4.23	73.16
1982	3	8.13	3.71	9.43	2.64	12.27	7.15	2.25	23.41	21.90	13.49	10.57	14.58	129.53
1983	3	3.81	1.02	3.32	2.26	1.53	5.74	7.46	28.20	6.59	14.97	4.11	15.58	94.59
1984	3	10.80	1.21	12.59	4.70	5.21	14.32	11.30	4.47	11.34	22.07	14.41	8.02	120.45
1985	3	5.98	2.67	3.41	1.78	3.41	10.10	8.65	8.13	19.46	14.62	30.03	5.65	113.87
1986	2	5.01	5.31	0.83	3.87	4.25	2.35	8.97	15.14	17.78	12.66	15.25	7.43	98.87
1987	2	1.88	1.16	6.50	1.24	0.07	2.99	9.48	9.97	10.28	13.04	14.58	11.56	82.75
1988	1	4.38	2.39	0.80	2.32	1.67	16.02	12.29	17.63	12.17	16.67	17.42	12.94	116.68
1989	1	10.82	3.19	0.58	2.41	4.66	1.19	12.94	15.51	19.50	20.70	8.14	5.95	105.60
1990	1	3.32	5.73	1.91	1.82	0.29	1.77	3.07	14.26	20.13	30.97	4.68	11.38	99.34
1991	1	9.58	1.61	0.93	0.49	5.16	2.85	11.66	16.34	27.40	14.31	14.70	10.06	115.09
1992	1	18.56	2.68	1.37	1.58	6.14	1.03	26.15	12.18	18.06	24.59	9.15	2.84	124.32
1993	1	0.91	4.33	3.65	2.11	1.42	1.58	5.14	9.53	34.61	10.41	5.71	7.87	87.28
1994	1	5.02	1.72	5.14	1.96	0.59	5.09	3.68	13.32	14.39	21.28	14.10	6.14	92.41
1995	1	15.00	4.20	8.39	0.33	5.30	5.63	3.01	7.55	24.79	19.02	15.78	16.58	125.59
1996	1	13.54	9.05	9.77	1.86	1.64	2.55	7.34	11.48	20.34	3.60	8.74	0.81	90.71
1997	1	3.74	12.79	4.95	3.28	0.07	1.91	7.43	23.40	14.08	13.64	8.51	4.30	98.11
1998	1	2.67	14.24	7.26	1.81	0.53	0.46	6.32	8.97	10.90	0.00	0.00	0.00	53.16
1999	1	0.89	4.06	2.95	5.91	0.07	4.38	1.44	8.24	12.03	19.01	10.61	17.66	87.24
2000	1	2.47	2.25	3.27	2.09	1.37	0.35	5.09	19.04	5.96	34.59	18.57	16.01	111.07
2001	1	3.97	2.01	2.05	13.13	2.55	1.57	7.27	7.34	15.58	20.23	13.94	6.73	96.37
2002	1	6.16	6.26	4.18	2.68	1.85	12.52	3.02	7.43	2.38	5.99	26.55	12.77	91.79
2003	1	7.22	0.27	5.50	6.12	0.96	3.16	8.32	2.51	9.54	12.31	13.81	9.33	79.05
2004	1	15.37	1.13	3.39	5.27	1.05	1.82	17.37	13.08	19.24	7.71	19.93	6.42	111.77
AVERAGE		7.27	4.69	3.66	3.40	3.14	4.03	8.28	12.47	15.18	14.91	13.85	9.46	100.33
ADJUSTED		7.24	4.68	3.64	3.39	3.13	4.01	8.25	12.43	15.13	14.86	13.80	9.43	100.00
STD.DEV.		4.27	3.83	2.66	2.89	3.04	3.15	5.21	6.60	7.92	7.00	6.36	5.33	18.51

AVERAGE RAINFALL ON CATCHMENT OF CODE G4H007 HIGH MAP

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
5	880	1068	1927 TO 1972	34.10	18.60
5	849	1036	1955 TO 1985	34.09	18.59
5	829	1232	1974 TO 2004	34.19	18.58
5	771	1056	1966 TO 2004	34.21	18.56
5	612	1242	1954 TO 2004	34.12	18.51

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	5.39	14.06	4.66	4.23	0.86	5.44	5.39	1.88	22.04	13.97	2.35	13.46	93.73
1928	1	1.49	4.23	3.29	0.19	0.88	1.19	13.83	9.78	9.65	17.49	14.44	3.19	79.65
1929	1	2.08	3.64	2.02	2.45	3.78	3.07	4.29	3.08	2.76	9.88	13.97	25.45	76.49
1930	1	4.49	8.19	2.35	2.07	3.74	0.38	11.96	11.06	7.31	10.70	21.55	12.83	96.63
1931	1	5.39	0.24	6.15	3.28	8.14	3.34	2.36	19.34	15.29	13.92	5.71	14.68	97.85
1932	1	4.61	5.73	2.10	3.56	3.67	1.78	3.53	11.14	29.17	17.65	15.19	3.86	102.00
1933	1	9.36	0.97	0.27	0.74	3.06	1.90	0.66	13.11	9.24	8.53	12.24	11.90	71.98
1934	1	5.39	1.46	2.30	0.07	2.06	8.32	9.46	15.55	14.73	12.60	7.43	11.72	91.09
1935	1	4.90	5.65	0.31	9.72	2.03	2.40	5.39	16.88	10.43	12.56	12.28	9.41	91.95
1936	1	4.99	6.81	9.17	4.53	0.82	5.31	8.00	14.75	29.57	25.70	8.43	7.33	125.43
1937	1	7.78	2.69	0.83	5.42	2.87	3.62	10.44	12.78	5.67	8.35	11.24	15.88	87.56
1938	1	6.55	4.05	1.65	0.03	7.96	1.32	11.63	13.03	4.52	10.83	15.17	2.94	79.68
1939	1	2.79	7.04	4.49	1.83	9.56	5.99	18.14	14.14	20.33	8.51	2.76	11.11	106.68
1940	1	3.93	10.06	2.86	10.24	2.74	1.09	16.94	24.86	21.86	16.04	13.68	26.28	150.57
1941	1	10.90	3.48	5.53	3.93	0.93	2.55	5.11	16.94	23.39	7.59	15.44	4.67	100.44
1942	1	3.01	0.23	3.54	7.22	2.33	5.78	9.74	6.62	9.40	19.24	19.27	8.17	94.56
1943	1	7.98	5.86	0.99	4.96	2.04	4.01	5.31	17.75	40.97	11.75	17.83	14.30	133.77
1944	1	11.23	6.49	5.58	0.22	0.31	0.85	7.71	23.10	31.55	31.66	17.17	1.36	137.24
1945	1	8.50	6.13	4.25	1.47	1.50	6.79	7.19	9.07	8.17	10.34	16.58	14.33	94.32
1946	1	4.13	0.84	1.57	0.28	0.27	8.33	6.38	11.58	3.43	29.70	9.66	6.61	82.79
1947	1	4.89	3.25	0.85	1.89	1.50	8.64	3.98	13.41	11.92	14.18	10.03	16.93	91.48
1948	1	11.94	1.68	2.89	3.48	0.93	1.70	10.85	10.35	10.18	13.46	11.60	14.54	93.58
1949	1	6.66	10.00	4.71	1.05	0.22	1.88	18.67	1.38	6.19	26.23	4.65	18.42	100.06
1950	1	8.38	12.08	7.31	6.58	0.27	1.34	21.79	9.50	31.36	16.99	10.33	17.20	143.14
1951	1	8.31	10.22	0.46	0.40	1.32	6.90	4.84	12.67	7.25	15.23	17.23	13.02	97.85
1952	1	5.70	7.93	2.11	1.21	2.24	1.82	23.43	19.93	9.46	18.91	13.21	3.16	109.11
1953	1	6.65	6.42	2.71	2.78	2.41	3.71	10.98	29.87	17.81	27.65	22.30	7.97	141.26
1954	2	6.28	5.13	5.87	3.50	10.23	3.59	7.78	3.27	12.46	21.87	22.79	8.49	111.25
1955	3	14.15	7.17	3.43	2.30	2.43	6.40	6.13	17.43	18.99	12.78	14.05	4.53	109.80
1956	3	9.44	1.18	5.96	2.76	8.20	4.97	8.33	28.31	19.08	18.77	16.80	9.25	133.06
1957	3	19.61	2.22	0.12	2.43	10.89	5.29	5.49	18.02	12.71	1.85	20.03	6.32	104.97
1958	3	8.78	5.60	0.65	3.95	1.46	4.05	21.31	33.12	5.39	7.24	18.32	6.65	116.51
1959	3	8.68	0.80	2.97	1.70	2.11	4.99	5.80	12.94	21.92	5.52	7.85	6.01	81.28
1960	3	3.41	0.97	3.96	11.22	1.39	2.26	2.87	10.55	14.76	10.16	17.71	11.71	90.99
1961	3	6.44	0.18	2.87	2.91	4.44	5.70	11.26	4.27	29.14	10.08	17.83	6.11	101.23
1962	3	16.72	5.03	0.92	3.95	0.41	3.20	3.32	9.03	16.14	21.63	20.48	6.77	107.59
1963	3	4.60	5.14	5.16	2.19	6.58	1.84	8.39	8.16	16.69	14.60	17.85	7.68	98.87
1964	3	14.87	10.78	1.46	4.90	6.13	8.60	9.63	12.52	7.38	10.29	11.00	4.85	102.42
1965	3	6.47	2.32	7.39	1.52	3.58	10.84	6.82	11.09	8.68	19.68	13.87	8.89	101.15
1966	4	1.23	3.12	2.42	2.22	0.39	4.50	20.91	8.39	18.34	10.82	8.83	5.72	86.87
1967	4	10.60	5.74	1.60	7.52	5.68	0.59	7.56	16.40	16.44	14.88	12.27	3.89	103.18
1968	4	11.16	1.05	5.60	7.14	4.29	4.51	8.50	2.55	12.87	9.04	10.99	8.60	86.31
1969	4	10.48	2.06	1.27	1.73	3.07	1.28	1.38	16.01	16.61	14.57	17.18	8.78	94.42
1970	4	6.60	4.29	6.27	2.62	1.12	2.38	2.74	7.63	10.74	12.88	15.56	4.88	77.71
1971	4	4.56	2.88	2.60	4.19	5.66	3.93	12.05	14.33	9.07	8.34	11.73	6.10	85.44
1972	4	2.84	0.78	5.49	2.32	0.82	2.44	2.36	7.43	5.11	18.77	8.61	9.12	66.09
1973	3	2.72	4.13	3.26	2.65	1.65	2.23	0.77	17.15	15.93	8.76	30.21	9.88	99.32
1974	4	12.13	3.41	2.08	5.13	1.21	2.05	7.50	16.94	11.01	19.88	12.52	4.52	98.38
1975	4	9.05	5.04	0.70	0.30	3.16	5.00	8.44	10.30	26.44	13.13	7.32	13.37	102.26
1976	4	5.30	14.36	7.95	3.12	5.64	6.94	10.96	19.87	20.49	18.80	17.97	9.42	140.81
1977	4	4.15	3.02	4.48	2.43	3.98	6.04	5.95	7.47	4.32	10.79	14.39	11.52	78.54
1978	4	7.11	2.28	4.15	3.86	14.28	2.10	1.26	18.53	14.58	8.99	8.32	10.16	95.62
1979	4	18.44	1.13	1.79	4.50	5.31	0.75	9.93	15.29	17.08	3.53	10.89	4.78	93.41
1980	4	7.11	14.25	8.54	14.57	2.20	6.18	11.65	2.59	7.17	22.77	12.75	12.24	122.01
1981	4	2.61	5.79	3.59	4.71	1.41	2.77	9.56	4.72	12.75	6.23	11.10	4.12	69.35
1982	4	5.58	4.71	9.67	2.62	12.99	8.69	2.48	20.37	23.31	12.45	10.19	12.13	125.20
1983	4	3.34	1.52	3.78	3.08	2.66	6.02	7.32	23.84	8.99	12.41	5.54	11.47	89.98
1984	4	12.62	1.29	12.37	4.85	5.56	12.09	11.59	3.76	10.07	16.62	12.56	8.24	111.63
1985	4	7.48	2.09	2.61	1.50	5.56	9.46	9.12	6.16	17.23	13.83	24.23	6.22	105.48
1986	3	5.66	4.29	2.17	5.76	4.86	3.43	8.06	17.33	11.61	14.35	17.31	11.49	106.32
1987	3	3.05	1.81	7.24	1.48	0.59	4.26	10.10	9.93	10.55	15.25	12.31	8.22	84.79
1988	3	7.24	2.85	1.66	1.84	4.07	15.39	11.04	13.27	11.98	16.12	13.85	12.71	112.03
1989	3	12.63	5.01	2.38	3.75	7.36	1.04	17.96	12.15	17.37	21.84	6.16	5.01	112.66
1990	3	2.94	4.69	2.78	2.53	0.50	2.82	2.60	14.44	24.62	25.07	6.66	14.44	104.07
1991	3	11.18	2.15	2.60	1.68	4.89	3.24	9.68	12.31	25.91	16.18	9.74	10.88	110.45
1992	3	15.30	5.06	2.98	3.59	6.49	2.34	24.61	13.41	16.55	27.31	10.68	2.66	130.99
1993	3	2.81	3.31	7.63	3.43	2.41	4.73	4.58	9.33	31.29	12.20	6.55	7.98	96.25
1994	3	5.35	2.67	5.75	3.93	1.13	4.41	6.38	11.65	14.11	22.01	12.41	6.83	96.62
1995	3	10.90	5.37	12.61	0.58	6.53	5.18	3.62	8.41	18.70	16.96	11.99	14.82	115.68
1996	3	11.09	9.13	9.23	2.98	3.16	1.96	5.83	11.10	18.68	4.59	13.24	1.97	92.97
1997	3	5.74	10.22	3.42	5.62	1.32	4.85	7.21	19.02	11.29	15.32	8.99	6.71	99.69
1998	3	4.46	12.28	8.38	2.82	1.12	1.93	8.79	8.24	13.84	3.93	5.66	5.11	76.56
1999	3	2.47	4.09	1.65	5.94	0.68	6.58	1.93	8.88	10.57	11.99	10.87	10.50	76.15
2000	3	2.80	2.10	2.71	2.79	3.99	0.58	5.13	19.47	6.89	26.95	21.90	14.37	109.68
2001	3	7.16	2.34	4.06	14.14	3.85	2.03	7.57	13.80	12.96	15.39	12.38	4.65	100.33
2002	3	5.96	6.46	1.99	5.05	3.45	9.72	3.36	11.80	3.91	7.85	18.77	10.14	88.44
2003	3	6.81	1.39	5.78	5.79	3.15	4.95	8.65	1.76	11.07	14.22	11.78	7.45	82.80
2004	3	14.50	0.89	4.36	3.93	2.54	2.42	23.70	13.91	19.38	7.18	16.27	5.83	114.93
AVERAGE		7.31	4.68	3.91	3.66	3.53	4.27	8.69	12.85	14.96	14.57	13.22	9.29	100.94
ADJUSTED		7.24	4.64	3.88	3.63	3.49	4.23	8.61	12.73	14.82	14.43	13.09	9.21	100.00
STD.DEV.		4.03	3.48	2.73	2.83	2.98	2.89	5.60	6.41	7.77	6.35	5.14	4.79	17.94

AVERAGE RAINFALL ON CATCHMENT OF CODE G4H007 LOW MAP

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
6	167	928	1938 TO 1991	34.17	19.06
6	192	677	1927 TO 1990	34.12	19.07
6	223	678	1971 TO 2004	34.13	19.08

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	2.08	10.69	5.47	6.45	0.64	5.92	5.47	1.02	24.05	8.05	13.88	12.72	96.44
1928	1	0.86	4.77	6.84	0.41	2.22	2.10	8.40	7.75	8.08	25.52	14.99	2.02	83.97
1929	1	2.63	4.96	5.33	3.59	5.52	5.98	2.56	5.41	7.03	5.67	14.98	21.20	84.86
1930	1	6.84	8.29	0.75	1.27	3.99	0.77	17.65	7.61	3.99	11.49	16.16	9.66	88.46
1931	1	16.40	0.49	6.28	3.29	7.87	1.33	1.37	10.68	12.75	13.77	6.25	17.64	98.11
1932	1	5.83	1.88	4.36	1.88	1.88	3.41	2.38	11.11	21.88	14.12	14.31	6.47	89.50
1933	1	5.64	2.33	0.15	2.22	4.46	2.29	0.46	7.58	9.78	10.83	16.77	14.89	77.39
1934	1	12.27	2.19	0.22	1.05	1.17	5.35	10.75	17.36	10.62	10.18	4.84	7.36	83.35
1935	1	2.73	10.68	1.00	8.97	1.89	7.96	2.22	15.32	8.83	15.16	10.66	10.96	96.38
1936	1	4.40	10.68	9.65	1.39	0.86	4.65	7.95	8.02	23.15	20.61	5.16	10.66	107.16
1937	1	5.63	4.00	1.91	3.43	2.14	5.58	11.55	13.22	4.03	7.80	11.15	15.49	85.94
1938	2	7.60	4.20	4.13	0.18	9.09	5.91	7.90	10.31	5.09	11.30	15.47	3.98	85.14
1939	2	5.12	4.89	3.09	1.32	10.17	4.69	15.77	7.48	16.91	8.97	4.07	9.51	92.00
1940	2	3.98	9.26	1.48	4.28	3.61	1.05	20.59	23.52	17.63	10.83	10.21	23.87	130.32
1941	2	8.46	5.28	6.10	6.01	1.36	3.30	6.68	16.37	28.04	5.85	9.17	5.63	102.26
1942	2	2.90	0.99	5.31	17.97	5.15	5.80	5.24	8.36	8.39	15.20	19.01	7.74	102.07
1943	2	6.44	6.72	0.70	2.49	1.44	2.92	5.02	15.76	29.54	8.21	22.27	15.97	117.48
1944	2	5.32	3.63	3.98	0.03	0.87	1.84	7.17	27.86	24.75	22.42	16.66	1.64	116.16
1945	2	16.58	4.89	2.04	2.44	2.74	10.38	4.53	4.86	8.13	8.77	10.57	11.28	87.22
1946	2	3.31	1.57	1.54	0.46	1.64	10.22	4.83	12.28	9.10	24.71	5.61	4.89	80.15
1947	2	4.58	5.24	1.08	2.99	1.81	6.02	6.53	8.19	9.72	14.40	3.19	16.07	79.82
1948	2	16.45	2.30	2.33	4.16	1.81	1.29	11.62	9.27	8.28	9.60	11.78	10.32	89.21
1949	2	3.93	8.64	2.73	2.37	0.48	1.02	11.86	2.01	3.20	24.75	3.63	15.51	80.12
1950	2	12.07	17.66	7.40	5.64	0.65	6.27	14.30	9.66	25.59	14.32	10.59	27.75	151.90
1951	2	7.03	7.97	1.96	1.36	1.78	3.42	4.72	13.46	7.59	13.59	17.72	12.14	92.73
1952	2	6.45	10.09	3.09	1.81	2.98	0.60	14.38	11.87	7.36	12.62	7.93	2.64	81.82
1953	2	7.24	8.34	2.52	1.60	3.01	5.07	9.81	27.96	14.85	28.94	20.63	8.78	138.73
1954	2	5.03	5.10	4.12	2.33	22.02	1.29	7.62	3.31	13.19	18.60	23.05	7.23	112.90
1955	2	13.75	5.30	2.19	1.67	3.45	6.00	5.17	18.47	18.04	10.06	11.57	3.87	99.53
1956	2	9.95	1.30	3.79	0.82	7.44	8.32	5.54	25.88	24.23	18.04	17.62	9.19	132.13
1957	2	19.44	1.06	0.37	0.52	5.17	7.55	8.17	16.94	12.89	1.20	20.92	4.48	98.71
1958	2	8.06	3.72	0.78	4.88	2.63	5.66	23.05	28.81	3.42	10.52	19.53	5.33	116.39
1959	2	10.87	0.55	4.24	2.25	1.91	4.44	3.66	13.07	16.97	7.89	3.26	10.10	79.20
1960	2	3.93	1.24	9.44	6.79	0.90	1.90	4.18	7.54	8.06	10.87	14.51	9.72	79.08
1961	2	7.07	0.35	1.96	2.67	2.87	6.80	9.97	4.56	27.78	8.28	24.64	4.83	101.77
1962	2	20.47	6.83	1.18	7.72	1.57	2.34	5.05	7.16	12.09	23.47	14.14	2.96	104.98
1963	2	5.34	6.09	3.51	0.22	7.25	4.63	5.59	5.93	22.66	15.23	16.63	7.26	100.33
1964	2	7.02	9.90	0.56	2.12	6.71	7.04	9.03	13.02	6.82	14.61	9.39	4.65	90.88
1965	2	10.74	6.15	7.44	2.93	1.85	5.86	5.95	8.11	8.76	16.39	18.93	11.99	105.12
1966	2	1.48	2.62	1.36	1.94	1.06	6.15	20.49	11.00	16.73	12.20	10.60	5.40	91.04
1967	2	7.88	5.64	1.12	2.07	4.69	1.41	7.20	18.75	18.53	11.05	14.35	2.48	95.16
1968	2	12.97	2.91	3.46	4.48	5.78	3.70	7.71	1.97	15.28	8.17	10.76	9.57	86.78
1969	2	14.58	2.06	0.62	3.17	4.76	1.33	1.53	10.34	15.53	15.71	16.16	8.47	94.25
1970	2	8.95	4.91	7.25	2.59	2.02	2.96	3.82	10.72	11.85	19.28	15.04	5.11	94.50
1971	3	6.88	4.42	3.23	5.32	6.22	5.89	13.36	11.99	9.02	9.00	12.79	4.68	92.81
1972	3	3.03	2.08	4.09	1.69	1.54	1.66	3.89	6.31	5.77	19.55	7.60	12.05	69.26
1973	3	6.13	4.26	3.21	2.14	2.94	2.26	1.57	14.58	11.72	7.53	39.41	10.75	106.51
1974	3	10.84	1.65	2.20	2.42	1.50	1.10	4.33	16.65	13.17	19.38	15.81	13.52	102.59
1975	3	8.39	6.52	2.36	0.20	2.32	6.25	6.91	9.20	22.32	16.57	7.20	12.21	100.45
1976	3	6.01	17.84	8.55	3.46	8.84	5.79	10.74	23.80	18.06	19.42	16.20	6.04	144.75
1977	3	2.55	6.21	6.44	0.94	3.79	3.81	7.76	3.87	3.19	17.60	15.45	11.03	82.63
1978	3	7.44	1.67	5.17	5.85	13.20	1.03	0.33	20.73	14.19	10.97	7.94	10.92	99.45
1979	3	13.08	1.58	2.16	4.58	3.09	0.76	7.52	10.04	16.27	3.62	6.45	2.23	71.39
1980	3	7.39	12.54	5.57	17.29	3.12	7.28	12.09	1.76	4.79	20.80	16.49	12.43	121.54
1981	3	2.81	4.00	2.74	2.21	1.56	1.97	12.68	3.96	11.98	6.13	7.32	4.56	61.92
1982	3	6.02	2.37	4.96	2.47	8.83	4.95	1.84	23.34	21.08	17.92	9.30	13.15	116.23
1983	3	3.10	0.61	1.36	1.31	2.05	3.78	6.04	24.50	7.90	11.61	4.95	14.16	81.35
1984	3	14.34	1.09	12.37	5.43	6.72	12.10	10.24	3.17	8.33	23.35	12.65	5.06	114.85
1985	3	12.15	4.67	2.92	1.53	10.22	9.15	6.45	3.74	15.31	12.04	32.85	6.08	117.11
1986	3	8.28	4.70	2.01	2.24	4.73	2.04	12.40	16.08	14.00	9.70	18.07	8.95	103.21
1987	3	2.41	0.95	4.91	0.47	0.39	2.79	8.93	8.59	12.41	11.44	13.89	8.04	75.21
1988	3	6.55	2.32	2.02	1.95	2.50	18.07	16.12	12.69	18.77	16.70	15.48	13.86	127.01
1989	3	14.40	5.49	1.37	1.94	11.35	2.72	13.97	16.50	19.55	16.16	8.05	4.52	116.02
1990	3	5.86	5.63	1.83	2.77	0.99	1.77	3.37	11.95	18.09	25.35	4.80	9.10	91.51
1991	2	17.35	1.78	3.94	1.43	4.54	4.14	9.05	12.35	20.82	12.54	11.74	9.40	109.07
1992	1	22.36	4.13	1.59	4.28	4.87	3.02	28.92	12.87	15.26	23.15	10.69	3.67	134.82
1993	1	1.28	2.65	8.88	1.45	2.40	4.20	4.69	10.62	27.30	9.08	8.35	7.20	88.10
1994	1	8.36	0.78	8.41	4.67	0.97	7.34	7.30	17.62	12.96	14.26	13.46	6.39	102.54
1995	1	10.18	5.99	16.07	1.14	5.91	4.81	3.04	6.84	18.02	16.83	11.27	12.64	112.73
1996	1	21.29	14.33	5.18	0.87	1.95	2.68	8.63	16.87	21.44	4.93	11.78	1.12	111.08
1997	1	4.32	26.34	3.79	5.53	1.50	4.69	9.25	25.44	9.56	15.03	9.42	3.39	118.26
1998	1	2.71	15.76	14.98	2.99	1.30	1.18	12.70	6.61	10.18	0.00	0.00	0.00	68.41
1999	1	0.00	4.01	2.21	8.92	0.72	14.47	3.32	7.00	10.65	13.18	11.74	16.28	92.51
2000	1	3.38	6.34	3.51	4.72	2.67	2.17	8.45	19.45	5.60	27.65	16.52	14.51	114.97
2001	1	10.94	3.26	2.76	15.57	2.73	2.11	11.50	12.59	13.76	20.04	15.90	6.36	117.52
2002	1	5.01	5.78	4.10	3.61	3.55	19.55	3.58	15.38	2.96	4.32	22.05	7.93	97.85
2003	1	9.50	2.43	6.67	6.03	5.47	4.32	7.29	2.30	10.19	13.43	9.82	6.56	84.01
2004	1	22.98	1.89	9.75	6.68	2.34	3.52	37.55	10.44	18.86	5.94	14.73	5.69	140.38
AVERAGE		8.17	5.31	4.05	3.49	3.85	4.69	8.61	12.05	13.78	13.78	13.06	9.03	99.86
ADJUSTED		8.19	5.32	4.06	3.50	3.85	4.70	8.62	12.06	13.80	13.79	13.08	9.04	100.00
STD.DEV.		5.31	4.55	3.21	3.38	3.47	3.57	6.21	6.77	6.74	6.21	6.40	5.17	18.56

AVERAGE RAINFALL ON CATCHMENT OF CODE G4R001

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
5	612	1242	1954 TO 2004	34.12	18.51
5	880	1068	1927 TO 1972	34.10	18.60
5	611	967	1955 TO 2003	34.11	18.51
5	640	981	1959 TO 2004	34.10	18.52
5	730	1159	1955 TO 1994	34.10	18.55
5	759	927	1955 TO 1987	34.09	18.56
9158	101	955	1928 TO 1988	0.11	3665.04

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	5.39	14.06	4.66	4.23	0.86	5.44	5.39	1.88	22.04	13.97	2.35	13.46	93.73
1928	2	2.03	3.13	2.27	0.33	1.09	1.18	11.44	9.39	7.98	16.30	11.23	4.43	70.79
1929	2	2.41	3.59	4.99	3.29	5.98	3.66	4.24	2.31	5.28	9.80	11.17	20.86	77.59
1930	2	4.26	6.70	1.95	1.04	3.62	0.32	11.23	8.99	7.05	11.27	17.93	9.76	84.11
1931	2	8.92	0.16	5.12	3.58	8.73	2.58	1.62	19.11	14.44	10.79	7.00	10.76	92.82
1932	2	3.50	3.40	1.96	3.14	2.78	1.38	3.48	9.39	24.12	14.33	13.46	3.87	84.81
1933	2	6.82	1.79	0.14	0.76	2.14	3.63	0.82	12.61	7.42	8.18	11.54	10.02	65.86
1934	2	6.27	5.01	1.58	0.78	1.44	6.29	9.68	14.27	11.63	12.39	8.37	9.74	87.45
1935	2	4.15	4.75	0.48	10.20	2.05	2.54	4.08	12.97	8.12	9.67	11.87	9.32	80.22
1936	2	3.97	4.71	8.02	4.17	0.92	5.50	8.11	11.86	29.23	22.68	9.34	7.61	116.10
1937	2	6.95	2.48	0.55	5.76	2.00	3.16	11.79	12.10	6.23	9.96	10.67	14.95	86.60
1938	2	7.08	4.53	1.51	0.07	7.99	1.10	9.91	10.14	5.47	9.60	14.85	4.22	76.46
1939	2	2.87	6.50	5.18	2.14	8.87	6.40	14.08	11.47	19.94	9.30	3.84	11.30	101.89
1940	2	5.14	8.14	3.55	7.07	1.71	1.66	19.31	22.60	20.55	14.19	10.41	20.20	134.54
1941	2	9.39	4.79	4.49	3.52	1.95	2.53	5.87	15.88	23.54	6.47	14.74	4.89	98.05
1942	2	4.14	0.52	3.12	6.92	3.23	5.15	9.02	8.35	8.73	15.14	15.05	7.30	86.67
1943	2	6.00	4.95	0.80	5.13	1.41	3.03	5.27	18.14	36.09	13.03	17.70	16.98	128.54
1944	2	9.42	4.70	5.17	0.13	0.27	1.02	9.44	26.53	28.53	25.95	15.81	1.09	128.07
1945	2	7.69	4.89	3.72	1.91	1.34	7.76	7.79	8.92	9.35	11.29	14.82	15.03	94.50
1946	2	4.74	0.79	2.20	0.58	0.28	8.14	7.07	11.41	5.31	26.17	9.71	5.41	81.81
1947	2	3.87	2.70	0.77	1.32	1.69	6.11	4.61	12.07	12.63	15.46	9.14	13.52	83.89
1948	2	12.21	1.94	3.21	2.62	1.11	1.74	11.70	9.62	11.23	13.11	13.33	11.71	93.53
1949	2	5.20	6.92	4.23	1.21	0.40	1.99	18.95	2.91	7.09	26.23	4.21	15.59	94.93
1950	2	7.69	8.97	7.49	6.57	0.29	1.29	20.64	11.12	32.51	14.71	9.31	16.77	137.36
1951	2	6.36	9.45	0.75	0.60	1.26	6.92	5.79	10.27	8.08	13.32	14.45	12.08	89.33
1952	2	5.15	7.88	2.25	1.46	1.74	2.05	20.45	20.36	9.17	16.32	10.69	2.24	99.77
1953	2	5.57	5.87	2.43	2.45	2.97	3.21	10.12	29.99	15.46	26.65	20.80	7.76	133.29
1954	3	6.70	4.57	5.51	2.35	12.62	3.23	7.87	2.94	11.78	21.08	21.89	8.63	109.17
1955	6	13.24	6.22	3.31	2.30	2.47	5.96	7.47	17.55	19.55	11.30	14.14	3.73	107.23
1956	6	9.25	1.25	5.48	2.84	7.55	4.15	8.40	28.10	17.93	18.21	15.87	8.95	127.99
1957	6	18.91	2.18	0.11	2.34	10.35	4.57	5.81	19.70	12.94	1.78	19.50	7.20	105.39
1958	6	8.45	4.81	0.40	3.78	1.81	4.52	21.33	33.60	5.29	6.80	17.34	6.92	115.06
1959	7	9.34	0.97	3.25	1.74	2.26	4.73	5.95	13.73	20.88	5.48	8.17	5.07	81.57
1960	7	2.75	0.72	4.27	12.25	1.50	2.16	2.56	10.65	15.24	8.91	16.87	11.14	89.02
1961	7	6.47	0.10	2.50	3.58	5.22	5.26	12.19	5.12	30.55	10.29	18.21	6.37	105.85
1962	7	16.05	5.35	1.05	3.25	0.29	1.70	2.70	7.37	12.97	25.48	18.81	4.31	99.32
1963	7	2.56	8.43	5.44	1.34	5.59	1.30	5.32	11.35	17.83	14.29	18.35	6.28	98.10
1964	7	8.89	7.41	1.76	4.47	6.38	9.49	10.01	12.61	8.11	9.93	11.47	4.82	95.36
1965	7	6.56	1.73	6.53	1.23	3.43	10.35	6.58	12.06	8.58	20.61	13.07	9.13	99.86
1966	7	1.74	4.15	3.83	2.53	0.25	4.65	21.64	7.77	19.63	9.10	8.37	5.65	89.33
1967	7	10.19	4.54	1.46	7.67	5.44	0.17	7.99	17.61	18.50	15.65	12.22	3.28	104.73
1968	7	10.64	0.88	6.77	7.79	3.98	4.47	8.31	3.00	13.05	8.20	11.64	7.66	86.38
1969	7	9.89	2.25	1.19	2.39	2.33	1.27	2.14	18.37	16.22	14.15	17.75	8.26	96.21
1970	7	6.45	3.14	5.65	2.15	0.84	2.19	2.24	7.62	10.66	12.11	17.91	5.21	76.17
1971	7	5.26	2.74	2.11	3.87	6.17	2.90	14.21	15.80	9.32	9.36	12.01	6.35	90.08
1972	7	3.35	0.51	5.96	1.75	0.53	2.49	2.27	8.93	5.46	19.05	10.04	11.50	71.83
1973	6	3.44	4.04	3.42	2.99	1.09	1.85	1.02	21.25	16.78	9.77	33.13	11.43	110.22
1974	6	13.13	3.84	1.60	6.19	1.29	1.30	6.89	18.48	14.28	21.78	11.70	3.24	103.73
1975	6	9.44	5.96	0.78	0.29	2.10	5.21	11.16	8.85	29.58	11.68	10.46	11.28	106.79
1976	6	4.62	12.74	9.25	2.93	3.91	6.67	11.18	22.23	23.58	18.44	13.02	11.51	140.09
1977	6	5.19	3.00	2.68	1.82	4.93	5.99	8.40	7.55	5.05	5.40	13.85	12.76	76.63
1978	6	8.32	3.56	3.99	4.33	15.29	1.29	0.49	22.33	13.74	10.96	7.27	9.89	101.46
1979	6	20.91	1.41	1.06	4.06	5.29	0.57	10.12	16.68	19.28	3.53	7.62	5.59	96.12
1980	6	6.64	12.64	7.85	14.60	0.77	6.98	10.81	2.05	9.07	24.61	16.79	14.15	126.97
1981	6	3.20	4.45	4.52	6.11	0.80	2.49	9.50	5.13	12.55	8.13	10.98	3.02	70.88
1982	6	5.08	6.25	8.91	1.93	10.49	9.48	3.08	21.11	22.81	12.23	9.78	16.57	127.72
1983	6	2.84	1.78	3.97	2.62	1.75	6.75	7.62	22.76	8.94	11.68	5.40	10.49	86.59
1984	6	11.64	1.11	16.02	3.85	5.85	12.86	11.55	6.44	11.19	19.65	13.36	8.34	121.87
1985	6	4.80	1.24	3.61	1.33	4.04	9.45	10.46	8.58	20.30	17.19	26.36	6.91	114.27
1986	6	4.09	2.65	2.43	7.69	3.54	3.29	11.45	18.20	16.06	19.48	16.63	12.35	117.85
1987	6	2.71	2.58	7.10	1.24	0.33	4.65	9.12	13.01	11.44	15.57	15.99	9.46	93.21
1988	5	9.31	2.98	1.34	0.99	3.78	18.96	7.01	16.27	15.68	20.08	15.13	10.60	122.13
1989	4	10.14	6.41	1.05	3.14	3.52	0.46	22.67	12.90	19.04	25.74	7.26	5.83	118.15
1990	4	2.48	4.88	3.89	1.66	0.85	3.35	3.05	14.30	17.07	27.12	5.85	11.99	96.50
1991	4	9.01	2.43	2.51	0.82	3.94	3.02	12.01	16.91	21.95	12.51	9.78	14.68	109.56
1992	4	11.08	5.32	2.48	2.53	7.45	1.53	27.78	16.88	18.85	20.95	10.96	1.34	127.16
1993	4	1.27	1.72	4.15	4.37	1.05	1.19	5.24	8.78	34.52	14.57	8.09	7.30	92.24
1994	4	4.08	3.14	2.22	1.77	0.69	3.05	4.20	15.69	16.85	21.57	14.36	5.79	93.43
1995	3	9.55	3.15	15.39	0.67	9.19	6.01	5.03	5.98	17.44	15.28	10.48	16.16	114.34
1996	3	10.83	6.75	12.58	2.19	1.01	0.72	7.41	9.92	18.52	6.57	13.52	2.19	92.19
1997	3	3.40	10.16	2.77	4.11	0.17	2.83	8.82	28.81	11.51	12.94	10.27	6.32	102.11
1998	3	3.73	11.99	7.35	0.77	0.75	0.12	11.51	8.06	16.22	0.00	0.00	0.00	60.50
1999	3	1.41	4.63	0.92	6.66	0.00	3.03	1.41	12.33	11.06	10.44	13.45	0.00	65.33
2000	3	1.86	2.70	4.28	1.77	4.40	0.66	7.30	21.98	10.05	29.41	17.50	12.15	114.07
2001	3	12.14	1.58	3.25	12.69	3.03	3.29	10.04	15.88	15.90	15.92	11.56	5.31	110.61
2002	3	5.35	5.37	2.34	2.42	1.39	10.93	4.94	13.24	5.84	8.46	19.12	9.77	89.18
2003	3	5.81	0.70	6.51	5.22	0.36	4.23	10.77	1.80	12.79	15.96	14.29	5.82	84.26
2004	2	14.89	1.28	3.00	6.58	0.92	3.45	11.96	13.11	22.16	9.13	15.84	6.19	108.50
AVERAGE		6.88	4.33	3.88	3.47	3.22	4.06	8.86	13.41	15.28	14.29	12.91	8.72	99.31
ADJUSTED		6.92	4.36	3.90	3.50	3.24	4.09	8.92	13.50	15.39	14.39	13.00	8.78	100.00
STD.DEV.		3.95	3.06	3.08	2.89	3.14	3.22	5.50	6.86	7.33	6.34	5.12	4.55	18.20

AVERAGE RAINFALL ON CATCHMENT OF CODE G4R002

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
6	38	1001	1962 TO 1987	34.08	19.02
6	65	1595	1927 TO 2004	34.05	19.03
6	214	820	1932 TO 1994	34.04	19.08
995	17	1013	1963 TO 1988	0.17	462.01

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	1.53	11.78	3.86	2.79	0.95	3.44	0.86	0.88	36.81	16.61	16.45	15.52	111.47
1928	1	1.07	3.86	1.44	0.09	2.70	2.13	13.84	8.90	7.79	23.52	17.24	3.05	85.62
1929	1	1.75	2.26	7.30	1.99	3.27	3.36	2.61	4.01	2.46	9.54	12.59	21.49	72.64
1930	1	3.87	4.52	1.07	1.53	1.10	0.86	11.48	14.91	5.11	10.56	18.28	14.15	87.45
1931	1	12.25	0.29	4.41	4.16	3.87	1.10	0.97	15.74	14.28	18.96	8.23	13.43	97.72
1932	2	5.85	1.51	2.20	2.08	1.05	1.18	1.77	11.43	31.98	26.38	14.96	8.70	109.10
1933	2	6.19	1.52	0.20	1.50	2.11	0.60	0.48	13.08	16.75	6.09	12.24	13.40	74.15
1934	2	10.85	1.74	0.23	0.74	1.17	4.55	8.02	15.67	10.58	12.48	5.40	7.63	79.05
1935	2	2.76	10.61	0.98	8.40	2.14	4.59	1.55	20.72	10.43	19.87	16.02	8.78	106.84
1936	2	2.71	5.23	10.90	1.07	0.74	4.11	8.72	14.14	29.81	21.17	5.80	5.11	109.51
1937	2	5.97	2.42	1.46	4.25	1.73	1.51	7.09	14.95	6.94	10.03	15.75	15.93	88.00
1938	2	3.36	3.13	2.36	1.04	7.27	2.76	8.27	15.24	2.48	7.89	8.68	4.50	66.95
1939	2	1.60	3.48	1.86	1.11	5.51	2.44	18.37	9.54	16.81	11.34	4.26	6.69	83.01
1940	2	3.08	10.41	0.87	6.32	1.46	0.59	15.34	30.16	29.12	20.41	20.66	27.44	165.88
1941	2	6.31	2.47	4.68	3.44	0.13	2.13	4.38	14.72	42.85	7.03	17.58	3.82	109.54
1942	2	2.92	0.42	2.96	6.54	2.15	6.20	1.87	9.89	16.35	16.88	23.26	7.41	96.83
1943	2	6.75	5.70	2.52	1.34	0.91	2.68	2.97	16.18	41.45	14.99	20.34	12.45	128.29
1944	2	9.73	3.23	5.59	0.03	0.42	1.62	6.90	22.67	31.97	37.06	23.96	1.28	144.48
1945	2	8.76	3.99	1.84	1.15	1.14	5.42	3.72	11.68	6.31	12.87	13.69	17.71	88.28
1946	2	3.37	1.58	0.93	0.31	0.36	7.45	2.65	10.54	7.47	27.21	12.66	5.25	79.78
1947	2	4.85	2.46	0.59	1.07	1.87	4.05	3.38	14.40	8.82	14.83	8.08	22.44	86.84
1948	2	10.76	0.80	1.89	1.93	0.54	0.67	10.18	10.14	10.31	10.40	10.03	12.06	79.71
1949	2	5.66	12.65	2.75	1.24	0.54	0.30	13.40	1.30	7.26	37.95	2.60	14.83	100.47
1950	2	5.50	9.15	3.96	5.97	0.23	1.36	9.03	5.74	34.90	12.27	11.86	14.92	114.91
1951	2	8.89	11.87	0.60	0.40	1.14	2.19	3.42	20.40	5.43	16.77	16.13	9.37	96.61
1952	2	5.43	7.36	0.67	0.32	0.89	0.42	27.22	31.77	6.82	15.56	16.94	1.96	115.35
1953	2	4.26	6.00	0.42	1.30	1.33	2.69	10.58	36.85	20.07	36.31	27.07	6.90	153.80
1954	2	8.12	2.59	4.44	0.96	14.10	0.49	5.80	3.61	12.88	18.80	32.68	4.71	109.18
1955	2	15.14	5.09	1.74	1.08	1.44	3.75	2.63	11.58	21.53	14.91	13.12	7.68	99.69
1956	2	6.75	1.21	3.04	0.27	5.13	6.55	4.74	24.45	22.97	25.15	16.30	5.97	122.54
1957	2	13.35	0.59	0.28	0.83	3.19	4.48	4.75	14.83	10.57	2.50	19.01	2.45	76.83
1958	2	6.55	3.75	0.38	2.86	2.63	3.25	15.83	31.89	4.12	3.35	17.41	4.58	96.60
1959	2	6.09	0.22	2.81	2.49	0.31	5.15	4.18	10.01	22.06	3.59	4.34	7.46	68.70
1960	2	1.85	1.66	3.49	6.86	0.95	2.04	2.53	7.73	11.10	8.66	16.85	15.19	78.90
1961	2	6.52	0.24	1.60	2.59	2.50	3.78	8.84	3.67	37.38	9.51	33.06	3.80	113.48
1962	3	11.75	5.61	1.98	4.40	0.65	1.49	3.28	6.65	8.14	19.81	26.08	4.53	94.36
1963	4	2.82	2.84	4.77	0.85	5.89	2.14	2.25	4.79	21.01	16.98	20.73	5.76	90.84
1964	4	5.98	6.61	0.37	2.50	5.93	7.48	8.77	12.57	7.95	7.97	12.27	6.65	85.05
1965	4	4.94	3.24	6.90	1.34	1.54	9.05	6.64	7.01	14.20	17.68	14.48	9.25	96.27
1966	4	1.40	2.02	1.06	1.36	0.25	2.84	14.28	7.70	21.13	12.93	11.02	6.99	82.98
1967	4	8.31	4.98	0.88	2.66	2.63	0.46	8.61	17.06	16.64	17.61	15.07	3.10	98.03
1968	4	14.80	2.09	3.56	3.44	2.98	2.91	7.48	2.03	11.54	8.97	11.73	11.90	83.45
1969	4	11.33	1.68	0.72	1.56	2.81	0.82	0.72	15.78	22.56	16.03	16.23	8.41	98.65
1970	4	4.65	3.35	4.42	1.83	0.87	2.60	1.43	9.15	8.85	17.85	14.97	2.32	72.30
1971	4	3.18	3.26	3.12	3.50	3.40	3.66	10.36	12.90	8.88	7.57	8.79	4.97	73.59
1972	4	2.54	0.70	2.90	1.90	0.78	2.76	2.62	5.21	3.59	28.52	9.26	12.15	72.93
1973	4	4.46	2.53	3.40	1.70	1.52	1.93	0.65	11.22	16.29	10.99	48.41	9.72	112.80
1974	4	11.44	3.56	1.89	3.33	1.78	1.39	5.86	21.98	10.16	21.21	17.92	3.10	103.63
1975	4	10.53	4.64	0.64	0.26	1.57	4.08	6.38	9.55	26.24	18.33	7.40	8.33	97.95
1976	4	4.19	19.12	11.83	3.56	4.27	4.61	13.32	26.61	27.98	21.61	26.18	6.33	169.60
1977	4	3.69	5.66	3.84	2.83	2.31	4.73	5.25	4.69	4.46	8.83	21.44	12.51	80.25
1978	4	5.59	2.00	5.48	4.59	8.66	0.80	0.63	19.68	16.63	11.13	11.05	11.73	97.97
1979	4	13.29	0.68	1.20	3.09	4.32	0.75	6.85	15.21	17.26	6.19	15.07	3.73	87.64
1980	4	6.92	15.99	8.78	14.35	0.96	6.97	7.06	1.47	8.19	26.91	16.48	22.65	136.72
1981	4	3.29	3.74	2.93	2.88	0.52	2.63	12.28	7.31	15.22	6.33	6.90	3.41	67.43
1982	4	8.32	2.27	6.68	1.84	8.64	5.66	1.70	27.83	25.10	21.55	10.67	12.46	132.71
1983	4	2.66	1.16	2.53	1.23	1.71	4.73	8.10	30.44	6.75	14.52	6.14	18.00	97.97
1984	4	15.71	0.92	11.06	4.51	6.11	15.31	8.82	7.14	16.65	24.99	18.87	8.50	138.60
1985	4	6.21	2.78	2.99	1.03	3.59	8.99	5.88	5.93	22.51	13.90	27.78	6.18	107.76
1986	4	5.44	5.65	1.13	3.75	3.34	1.87	7.97	20.42	17.45	14.15	18.54	7.59	107.32
1987	4	2.11	0.96	5.94	0.90	0.14	3.49	10.30	10.72	11.35	13.55	15.18	10.90	85.55
1988	3	3.85	2.02	1.95	1.89	2.28	14.34	12.22	15.07	12.73	15.32	18.00	14.57	114.24
1989	2	8.42	4.02	0.95	2.03	4.36	1.68	15.09	13.94	12.75	20.56	9.17	3.80	96.78
1990	2	4.41	4.51	1.00	1.17	0.93	1.79	3.79	15.18	64.23	26.29	5.16	22.65	151.10
1991	2	9.54	1.88	0.67	0.52	3.19	3.79	9.25	10.14	32.24	17.54	13.64	6.89	109.29
1992	2	22.31	1.69	0.67	0.91	3.82	1.24	29.26	10.58	13.68	41.50	10.91	3.27	139.84
1993	2	0.47	2.55	3.94	0.89	1.23	1.75	5.75	7.92	49.67	9.20	3.97	7.49	94.83
1994	2	3.36	0.58	6.79	1.87	0.79	2.57	2.46	17.06	12.73	17.97	14.82	5.87	86.87
1995	1	15.93	3.13	7.46	0.50	3.46	1.87	4.67	1.00	29.45	16.30	16.62	14.43	114.83
1996	1	14.92	9.09	9.22	1.07	0.00	2.63	5.52	10.82	28.09	6.71	12.25	0.44	100.75
1997	1	2.38	13.73	4.80	4.01	0.00	1.57	3.42	21.39	11.00	21.04	6.21	3.42	92.97
1998	1	2.60	11.34	4.23	0.16	0.85	0.85	14.45	4.83	15.71	0.00	0.00	0.00	55.01
1999	1	0.19	1.57	1.88	3.95	0.75	8.68	1.98	14.77	10.23	17.24	9.97	15.64	86.85
2000	1	2.85	0.85	1.60	0.13	0.25	0.44	4.50	13.57	7.02	32.70	19.72	14.55	98.17
2001	1	3.95	1.69	1.44	10.53	1.91	2.57	5.96	11.76	17.18	18.33	15.79	3.26	94.38
2002	1	4.46	2.41	2.82	1.82	1.25	8.71	2.51	4.55	1.49	3.77	13.04	10.35	57.18
2003	1	6.96	0.00	3.01	4.44	0.00	1.40	5.02	1.09	8.37	9.25	7.02	5.83	52.39
2004	1	11.29	0.47	5.45	2.57	0.50	1.13	16.13	11.57	19.91	8.84	26.02	6.58	110.46
AVERAGE		6.46	4.04	3.14	2.48	2.30	3.35	7.15	12.95	17.14	16.03	14.93	9.08	99.06
ADJUSTED		6.52	4.08	3.17	2.51	2.33	3.38	7.22	13.07	17.31	16.18	15.07	9.17	100.00
STD.DEV.		4.33	3.88	2.66	2.38	2.36	2.87	5.57	7.88	11.70	8.42	7.69	5.77	23.72

AVERAGE RAINFALL ON CATCHMENT OF CODE H6H007

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
22	113	835	1927 TO 2003	33.53	19.04
22	148	1995	1961 TO 2004	33.58	19.05
22	204	880	1941 TO 1969	33.54	19.07
22	504	760	1932 TO 2000	33.54	19.17

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	0.60	8.92	5.44	3.32	0.00	4.90	3.41	0.60	34.11	13.81	10.67	12.12	97.88
1928	1	1.98	2.41	3.28	0.00	0.85	1.01	10.24	13.25	8.09	17.27	11.82	3.78	73.97
1929	1	3.34	2.69	4.43	3.20	2.96	6.90	3.62	0.00	2.47	14.72	14.34	22.68	81.33
1930	1	5.09	6.80	2.07	0.00	3.50	0.00	9.82	5.11	3.83	7.83	12.64	8.62	65.31
1931	1	10.56	0.00	1.10	1.34	6.57	1.13	1.07	17.65	11.61	10.31	7.38	7.30	76.02
1932	2	3.31	1.11	2.30	1.14	1.55	0.84	1.64	12.57	27.36	20.82	12.09	4.01	88.74
1933	2	4.65	1.03	3.09	0.51	3.03	2.14	0.48	13.16	11.91	7.85	7.95	10.96	66.76
1934	2	9.27	1.57	0.43	0.97	3.05	3.56	9.56	14.41	10.18	11.75	7.24	7.30	79.29
1935	2	0.63	6.82	0.94	6.13	1.27	1.79	0.69	9.35	7.88	13.96	15.83	7.31	72.60
1936	2	1.76	5.63	10.83	1.41	0.31	4.27	9.65	15.19	30.33	20.63	4.28	4.93	109.23
1937	2	2.26	3.66	0.11	5.26	1.08	1.57	9.35	12.39	6.29	9.25	9.31	13.63	74.17
1938	2	2.75	5.72	2.43	0.59	7.55	4.46	7.42	18.89	4.21	4.92	16.28	5.56	80.75
1939	2	0.98	4.95	3.65	0.34	8.07	3.20	12.15	9.47	17.90	10.65	5.87	7.33	84.55
1940	2	4.19	10.88	1.02	7.90	0.72	0.93	19.97	28.32	21.90	17.71	14.04	28.36	155.94
1941	3	8.36	1.38	3.62	1.41	0.22	0.46	3.06	17.68	38.79	6.64	18.26	1.99	101.86
1942	3	4.77	0.02	1.72	4.55	1.13	6.49	5.52	7.49	15.56	13.49	18.73	6.44	85.90
1943	3	5.18	6.30	0.85	1.38	0.48	2.45	5.48	15.59	32.06	13.93	17.29	9.28	110.28
1944	3	6.23	4.54	4.89	0.00	0.00	0.23	7.39	26.07	32.29	32.86	16.35	0.98	131.82
1945	3	6.43	3.50	1.85	0.74	1.39	3.83	4.78	10.28	4.89	9.69	10.91	17.09	75.37
1946	3	11.57	1.49	0.85	0.00	0.00	8.49	3.27	12.07	6.59	28.09	10.60	4.41	87.45
1947	3	7.20	2.16	0.41	0.32	0.68	4.59	2.28	14.53	9.98	14.52	7.86	19.50	84.04
1948	3	10.16	0.96	1.97	0.57	0.00	0.60	7.77	7.29	9.53	12.05	12.19	10.87	73.95
1949	3	7.14	7.30	0.86	0.30	0.00	0.39	15.06	2.66	5.95	29.81	3.48	18.40	91.34
1950	3	4.02	11.21	2.87	5.00	0.22	0.48	17.53	6.55	24.50	9.23	8.62	13.64	103.86
1951	3	4.53	7.09	0.14	0.00	1.00	2.13	4.94	12.26	7.54	11.10	19.01	15.29	85.03
1952	3	5.63	11.75	1.44	1.99	1.79	1.69	25.17	17.83	6.59	17.95	11.49	2.51	105.81
1953	3	6.10	6.71	1.85	0.94	2.05	4.16	13.95	28.79	16.93	35.13	20.59	4.19	141.38
1954	3	6.51	2.45	4.58	0.00	17.20	0.92	4.84	2.73	13.80	21.55	32.34	4.16	111.10
1955	3	12.23	9.50	1.78	1.70	0.68	3.07	6.84	15.62	24.82	15.28	20.15	8.56	120.24
1956	3	6.14	0.18	5.05	0.68	9.37	4.93	6.86	32.36	26.80	24.47	18.69	6.98	142.50
1957	3	15.65	0.75	0.00	1.03	6.92	3.22	4.46	19.36	10.54	2.23	18.47	3.63	86.25
1958	3	6.36	5.13	0.11	2.95	1.26	2.37	16.08	33.61	2.95	4.72	14.48	4.13	94.16
1959	3	9.52	0.04	1.87	2.32	0.68	4.07	4.37	10.15	23.32	4.00	3.00	5.07	68.41
1960	3	4.48	0.53	2.25	4.49	1.48	1.39	4.72	8.67	13.91	10.86	14.75	16.50	84.03
1961	4	3.30	0.01	2.63	1.66	4.26	6.37	10.67	3.92	41.88	11.79	27.08	6.09	119.65
1962	4	17.90	4.44	0.52	3.52	0.07	1.10	2.82	5.78	9.80	23.12	21.93	5.16	96.15
1963	4	3.57	4.45	5.00	0.37	9.47	2.42	4.95	10.23	21.36	14.37	13.88	5.14	95.21
1964	4	5.63	7.56	1.16	5.15	5.55	10.76	10.38	18.36	8.83	10.03	12.45	6.08	101.96
1965	4	4.45	3.61	7.19	0.52	1.01	15.49	5.54	8.98	16.16	21.36	13.75	8.82	106.88
1966	4	0.42	2.07	2.95	2.52	0.15	0.89	14.60	11.27	25.48	7.64	7.14	7.53	82.65
1967	4	6.33	5.10	0.26	4.08	1.70	0.34	12.93	22.85	16.74	18.68	12.89	3.00	104.89
1968	4	16.45	2.34	2.24	5.35	1.82	0.95	6.13	2.10	13.45	10.12	13.64	13.19	87.80
1969	4	11.43	0.38	0.07	0.87	2.81	0.20	0.36	18.27	22.95	15.78	18.11	7.94	99.17
1970	3	5.11	2.40	3.57	0.24	0.00	3.39	2.65	9.22	12.55	18.25	16.81	2.73	76.91
1971	3	2.20	1.03	2.57	3.03	1.72	0.90	5.90	14.10	11.59	5.69	8.71	6.35	63.80
1972	3	2.21	0.14	2.97	0.32	0.07	2.63	1.60	5.14	2.25	26.76	9.74	6.13	59.96
1973	3	4.12	2.37	5.73	1.08	0.77	0.65	0.20	12.55	18.53	11.73	43.99	10.19	111.90
1974	3	9.65	4.39	1.75	2.22	1.24	1.21	8.18	27.28	13.09	23.58	12.29	3.01	107.90
1975	3	6.98	2.94	0.28	0.00	0.39	3.64	3.83	6.36	35.84	20.87	7.67	5.42	94.21
1976	3	2.93	19.77	9.23	3.25	4.93	1.84	16.31	35.97	35.81	31.06	28.06	6.66	195.81
1977	3	2.80	3.00	4.14	2.53	1.42	4.19	4.12	5.39	2.25	4.30	24.45	8.91	67.49
1978	3	7.45	0.55	5.95	2.66	7.54	0.77	1.79	15.82	19.15	10.43	11.65	12.82	96.57
1979	3	12.99	0.60	0.24	4.73	3.36	0.28	8.74	16.72	16.23	5.30	13.44	5.36	87.98
1980	3	6.04	14.75	8.34	15.31	1.31	5.95	5.71	2.85	9.81	23.32	13.07	16.42	122.86
1981	3	4.16	3.21	1.97	3.40	0.38	1.38	12.83	8.28	15.64	16.54	8.83	3.45	80.07
1982	3	6.42	3.25	6.15	0.74	6.51	5.38	2.95	27.09	25.24	19.45	7.93	17.37	128.46
1983	3	2.20	1.12	1.90	2.00	0.73	5.87	7.31	32.51	7.06	14.46	7.01	19.10	101.25
1984	3	13.03	0.34	10.20	5.30	6.17	13.81	9.06	5.81	23.66	24.39	15.41	8.54	135.72
1985	3	5.84	1.75	2.93	1.42	2.19	8.36	6.97	8.92	22.65	16.53	24.58	7.38	109.53
1986	3	1.84	3.05	1.09	4.66	1.90	1.94	6.71	21.67	15.37	13.07	19.74	10.71	101.76
1987	3	2.35	1.66	6.54	0.31	0.38	2.93	13.30	12.57	10.88	12.47	16.26	8.44	88.08
1988	3	3.34	1.41	2.34	0.70	3.30	13.06	8.94	13.28	12.76	17.34	17.11	13.88	107.47
1989	3	7.20	5.57	0.64	0.95	4.27	1.75	22.57	11.30	20.04	25.32	8.98	3.50	112.10
1990	3	1.22	4.40	3.67	0.89	1.38	1.08	4.83	17.35	31.32	27.88	7.34	16.33	117.70
1991	3	6.36	1.85	0.58	0.12	3.16	4.31	10.66	11.00	34.11	17.50	9.48	6.75	105.88
1992	3	14.52	2.33	0.81	1.13	3.70	0.72	28.39	17.72	15.21	35.43	9.13	2.04	131.15
1993	3	0.44	1.04	3.57	1.93	0.60	0.78	6.06	6.10	43.88	13.20	5.68	11.74	95.01
1994	3	2.87	0.96	3.25	2.99	1.12	3.13	1.87	12.65	18.19	23.61	14.53	3.64	88.81
1995	3	13.64	2.30	7.05	0.57	3.67	3.84	4.01	8.93	36.50	17.94	17.08	20.41	135.94
1996	3	11.55	10.47	7.06	0.63	0.01	0.73	5.91	9.66	30.44	6.30	13.15	0.94	96.85
1997	3	5.43	7.60	5.47	3.38	0.30	2.33	7.79	30.04	10.96	17.23	6.44	5.30	102.27
1998	3	1.91	9.39	7.55	0.15	0.04	0.00	8.05	11.93	19.54	9.59	14.21	9.94	92.30
1999	3	1.09	3.22	4.48	4.03	0.34	4.45	1.11	14.66	13.19	17.49	12.69	12.97	89.73
2000	3	1.94	2.82	1.99	2.38	2.02	0.07	6.74	23.23	9.64	38.22	22.28	19.95	131.28
2001	2	4.34	1.00	0.66	8.60	2.86	1.24	8.39	13.97	16.30	20.61	12.40	5.46	95.83
2002	2	9.68	3.74	4.04	1.38	0.49	6.52	4.30	4.37	2.98	6.68	20.73	10.44	75.35
2003	2	6.84	4.33	4.97	4.50	0.00	1.99	8.02	8.81	15.56	13.59	17.22	4.28	90.11
2004	1	8.81	0.76	0.66	8.16	0.11	0.47	6.04	16.65	21.27	18.78	18.91	6.74	107.36
AVERAGE		6.01	3.91	3.03	2.34	2.34	3.11	7.61	13.76	17.33	16.11	14.17	8.89	98.60
ADJUSTED		6.09	3.96	3.07	2.37	2.37	3.16	7.72	13.96	17.57	16.34	14.37	9.02	100.00
STD.DEV.		4.03	3.68	2.51	2.52	2.91	3.14	5.57	8.15	10.27	7.94	6.70	5.62	23.10

AVERAGE RAINFALL ON CATCHMENT OF CODE H6H008

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
6	65	1595	1927 TO 2004	34.05	19.03
6	214	820	1932 TO 1994	34.04	19.08
21	809	1463	1936 TO 2004	33.59	18.57
21	900	2050	1971 TO 1990	33.60	18.60
22	29	2060	1944 TO 2004	33.59	19.01

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	1.53	11.78	3.86	2.79	0.95	3.44	0.86	0.88	36.81	16.61	16.45	15.52	111.47
1928	1	1.07	3.86	1.44	0.09	2.70	2.13	13.84	8.90	7.79	23.52	17.24	3.05	85.62
1929	1	1.75	2.26	7.30	1.99	3.27	3.36	2.61	4.01	2.46	9.54	12.59	21.49	72.64
1930	1	3.87	4.52	1.07	1.53	1.10	0.86	11.48	14.91	5.11	10.56	18.28	14.15	87.45
1931	1	12.25	0.29	4.41	4.16	3.87	1.10	0.97	15.74	14.28	18.96	8.23	13.43	97.72
1932	2	5.85	1.51	2.20	2.08	1.05	1.18	1.77	11.43	31.98	26.38	14.96	8.70	109.10
1933	2	6.19	1.52	0.20	1.50	2.11	0.60	0.48	13.08	16.75	6.09	12.24	13.40	74.15
1934	2	10.85	1.74	0.23	0.74	1.17	4.55	8.02	15.67	10.58	12.48	5.40	7.63	79.05
1935	2	2.76	10.61	0.98	8.40	2.14	4.59	1.55	20.72	10.43	19.87	16.02	8.78	106.84
1936	3	2.87	6.27	8.86	2.04	0.72	4.42	8.43	13.10	28.82	21.28	7.05	5.44	109.31
1937	3	6.13	3.15	0.99	5.82	1.83	1.65	9.07	15.72	7.10	10.30	13.77	16.45	91.98
1938	3	4.27	3.78	1.96	0.69	7.06	2.27	9.30	14.36	3.50	8.23	10.47	4.70	70.60
1939	3	1.93	4.51	3.64	1.53	4.80	3.82	17.20	9.34	16.81	10.11	4.77	7.11	85.56
1940	3	4.58	9.97	1.31	5.55	2.05	1.09	17.11	27.25	25.62	18.29	18.77	25.61	157.20
1941	3	6.72	3.63	4.15	3.24	0.30	1.72	4.55	16.95	37.19	7.46	16.96	4.34	107.21
1942	3	3.27	0.41	2.50	6.53	2.74	5.40	3.77	10.39	13.73	16.67	20.88	7.16	93.45
1943	3	6.98	5.78	2.29	1.48	0.83	2.24	4.29	19.28	36.30	14.82	18.70	13.03	126.03
1944	4	8.15	4.48	4.63	0.31	0.21	1.61	6.60	19.38	29.73	23.58	19.04	1.30	119.02
1945	4	8.65	10.46	2.56	1.02	1.41	5.09	5.57	9.31	8.99	12.87	10.37	17.86	94.17
1946	4	6.22	3.18	1.50	0.47	0.18	6.92	2.91	13.61	5.90	27.83	8.73	7.08	84.53
1947	4	4.99	2.92	1.16	0.91	1.71	4.16	3.55	11.92	10.30	16.07	6.29	17.56	81.54
1948	4	11.61	1.03	2.99	2.03	0.53	0.92	8.33	8.33	9.58	10.42	7.97	11.11	74.83
1949	4	8.19	10.64	5.68	0.94	0.44	1.17	11.78	5.69	5.20	31.55	3.95	10.59	95.82
1950	4	8.55	8.79	5.00	6.16	0.20	1.13	9.48	8.33	25.70	17.07	10.79	10.12	111.34
1951	4	11.55	10.50	0.40	0.44	1.76	2.13	6.22	15.75	6.08	15.75	12.44	11.95	94.96
1952	4	5.75	6.21	3.61	0.94	0.90	1.50	26.35	25.61	6.46	21.73	11.58	8.49	119.12
1953	4	4.44	8.12	0.92	2.07	1.25	3.61	11.33	24.54	19.65	34.66	23.10	5.88	139.56
1954	4	8.12	2.22	5.34	0.52	11.63	5.57	6.67	3.03	12.63	19.89	22.55	12.44	110.59
1955	4	16.01	6.75	1.43	2.73	1.38	4.07	3.44	15.78	16.43	16.24	20.84	7.19	112.28
1956	4	4.97	2.78	2.65	1.97	7.50	4.52	6.37	22.21	16.60	24.55	21.80	4.89	120.81
1957	4	19.03	0.77	0.14	0.73	5.54	7.19	4.59	16.25	18.34	3.53	14.80	8.52	99.45
1958	4	8.21	2.78	1.55	2.95	1.67	3.12	14.91	31.20	11.55	3.81	11.98	8.09	101.83
1959	4	8.87	1.60	3.33	2.28	1.74	4.49	7.05	14.23	22.49	2.58	4.39	8.69	81.73
1960	4	2.72	1.00	2.69	6.53	2.08	2.06	2.57	7.90	17.93	6.07	16.75	16.51	84.81
1961	4	7.73	0.12	1.38	2.82	3.05	6.73	9.41	4.67	27.04	12.25	31.02	3.54	109.76
1962	4	12.77	9.91	1.11	3.27	0.35	1.21	3.56	6.45	8.92	14.62	31.23	3.86	97.25
1963	4	4.82	4.10	5.32	0.66	4.74	4.18	3.48	7.33	20.45	14.35	16.40	4.19	90.03
1964	4	7.98	5.03	2.64	1.92	4.95	7.96	9.15	12.78	10.34	6.30	13.27	6.42	88.76
1965	4	4.00	2.69	4.86	3.04	2.17	7.23	11.64	4.92	12.90	20.95	9.87	12.22	96.49
1966	4	0.62	2.63	1.85	2.13	1.27	1.59	9.65	12.62	23.90	8.22	12.94	5.87	83.30
1967	4	8.70	3.91	2.89	3.65	1.72	1.14	7.54	18.52	17.75	13.98	19.87	3.14	102.82
1968	4	13.64	1.77	3.62	2.73	3.77	3.46	7.37	2.66	8.63	10.27	13.35	12.62	83.90
1969	4	8.26	3.82	1.12	1.14	2.96	0.52	1.15	14.35	21.00	20.97	12.48	13.31	101.07
1970	4	3.28	4.00	4.59	1.74	0.33	2.35	3.37	9.24	8.58	17.92	16.51	6.88	78.80
1971	5	2.85	3.71	3.00	1.91	2.65	3.14	8.41	21.45	7.96	6.71	10.02	6.83	78.61
1972	5	3.40	0.34	2.03	1.20	0.97	4.61	1.50	5.18	5.87	21.92	13.52	8.43	68.97
1973	5	7.01	4.77	2.22	1.08	1.49	1.66	1.45	10.97	17.38	15.53	32.74	16.15	112.44
1974	5	6.88	6.36	2.87	2.01	2.64	2.04	4.64	20.64	11.97	19.34	15.80	3.01	98.19
1975	5	8.88	2.76	2.03	0.12	0.68	3.28	4.32	8.28	31.10	14.89	15.25	9.51	101.13
1976	5	4.23	22.20	13.47	2.34	3.54	3.46	17.31	20.08	36.09	23.02	28.84	6.60	181.17
1977	5	3.64	3.46	5.17	3.48	2.24	2.62	7.99	8.20	3.68	7.82	22.53	12.81	83.65
1978	5	8.43	2.90	3.63	5.05	5.74	2.63	2.33	15.43	20.52	11.13	9.97	8.94	96.71
1979	5	13.46	1.95	0.75	3.63	3.03	0.76	7.76	15.13	18.06	4.99	14.04	4.75	88.32
1980	5	5.94	10.89	7.71	12.50	0.66	5.96	7.64	2.39	10.62	22.73	17.54	18.99	123.57
1981	5	2.68	6.18	2.70	3.32	0.47	2.21	12.89	7.90	13.18	9.54	7.57	3.98	72.61
1982	5	7.38	3.54	5.41	2.19	6.29	4.34	1.93	32.85	26.94	20.14	7.60	12.11	130.72
1983	5	2.00	1.66	1.79	1.34	1.49	4.66	7.04	26.38	3.71	14.96	7.53	14.90	87.46
1984	5	12.56	1.52	11.59	3.99	7.71	13.30	8.23	8.14	21.80	19.76	15.70	7.68	131.97
1985	5	4.90	3.46	3.01	2.08	3.84	6.79	8.39	7.31	22.67	15.15	26.74	8.60	112.94
1986	5	3.78	3.88	1.57	5.28	1.99	2.24	6.68	18.71	17.25	16.59	16.64	10.54	105.14
1987	5	3.51	2.06	6.18	0.63	0.37	3.09	12.25	9.54	13.90	14.63	16.59	10.73	93.49
1988	5	5.50	2.85	2.15	0.83	2.55	13.13	10.95	12.41	10.32	15.43	16.50	12.86	105.47
1989	5	9.03	5.85	0.88	2.03	4.74	1.08	11.23	19.89	13.94	23.30	9.38	4.44	105.80
1990	5	3.10	4.09	1.97	1.78	1.18	1.55	4.33	15.35	35.03	21.78	9.67	16.93	116.76
1991	4	8.21	1.99	0.91	0.51	3.49	2.98	10.93	11.05	28.83	16.08	11.82	8.68	105.48
1992	4	17.68	3.29	1.45	1.18	4.09	0.94	32.71	13.19	19.27	36.75	10.06	2.54	143.13
1993	4	0.78	2.00	3.18	2.08	0.97	1.51	5.55	6.83	37.83	9.75	4.71	7.21	82.40
1994	4	3.34	1.36	4.29	2.25	0.65	1.96	3.01	14.54	12.53	16.58	16.54	5.05	82.10
1995	3	13.69	2.14	7.79	0.48	4.70	3.15	5.77	2.92	23.61	13.50	9.92	18.71	106.39
1996	3	17.45	9.56	10.78	1.99	0.31	1.65	6.07	10.23	21.31	8.66	10.92	1.40	100.32
1997	3	4.50	12.92	8.54	4.01	0.18	2.28	5.67	16.77	17.41	18.74	8.22	4.72	103.95
1998	3	2.10	10.78	8.16	0.22	0.47	0.38	10.44	6.04	13.18	0.00	0.00	0.00	51.77
1999	3	0.83	1.63	1.11	2.56	2.42	4.07	1.64	8.83	13.27	14.42	7.23	18.36	76.37
2000	3	2.63	1.38	1.64	1.07	1.02	0.44	2.92	20.12	5.56	21.90	13.56	8.58	80.83
2001	3	4.41	16.01	1.83	12.95	2.67	1.36	3.88	16.96	17.15	14.58	15.70	3.64	111.13
2002	3	11.09	2.00	1.99	2.32	1.79	9.26	2.20	6.25	7.82	8.74	12.55	7.47	73.49
2003	3	4.99	2.95	2.88	5.18	0.08	3.15	6.10	5.57	7.00	5.61	8.05	4.14	55.68
2004	3	13.34	2.77	4.41	3.99	4.24	3.12	9.88	9.56	23.75	9.35	22.98	6.04	113.42
AVERAGE		6.73	4.65	3.35	2.61	2.38	3.32	7.35	12.99	16.65	15.30	14.15	9.30	98.79
ADJUSTED		6.81	4.71	3.39	2.65	2.41	3.36	7.44	13.15	16.86	15.49	14.32	9.42	100.00
STD.DEV.		4.23	3.95	2.68	2.36	2.10	2.52	5.43	6.76	9.24	7.17	6.49	5.16	21.29

AVERAGE RAINFALL ON CATCHMENT OF CODE H6R002

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
6	332	794	1932 TO 2004	34.02	19.12
22	504	760	1932 TO 2000	33.54	19.17
22	539	624	1927 TO 2004	33.59	19.18

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	1	0.82	11.50	4.41	4.68	0.00	3.69	0.00	0.90	26.35	12.45	15.19	13.63	93.62
1928	1	0.61	6.82	4.41	0.00	1.27	1.75	8.20	8.15	7.94	20.47	16.34	2.57	78.51
1929	1	1.72	5.10	3.93	3.91	6.30	5.26	1.88	2.45	7.06	3.62	21.68	23.03	85.95
1930	1	1.46	5.93	1.30	3.35	3.91	1.22	21.48	5.53	2.94	12.46	17.85	10.87	88.31
1931	1	19.55	0.00	2.57	6.35	9.53	3.10	0.00	9.90	9.45	15.85	2.53	18.09	96.90
1932	3	5.47	3.31	3.68	1.68	1.29	1.60	1.86	11.93	32.84	28.98	12.47	6.74	111.86
1933	3	3.20	1.60	3.73	0.99	2.88	1.86	0.49	11.46	16.80	9.40	11.02	13.15	76.57
1934	3	9.85	1.57	0.00	0.59	2.29	2.93	9.67	16.77	12.78	10.23	5.92	6.56	79.17
1935	3	0.67	10.85	0.84	6.00	0.56	2.71	0.99	12.94	8.88	22.75	19.17	6.95	93.31
1936	3	2.58	12.38	13.46	0.50	0.73	4.42	7.64	12.43	33.73	21.90	3.18	6.61	119.56
1937	3	2.54	4.06	0.99	3.80	0.90	3.99	8.51	13.96	6.50	7.86	11.86	14.48	79.47
1938	3	4.05	2.13	2.28	1.32	6.07	5.14	5.20	14.08	3.32	5.52	13.20	4.70	67.01
1939	3	0.58	2.74	1.29	0.07	7.46	2.07	19.62	9.01	18.83	10.26	3.71	5.65	81.31
1940	3	2.66	12.15	0.58	7.28	0.71	0.28	15.45	32.87	25.79	19.80	18.22	27.83	163.61
1941	3	9.13	1.09	4.90	1.57	0.65	1.46	2.25	14.68	45.29	4.28	15.08	2.04	102.41
1942	3	4.63	0.00	4.13	7.68	2.73	6.97	2.93	7.94	17.00	15.42	19.73	7.68	96.86
1943	3	4.56	6.62	1.44	0.36	0.83	3.19	3.11	10.00	36.74	8.76	18.15	11.49	105.25
1944	3	4.41	2.16	2.12	0.00	0.00	0.22	6.67	19.31	31.80	39.19	23.47	0.89	130.24
1945	3	9.03	2.96	0.73	0.63	1.66	3.83	1.59	6.45	4.82	9.46	10.21	17.58	68.95
1946	3	3.80	0.34	0.65	0.00	0.00	8.80	1.92	7.65	4.96	22.69	10.43	6.29	67.52
1947	3	5.14	3.08	1.12	1.11	0.57	8.34	3.07	12.69	9.63	14.31	6.24	25.18	90.49
1948	3	8.56	0.36	1.37	0.76	0.17	0.31	7.29	7.99	8.50	10.60	11.63	13.17	70.71
1949	3	6.82	10.37	0.85	0.66	0.02	0.14	10.94	2.58	4.53	33.65	3.02	19.19	92.75
1950	3	5.73	11.34	2.34	6.48	0.00	1.26	10.11	4.88	32.71	10.28	10.89	19.95	115.98
1951	3	7.17	11.82	0.55	0.03	1.16	0.75	2.22	17.28	8.98	15.77	22.85	14.73	103.29
1952	3	9.69	15.64	2.62	3.26	3.33	0.35	25.38	17.52	5.43	16.97	12.10	2.12	114.39
1953	3	6.21	6.73	1.07	0.67	2.15	5.23	8.14	33.96	18.70	40.52	24.90	7.86	156.14
1954	3	5.64	2.39	4.32	0.39	21.98	0.37	5.19	3.80	17.05	20.78	37.15	4.34	123.40
1955	3	14.69	6.31	2.15	3.25	2.19	1.96	1.77	12.15	22.70	11.20	12.98	6.32	97.65
1956	3	6.87	0.79	5.85	0.00	8.11	5.10	4.42	28.77	30.14	26.32	18.71	7.59	142.66
1957	3	14.21	0.15	0.00	0.17	4.16	5.17	4.23	16.74	11.39	1.52	20.88	3.14	81.75
1958	3	8.14	4.05	0.16	3.76	2.16	2.89	17.62	36.67	2.84	6.39	17.48	4.34	106.47
1959	3	10.61	0.25	2.40	2.83	0.37	3.15	2.92	8.93	19.52	4.98	2.27	11.19	69.40
1960	3	2.59	2.18	2.45	5.12	1.25	2.52	5.15	7.89	11.60	10.70	12.93	17.22	81.59
1961	3	4.54	0.04	0.90	2.72	2.00	3.85	11.57	3.77	35.54	11.62	38.98	3.74	119.28
1962	3	21.73	7.56	1.21	3.28	0.43	1.37	2.62	4.85	8.67	15.92	25.39	3.84	96.88
1963	3	3.35	3.07	4.03	0.99	7.44	2.10	4.23	5.48	27.12	14.19	15.97	8.06	96.05
1964	3	2.93	7.15	0.19	1.92	4.66	9.71	7.63	11.96	8.19	9.09	10.63	6.92	80.98
1965	3	8.46	5.06	8.55	0.56	0.26	7.03	5.32	4.85	22.49	14.88	11.46	8.09	97.04
1966	3	1.47	0.92	0.00	0.18	0.26	0.84	9.20	10.11	20.78	9.99	9.60	4.87	68.23
1967	3	5.71	5.45	0.50	1.11	1.87	0.36	7.51	16.02	16.72	18.44	13.48	2.55	89.71
1968	3	17.05	2.52	0.61	1.83	2.19	1.05	6.84	1.14	9.34	5.94	9.59	10.88	68.99
1969	3	14.34	1.70	0.05	0.25	3.51	0.33	0.71	10.82	16.36	19.01	16.11	7.02	90.19
1970	3	6.54	0.49	2.39	0.69	0.31	3.21	2.16	11.29	10.86	19.73	14.81	1.58	74.05
1971	3	2.12	2.61	1.96	4.81	2.48	2.72	7.29	19.28	9.86	5.96	8.79	5.55	73.45
1972	3	2.71	1.11	2.07	0.98	0.20	1.81	3.49	3.84	2.17	25.47	13.34	9.21	66.39
1973	3	2.39	2.03	3.22	1.27	1.15	1.50	0.74	11.29	15.28	11.16	66.29	9.05	125.36
1974	3	9.54	2.24	1.55	2.16	1.68	0.42	7.06	26.51	8.49	15.15	17.23	3.80	95.83
1975	3	7.34	2.33	0.08	0.06	1.49	5.07	3.70	8.36	32.72	18.66	4.70	6.21	90.72
1976	3	5.40	21.30	10.89	3.11	6.68	2.18	12.03	38.15	21.84	29.99	31.89	4.21	187.67
1977	3	1.38	3.72	5.46	3.41	0.59	3.49	4.50	3.03	3.07	5.56	23.75	7.60	65.56
1978	3	4.61	1.16	5.99	3.75	8.75	0.25	0.57	13.92	21.78	12.64	11.79	11.35	96.55
1979	3	9.12	0.63	0.57	3.42	1.15	0.23	5.08	14.55	12.75	8.62	13.52	3.44	73.08
1980	3	6.51	16.03	8.74	22.50	1.41	5.56	7.67	1.00	4.69	28.48	17.92	24.25	144.76
1981	3	3.47	1.43	1.25	2.34	0.16	1.46	18.63	5.67	14.43	9.11	8.76	2.85	69.56
1982	3	4.24	1.13	3.97	1.26	7.76	6.30	2.40	23.96	26.22	29.61	6.91	14.83	128.59
1983	3	2.67	0.68	0.66	1.55	1.30	4.75	7.53	39.26	8.48	17.06	6.66	24.36	114.97
1984	3	16.17	0.75	8.54	7.76	6.44	15.91	9.25	4.98	16.27	27.25	19.46	6.36	139.16
1985	3	9.01	2.32	4.31	0.32	4.84	8.29	4.19	4.24	19.65	14.19	24.71	5.74	101.80
1986	3	3.45	5.71	0.42	0.99	1.85	1.14	8.77	23.76	14.74	8.45	22.32	8.91	100.50
1987	3	0.80	0.52	3.46	0.16	0.13	1.69	15.45	7.02	12.63	7.93	16.80	7.51	74.10
1988	3	2.99	1.28	0.81	0.95	2.34	14.20	13.82	8.70	13.46	13.02	18.90	15.59	106.05
1989	3	10.78	3.23	0.05	1.36	4.27	2.51	14.30	14.11	19.95	15.16	12.63	2.45	100.81
1990	3	2.24	4.55	2.20	1.83	0.12	0.91	5.31	13.68	27.23	32.12	6.32	16.34	112.87
1991	3	8.66	1.24	0.80	0.34	3.04	3.95	10.23	8.58	31.88	18.79	15.45	5.09	108.05
1992	3	19.39	1.10	0.23	1.34	5.98	0.49	34.91	10.91	14.40	48.64	8.78	3.62	149.79
1993	3	0.16	1.47	6.48	0.60	1.16	1.07	5.89	7.66	45.65	11.86	4.64	12.51	99.15
1994	3	3.65	0.24	7.75	2.06	1.24	4.14	2.60	16.04	14.91	17.23	13.07	4.68	87.62
1995	3	13.67	5.33	11.73	0.48	3.45	3.83	2.28	10.98	37.54	22.78	18.67	15.87	146.62
1996	3	15.38	10.39	5.70	0.18	0.85	0.53	5.42	15.81	36.02	6.08	11.32	0.14	107.82
1997	3	2.86	11.17	2.70	3.69	0.33	2.41	5.74	29.87	7.45	18.36	7.80	2.83	95.23
1998	3	0.93	10.59	12.29	1.33	0.21	0.54	8.32	11.54	15.18	4.76	5.38	4.11	75.17
1999	3	1.72	2.39	6.70	4.24	0.74	7.20	2.34	8.62	13.79	23.11	9.25	10.81	90.91
2000	3	2.11	2.96	2.41	3.17	0.74	0.13	7.98	22.04	8.70	37.81	22.16	21.02	131.23
2001	2	7.24	1.85	2.26	11.59	3.61	0.79	7.53	14.03	10.12	29.38	20.19	8.32	116.90
2002	2	5.06	5.73	4.31	1.60	0.67	12.22	3.85	7.44	1.11	7.28	23.64	13.34	86.24
2003	2	6.79	0.01	3.26	4.76	0.00	4.00	6.35	0.62	10.88	12.24	8.91	4.23	62.06
2004	2	16.24	0.57	2.59	8.95	0.44	1.48	24.36	13.30	15.68	7.35	18.92	7.24	117.11
AVERAGE		6.41	4.26	3.06	2.58	2.53	3.27	7.25	12.61	16.70	16.22	15.26	9.28	99.44
ADJUSTED		6.45	4.29	3.08	2.59	2.55	3.29	7.29	12.68	16.79	16.31	15.35	9.34	100.00
STD.DEV.		5.00	4.42	3.03	3.27	3.27	3.17	6.35	8.78	10.64	9.55	9.37	6.39	25.55

AVERAGE RAINFALL ON CATCHMENT OF CODE H6R001

DETAILS OF RAINFALL STATIONS USED

SECTION	POSITION	MAP(mm)	PERIOD OF RECORD	LATITUDE	LONGITUDE
6	65	1595	1927 TO 2004	34.05	19.03
6	214	820	1932 TO 1994	34.04	19.08
22	29	2060	1944 TO 2004	33.59	19.01
6	332	794	1932 TO 2004	34.02	19.12
22	148	1995	1961 TO 2004	33.58	19.05
22	204	880	1941 TO 1969	33.54	19.07
22	504	760	1932 TO 2000	33.54	19.17
22	539	624	1927 TO 2004	33.59	19.18

RAINFALL INPUT AS PERCENT M.A.P.

YEAR	STNS.	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR
1927	2	1.17	11.64	4.13	3.74	0.48	3.56	0.43	0.89	31.58	14.53	15.82	14.58	102.54
1928	2	0.84	5.34	2.92	0.05	1.98	1.94	11.02	8.53	7.86	22.00	16.79	2.81	82.06
1929	2	1.73	3.68	5.62	2.95	4.78	4.31	2.25	3.23	4.76	6.58	17.14	22.26	79.29
1930	2	2.67	5.23	1.19	2.44	2.51	1.04	16.48	10.22	4.02	11.51	18.06	12.51	87.88
1931	2	15.90	0.14	3.49	5.26	6.70	2.10	0.49	12.82	11.86	17.40	5.38	15.76	97.31
1932	5	5.62	2.59	3.09	1.84	1.19	1.43	1.83	11.73	32.49	27.94	13.47	7.52	110.75
1933	5	4.40	1.57	2.32	1.20	2.57	1.36	0.48	12.11	16.78	8.08	11.51	13.25	75.60
1934	5	10.25	1.64	0.09	0.65	1.84	3.58	9.01	16.33	11.90	11.13	5.71	6.98	79.12
1935	5	1.50	10.75	0.90	6.96	1.19	3.46	1.22	16.05	9.50	21.60	17.91	7.68	98.72
1936	5	2.63	9.52	12.44	0.73	0.73	4.29	8.07	13.11	32.16	21.61	4.23	6.01	115.54
1937	5	3.91	3.40	1.18	3.98	1.23	3.00	7.94	14.35	6.68	8.73	13.42	15.06	82.89
1938	5	3.77	2.53	2.31	1.21	6.55	4.19	6.43	14.54	2.98	6.47	11.39	4.62	66.99
1939	5	0.99	3.04	1.52	0.49	6.68	2.22	19.12	9.22	18.02	10.69	3.93	6.07	81.99
1940	5	2.83	11.46	0.70	6.89	1.01	0.40	15.40	31.79	27.12	20.04	19.20	27.68	164.52
1941	6	7.90	1.73	4.54	2.32	0.41	1.57	3.34	15.50	42.86	5.69	16.68	2.76	105.30
1942	6	4.11	0.15	3.71	6.97	2.42	6.67	3.27	8.63	16.03	16.14	20.84	7.57	96.50
1943	6	5.47	6.15	1.71	1.01	0.72	2.83	3.64	13.52	37.61	11.83	19.27	11.23	115.00
1944	7	6.71	3.61	3.73	0.16	0.12	0.88	6.62	19.43	31.08	31.43	20.72	1.18	125.67
1945	7	8.69	7.06	1.67	0.77	1.57	4.57	3.90	8.66	6.88	10.93	9.84	17.34	81.88
1946	7	6.84	1.92	1.06	0.19	0.10	8.18	2.23	10.32	5.38	26.03	9.45	6.35	78.07
1947	7	5.03	2.95	1.04	1.04	1.03	6.32	2.81	12.58	9.47	15.24	6.20	20.91	84.61
1948	7	10.69	0.59	2.13	1.25	0.29	0.68	7.81	8.28	9.37	10.61	9.60	12.13	73.42
1949	7	8.00	10.25	3.47	0.86	0.16	0.65	11.27	4.21	5.04	32.42	3.44	15.01	94.80
1950	7	7.33	10.64	3.46	6.16	0.12	1.15	11.16	6.53	25.82	12.31	10.00	13.44	108.12
1951	7	8.98	10.27	0.40	0.21	1.35	1.17	3.90	15.77	6.79	14.43	15.83	12.73	91.84
1952	7	6.93	9.56	3.03	1.82	1.80	0.87	26.87	22.07	5.38	19.78	11.88	5.96	115.93
1953	7	5.44	6.92	1.18	1.27	1.72	4.36	10.40	29.46	20.12	37.36	24.52	6.65	149.40
1954	7	7.15	2.17	4.92	0.44	15.85	3.34	5.89	3.07	14.47	19.88	29.37	8.39	114.92
1955	7	15.23	6.63	1.67	2.96	1.60	3.24	2.83	14.18	19.13	14.07	17.58	7.19	106.31
1956	7	5.72	1.74	4.04	1.09	7.96	5.22	5.35	25.19	22.61	25.87	21.55	6.02	132.36
1957	7	16.10	0.46	0.08	0.55	4.91	6.14	3.93	15.33	15.15	2.70	17.16	6.11	88.63
1958	7	7.87	3.57	0.95	3.41	1.75	2.78	15.34	34.00	7.45	4.91	14.40	5.95	102.37
1959	7	9.03	0.88	2.70	2.21	1.07	3.71	4.97	10.85	21.62	3.79	3.20	9.43	73.47
1960	7	3.03	1.43	2.46	5.49	1.77	2.10	3.80	7.61	14.76	8.45	14.96	17.64	83.50
1961	8	5.56	0.08	1.50	2.49	3.01	5.66	10.59	3.91	33.86	11.61	32.97	4.11	115.35
1962	8	17.10	8.24	0.84	2.68	0.33	1.29	2.99	5.83	9.08	16.77	27.07	4.29	96.51
1963	8	4.64	3.38	4.50	0.69	6.93	3.91	4.12	6.90	22.99	14.42	15.91	5.28	93.66
1964	8	5.58	6.02	1.64	2.49	4.81	8.32	9.10	13.40	9.58	8.57	12.97	6.59	89.06
1965	8	5.59	4.04	6.47	1.59	1.10	9.25	8.20	5.94	17.37	19.94	11.51	10.65	101.65
1966	8	0.82	1.70	1.70	1.60	0.77	0.93	10.18	12.22	23.75	8.30	10.82	5.97	78.76
1967	8	6.48	4.29	1.50	2.54	1.50	0.84	9.15	20.07	17.15	17.07	16.58	3.04	100.22
1968	8	15.85	2.21	2.12	2.90	2.53	1.89	6.79	1.95	10.00	8.83	12.65	12.48	80.21
1969	8	10.87	2.43	0.42	0.71	3.21	0.41	0.83	13.55	20.67	19.63	14.59	10.17	97.48
1970	7	4.53	2.31	3.65	1.12	0.32	2.77	3.14	10.31	10.16	19.42	16.30	4.51	78.52
1971	7	2.42	2.83	2.24	3.13	2.86	2.74	6.17	18.41	8.94	6.28	8.80	6.20	71.02
1972	7	2.74	0.56	1.98	1.20	0.52	2.83	2.35	3.90	3.31	25.21	13.97	7.39	65.95
1973	7	4.27	3.60	2.88	1.29	1.27	1.36	0.79	9.12	17.25	13.30	49.57	13.05	117.74
1974	7	7.62	3.93	1.98	1.92	1.99	1.26	6.53	24.41	11.60	18.46	15.92	3.33	98.94
1975	7	8.14	2.90	0.81	0.11	0.95	3.62	3.38	8.63	32.34	17.40	9.44	6.47	94.20
1976	7	4.40	21.94	11.80	2.74	4.94	2.63	14.77	30.33	30.62	27.31	32.93	4.86	189.26
1977	7	2.35	4.05	5.21	3.19	1.38	2.96	5.76	5.04	3.01	6.57	25.24	10.21	74.97
1978	7	5.98	1.85	4.83	4.49	6.98	1.25	1.54	15.63	22.13	11.98	11.85	10.87	99.38
1979	7	11.14	0.91	0.61	3.51	1.95	0.45	6.62	15.85	15.27	7.05	14.45	3.82	81.64
1980	7	5.71	12.98	8.35	16.40	0.94	5.90	6.48	1.56	7.56	25.95	16.86	22.78	131.47
1981	7	2.91	3.32	1.82	2.80	0.26	1.82	14.19	7.48	14.60	8.93	8.50	3.32	69.95
1982	7	6.18	2.21	4.59	1.58	6.06	5.03	2.29	29.48	27.26	25.42	7.53	14.49	132.11
1983	7	2.37	1.26	1.34	1.47	1.30	4.33	7.15	32.74	5.70	15.95	7.63	19.22	100.47
1984	7	13.73	0.92	9.41	5.49	6.60	14.29	8.11	6.92	19.95	24.18	18.46	7.15	135.21
1985	7	6.64	2.55	3.37	1.04	3.80	7.30	6.01	6.66	22.65	15.50	24.69	7.06	107.26
1986	7	3.54	4.67	1.13	2.95	1.91	1.71	7.20	22.07	16.05	12.60	20.38	9.45	103.65
1987	7	1.84	1.23	4.98	0.31	0.33	2.47	13.25	9.56	12.35	11.50	16.09	8.69	82.59
1988	7	3.75	1.80	1.57	1.08	2.58	12.23	11.61	11.70	12.10	14.53	17.81	14.08	104.85
1989	7	8.95	4.64	0.67	1.49	4.58	1.73	13.44	15.75	16.29	21.36	10.46	3.63	103.01
1990	7	2.81	4.18	1.82	1.58	0.92	1.35	4.53	15.69	39.27	24.57	9.26	18.35	124.35
1991	7	8.32	1.58	0.73	0.44	3.29	3.70	10.12	10.73	32.05	18.51	12.46	6.84	108.77
1992	7	18.56	1.98	0.90	1.11	4.44	0.70	31.33	12.55	15.74	42.97	9.50	2.92	142.69
1993	7	0.52	1.71	4.77	1.53	1.01	1.34	6.05	7.20	44.94	11.42	4.90	10.12	95.51
1994	7	3.35	0.77	5.74	2.17	1.00	3.17	2.50	14.42	14.67	19.46	13.84	4.89	85.98
1995	6	13.64	3.64	9.04	0.47	3.71	3.33	3.73	7.97	32.74	17.49	14.66	19.18	129.61
1996	6	14.73	9.98	6.77	1.19	0.48	1.02	5.47	12.24	30.98	6.07	11.98	0.43	101.35
1997	6	5.00	7.88	7.20	3.67	0.26	2.39	6.10	22.30	11.69	19.88	7.16	4.22	97.74
1998	6	1.39	9.93	10.77	0.69	0.29	0.46	8.98	10.27	15.23	4.74	5.87	4.01	72.64
1999	6	0.92	2.04	3.91	4.07	0.91	5.63	1.96	10.03	13.65	18.09	8.50	13.83	83.55
2000	6	2.31	2.12	2.25	2.13	0.98	0.23	5.76	21.50	7.07	29.09	17.97	15.33	106.75
2001	5	4.49	9.77	1.75	10.82	2.66	1.06	5.51	15.30	13.83	19.85	17.82	4.83	107.68
2002	5	9.73	3.58	2.79	1.92	1.21	7.94	2.66	5.72	4.27	7.61	15.35	9.49	72.26
2003	5	5.16	3.48	2.78	4.92	0.05	3.28	5.08	6.49	8.80	9.75	9.52	3.56	62.87
2004	5	13.96	1.74	3.53	7.19	1.62	2.18	15.44	12.67	21.11	10.20	21.47	6.83	117.93
AVERAGE		6.42	4.34	3.19	2.53	2.37	3.23	7.15	13.01	17.11	15.97	14.78	9.29	99.39
ADJUSTED		6.46	4.37	3.21	2.55	2.38	3.25	7.19	13.09	17.21	16.07	14.87	9.35	100.00
STD.DEV.		4.36	3.84	2.65	2.56	2.52	2.65	5.57	7.51	10.23	8.04	7.51	5.59	22.88

APPENDIX C:

PATCHED OBSERVED FLOW SEQUENCES

APPENDIX NUMBER	BASIN	CALIBRATION GAUGE
C1	DIEP	G2H012
C2	DIEP	G2H013
C3	DIEP	G2H014
C4	DIEP	G2H042
C5	EERSTE	G2H015
C6	LOURENS	G2H016
C7	EERSTE	G2H020
C8	EERSTE	G2H037
C9	PALMIET	G4H005
C10	PALMIET	G4H007
C11	STEENBRAS	G4R001
C12	STEENBRAS	G4R002
C13	RIVIERSONDEREND	H6H007
C14	RIVIERSONDEREND	H6H008
C15	RIVIERSONDEREND	H6R001
C16	RIVIERSONDEREND	H6R002

Patched observed flows at G2H012

File : G2H012.NSI
Units : Mm3
Descrip. : From DWAF for 1964 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1964	2.160	1.730	0.840	1.030	1.220	0.470	0.060	0.090	0.180	0.270	0.260	0.070	8.4
1965	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	1.370	1.620	0.520	3.5
1966	0.070	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.780	0.390	0.480	0.140	2.9
1967	0.110	0.000	0.000	0.000	0.000	0.000	0.000	0.240	4.360	7.060	2.610	0.590	15.0
1968	0.330	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.120	0.230	0.380	1.1
1969	0.210	0.010	0.000	0.000	0.000	0.000	0.000	0.050	0.530	1.340	1.640	1.040	4.8
1970	0.280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.510	1.630	0.370	3.8
1971	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.140	0.090	0.160	0.090	0.5
1972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.310	0.540	0.260	1.1
1973	0.020	0.000	0.150	0.000	0.000	0.000	0.000	0.000	6.570	0.290	26.280	3.530	36.8
1974	1.020	0.100	0.000	0.000	0.000	0.000	0.000	2.880	0.960	3.420	2.420	0.290	11.1
1975	0.300	0.030	0.000	0.000	0.000	0.000	0.170	0.010	6.770	4.600	2.200	0.500	14.6
1976	0.140	0.510	0.050	0.020	0.090	0.000	0.540	4.410	12.770	23.630	13.060	2.280	57.5
1977	0.420	0.060	0.120	0.000	0.000	0.000	0.150	0.110	0.080	0.090	0.610	0.290	1.9
1978	0.090	0.020	0.000	0.000	0.000	0.000	0.000	0.020	1.410	0.330	1.950	0.150	4.0
1979	0.140	0.000	0.000	0.000	0.000	0.000	0.000	0.050	0.370	0.180	0.350	0.110	1.2
1980	0.010	0.110	0.240	0.400	0.000	0.000	0.140	0.040	0.010	1.730	4.220	1.580	8.5
1981	0.170	0.000	0.000	0.000	0.000	0.020	0.070	0.490	1.820	4.740	3.510	1.600	12.4
1982	1.330	0.000	0.000	0.000	0.000	0.000	0.000	1.140	12.630	11.850	3.960	2.100	33.0
1983	0.140	0.000	0.000	0.000	0.000	0.140	0.000	5.180	0.240	1.740	0.600	1.810	9.8
1984	1.430	0.010	0.020	0.000	0.000	0.070	0.040	0.080	0.850	3.810	3.350	0.540	10.2
1985	0.130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.270	3.510	5.540	0.960	10.4
1986	0.140	0.010	0.000	0.000	0.000	0.000	0.000	0.170	1.670	7.430	6.400	2.070	17.9
1987	0.410	0.030	0.000	0.000	0.000	0.000	0.050	0.050	0.480	0.980	1.000	1.020	4.0
1988	0.170	0.030	0.000	0.000	0.000	0.000	0.040	0.050	0.460	1.910	2.240	4.500	9.4
1989	0.530	0.120	0.000	0.000	0.000	0.000	0.480	2.420	5.250	11.740	3.630	0.570	24.7
1990	0.110	0.000	0.000	0.000	0.000	0.000	0.000	0.040	0.660	6.940	3.100	3.330	14.2
1991	0.700	0.130	0.000	0.000	0.000	0.000	0.000	0.000	3.350	5.100	1.230	0.940	11.4
1992	0.910	0.140	0.000	0.000	0.030	0.010	0.300	1.210	3.430	16.480	7.080	0.780	30.4
1993	0.170	0.020	0.030	0.000	0.000	0.000	0.000	0.010	9.660	3.970	0.930	1.030	15.8
1994	0.130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.370	3.250	2.430	0.410	6.6
1995	0.200	0.010	0.270	0.000	0.000	0.000	0.000	0.000	1.610	2.830	4.030	4.750	13.7
1996	1.270	0.270	0.040	0.000	0.000	0.000	0.000	0.080	2.240	0.820	1.490	0.750	7.0
1997	0.070	0.010	0.000	0.000	0.000	0.000	0.000	0.820	0.530	0.950	0.430	0.160	3.0
1998	0.040	0.080	0.000	0.000	0.000	0.020	0.020	0.070	0.190	0.460	2.280	2.630	5.8
1999	0.200	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.120	0.140	0.200	0.7
2000	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	10.740	3.680	5.070	19.5
2001	0.650	0.180	0.010	0.000	0.000	0.000	0.000	0.120	0.270	3.580	3.660	0.970	9.4
2002	0.370	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.810	0.360	1.6
2003	0.070	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.140	0.380	0.110	0.7
2004	0.100	0.000	0.000	0.000	0.000	0.000	0.020	0.000	1.260	0.340	4.400	0.500	6.6
AVE :	0.36	0.09	0.04	0.04	0.03	0.02	0.05	0.48	2.03	3.66	3.09	1.20	11.1
SD :	0.47	0.28	0.14	0.17	0.19	0.08	0.12	1.17	3.28	5.00	4.44	1.34	11.5

Patched observed flows at G2H013

File : G2H013.NSI
Units : Mm3
Descrip. : From DWAF for 1965 to 1985

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1965	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	3.440	5.820	1.090	10.3
1966	0.130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	2.460	1.610	1.280	0.350	5.8
1967	0.130	0.000	0.000	0.000	0.000	0.000	0.000	0.000	8.500	14.360	6.540	1.090	30.6
1968	0.530	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.110	0.630	1.3
1969	0.160	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.250	5.510	3.850	2.830	13.6
1970	0.460	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.360	0.910	0.430	2.2
1971	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.220	0.140	0.670	0.250	1.3
1972	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.010	0.330	0.040	0.4
1973	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.660	1.230	51.620	6.990	70.5
1974	2.350	0.550	0.000	0.000	0.000	0.000	0.000	1.040	2.620	11.670	8.820	4.000	31.1
1975	2.860	1.280	0.080	0.000	0.000	0.000	0.190	0.220	7.840	5.160	10.750	2.300	30.7
1976	0.000	0.310	0.210	0.190	0.080	0.100	0.400	2.750	18.300	38.290	21.360	3.490	85.5
1977	0.600	0.270	0.120	0.000	0.030	0.110	0.190	0.280	0.200	0.210	0.400	0.620	3.0
1978	0.340	0.190	0.010	0.000	0.010	0.080	0.050	0.150	0.360	0.380	0.590	0.170	2.3
1979	0.350	0.070	0.000	0.000	0.000	0.000	0.060	0.210	0.620	0.240	0.440	0.210	2.2
1980	0.060	0.040	0.030	0.240	0.000	0.000	0.110	0.110	0.140	3.440	6.340	1.580	12.1
1981	0.160	0.030	0.050	0.000	0.010	0.000	0.000	0.010	0.180	1.000	1.230	0.260	2.9
1982	0.020	0.000	0.000	0.000	0.000	0.000	0.000	0.100	10.960	9.650	2.390	1.110	24.2
1983	0.310	0.040	0.000	0.000	0.000	0.000	0.000	8.780	1.570	6.280	2.970	7.160	27.1
1984	6.940	0.610	0.060	0.000	0.020	1.940	3.500	4.110	5.610	19.680	16.450	2.790	61.7
1985	1.660	0.130	0.000	0.000	0.000	0.000	0.020	0.000	0.000	3.640	6.750	0.000	12.2
AVE :	0.81	0.17	0.03	0.02	0.01	0.11	0.22	0.85	3.40	6.01	7.12	1.78	20.5
SD :	1.61	0.31	0.05	0.07	0.02	0.42	0.76	2.10	5.04	9.13	11.65	2.12	24.6

Patched observed flows at G2H014

File : G2H014.NSI
Units : Mm3
Descrip. : From DWAF for 1966 to 1982

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1966	2.390	1.080	0.500	0.260	0.150	0.100	0.190	0.000	5.490	3.039	2.610	0.543	16.3
1967	0.577	0.002	0.000	0.000	0.000	0.000	0.000	0.413	11.920	17.927	16.167	2.901	49.9
1968	1.415	0.101	0.000	0.000	0.000	0.000	0.000	0.000	0.097	0.255	0.370	1.797	4.0
1969	1.035	0.069	0.000	0.000	0.000	0.000	0.000	0.025	4.909	12.602	10.571	7.285	36.5
1970	1.459	0.048	0.000	0.280	0.150	0.110	0.120	0.210	0.013	2.618	3.865	0.992	9.8
1971	0.075	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.466	0.236	1.557	0.530	2.8
1972	0.045	0.000	0.000	0.000	0.000	0.000	0.090	0.160	0.230	1.580	1.675	0.338	4.1
1973	0.023	0.000	0.540	0.220	0.130	0.090	0.080	0.550	12.360	3.481	93.980	19.180	130.6
1974	9.045	0.760	0.990	0.430	0.240	0.150	0.220	7.976	6.692	24.053	23.831	2.279	76.6
1975	6.430	0.753	0.540	0.000	0.130	0.100	0.550	0.540	24.172	14.450	21.444	4.945	74.0
1976	0.377	2.364	0.525	0.429	0.410	0.240	1.684	12.685	48.965	60.953	49.019	13.209	190.8
1977	2.055	0.300	0.201	0.390	0.000	0.000	0.383	0.402	0.275	0.353	1.724	2.856	8.9
1978	0.666	0.030	0.000	0.000	0.000	0.000	0.000	0.021	2.828	1.131	4.445	0.097	9.2
1979	0.510	0.002	0.000	0.000	0.000	0.000	0.000	0.000	1.663	1.264	6.152	1.641	11.2
1980	0.046	0.000	0.547	3.222	0.226	0.000	0.106	0.458	0.456	19.135	27.959	12.350	64.5
1981	1.157	0.004	0.000	0.000	0.000	0.000	0.000	0.890	2.820	7.270	7.780	4.550	24.5
1982	3.400	0.810	0.480	0.290	0.210	0.200	0.200	2.440	26.760	26.350	11.600	8.120	80.9
AVE :	1.80	0.37	0.25	0.32	0.10	0.06	0.21	1.57	8.83	11.57	16.75	4.91	46.7
SD :	2.46	0.63	0.31	0.77	0.12	0.08	0.41	3.45	13.20	15.52	23.63	5.46	52.1

Patched observed flows at G2H042

File : G2H042.NSI
Units : Mm3
Descrip. : From DWAF for 1998 to 2005

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1998	2.230	0.610	0.000	0.000	0.000	0.000	0.000	0.220	1.650	11.570	19.630	21.960	57.9
1999	1.750	0.160	0.010	0.000	0.000	0.000	0.000	0.010	0.690	2.120	2.410	2.500	9.7
2000	0.370	0.050	0.000	0.000	0.000	0.000	0.000	0.120	0.840	56.720	23.000	26.340	107.4
2001	3.130	1.230	0.040	0.140	0.000	0.000	0.000	0.870	1.740	9.280	14.120	6.530	37.1
2002	2.100	0.270	0.000	0.000	0.000	0.000	0.000	0.170	0.380	0.410	5.950	2.930	12.2
2003	0.780	0.050	0.000	0.000	0.000	0.000	0.050	0.110	1.240	1.670	6.280	1.040	11.2
2004	2.660	0.190	0.000	0.000	0.020	0.000	4.670	0.830	7.580	5.190	15.500	3.950	40.6
2005	1.250	0.260	0.010	0.000	0.000	0.000	0.000	1.450	2.600	5.900	14.760	1.930	28.2
AVE :	1.78	0.35	0.01	0.02	0.00	0.00	0.59	0.47	2.09	11.61	12.71	8.40	38.0
SD :	0.94	0.40	0.01	0.05	0.01	0.00	1.65	0.52	2.33	18.63	7.18	9.93	32.7

Patched observed flows at G2H015

File : G2H015.NSI
Units : Mm3
Descrip. : From DWAF for 1967 to 1976

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1967	8.740	3.440	0.280	0.240	0.020	0.020	2.240	12.820	20.130	15.440	18.890	14.960	97.2
1968	11.770	1.440	0.520	1.480	0.810	0.450	2.220	2.070	6.920	8.310	8.770	11.590	56.4
1969	5.900	0.790	0.000	0.000	0.000	0.000	0.000	7.220	16.750	18.500	22.670	17.960	89.8
1970	5.840	1.470	2.460	0.150	0.000	0.130	1.030	3.410	3.920	17.740	18.040	8.800	63.0
1971	2.700	0.780	0.500	0.300	0.800	0.000	0.680	14.190	11.300	2.610	7.530	10.920	52.3
1972	2.650	0.370	0.120	0.000	0.000	0.580	0.030	1.150	1.650	18.220	17.120	13.940	55.8
1973	4.080	0.690	1.510	0.000	0.000	0.000	0.000	5.970	20.000	10.280	40.210	21.870	104.6
1974	12.790	4.320	1.280	1.050	0.240	0.830	4.300	24.520	21.010	29.310	24.800	7.660	132.1
1975	5.400	1.770	1.240	0.100	0.030	0.450	1.180	5.120	47.260	34.790	21.100	18.190	136.6
1976	16.170	13.510	11.520	9.380	1.710	1.430	9.910	26.220	53.530	46.140	41.910	22.000	253.4
AVE :	7.60	2.86	1.94	1.27	0.36	0.39	2.16	10.27	20.25	20.13	22.10	14.79	104.1
SD :	4.60	3.95	3.45	2.89	0.58	0.47	3.04	9.01	17.39	13.14	11.40	5.13	60.9

Patched observed flows at G2H016

File : G2H016.NSI
Units : Mm3
Descrip. : From DWAF for 1969 to 1990

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1969	5.050	0.520	0.210	0.070	0.050	0.040	0.010	0.340	3.790	2.260	6.700	1.820	20.9
1970	1.380	0.680	0.580	0.140	0.080	0.000	0.160	0.900	1.610	8.910	2.320	2.000	18.8
1971	0.750	0.330	0.200	0.180	0.190	0.010	0.200	4.670	1.810	0.810	2.270	3.120	14.5
1972	1.220	0.250	0.120	0.030	0.000	0.080	0.010	0.200	0.190	3.510	2.480	1.550	9.6
1973	0.840	0.330	0.480	0.000	0.000	0.000	0.000	1.320	3.640	1.390	13.270	8.130	29.4
1974	5.120	2.160	0.930	0.410	0.240	0.040	1.510	4.750	6.520	13.140	14.030	4.230	53.1
1975	3.780	1.290	0.560	0.080	0.060	0.300	0.240	1.570	10.470	9.640	6.480	6.080	40.6
1976	4.750	5.810	7.060	3.200	1.280	1.590	6.990	14.000	23.980	22.510	16.590	4.740	112.5
1977	2.600	0.690	1.050	0.340	0.200	0.320	1.340	2.470	1.540	2.250	5.300	5.090	23.2
1978	4.630	2.090	0.640	0.340	0.200	0.510	0.170	2.810	4.880	2.560	3.030	1.580	23.4
1979	4.310	1.550	0.520	0.540	0.400	0.170	1.230	3.000	3.790	1.800	3.480	1.520	22.3
1980	1.530	2.200	2.720	4.500	0.770	1.090	2.110	1.500	2.680	14.560	18.560	16.500	68.7
1981	9.400	3.440	3.280	3.300	0.800	0.070	1.970	3.040	5.750	6.590	8.930	5.700	52.3
1982	4.450	1.970	3.560	2.060	2.560	2.310	1.620	11.040	15.150	14.170	13.390	13.190	85.5
1983	6.510	1.600	0.550	0.130	0.040	0.110	0.290	3.530	1.910	11.420	4.990	8.080	39.2
1984	7.790	1.470	1.020	0.630	0.730	1.920	2.200	2.640	5.530	8.090	7.530	4.280	43.8
1985	2.410	0.810	0.280	0.070	0.110	0.490	2.130	3.390	5.510	8.350	17.210	9.760	50.5
1986	3.840	2.250	1.430	1.570	1.320	1.400	0.940	6.540	7.240	7.350	14.070	12.930	60.9
1987	4.300	1.520	1.850	0.550	0.340	0.550	2.240	3.300	4.180	6.990	4.710	7.290	37.8
1988	3.360	1.540	0.900	0.640	0.670	2.660	3.010	5.150	6.900	9.240	11.210	12.190	57.5
1989	7.370	3.120	1.200	0.830	2.920	0.450	3.310	5.430	6.410	15.230	11.420	4.290	62.0
1990	1.230	0.810	0.470	0.370	0.050	0.200	0.290	2.060	5.690	27.050	3.630	7.400	49.3
AVE :	3.94	1.66	1.35	0.91	0.59	0.65	1.45	3.80	5.87	8.99	8.71	6.43	44.3
SD :	2.38	1.27	1.60	1.25	0.80	0.81	1.61	3.30	5.20	6.84	5.36	4.27	24.8

Patched observed flows at G2H020

File : G2H020.NSI
Units : Mm3
Descrip. : From DWAF for 1980 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1980	0.650	0.680	0.310	0.370	0.000	0.030	0.270	1.430	0.000	0.720	2.830	1.600	8.9
1981	1.390	0.000	0.000	0.000	0.000	0.000	0.140	0.370	0.000	0.730	0.710	0.450	3.8
1982	0.660	0.000	0.000	0.000	0.000	0.020	0.000	1.920	7.290	5.370	3.330	2.690	21.3
1983	1.520	0.190	0.000	0.000	0.000	0.000	0.000	2.550	0.340	3.190	2.110	4.560	14.5
1984	4.300	0.000	2.730	0.150	0.000	0.660	1.060	3.560	4.100	7.710	5.320	2.150	31.7
1985	0.810	0.250	0.000	0.000	0.000	0.000	0.000	0.000	3.000	4.420	6.030	3.090	17.6
1986	1.230	0.240	0.000	0.000	0.000	0.000	0.000	0.390	2.290	4.130	9.480	4.510	22.3
1987	2.630	0.490	0.170	0.000	0.000	0.000	0.260	0.000	1.650	1.330	2.180	4.620	13.3
1988	1.350	0.290	0.000	0.000	0.000	0.280	0.720	0.940	1.370	4.030	4.730	6.430	20.1
1989	2.580	0.620	0.000	0.000	0.000	0.000	0.770	2.430	3.330	8.360	5.880	2.020	26.0
1990	0.300	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.930	15.100	6.500	6.710	30.5
1991	2.330	0.850	0.000	0.000	0.000	0.000	0.830	1.380	6.870	6.730	3.380	3.690	26.1
1992	3.380	1.050	0.000	0.000	0.000	0.000	7.050	4.800	5.790	18.190	9.830	2.250	52.3
1993	0.500	0.000	0.000	0.000	0.000	0.000	0.230	0.300	7.310	5.710	2.320	1.320	17.7
1994	0.770	0.100	0.000	0.000	0.000	0.000	0.000	0.450	1.670	3.670	5.620	1.580	13.9
1995	1.760	0.530	0.620	0.110	0.000	0.100	0.520	0.460	7.680	4.560	5.210	8.700	30.3
1996	7.570	2.560	1.470	0.500	0.000	0.000	0.450	1.350	4.400	1.930	3.830	2.000	26.1
1997	0.320	1.550	0.340	0.000	0.000	0.000	0.000	4.890	2.590	4.020	2.680	1.090	17.5
1998	0.690	1.360	0.180	0.000	0.000	0.000	0.210	0.500	1.230	2.740	4.680	4.550	16.1
1999	1.290	0.280	0.000	0.000	0.000	0.000	0.000	0.130	1.390	2.370	1.850	3.120	10.4
2000	0.980	0.130	0.000	0.000	0.000	0.000	0.040	1.000	1.410	9.960	7.150	8.570	29.2
2001	2.880	1.570	0.070	1.150	0.110	0.000	0.510	1.660	3.870	6.610	6.830	4.040	29.3
2002	2.620	0.790	0.110	0.000	0.000	0.340	0.460	0.660	0.630	0.620	5.110	3.310	14.7
2003	1.680	0.400	0.150	0.000	0.000	0.000	0.580	0.360	0.960	1.520	4.140	1.280	11.1
2004	3.770	0.400	0.000	0.030	0.000	0.000	0.290	1.190	4.090	2.790	4.840	2.190	19.6
AVE :	1.92	0.57	0.25	0.09	0.00	0.06	0.58	1.31	3.01	5.06	4.66	3.46	21.0
SD :	1.62	0.63	0.61	0.25	0.02	0.15	1.38	1.39	2.40	4.29	2.26	2.23	10.0

Patched observed flows at G2H037

File : G2H037.NSI
Units : Mm3
Descrip. : From DWAF for 1988 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1988	0.700	0.010	0.000	0.000	0.000	2.000	0.870	0.910	0.000	0.000	5.220	5.100	14.8
1989	2.450	1.160	0.180	0.060	0.500	0.050	4.210	3.200	1.300	3.840	5.020	1.530	23.5
1990	0.470	0.090	0.020	0.040	0.030	0.030	0.030	0.000	2.210	3.610	4.370	0.770	11.7
1991	1.730	0.270	0.060	0.150	0.120	0.430	3.110	3.240	9.630	7.050	3.260	3.790	32.8
1992	4.310	1.530	0.410	0.060	0.130	0.030	4.610	5.310	6.030	10.840	4.030	0.650	37.9
1993	0.050	0.010	0.080	0.160	0.030	0.020	0.530	0.530	8.180	4.010	2.400	1.130	17.1
1994	0.520	0.050	0.010	0.020	0.000	0.000	0.020	1.000	3.560	7.210	5.600	1.610	19.6
1995	3.230	0.470	1.100	0.120	0.150	0.270	0.710	0.380	5.710	4.080	4.150	6.610	27.0
1996	6.550	3.170	2.280	0.580	0.050	0.050	0.260	1.150	4.810	2.270	5.320	1.640	28.1
1997	0.150	3.300	0.730	0.160	0.020	0.050	0.490	5.130	3.210	4.720	2.690	1.270	21.9
1998	0.380	2.360	0.230	0.060	0.050	0.040	0.600	1.450	2.700	4.130	5.770	4.970	22.7
1999	1.320	0.400	0.030	0.260	0.030	0.050	0.020	1.870	2.240	2.670	2.540	4.650	16.1
2000	0.890	0.050	0.040	0.030	0.040	0.030	0.260	2.180	1.950	8.370	7.450	6.200	27.5
2001	2.020	0.910	0.070	1.350	0.040	0.140	1.000	2.630	5.070	5.900	3.900	1.810	24.8
2002	1.540	0.460	0.120	0.050	0.010	0.930	0.420	0.510	0.380	0.910	5.510	3.090	13.9
2003	2.610	0.180	0.330	0.350	0.050	0.030	0.980	0.040	1.800	1.980	6.180	0.920	15.5
2004	1.680	0.070	0.030	0.340	0.070	0.020	0.670	2.680	7.310	3.360	5.890	2.010	24.1
AVE :	1.80	0.85	0.34	0.22	0.08	0.25	1.11	1.89	3.89	4.41	4.66	2.81	22.3
SD :	1.69	1.10	0.58	0.33	0.12	0.51	1.43	1.63	2.77	2.76	1.42	2.00	7.1

Patched observed flows at G4H005

File : G4H005.NSI
Units : Mm3
Descrip. : From DWAF for 1978 to 1997

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1978	7.409	2.598	0.000	0.000	0.000	0.558	0.236	2.797	8.620	6.105	5.432	3.868	37.6
1979	9.360	0.677	0.000	0.000	0.000	0.000	0.652	2.798	5.010	0.164	0.000	3.184	21.8
1980	2.571	4.723	3.149	4.941	1.116	1.088	2.163	1.951	2.384	11.809	12.653	16.600	65.1
1981	2.996	0.245	0.308	0.000	0.000	0.000	1.311	1.858	2.190	0.572	3.123	2.640	15.2
1982	3.360	0.190	0.928	0.000	0.825	1.318	0.401	7.057	12.481	11.876	3.788	9.522	51.7
1983	4.420	0.260	0.000	0.000	0.000	0.000	0.021	9.752	0.569	9.524	2.549	7.789	34.9
1984	6.319	0.541	1.778	0.088	0.313	2.572	1.466	1.123	5.669	14.850	7.241	1.183	43.1
1985	0.044	0.495	0.000	0.000	0.000	0.000	2.124	2.500	5.338	9.084	18.620	5.552	43.7
1986	0.692	0.996	0.000	0.000	0.000	0.000	1.175	5.276	6.708	4.445	6.268	3.502	29.0
1987	0.825	0.000	0.589	0.000	0.000	0.000	0.429	2.424	3.017	4.808	2.397	8.005	22.4
1988	0.509	1.154	0.000	0.000	0.000	0.648	4.788	5.562	9.628	12.427	14.438	12.231	61.3
1989	5.931	2.212	0.012	0.000	0.087	0.258	1.851	7.353	11.306	16.513	11.290	3.592	60.4
1990	0.020	0.940	0.000	0.000	0.000	0.000	0.000	2.050	5.640	14.732	9.616	3.988	37.0
1991	2.640	1.444	0.000	0.000	0.000	0.050	1.571	4.180	18.603	10.866	5.791	5.747	50.9
1992	8.141	0.229	0.000	0.000	0.000	0.000	12.436	5.452	10.694	29.850	6.642	0.000	73.4
1993	0.182	0.000	0.048	0.000	0.000	0.000	0.300	1.000	17.540	10.546	4.415	1.307	35.3
1994	2.092	0.195	0.000	0.000	0.000	0.000	0.030	1.420	3.710	9.292	9.564	2.084	28.4
1995	5.854	1.153	2.515	0.107	0.199	0.299	0.579	0.499	6.653	17.605	3.641	7.725	46.8
1996	12.970	4.335	2.669	0.615	0.050	0.079	1.109	2.199	8.708	2.312	2.400	1.377	38.8
1997	0.700	1.763	0.883	0.000	0.000	0.000	0.859	13.558	5.778	8.906	1.660	0.710	34.8
AVE :	3.85	1.20	0.64	0.29	0.13	0.34	1.67	4.04	7.51	10.31	6.57	5.03	41.6
SD :	3.62	1.35	1.03	1.10	0.30	0.65	2.76	3.33	4.81	6.78	4.80	4.24	15.4

Patched observed flows at G4H007

File : G4H007.NSI
Units : Mm3
Descrip. : From DWAF for 1987 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1987	8.776	2.361	4.211	1.028	0.210	1.380	4.662	6.861	16.339	25.421	15.097	21.597	107.9
1988	8.451	4.952	0.556	0.015	0.619	6.452	15.716	16.345	24.254	27.515	29.305	32.945	167.1
1989	17.520	8.650	3.064	1.165	2.606	2.569	11.635	27.386	28.713	42.318	24.646	9.087	179.3
1990	4.059	3.219	2.021	0.369	0.605	0.038	1.673	12.243	30.990	40.260	25.038	24.246	144.7
1991	15.015	8.120	2.173	0.263	1.196	1.520	7.850	14.973	52.647	36.777	22.563	18.859	181.9
1992	25.103	9.395	2.407	0.877	1.333	1.204	26.681	15.338	34.725	70.019	26.604	6.935	220.6
1993	4.006	1.942	3.668	0.000	0.000	0.853	1.641	3.634	53.204	30.761	16.292	9.124	125.1
1994	6.724	2.375	1.120	0.443	0.446	0.561	2.314	7.892	16.602	37.692	27.847	10.556	114.5
1995	20.391	6.484	10.821	4.178	1.074	1.304	1.903	2.821	27.135	37.117	25.649	30.309	169.1
1996	33.114	15.314	8.952	3.276	1.255	1.122	1.530	9.081	29.995	18.415	22.370	9.672	154.1
1997	3.994	15.616	4.734	2.137	0.834	1.163	5.109	26.515	23.493	29.006	19.038	8.095	139.7
1998	4.590	15.086	6.856	2.702	0.994	1.036	1.920	6.039	12.916	23.730	23.469	28.125	127.4
1999	9.805	3.665	1.433	1.844	0.149	3.304	1.891	5.615	12.842	21.013	15.389	29.939	106.8
2000	5.986	2.536	1.198	0.849	1.596	0.566	1.388	12.270	14.130	50.660	36.063	35.165	162.4
2001	8.978	4.640	1.960	7.327	2.435	0.889	2.942	7.852	22.006	28.850	26.173	9.370	123.4
2002	10.813	4.766	1.459	1.036	1.084	3.261	2.260	7.042	6.257	6.726	31.031	16.170	91.9
2003	10.736	3.617	2.134	1.634	0.719	1.235	0.757	1.928	7.704	16.409	27.340	7.447	81.6
2004	18.704	2.920	1.479	1.074	0.776	0.659	15.541	11.100	37.179	18.623	28.905	14.483	151.4
AVE :	12.04	6.42	3.34	1.67	0.99	1.61	5.96	10.83	25.06	31.18	24.60	17.89	141.6
SD :	8.13	4.66	2.85	1.81	0.70	1.49	7.05	7.23	13.51	14.46	5.56	9.92	35.4

Patched observed flows at G4R001

File : G4R001.NSI
Units : Mm3
Descrip. : From DWAF for 1927 to 1987

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.760	2.190	0.510	0.250	0.220	0.130	0.290	0.130	6.580	4.930	2.640	9.510	28.1
1928	0.820	0.690	0.910	0.040	0.110	1.070	2.050	4.160	3.810	8.480	1.430	3.830	27.4
1929	0.750	0.710	0.530	1.200	0.450	0.160	1.710	0.030	1.780	4.360	8.300	9.270	29.3
1930	3.050	0.600	1.020	0.650	0.030	0.070	2.020	4.830	2.110	7.900	12.640	13.090	48.0
1931	17.000	0.140	0.190	0.690	1.340	1.070	0.160	4.700	14.390	11.900	9.320	13.080	74.0
1932	4.860	0.400	0.600	0.170	0.000	0.060	0.010	1.750	13.160	10.770	12.850	4.030	48.7
1933	2.380	0.520	0.350	0.060	0.030	0.210	0.130	2.480	1.230	6.260	10.540	5.790	30.0
1934	8.290	2.590	0.270	0.140	0.100	0.080	0.720	4.830	5.260	5.860	3.200	4.920	36.3
1935	2.010	0.730	0.290	1.600	0.320	0.510	0.190	2.140	3.130	3.930	7.500	3.250	25.6
1936	1.130	1.680	1.750	0.040	0.660	0.020	1.650	4.370	19.800	11.190	7.120	3.150	52.6
1937	0.810	0.710	0.480	0.550	0.020	0.090	1.500	6.350	2.770	7.340	7.590	10.470	38.7
1938	3.400	1.340	0.200	0.050	0.370	0.440	1.600	5.540	1.120	4.810	9.750	3.560	32.2
1939	0.790	1.900	0.330	0.850	1.090	1.640	1.840	7.140	12.770	4.070	4.500	7.070	44.0
1940	1.960	3.590	0.800	1.280	0.270	0.170	6.770	16.970	15.540	9.150	9.340	13.960	79.8
1941	3.630	2.890	0.810	1.030	0.210	0.500	0.290	5.020	21.160	6.010	8.740	4.110	54.4
1942	1.020	0.480	0.260	0.810	0.680	0.300	1.880	2.530	5.320	8.360	9.310	3.640	34.6
1943	3.470	1.500	0.390	0.130	0.270	0.140	0.430	5.680	20.910	14.970	13.400	15.070	76.4
1944	5.470	1.430	1.650	0.360	0.110	0.790	0.720	14.500	18.150	11.490	16.220	1.110	72.0
1945	5.190	1.200	0.440	0.530	0.270	0.840	2.350	4.280	4.310	6.960	9.970	10.820	47.2
1946	1.370	1.120	0.260	0.170	0.200	0.510	0.860	3.350	5.160	18.040	4.380	3.460	38.9
1947	1.360	2.320	0.310	0.130	0.160	0.270	0.400	3.050	6.800	9.870	4.960	4.360	34.0
1948	5.250	0.870	0.330	0.190	0.040	0.220	1.500	2.860	4.580	4.930	9.470	5.470	35.7
1949	0.830	1.820	0.250	0.060	0.060	0.460	3.630	2.860	2.280	15.990	2.730	2.670	33.6
1950	3.390	2.280	3.230	0.630	0.690	0.340	4.860	7.790	18.570	10.530	3.930	9.670	65.9
1951	4.690	2.370	1.070	0.570	0.410	0.700	0.930	2.480	2.180	5.500	10.150	7.410	38.5
1952	17.820	1.900	1.350	0.370	0.380	0.260	2.620	10.120	6.030	11.810	7.870	2.070	62.6
1953	1.550	2.730	0.390	0.350	0.060	0.060	1.620	15.270	9.360	16.920	12.200	4.730	65.2
1954	2.570	2.330	0.150	0.160	5.590	0.390	1.920	0.800	1.880	17.300	12.470	4.830	50.4
1955	5.160	1.420	1.540	0.390	0.200	0.400	1.670	8.210	12.420	10.460	12.610	2.490	57.0
1956	2.460	1.350	0.320	0.170	0.970	0.160	1.940	6.010	20.150	9.260	15.890	4.940	63.6
1957	11.520	1.950	0.540	0.160	0.220	1.540	0.790	9.840	9.550	1.760	5.160	8.510	51.5
1958	3.020	1.520	0.650	0.210	0.120	0.330	2.800	21.700	7.220	3.980	8.510	3.950	54.0
1959	1.650	1.680	0.320	0.380	0.430	0.650	1.620	5.100	11.800	2.990	2.750	1.680	31.0
1960	1.300	0.230	0.690	1.450	0.760	0.420	0.470	1.910	7.450	4.030	8.320	8.020	35.1
1961	2.490	0.710	0.270	0.520	0.580	0.900	2.930	1.450	17.900	18.280	15.300	2.860	64.2
1962	8.940	2.320	0.570	0.360	0.230	0.430	0.620	0.550	3.170	10.700	14.200	2.400	44.5
1963	1.380	1.560	1.020	0.340	0.840	0.530	0.700	2.850	5.770	6.110	10.600	2.700	34.4
1964	3.170	0.260	0.310	0.560	0.420	1.660	2.300	5.210	4.620	5.300	8.510	1.620	33.9
1965	1.510	1.010	0.930	0.660	0.490	1.190	1.680	2.800	2.680	13.300	9.760	4.310	40.3
1966	1.080	0.340	0.560	0.480	0.510	0.220	4.570	4.280	13.400	4.700	5.920	2.770	38.8
1967	5.120	1.190	0.760	0.840	0.810	0.590	0.470	8.100	11.100	8.420	7.770	2.030	47.2
1968	3.720	0.510	0.530	1.510	0.910	0.890	1.860	1.110	3.940	4.540	5.800	4.300	29.6
1969	3.620	1.040	0.630	0.560	0.310	0.180	0.170	3.910	7.410	8.020	11.200	6.170	43.2
1970	2.230	0.660	1.210	0.580	0.450	0.570	0.370	1.410	1.520	7.050	7.770	4.240	28.1
1971	1.610	0.970	0.670	0.550	0.810	0.280	0.030	7.820	4.960	2.770	6.020	4.960	31.4
1972	1.350	0.970	0.450	0.270	0.100	0.150	0.040	0.480	1.130	6.550	5.920	4.520	21.9
1973	2.080	0.940	0.640	0.310	0.120	0.200	0.010	2.520	7.350	3.080	20.500	5.700	43.5
1974	5.330	1.630	0.430	0.370	0.400	0.350	0.670	5.380	6.790	11.800	8.140	1.090	42.4
1975	2.910	1.400	0.530	0.150	0.310	0.200	0.170	1.770	2.750	7.620	6.600	4.390	28.8
1976	3.640	5.310	3.770	2.040	0.720	0.680	3.380	10.290	18.500	12.710	9.100	5.130	75.3
1977	2.670	0.860	1.210	0.810	0.430	0.270	1.230	5.030	1.660	2.820	6.960	6.660	30.6
1978	4.470	2.620	0.250	0.330	1.240	1.140	0.360	6.760	8.210	6.310	4.810	3.290	39.8
1979	11.520	1.540	0.510	1.180	0.440	0.600	2.450	4.680	10.660	3.660	2.350	3.060	42.6
1980	2.500	3.680	5.210	5.390	1.540	0.150	4.130	1.340	3.190	11.700	12.830	7.630	59.3
1981	2.070	0.660	0.930	0.970	0.520	0.180	1.130	1.240	3.760	4.140	5.420	2.680	23.7
1982	1.810	0.900	1.460	0.490	1.770	2.680	0.130	8.110	14.980	8.890	5.340	12.310	58.9
1983	2.480	0.690	0.700	0.290	0.020	0.630	0.270	10.350	2.430	9.460	3.100	7.730	38.2
1984	4.020	1.080	4.010	1.670	1.690	4.460	3.570	2.270	8.160	12.060	8.780	3.170	54.9
1985	2.130	1.840	0.290	0.630	0.560	0.690	3.070	3.260	7.540	11.340	15.920	5.400	52.7
1986	1.260	1.100	0.660	1.490	0.690	0.170	1.850	8.440	7.800	9.530	7.830	5.960	46.8
1987	2.270	4.140	1.950	0.210	0.110	0.110	0.900	4.050	5.600	8.840	6.310	7.600	42.1
AVE :	3.58	1.49	0.88	0.65	0.56	0.58	1.52	5.15	7.96	8.39	8.50	5.55	44.8
SD :	3.46	1.01	0.96	0.77	0.78	0.70	1.39	4.22	5.85	4.11	3.97	3.34	14.5

Patched observed flows at G4R002

File : G4R002.NSI
Units : Mm3
Descrip. : From DWAF for 1978 to 1997

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1978	5.010	2.320	2.360	1.760	1.480	2.170	0.880	5.820	9.050	5.060	5.650	4.650	46.2
1979	10.090	1.490	0.750	1.810	1.350	0.730	2.000	5.310	8.050	4.280	10.780	2.140	48.8
1980	3.030	6.800	4.510	8.470	1.180	2.660	3.410	2.840	2.390	11.310	10.980	14.810	72.4
1981	1.350	0.900	1.210	1.100	0.540	0.610	3.700	3.470	5.540	3.850	3.020	5.520	30.8
1982	3.520	1.000	2.110	0.590	2.190	2.140	0.750	7.450	16.640	13.810	5.790	10.990	67.0
1983	3.340	0.730	1.110	0.620	0.710	0.800	0.010	15.280	2.560	11.830	4.100	12.550	53.6
1984	7.030	1.020	3.110	1.620	1.270	4.340	3.270	1.790	7.790	14.960	11.960	3.490	61.7
1985	4.180	2.340	1.000	0.430	0.860	1.580	3.310	2.870	5.840	9.520	19.670	4.640	56.2
1986	2.040	1.700	0.510	0.820	1.000	0.830	2.510	7.730	9.780	7.400	9.380	5.440	49.1
1987	1.510	0.430	2.110	0.340	0.470	1.070	3.530	2.570	5.640	8.780	6.160	7.720	40.3
1988	2.230	1.640	0.390	0.330	0.230	3.470	5.400	5.160	9.020	7.280	10.690	11.640	57.5
1989	7.360	4.040	0.660	0.590	0.730	0.600	3.120	5.790	9.790	12.920	9.370	3.390	58.4
1990	2.560	1.100	0.710	0.480	0.260	0.030	0.600	4.080	9.400	15.930	7.350	12.220	54.7
1991	7.390	2.170	0.700	0.370	0.440	0.180	2.990	3.960	19.640	9.670	8.140	7.580	63.2
1992	13.520	3.500	0.590	0.340	0.810	0.540	11.070	6.500	9.310	24.240	7.320	1.410	79.2
1993	0.330	0.780	1.130	0.410	0.870	0.830	2.040	2.770	14.540	7.020	3.160	3.080	37.0
1994	2.400	0.570	0.760	0.500	0.380	0.310	1.500	4.830	6.560	12.420	10.380	2.270	42.9
1995	9.670	0.460	7.020	0.920	0.430	1.170	1.190	0.490	13.310	10.240	10.810	9.370	65.1
1996	15.520	8.450	6.870	1.520	0.860	0.650	1.670	3.350	12.360	6.910	6.150	3.020	67.3
1997	1.120	4.890	2.080	1.120	0.510	0.840	1.970	8.960	9.210	6.800	5.420	3.430	46.4
AVE :	5.16	2.32	1.98	1.21	0.83	1.28	2.75	5.05	9.32	10.21	8.31	6.47	54.9
SD :	4.27	2.20	1.98	1.78	0.48	1.13	2.36	3.21	4.34	4.79	3.83	4.10	12.4

Patched observed flows at H6H007

File : H6H007.NSI
Units : Mm3
Descrip. : From DWAF for 1963 to 1991

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1963	4.560	3.780	3.420	3.320	4.940	4.090	4.420	5.340	6.920	8.220	9.090	3.450	61.6
1964	3.410	2.820	0.770	0.720	0.600	1.770	3.000	5.910	4.280	4.630	7.050	2.910	37.9
1965	3.000	1.990	1.790	0.680	0.440	2.010	1.400	1.700	4.600	12.070	6.440	4.240	40.4
1966	1.290	0.660	0.500	0.500	0.300	0.340	2.920	3.490	11.580	4.170	4.230	2.350	32.3
1967	2.990	1.400	0.680	0.510	0.400	0.350	0.840	8.940	8.410	7.380	6.190	2.860	41.0
1968	6.040	1.220	0.730	0.690	0.470	0.460	1.150	0.900	2.630	4.330	5.380	6.230	30.2
1969	4.930	1.070	0.600	0.450	0.400	0.390	0.340	2.930	7.610	7.510	8.100	5.020	39.4
1970	1.850	1.000	0.920	0.550	0.390	0.410	0.490	1.270	1.550	8.920	7.460	2.550	27.4
1971	1.130	0.820	0.560	0.520	0.550	0.400	0.480	3.840	4.080	1.850	5.150	2.950	22.3
1972	1.100	0.510	0.460	0.350	0.300	0.350	0.270	0.580	0.660	8.230	5.660	3.170	21.6
1973	1.800	0.640	1.350	0.380	0.340	0.350	0.310	1.280	6.830	3.660	22.110	5.680	44.7
1974	3.920	1.770	0.780	0.480	0.380	0.390	1.290	7.480	5.310	8.780	7.860	2.000	40.4
1975	2.640	1.110	0.640	0.400	0.360	0.380	0.370	0.560	11.940	9.910	3.880	1.930	34.1
1976	1.510	4.130	3.140	1.550	0.850	0.770	1.930	8.260	9.510	8.130	9.060	1.720	50.6
1977	1.460	0.810	0.970	0.580	0.410	0.530	1.050	2.640	1.070	1.020	8.500	4.130	23.2
1978	2.150	1.510	1.020	0.980	0.810	0.750	0.470	4.110	6.230	3.440	5.100	3.360	29.9
1979	5.560	1.130	0.670	0.730	0.450	0.390	1.070	2.960	3.820	2.580	3.470	1.820	24.7
1980	1.440	3.500	3.170	3.740	1.100	0.810	1.010	0.990	1.960	7.010	6.740	7.640	39.1
1981	1.440	0.930	0.610	0.600	0.370	0.390	1.930	3.390	5.080	4.200	3.650	2.350	24.9
1982	2.630	1.060	1.340	0.610	0.830	1.080	0.500	5.080	12.330	7.950	4.020	7.090	44.5
1983	2.540	1.110	0.620	0.390	0.400	0.740	1.490	9.780	2.250	6.130	3.000	7.670	36.1
1984	3.900	0.590	1.380	1.230	1.300	4.990	2.690	2.500	7.220	8.770	10.030	7.100	51.7
1985	6.530	6.960	7.120	5.180	3.120	0.970	2.550	3.950	7.200	9.190	9.750	4.780	67.3
1986	1.500	1.080	0.700	0.620	0.470	0.500	1.040	6.870	8.310	6.450	8.430	6.650	42.6
1987	2.570	0.940	1.670	0.560	0.400	0.450	2.840	3.710	6.980	6.320	5.060	6.470	38.0
1988	2.410	1.090	0.570	0.440	0.420	2.250	2.610	4.490	5.310	8.580	7.780	7.950	43.9
1989	4.310	2.220	0.800	0.560	0.600	0.490	3.940	5.940	7.440	9.500	6.570	2.460	44.8
1990	0.910	0.890	0.710	0.490	0.910	0.430	0.490	9.610	14.460	13.440	6.510	7.500	56.4
1991	3.030	1.540	0.720	0.510	0.550	0.530	2.370	3.180	17.420	11.190	5.920	8.430	55.4
AVE :	2.85	1.66	1.32	0.98	0.79	0.96	1.56	4.20	6.65	7.02	6.97	4.57	39.5
SD :	1.56	1.39	1.38	1.13	0.96	1.12	1.16	2.72	4.05	3.04	3.51	2.23	11.8

Patched observed flows at H6H008

File : H6H008.NSI
Units : Mm3
Descrip. : From DWAF for 1963 to 1991

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1963	2.800	4.640	5.360	3.860	5.910	4.600	5.940	9.090	9.980	8.750	13.060	4.930	78.9
1964	5.460	5.330	0.650	0.710	1.250	4.720	8.270	8.560	5.360	6.090	11.940	4.680	63.0
1965	2.250	3.340	1.930	1.830	0.570	5.300	3.910	2.730	7.660	21.670	10.280	6.630	68.1
1966	1.080	0.990	0.600	1.040	0.300	0.560	5.970	7.150	13.060	9.380	7.050	6.740	53.9
1967	6.470	2.660	0.770	1.150	0.870	0.410	3.430	15.250	15.460	11.800	10.680	2.650	71.6
1968	9.240	1.250	1.080	1.730	0.940	0.910	2.360	1.860	8.200	6.590	12.340	11.530	58.0
1969	7.320	0.730	0.580	0.380	0.530	0.340	0.320	9.760	14.600	11.070	10.790	8.210	64.6
1970	3.050	1.110	1.790	0.700	0.590	1.010	1.590	4.530	5.500	13.790	13.160	3.290	50.1
1971	1.860	1.700	1.210	0.900	1.260	0.440	1.090	9.760	7.650	3.060	8.020	6.350	43.3
1972	1.200	1.810	0.970	0.390	0.280	1.380	1.010	1.960	1.550	15.090	8.790	8.690	43.1
1973	3.750	1.490	2.850	0.560	0.360	0.340	0.290	4.480	13.120	6.210	24.760	7.590	65.8
1974	6.260	2.080	0.580	1.000	0.840	0.950	4.810	12.850	7.850	14.430	11.630	3.560	66.8
1975	4.900	2.260	1.040	0.340	0.220	0.470	0.850	3.670	25.880	13.850	4.770	4.690	62.9
1976	4.970	8.560	9.310	4.170	1.440	1.360	5.700	16.670	27.350	14.650	16.110	6.060	116.4
1977	2.700	1.260	2.870	1.180	0.440	0.910	2.880	6.280	1.890	5.740	13.020	7.880	47.1
1978	4.990	2.610	2.880	1.380	1.060	1.210	0.790	9.620	10.470	7.000	7.390	5.990	55.4
1979	10.440	0.930	0.280	1.240	1.390	0.540	6.060	10.540	10.340	4.410	8.380	2.890	57.4
1980	3.450	6.770	6.170	5.170	0.820	1.970	2.680	2.190	4.920	12.600	10.540	12.920	70.2
1981	1.200	1.630	2.670	1.620	0.340	1.010	5.950	5.000	8.480	5.720	5.540	6.370	45.5
1982	4.750	1.810	2.980	0.670	2.230	5.140	7.330	15.040	16.430	13.290	6.120	10.530	86.3
1983	2.610	0.820	0.960	0.500	0.500	1.400	2.340	14.740	4.500	11.600	6.140	11.210	57.3
1984	7.570	1.430	4.260	2.880	2.290	6.060	4.060	4.260	11.120	10.070	9.820	5.170	69.0
1985	4.580	2.830	1.810	0.610	0.730	2.650	5.060	6.550	13.750	11.470	17.780	6.300	74.1
1986	1.860	2.020	0.620	0.930	0.470	0.820	2.820	11.500	11.740	9.810	10.390	6.300	59.3
1987	1.920	0.640	3.400	0.480	0.340	1.140	6.740	7.230	7.430	10.680	7.930	7.690	55.6
1988	3.540	1.950	0.630	0.340	0.500	5.600	5.720	7.140	9.430	10.760	11.140	9.660	66.4
1989	5.970	3.220	0.590	0.430	1.970	1.230	9.350	7.430	9.540	16.750	8.410	3.580	68.5
1990	1.210	1.620	1.050	0.430	0.560	0.750	1.340	8.510	12.300	14.240	7.220	11.420	60.7
1991	6.130	2.030	0.660	0.400	1.030	1.870	6.870	6.730	18.200	11.740	7.020	10.750	73.4
AVE :	4.26	2.40	2.09	1.28	1.04	1.90	3.98	7.97	10.82	10.77	10.35	7.04	63.9
SD :	2.47	1.83	2.05	1.23	1.10	1.82	2.57	4.17	5.98	4.13	4.14	2.85	14.5

Patched observed flows at H6R001

File : H6R001.NSI
Units : Mm3
Descrip. : From DWAF for 1987 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1987	9.640	3.010	7.980	0.990	0.020	1.210	14.580	27.740	35.320	38.930	34.330	42.230	216.0
1988	11.350	5.590	4.110	1.170	0.750	7.100	20.670	31.320	42.520	51.910	58.710	62.570	297.8
1989	25.910	15.050	3.600	1.590	6.470	2.370	31.250	39.400	51.700	90.410	56.380	15.490	339.6
1990	4.920	5.970	4.630	1.650	1.970	1.840	1.500	33.070	94.640	105.690	59.600	72.230	387.7
1991	24.340	13.690	7.430	4.730	5.510	8.390	18.510	21.030	142.700	83.470	34.190	27.100	391.1
1992	62.420	14.840	8.160	5.320	3.620	2.620	58.740	49.700	51.680	185.480	40.910	10.040	493.5
1993	8.350	2.340	2.620	4.650	0.000	6.890	4.040	3.220	148.830	58.920	20.290	13.810	274.0
1994	22.850	12.850	3.610	5.170	4.680	4.630	8.440	42.320	39.170	77.690	64.690	11.410	297.5
1995	36.700	8.950	1.590	2.920	5.160	5.930	8.610	0.190	121.850	71.840	58.120	70.350	392.2
1996	58.440	42.290	9.570	5.950	5.740	8.050	10.360	12.330	112.520	32.400	54.050	23.910	375.6
1997	4.110	18.720	10.530	4.480	0.000	7.890	19.810	72.140	26.870	74.840	30.410	22.480	292.3
1998	3.530	27.670	14.150	3.930	3.200	0.520	0.010	9.710	41.410	55.970	61.550	71.420	293.1
1999	19.560	17.050	4.700	0.490	0.000	0.000	5.020	18.010	26.110	51.090	73.780	36.750	252.6
2000	13.420	11.490	5.530	3.880	4.760	5.760	12.960	36.360	29.820	128.410	94.550	80.130	427.1
2001	30.410	12.500	11.230	19.820	10.350	7.470	18.120	24.050	28.770	96.630	56.500	24.900	340.8
2002	19.370	5.990	2.570	0.000	3.030	3.600	4.690	4.910	2.040	5.320	60.630	38.240	150.4
2003	21.050	11.370	4.440	3.120	0.000	0.000	3.990	0.000	21.270	27.360	62.460	8.260	163.3
2004	21.940	1.460	3.230	1.320	0.540	2.010	20.760	10.810	86.790	49.690	79.980	24.890	303.4
AVE :	22.13	12.82	6.09	3.95	3.10	4.24	14.56	24.24	61.33	71.45	55.62	36.46	316.0
SD :	16.74	9.86	3.51	4.37	2.95	2.99	13.82	19.33	44.74	41.43	18.27	24.32	88.7

Patched observed flows at H6R002

File : H6R002.NSI
Units : Mm3
Descrip. : From DWAF for 1979 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1979	2.650	0.560	0.270	0.560	0.400	0.000	0.150	1.250	1.810	1.650	2.170	1.260	12.7
1980	0.750	2.390	2.470	3.600	1.100	0.550	0.620	0.490	0.920	4.110	4.690	8.220	29.9
1981	1.730	0.630	0.320	0.230	0.160	0.170	0.870	0.900	1.800	1.680	1.520	1.070	11.1
1982	0.930	0.330	0.260	0.200	0.200	0.350	0.130	2.630	6.660	8.280	2.820	4.300	27.1
1983	1.910	0.580	0.320	0.170	0.110	0.180	0.440	8.420	1.440	5.660	2.540	8.380	30.2
1984	4.020	0.910	0.820	0.700	0.640	2.720	1.030	0.820	3.870	6.080	5.320	2.220	29.2
1985	1.290	1.060	0.660	0.240	0.090	0.230	0.740	1.090	2.930	3.480	5.390	2.560	19.8
1986	1.000	0.810	0.280	0.140	0.020	0.060	0.270	3.430	4.180	2.100	4.270	2.580	19.1
1987	1.290	0.460	0.370	0.090	0.040	0.130	1.420	1.170	2.920	2.150	2.230	3.630	15.9
1988	1.320	0.500	0.150	0.040	0.070	0.420	0.950	1.390	2.410	3.610	3.990	7.060	21.9
1989	2.880	0.980	0.360	0.150	0.090	0.200	1.020	2.990	3.540	6.190	4.390	1.350	24.1
1990	0.680	0.530	0.240	0.190	0.070	0.110	0.340	1.160	4.280	7.220	4.840	5.640	25.3
1991	2.060	1.150	0.400	0.200	0.140	0.180	0.710	0.830	8.190	6.010	3.900	2.520	26.3
1992	3.420	1.420	0.530	0.250	0.170	0.160	6.030	2.350	3.410	13.450	4.550	1.300	37.0
1993	0.910	0.430	0.430	0.250	0.670	0.910	0.270	0.140	8.750	4.470	1.970	2.030	21.2
1994	1.550	0.510	0.320	0.330	0.170	0.220	0.200	0.970	1.600	4.320	4.530	1.520	16.2
1995	3.020	1.170	1.110	0.430	0.300	0.270	0.270	0.460	8.920	7.380	5.250	6.330	34.9
1996	5.670	4.520	2.000	0.780	0.450	0.420	0.590	1.540	6.840	3.230	2.900	1.730	30.7
1997	0.630	1.510	0.750	0.590	0.420	0.390	0.450	3.820	1.810	3.180	1.480	0.940	16.0
1998	0.660	0.800	0.430	0.130	0.110	0.360	0.200	0.590	1.120	2.820	4.130	4.510	15.9
1999	1.720	0.560	0.470	0.350	0.380	0.330	0.230	0.510	1.870	3.720	2.630	3.230	16.0
2000	1.030	0.480	0.270	0.270	0.250	0.300	0.140	1.600	1.520	8.150	6.200	8.120	28.3
2001	3.050	1.010	0.780	0.960	0.440	0.460	1.080	1.060	1.710	5.730	7.320	2.590	26.2
2002	1.610	0.720	0.330	0.100	0.490	1.370	0.630	0.390	0.430	0.390	2.850	2.160	11.5
2003	1.020	0.620	0.170	0.200	0.180	0.220	0.190	0.130	0.500	0.880	1.810	0.480	6.4
2004	1.280	0.270	0.110	0.060	0.080	0.060	1.480	0.840	4.230	2.910	4.480	2.260	18.1
AVE :	1.85	0.96	0.56	0.43	0.28	0.41	0.79	1.58	3.37	4.57	3.78	3.38	22.0
SD :	1.22	0.86	0.55	0.69	0.25	0.55	1.14	1.70	2.53	2.85	1.52	2.43	7.8

APPENDIX D:

NATURALISED INCREMENTAL FLOW SEQUENCES

APPENDIX NUMBER	BASIN	CALIBRATION GAUGE
D1	DIEP	G2H012
D2	DIEP	G2H013
D3	DIEP	G2H014
D4	DIEP	G2H042
D5	EERSTE	G2H005
D6	EERSTE	G2H015
D7	LOURENS	G2H016
D8	EERSTE	G2H020
D9	EERSTE	G2H037
D10	PALMIET	G4H005
D11	PALMIET	G4H007 (1)
D12	PALMIET	G4H007 (2)
D13	PALMIET	G4H030
D14	STEENBRAS	G4R001
D15	STEENBRAS	G4R002
D16	RIVIERSONDEREND	H6H007
D17	RIVIERSONDEREND	H6H008
D18	RIVIERSONDEREND	H6R001
D19	RIVIERSONDEREND	H6R002

(1) excluding G4H030

(2) including G4H030

Incremental Naturalised Flows at G2h012

File : G2H012.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.400	0.320	0.240	0.200	0.180	0.180	0.170	0.170	2.490	1.020	0.610	0.720	6.7
1928	0.620	0.390	0.250	0.200	0.180	0.170	0.250	0.410	0.470	1.040	1.040	0.950	6.0
1929	0.710	0.430	0.270	0.210	0.190	0.180	0.180	0.190	0.190	0.250	0.360	1.940	5.1
1930	1.030	0.500	0.310	0.210	0.180	0.180	0.290	0.320	0.360	0.430	1.070	1.040	5.9
1931	0.850	0.520	0.280	0.200	0.220	0.210	0.190	0.960	0.740	0.750	0.860	0.940	6.7
1932	0.790	0.460	0.260	0.200	0.180	0.180	0.170	0.190	2.880	2.210	1.350	1.120	10.0
1933	0.860	0.550	0.320	0.220	0.190	0.200	0.200	0.250	0.320	0.400	0.500	0.650	4.7
1934	0.630	0.460	0.290	0.200	0.180	0.170	0.190	0.250	0.320	0.430	0.620	0.720	4.5
1935	0.630	0.410	0.250	0.200	0.190	0.180	0.180	0.200	0.230	0.350	0.550	0.680	4.1
1936	0.600	0.380	0.250	0.200	0.180	0.180	0.200	0.330	1.250	1.950	1.400	1.000	7.9
1937	0.710	0.420	0.250	0.200	0.180	0.180	0.200	0.270	0.350	0.410	0.490	0.590	4.3
1938	0.540	0.370	0.250	0.200	0.180	0.170	0.180	0.620	0.440	0.440	0.800	0.820	5.0
1939	0.640	0.390	0.240	0.190	0.180	0.190	0.220	0.310	0.860	0.790	0.790	0.800	5.6
1940	0.680	0.480	0.310	0.210	0.190	0.180	0.360	6.640	8.020	12.370	14.410	15.860	59.7
1941	4.040	0.630	0.320	0.210	0.180	0.170	0.170	1.090	9.330	3.210	8.720	2.990	31.1
1942	0.810	0.470	0.270	0.200	0.180	0.180	0.190	0.210	0.260	0.810	1.620	1.280	6.5
1943	0.950	0.600	0.330	0.220	0.180	0.170	0.180	0.380	5.720	2.400	9.560	3.260	24.0
1944	0.960	0.620	0.370	0.240	0.190	0.180	0.180	1.050	2.620	9.520	12.090	3.310	31.3
1945	0.760	0.450	0.260	0.200	0.180	0.170	0.180	0.260	0.340	0.530	0.800	1.780	5.9
1946	1.250	0.690	0.360	0.220	0.180	0.180	0.190	0.210	0.260	3.380	1.560	0.860	9.3
1947	0.670	0.440	0.260	0.190	0.180	0.180	0.180	0.300	0.350	1.970	1.270	1.110	7.1
1948	1.000	0.620	0.320	0.210	0.180	0.170	0.240	0.260	0.360	0.610	0.950	0.990	5.9
1949	0.840	0.550	0.320	0.210	0.180	0.170	0.740	0.410	0.310	9.220	3.070	0.920	16.9
1950	0.770	0.520	0.320	0.230	0.190	0.180	0.360	0.320	4.370	1.930	6.330	2.450	18.0
1951	0.910	0.600	0.340	0.220	0.180	0.180	0.180	0.580	0.480	0.660	1.630	1.390	7.3
1952	1.030	0.660	0.370	0.220	0.180	0.180	0.960	3.530	1.510	2.000	13.740	4.170	28.6
1953	0.760	0.460	0.280	0.210	0.180	0.180	0.200	6.830	2.410	22.960	15.920	3.470	53.9
1954	0.920	0.560	0.310	0.210	0.190	0.190	0.190	0.200	0.400	0.660	6.760	2.590	13.2
1955	0.950	0.620	0.340	0.220	0.180	0.180	0.180	0.220	2.890	1.770	12.080	3.840	23.5
1956	0.840	0.500	0.270	0.200	0.200	0.200	0.190	0.890	1.250	8.450	7.770	2.350	23.1
1957	1.360	0.820	0.370	0.220	0.190	0.180	0.180	0.430	0.410	0.430	0.880	0.760	6.2
1958	0.600	0.410	0.250	0.190	0.180	0.180	0.200	10.870	3.300	0.700	0.980	0.930	18.8
1959	0.750	0.480	0.270	0.190	0.180	0.170	0.180	0.520	0.880	0.720	0.630	0.560	5.5
1960	0.450	0.310	0.220	0.180	0.180	0.170	0.170	0.190	0.890	0.630	0.690	1.150	5.2
1961	0.900	0.490	0.270	0.200	0.180	0.190	0.200	0.230	21.310	6.090	5.880	2.330	38.3
1962	1.040	0.690	0.350	0.220	0.180	0.170	0.170	0.170	0.200	0.820	1.570	1.060	6.6
1963	0.700	0.430	0.280	0.210	0.190	0.190	0.190	0.210	1.090	0.750	0.950	0.920	6.1
1964	0.720	0.480	0.290	0.210	0.200	0.240	0.260	0.330	0.420	0.480	0.680	0.690	5.0
1965	0.530	0.340	0.230	0.190	0.180	0.190	0.200	0.210	0.260	2.000	1.180	0.890	6.4
1966	0.700	0.410	0.240	0.190	0.180	0.170	0.180	0.210	1.430	0.830	0.660	0.680	5.9
1967	0.620	0.450	0.280	0.200	0.180	0.170	0.330	0.550	0.630	2.050	3.690	1.670	10.8
1968	0.960	0.620	0.330	0.220	0.190	0.180	0.190	0.200	0.270	0.340	0.500	0.620	4.6
1969	0.610	0.420	0.250	0.190	0.180	0.170	0.170	0.410	0.830	0.920	1.000	1.030	6.2
1970	0.830	0.500	0.280	0.200	0.180	0.170	0.170	0.170	0.500	0.500	0.740	0.720	5.0
1971	0.520	0.330	0.220	0.180	0.180	0.170	0.180	0.300	0.370	0.470	0.580	0.620	4.1
1972	0.510	0.330	0.230	0.190	0.180	0.190	0.190	0.200	0.220	1.990	1.080	0.850	6.2
1973	0.730	0.450	0.280	0.210	0.180	0.170	0.170	0.630	2.510	1.270	28.260	8.010	42.9
1974	1.080	0.690	0.350	0.220	0.190	0.180	0.190	1.410	0.800	1.480	1.300	1.060	9.0
1975	0.830	0.550	0.310	0.200	0.180	0.170	0.270	0.270	3.140	1.460	0.940	0.890	9.2
1976	0.650	0.750	0.440	0.260	0.200	0.190	0.250	4.320	12.250	24.460	17.080	3.860	64.7
1977	0.920	0.540	0.310	0.210	0.180	0.180	0.190	0.230	0.250	0.250	0.540	0.530	4.3
1978	0.450	0.320	0.230	0.200	0.200	0.190	0.180	0.250	0.400	0.470	0.570	0.640	4.1
1979	0.610	0.430	0.260	0.200	0.180	0.180	0.190	0.310	0.450	0.520	0.590	0.590	4.5
1980	0.470	0.850	0.470	0.270	0.210	0.190	0.190	0.210	0.230	1.040	1.000	1.100	6.2
1981	0.900	0.530	0.300	0.220	0.190	0.190	0.330	0.350	0.700	0.820	0.960	0.890	6.4
1982	0.700	0.470	0.300	0.230	0.200	0.190	0.190	2.620	3.480	5.460	2.220	1.210	17.3
1983	0.910	0.530	0.300	0.210	0.180	0.190	0.200	4.950	1.740	0.710	0.770	1.220	11.9
1984	1.080	0.670	0.400	0.270	0.220	0.330	0.300	0.320	0.720	1.350	2.050	1.380	9.1
1985	0.950	0.570	0.310	0.210	0.180	0.180	0.190	0.220	0.810	1.100	3.220	1.740	9.7
1986	0.940	0.550	0.300	0.210	0.190	0.180	0.190	0.750	0.960	3.050	14.140	6.900	28.4
1987	1.660	0.590	0.320	0.220	0.180	0.170	0.320	0.310	0.400	0.630	0.810	0.890	6.5
1988	0.750	0.480	0.280	0.200	0.180	0.200	0.230	0.320	0.440	0.930	1.210	1.270	6.5
1989	1.070	0.680	0.360	0.220	0.190	0.190	1.710	1.030	1.220	8.650	3.130	1.150	19.6
1990	0.810	0.460	0.270	0.200	0.180	0.180	0.180	0.240	1.130	3.540	1.830	4.210	13.2
1991	1.910	0.760	0.370	0.220	0.190	0.190	0.200	0.250	4.050	2.080	1.260	1.170	12.7
1992	1.170	0.760	0.370	0.220	0.190	0.180	0.610	2.220	1.240	17.750	9.290	2.170	36.2
1993	0.880	0.490	0.270	0.200	0.180	0.180	0.190	0.210	11.930	3.650	0.830	0.810	19.8
1994	0.680	0.420	0.250	0.190	0.180	0.170	0.170	0.190	0.810	1.540	1.320	1.080	7.0
1995	0.910	0.590	0.860	0.410	0.230	0.210	0.210	0.250	2.680	1.480	5.220	9.760	22.8
1996	2.980	0.740	0.410	0.250	0.190	0.180	0.180	0.210	3.010	1.310	0.850	0.810	11.1
1997	0.570	0.370	0.250	0.190	0.180	0.170	0.180	1.260	0.650	0.500	0.590	0.590	5.5
1998	0.470	0.360	0.270	0.200	0.180	0.170	0.180	0.220	0.350	0.490	1.960	6.750	11.6
1999	2.310	0.560	0.300	0.200	0.180	0.170	0.170	0.180	0.210	0.380	0.470	0.590	5.7
2000	0.530	0.350	0.230	0.190	0.180	0.170	0.170	0.830	0.500	9.900	10.410	3.010	26.5
2001	1.030	0.600	0.310	0.230	0.210	0.190	0.190	1.570	0.870	1.320	7.140	2.550	16.2
2002	0.760	0.450	0.260	0.200	0.180	0.180	0.190	0.200	0.210	0.230	6.410	2.280	11.6
2003	0.760	0.480	0.290	0.220	0.190	0.180	0.190	0.190	0.400	0.820	0.820	0.810	5.3
2004	0.870	0.580	0.300	0.210	0.190	0.180	0.600	0.470	1.240	1.020	7.480	2.800	15.9
AVE :	0.90	0.52	0.30	0.21	0.19	0.18	0.25	0.90	1.85	2.72	3.65	1.96	13.6
SD :	0.53	0.12	0.08	0.03	0.01	0.02	0.21	1.73	3.26	4.62	5.11	2.35	12.9

Incremental Naturalised Flows at G2h013

File : G2H013.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.720	0.520	0.390	0.320	0.290	0.290	0.300	0.300	3.870	0.940	1.540	1.800	11.3
1928	1.250	0.650	0.380	0.300	0.290	0.280	0.760	0.650	0.740	1.840	1.900	1.580	10.6
1929	1.040	0.560	0.360	0.310	0.300	0.290	0.310	0.320	0.350	0.580	0.890	5.120	10.4
1930	1.390	0.750	0.400	0.300	0.300	0.290	0.720	0.860	0.740	0.970	2.890	2.180	11.8
1931	1.750	0.850	0.390	0.300	0.680	0.350	0.320	3.190	2.330	1.640	1.880	1.820	15.5
1932	1.250	0.610	0.380	0.320	0.290	0.290	0.290	0.500	4.180	3.450	2.400	1.890	15.9
1933	1.280	0.740	0.390	0.300	0.290	0.290	0.290	1.890	0.750	0.970	2.030	1.720	10.9
1934	1.290	0.700	0.370	0.300	0.280	0.280	0.530	0.960	0.760	2.710	2.100	2.030	12.3
1935	1.440	0.750	0.390	0.350	0.310	0.300	0.300	0.620	0.740	1.230	1.650	1.830	9.9
1936	1.270	0.630	0.380	0.320	0.290	0.290	0.360	1.150	4.700	25.120	2.380	1.940	38.8
1937	1.320	0.670	0.360	0.310	0.290	0.290	0.850	0.930	0.890	1.240	1.430	1.660	10.2
1938	1.190	0.640	0.380	0.300	0.390	0.310	0.380	3.000	1.010	2.660	2.710	1.970	14.9
1939	1.180	0.630	0.400	0.310	0.420	0.360	0.470	0.730	1.940	1.440	1.500	1.430	10.8
1940	1.130	0.750	0.420	0.320	0.300	0.290	3.140	4.700	8.080	13.490	7.650	12.170	52.4
1941	1.870	0.910	0.430	0.320	0.290	0.280	0.320	3.780	8.060	2.220	13.050	2.030	33.6
1942	1.380	0.690	0.360	0.310	0.300	0.310	0.320	0.430	0.670	1.940	3.610	2.040	12.4
1943	1.470	0.790	0.400	0.300	0.290	0.280	0.300	2.560	8.070	7.050	27.170	2.140	50.8
1944	1.570	0.840	0.460	0.330	0.290	0.280	0.300	6.820	8.500	49.460	11.570	1.840	82.3
1945	1.080	0.570	0.350	0.300	0.280	0.290	0.310	0.520	0.540	1.500	1.290	4.180	11.2
1946	1.670	0.830	0.400	0.300	0.280	0.310	0.320	0.960	0.720	8.730	2.710	1.990	19.2
1947	1.270	0.630	0.350	0.290	0.280	0.290	0.330	1.550	1.270	4.420	2.300	2.360	15.3
1948	1.720	0.830	0.400	0.310	0.290	0.280	0.530	0.500	0.750	1.320	1.740	1.990	10.7
1949	1.360	0.710	0.380	0.300	0.280	0.280	2.820	0.570	0.690	13.950	2.140	2.770	26.3
1950	1.640	0.890	0.480	0.340	0.300	0.280	9.550	1.020	33.530	16.970	2.300	2.000	69.3
1951	1.410	0.840	0.430	0.300	0.280	0.290	0.300	0.470	0.690	1.770	3.320	11.620	21.7
1952	1.760	1.280	0.520	0.310	0.290	0.290	7.400	5.820	2.360	15.580	13.880	1.920	51.4
1953	1.130	0.620	0.370	0.300	0.290	0.290	0.480	5.170	2.170	40.160	16.480	2.070	69.5
1954	1.420	0.710	0.380	0.300	0.690	0.340	0.320	0.340	1.040	5.690	32.220	2.160	45.6
1955	1.660	0.900	0.430	0.310	0.290	0.300	0.350	3.460	5.090	10.230	27.120	2.110	52.3
1956	1.450	0.700	0.370	0.300	0.300	0.310	0.310	7.250	5.720	32.710	26.310	2.160	77.9
1957	3.050	1.090	0.430	0.300	0.330	0.310	0.390	1.840	1.670	1.320	2.330	1.680	14.7
1958	1.230	0.680	0.370	0.300	0.290	0.290	2.790	20.770	2.010	1.770	2.540	1.980	35.0
1959	1.390	0.690	0.360	0.300	0.290	0.290	0.300	1.560	9.690	1.930	1.770	1.560	20.1
1960	1.060	0.530	0.330	0.300	0.290	0.290	0.290	0.400	2.610	1.310	2.710	6.400	16.5
1961	1.690	0.740	0.360	0.300	0.310	0.360	0.510	0.470	39.270	10.750	26.140	2.170	83.1
1962	3.560	1.220	0.490	0.310	0.290	0.280	0.280	0.300	0.840	2.030	2.960	1.850	14.4
1963	1.210	0.690	0.420	0.310	0.340	0.310	0.300	0.400	3.770	2.190	9.150	2.020	21.1
1964	1.410	0.880	0.450	0.320	0.310	0.370	0.630	0.840	1.120	1.190	2.750	1.740	12.0
1965	1.190	0.620	0.400	0.320	0.290	0.600	0.390	0.510	0.810	2.720	3.110	2.310	13.3
1966	1.490	0.700	0.390	0.310	0.290	0.280	0.770	0.560	3.950	1.660	1.670	1.490	13.6
1967	1.230	0.760	0.410	0.310	0.290	0.280	0.470	2.290	5.330	30.240	12.630	1.920	56.2
1968	1.820	0.830	0.390	0.330	0.300	0.290	0.350	0.350	1.350	0.910	2.220	1.780	10.9
1969	1.390	0.740	0.370	0.300	0.290	0.290	0.280	1.670	3.580	2.510	11.650	2.500	25.6
1970	1.730	0.810	0.410	0.320	0.290	0.290	0.290	0.460	0.790	1.290	2.270	1.550	10.5
1971	1.030	0.550	0.340	0.320	0.300	0.290	0.410	0.860	1.120	1.180	1.640	1.500	9.5
1972	1.020	0.520	0.340	0.290	0.280	0.280	0.290	0.350	0.380	2.720	1.180	1.210	8.9
1973	0.900	0.500	0.350	0.310	0.290	0.290	0.290	3.540	4.790	2.120	59.850	2.540	75.8
1974	1.920	1.010	0.460	0.330	0.300	0.290	0.340	4.760	1.450	10.730	6.870	1.900	30.4
1975	1.300	0.740	0.390	0.300	0.280	0.290	0.330	0.420	10.460	10.150	10.990	2.190	37.8
1976	1.370	1.150	0.610	0.370	0.340	0.310	1.200	4.130	24.370	44.950	31.790	2.160	112.8
1977	1.400	0.660	0.370	0.310	0.290	0.300	0.390	0.470	0.500	0.500	1.490	1.060	7.7
1978	0.880	0.520	0.340	0.310	0.340	0.320	0.310	0.750	1.030	1.070	1.180	1.190	8.2
1979	1.420	0.700	0.360	0.300	0.290	0.290	0.380	1.510	1.580	1.260	1.510	1.320	10.9
1980	0.870	0.880	0.450	0.590	0.340	0.320	0.400	0.400	0.660	4.990	2.180	2.460	14.5
1981	1.530	0.710	0.390	0.320	0.300	0.290	0.600	0.450	1.370	1.380	1.770	1.430	10.5
1982	1.010	0.610	0.420	0.320	0.330	0.340	0.330	3.570	6.830	5.840	2.440	2.220	24.3
1983	1.450	0.660	0.370	0.300	0.290	0.310	0.350	7.170	1.310	2.240	1.940	3.760	20.1
1984	2.140	0.970	0.590	0.390	0.330	0.630	0.620	0.590	2.480	23.440	14.160	2.340	48.7
1985	1.470	0.640	0.350	0.300	0.290	0.320	0.360	0.450	3.170	2.800	22.280	2.140	34.6
1986	1.400	0.690	0.380	0.360	0.320	0.300	0.330	1.630	2.260	10.150	25.230	2.440	45.5
1987	1.600	0.760	0.420	0.320	0.290	0.290	0.680	0.590	0.840	1.890	2.760	2.130	12.6
1988	1.480	0.710	0.380	0.310	0.300	0.580	0.780	0.890	1.060	3.580	18.100	8.250	36.4
1989	1.870	1.070	0.490	0.320	0.320	0.300	4.870	1.260	5.100	52.090	2.320	1.860	71.9
1990	1.140	0.570	0.370	0.310	0.290	0.290	0.290	1.190	9.670	45.720	2.290	7.790	69.9
1991	1.790	0.840	0.410	0.310	0.340	0.310	0.950	1.130	9.150	11.630	2.450	2.240	31.6
1992	1.900	0.930	0.410	0.310	0.290	0.290	14.370	6.910	8.160	41.320	6.660	1.990	83.5
1993	1.170	0.550	0.350	0.300	0.290	0.280	0.300	0.450	20.020	7.790	2.180	1.780	35.5
1994	1.210	0.620	0.350	0.300	0.290	0.300	0.300	0.430	1.760	3.560	2.620	2.030	13.8
1995	1.300	0.670	0.390	0.310	0.320	0.330	0.370	0.540	3.240	14.410	19.640	18.090	59.6
1996	3.570	1.330	0.600	0.370	0.300	0.290	0.760	0.970	4.570	1.650	2.210	1.590	18.2
1997	0.920	0.630	0.380	0.300	0.280	0.280	0.290	6.680	1.900	3.080	2.450	2.020	19.2
1998	1.280	0.870	0.560	0.350	0.290	0.280	0.340	0.870	1.230	1.390	2.090	2.750	12.3
1999	1.510	0.700	0.400	0.310	0.290	0.280	0.290	0.480	1.130	2.560	1.640	3.450	13.0
2000	1.520	0.660	0.360	0.300	0.290	0.280	0.320	3.470	1.220	48.990	35.530	3.350	96.3
2001	1.820	0.910	0.420	0.440	0.340	0.310	0.510	0.750	1.700	3.560	9.690	2.160	22.6
2002	1.520	0.790	0.420	0.320	0.290	0.320	0.320	0.360	0.410	0.640	3.780	2.540	11.7
2003	1.570	0.760	0.420	0.340	0.300	0.290	0.600	0.400	2.420	2.550	2.780	2.040	14.5
2004	3.210	1.060	0.430	0.320	0.300	0.290	1.900	1.750	2.750	1.880	2.650	2.110	18.7
AVE :	1.49	0.76	0.40	0.32	0.31	0.31	0.98	1.97	4.20	9.07	7.85	2.76	30.4
SD :	0.52	0.18	0.06	0.04	0.07	0.06	2.12	2.87	6.66	13.50	10.67	2.63	25.0

Incremental Naturalised Flows at G2H014

File : G2H014.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.0
1928	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1929	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	1.0
1930	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	1.0
1931	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	0.100	1.0
1932	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.0
1933	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1934	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1935	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	1.0
1936	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.100	0.100	0.100	0.100	1.1
1937	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1938	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1939	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.0
1940	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.120	0.100	0.100	0.110	0.110	1.1
1941	0.110	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.170	0.100	0.100	0.100	1.2
1942	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1943	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.140	0.100	0.110	0.110	1.1
1944	0.100	0.100	0.090	0.080	0.080	0.080	0.080	0.100	0.110	0.110	0.110	0.110	1.1
1945	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	1.0
1946	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.100	0.090	0.090	1.0
1947	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1948	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1949	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.210	0.100	0.100	1.1
1950	0.100	0.090	0.090	0.080	0.080	0.080	0.090	0.080	0.210	0.100	0.100	0.100	1.2
1951	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.100	0.100	1.1
1952	0.100	0.090	0.090	0.080	0.080	0.080	0.110	0.100	0.090	0.100	0.100	0.100	1.1
1953	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.190	0.090	0.220	0.120	0.120	1.3
1954	0.110	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.100	0.140	0.100	1.1
1955	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.100	0.100	1.1
1956	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.100	0.090	0.100	0.110	0.110	1.1
1957	0.110	0.100	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.1
1958	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.260	0.090	0.090	0.100	0.100	1.2
1959	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.0
1960	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1961	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.510	0.100	0.100	0.110	1.5
1962	0.100	0.100	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	1.0
1963	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.0
1964	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.0
1965	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1966	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.0
1967	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.100	0.100	0.100	1.1
1968	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	1.0
1969	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.100	1.0
1970	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	1.0
1971	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1972	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1973	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.100	0.090	0.290	0.110	1.2
1974	0.110	0.100	0.090	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.100	0.100	1.1
1975	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.130	0.090	0.100	0.100	1.1
1976	0.090	0.090	0.090	0.080	0.080	0.080	0.080	0.090	0.120	0.120	0.120	0.120	1.2
1977	0.110	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	1.0
1978	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1979	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1980	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.100	0.090	0.100	1.0
1981	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1982	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.100	0.090	0.100	0.100	1.1
1983	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.110	0.090	0.090	0.090	0.100	1.1
1984	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.110	0.100	0.100	1.1
1985	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.100	0.100	1.1
1986	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.100	0.100	0.100	1.1
1987	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1988	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.100	0.100	1.0
1989	0.100	0.090	0.090	0.080	0.080	0.080	0.090	0.090	0.090	0.110	0.110	0.100	1.1
1990	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.140	0.100	0.100	1.1
1991	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.150	0.100	0.100	0.100	1.1
1992	0.100	0.090	0.090	0.080	0.080	0.080	0.110	0.090	0.090	0.140	0.110	0.110	1.2
1993	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.340	0.100	0.100	0.100	1.3
1994	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
1995	0.090	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.100	0.090	0.100	0.100	1.1
1996	0.100	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.090	0.090	0.090	0.090	1.1
1997	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.080	0.090	0.090	0.090	1.0
1998	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.100	0.100	1.0
1999	0.100	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	1.0
2000	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.300	0.100	0.110	1.2
2001	0.100	0.100	0.090	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.100	0.100	1.1
2002	0.090	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.120	0.090	1.0
2003	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.090	1.0
2004	0.090	0.090	0.080	0.080	0.080	0.080	0.080	0.080	0.090	0.090	0.100	0.100	1.0
AVE :	0.09	0.09	0.08	0.08	0.08	0.08	0.08	0.09	0.10	0.10	0.10	0.10	1.1
SD :	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.03	0.02	0.01	0.1

Incremental Naturalised Flows at G2h042

File : G2H042.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	2.460	1.080	0.420	0.170	0.090	0.080	0.080	0.090	1.970	2.070	2.850	3.400	14.8
1928	2.340	0.860	0.290	0.120	0.070	0.060	0.230	0.760	1.340	2.490	3.420	3.040	15.0
1929	1.810	0.700	0.270	0.150	0.100	0.090	0.120	0.160	0.170	0.440	0.960	3.570	8.5
1930	2.670	1.210	0.400	0.110	0.090	0.070	0.320	0.860	1.230	1.570	3.070	4.190	15.8
1931	3.450	1.380	0.310	0.110	0.290	0.250	0.150	1.910	3.150	4.300	4.610	4.360	24.3
1932	2.860	0.990	0.290	0.140	0.090	0.070	0.070	0.240	2.720	5.160	6.170	4.730	23.5
1933	2.850	1.250	0.330	0.110	0.080	0.110	0.120	0.730	1.320	1.810	2.870	3.460	15.0
1934	2.620	1.160	0.310	0.090	0.060	0.060	0.190	0.700	1.190	2.300	3.440	3.760	15.9
1935	2.630	1.110	0.320	0.190	0.140	0.110	0.100	0.320	0.720	1.420	2.330	2.910	12.3
1936	2.090	0.750	0.260	0.130	0.070	0.100	0.240	0.760	3.980	6.820	6.900	4.760	26.9
1937	2.660	0.990	0.240	0.130	0.090	0.070	0.270	0.790	1.310	1.810	2.340	2.630	13.3
1938	1.950	0.800	0.290	0.120	0.110	0.100	0.140	1.110	1.560	2.580	3.950	3.550	16.3
1939	1.910	0.760	0.280	0.110	0.170	0.220	0.350	0.790	2.300	3.280	3.340	2.880	16.4
1940	2.090	1.130	0.390	0.150	0.100	0.070	0.640	4.740	6.490	7.920	8.850	9.620	42.2
1941	6.760	2.500	0.620	0.190	0.080	0.060	0.110	1.220	8.570	6.270	6.690	5.550	38.6
1942	3.190	1.200	0.280	0.130	0.100	0.140	0.170	0.310	0.790	2.160	3.920	4.080	16.5
1943	2.700	1.160	0.320	0.110	0.070	0.060	0.100	1.560	7.380	7.400	9.920	8.480	39.3
1944	5.140	2.120	0.670	0.210	0.080	0.060	0.110	2.760	5.920	10.090	10.890	7.640	45.7
1945	3.540	1.200	0.300	0.100	0.060	0.070	0.100	0.370	0.780	1.690	2.530	4.480	15.2
1946	3.590	1.420	0.350	0.100	0.060	0.100	0.150	0.480	0.960	4.540	4.880	3.840	20.5
1947	2.220	0.900	0.230	0.080	0.060	0.090	0.160	0.690	1.460	3.540	4.440	4.490	18.4
1948	3.340	1.300	0.320	0.120	0.070	0.060	0.220	0.550	1.160	2.330	3.590	4.040	17.1
1949	2.800	1.170	0.340	0.100	0.060	0.050	0.750	0.770	1.040	10.050	5.890	5.020	28.0
1950	3.490	1.510	0.520	0.200	0.090	0.060	1.400	1.480	10.600	7.910	7.640	6.080	41.0
1951	3.750	1.760	0.530	0.130	0.070	0.070	0.130	0.520	1.250	2.650	6.170	7.120	24.2
1952	4.790	2.130	0.670	0.150	0.070	0.060	3.180	4.680	4.860	5.770	7.610	6.050	40.0
1953	2.900	1.120	0.340	0.120	0.090	0.080	0.240	7.540	5.080	15.090	15.740	9.670	58.0
1954	5.480	1.970	0.510	0.160	0.270	0.230	0.190	0.260	0.790	3.860	9.990	7.730	31.4
1955	4.750	2.050	0.540	0.140	0.080	0.090	0.170	1.220	4.030	6.110	8.480	7.090	34.8
1956	3.960	1.420	0.330	0.110	0.140	0.150	0.140	2.400	4.190	8.050	9.680	7.770	38.3
1957	5.740	2.600	0.530	0.130	0.130	0.130	0.210	1.100	2.020	2.230	2.820	2.960	20.6
1958	2.050	0.940	0.250	0.090	0.070	0.080	0.560	10.920	4.940	4.080	4.880	4.630	33.5
1959	3.020	1.180	0.270	0.090	0.060	0.080	0.130	0.740	3.470	3.700	3.130	2.470	18.3
1960	1.510	0.550	0.180	0.100	0.070	0.070	0.100	0.280	1.580	2.500	3.720	5.170	15.8
1961	3.670	1.200	0.260	0.100	0.110	0.160	0.320	0.440	18.530	6.650	8.350	7.190	47.0
1962	5.430	2.650	0.620	0.160	0.080	0.070	0.070	0.110	0.420	1.540	3.720	3.840	18.7
1963	2.200	0.920	0.370	0.130	0.110	0.090	0.080	0.220	1.930	3.200	5.190	4.730	19.2
1964	2.870	1.400	0.430	0.160	0.160	0.260	0.510	1.080	1.810	2.260	3.520	3.530	18.0
1965	2.080	0.770	0.300	0.140	0.070	0.220	0.330	0.480	0.990	3.040	4.570	4.570	17.6
1966	2.700	0.930	0.280	0.130	0.080	0.060	0.200	0.510	2.820	3.450	3.440	2.950	17.6
1967	2.230	1.160	0.360	0.130	0.080	0.060	0.250	1.120	3.160	7.090	8.010	5.910	29.6
1968	3.780	1.650	0.370	0.170	0.100	0.070	0.150	0.200	0.730	1.410	2.560	3.230	14.4
1969	2.570	1.100	0.270	0.100	0.080	0.070	0.060	0.700	2.870	4.470	5.740	5.300	23.3
1970	3.330	1.240	0.360	0.140	0.070	0.070	0.090	0.230	0.730	1.620	3.020	2.940	13.8
1971	1.690	0.650	0.190	0.130	0.110	0.090	0.190	0.650	1.380	1.960	2.500	2.530	12.1
1972	1.570	0.550	0.190	0.090	0.060	0.080	0.080	0.170	0.280	2.120	2.660	2.710	10.6
1973	1.860	0.740	0.290	0.130	0.070	0.060	0.060	0.870	3.960	4.500	16.820	9.920	39.3
1974	6.090	2.560	0.650	0.210	0.110	0.070	0.190	2.050	2.660	4.890	5.850	4.350	29.7
1975	2.570	1.180	0.310	0.090	0.060	0.070	0.190	0.390	5.300	5.170	5.880	4.850	26.1
1976	2.620	1.310	0.750	0.280	0.200	0.170	0.570	3.040	7.510	11.950	21.730	9.820	60.0
1977	5.190	1.770	0.460	0.160	0.090	0.110	0.270	0.530	0.610	0.630	1.220	1.720	12.8
1978	1.370	0.590	0.210	0.140	0.140	0.130	0.110	0.400	1.280	2.110	2.400	2.290	11.2
1979	1.990	0.930	0.220	0.100	0.080	0.060	0.140	0.730	1.730	2.260	2.660	2.450	13.4
1980	1.430	1.140	0.660	0.460	0.240	0.170	0.310	0.380	0.640	3.610	4.700	5.130	18.9
1981	3.280	1.130	0.340	0.160	0.090	0.070	0.230	0.530	1.380	2.520	3.540	3.050	16.3
1982	1.840	0.840	0.360	0.170	0.150	0.190	0.180	1.810	4.550	5.680	5.640	4.700	26.1
1983	2.830	0.980	0.290	0.120	0.070	0.120	0.250	3.870	3.120	3.900	4.110	4.690	24.4
1984	4.330	1.840	0.610	0.320	0.200	0.350	0.610	0.830	1.720	6.000	6.770	6.140	29.7
1985	3.690	1.240	0.280	0.110	0.080	0.120	0.200	0.360	2.230	4.120	6.650	6.180	25.3
1986	3.450	1.270	0.360	0.190	0.140	0.110	0.170	1.260	2.690	6.020	8.530	8.010	32.2
1987	4.660	1.610	0.480	0.160	0.070	0.080	0.340	0.740	1.250	2.370	3.990	4.240	20.0
1988	2.800	1.070	0.300	0.120	0.100	0.240	0.550	1.070	1.730	3.780	5.840	6.590	24.2
1989	4.770	2.080	0.580	0.160	0.130	0.100	1.780	2.010	4.600	9.220	8.740	6.060	40.2
1990	3.030	1.010	0.340	0.140	0.080	0.070	0.090	0.490	3.160	9.510	7.790	6.810	32.5
1991	5.130	2.030	0.490	0.140	0.110	0.130	0.300	0.870	7.260	6.690	6.740	5.340	35.2
1992	3.870	1.720	0.400	0.120	0.090	0.080	3.240	4.150	5.290	11.510	10.560	7.610	48.6
1993	3.750	1.160	0.330	0.130	0.080	0.060	0.130	0.330	13.210	5.850	5.080	4.110	34.2
1994	2.580	0.890	0.240	0.100	0.070	0.070	0.080	0.220	1.650	4.260	5.710	4.670	20.5
1995	3.080	1.390	0.650	0.300	0.210	0.200	0.220	0.500	3.650	4.900	6.400	7.630	29.1
1996	6.140	2.880	0.920	0.290	0.110	0.070	0.130	0.460	3.050	3.380	3.940	3.260	24.6
1997	1.570	0.680	0.250	0.090	0.060	0.060	0.090	1.830	2.100	2.920	3.360	2.750	15.8
1998	1.600	0.890	0.440	0.150	0.070	0.050	0.150	0.450	1.350	2.470	5.490	7.010	20.1
1999	4.450	1.460	0.420	0.140	0.070	0.060	0.060	0.140	0.490	1.440	2.220	2.890	13.8
2000	2.080	0.730	0.210	0.090	0.070	0.060	0.090	1.230	1.670	14.210	10.090	9.100	39.6
2001	5.550	2.050	0.480	0.300	0.240	0.130	0.220	1.030	2.080	4.060	5.720	5.020	26.9
2002	2.960	1.180	0.350	0.130	0.070	0.100	0.150	0.250	0.350	0.550	4.730	4.310	15.1
2003	3.160	1.160	0.360	0.200	0.100	0.080	0.240	0.330	1.100	2.790	4.050	3.680	17.3
2004	3.500	1.760	0.380	0.160	0.100	0.070	0.620	1.450	3.490	4.200	5.560	5.420	26.7
AVE :	3.21	1.31	0.38	0.15	0.10	0.10	0.33	1.21	2.99	4.49	5.69	5.01	25.0
SD :	1.26	0.53	0.15	0.06	0.05	0.06	0.54	1.67	3.01	3.07	3.47	2.01	11.3

Incremental Naturalised Flows at G2h005

File : G2H005.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.060	0.160	0.120	0.070	0.050	0.040	0.040	0.040	1.120	0.480	1.900	2.070	6.2
1928	0.440	0.120	0.080	0.050	0.040	0.030	0.500	0.440	0.770	2.030	1.940	0.560	7.0
1929	0.160	0.110	0.290	0.120	0.070	0.060	0.060	0.060	0.070	0.400	2.120	2.960	6.5
1930	0.860	0.240	0.100	0.050	0.040	0.040	0.460	0.620	1.070	1.800	2.400	2.250	9.9
1931	1.880	0.370	0.070	0.050	0.270	0.110	0.070	0.500	2.280	2.020	1.150	0.950	9.7
1932	0.280	0.110	0.070	0.050	0.040	0.040	0.040	0.090	0.930	1.920	2.290	0.490	6.4
1933	0.180	0.120	0.070	0.040	0.040	0.040	0.040	0.910	0.540	0.550	1.430	1.250	5.2
1934	0.650	0.290	0.120	0.060	0.040	0.040	0.140	0.630	0.560	1.840	1.590	0.810	6.8
1935	0.250	0.290	0.130	0.090	0.060	0.100	0.070	0.370	0.230	1.060	1.520	1.530	5.7
1936	0.360	0.130	0.090	0.070	0.050	0.050	0.100	0.320	3.470	3.380	1.500	0.600	10.1
1937	0.290	0.150	0.080	0.110	0.060	0.040	0.340	1.120	1.050	1.260	1.210	1.870	7.6
1938	0.510	0.160	0.090	0.050	0.070	0.050	0.200	0.410	0.460	1.050	1.710	0.520	5.3
1939	0.160	0.130	0.120	0.070	0.050	0.070	0.390	0.340	2.150	1.210	0.570	0.760	6.0
1940	0.430	0.230	0.110	0.070	0.050	0.040	1.150	1.830	2.730	2.150	1.910	2.860	13.6
1941	0.890	0.190	0.090	0.060	0.040	0.040	0.040	1.210	3.210	1.390	2.050	0.650	9.9
1942	0.190	0.100	0.060	0.060	0.050	0.050	0.110	0.250	0.780	1.950	2.280	0.960	6.8
1943	0.400	0.180	0.090	0.060	0.040	0.040	0.070	1.530	3.570	2.370	2.200	1.850	12.4
1944	0.610	0.170	0.100	0.060	0.040	0.030	0.080	2.280	3.730	3.340	2.350	0.460	13.3
1945	0.200	0.150	0.090	0.060	0.040	0.040	0.060	0.130	0.180	1.520	1.680	2.460	6.6
1946	0.610	0.140	0.080	0.050	0.040	0.060	0.060	0.670	0.700	3.470	1.620	0.630	8.1
1947	0.210	0.110	0.060	0.040	0.040	0.040	0.060	0.430	1.330	2.450	1.360	1.730	7.9
1948	0.840	0.200	0.080	0.060	0.040	0.040	0.230	0.150	0.180	1.370	1.610	1.070	5.9
1949	0.290	0.170	0.100	0.060	0.040	0.030	1.140	0.280	0.140	3.550	0.830	1.250	7.9
1950	0.360	0.190	0.130	0.090	0.060	0.040	0.180	0.290	3.840	2.840	1.480	1.150	10.6
1951	0.470	0.230	0.110	0.050	0.040	0.040	0.070	0.180	0.170	0.990	1.510	1.600	5.5
1952	0.440	0.240	0.120	0.060	0.040	0.040	1.200	1.640	1.430	2.290	1.820	0.390	9.7
1953	0.140	0.220	0.110	0.060	0.050	0.040	0.210	1.850	1.600	4.270	3.050	0.790	12.4
1954	0.220	0.130	0.090	0.050	0.670	0.170	0.070	0.070	0.320	2.900	3.650	1.270	9.6
1955	1.010	0.380	0.130	0.060	0.040	0.040	0.100	0.740	2.670	1.990	2.200	0.590	9.9
1956	0.200	0.120	0.080	0.050	0.080	0.060	0.080	1.450	2.710	2.710	1.920	0.830	10.3
1957	1.980	0.440	0.070	0.040	0.150	0.070	0.120	2.210	1.830	0.400	2.360	0.700	10.4
1958	0.350	0.160	0.080	0.050	0.040	0.040	1.010	3.300	1.190	0.340	1.630	0.950	9.1
1959	0.850	0.220	0.070	0.060	0.040	0.060	0.090	0.960	2.760	0.710	0.490	0.460	6.8
1960	0.190	0.100	0.060	0.090	0.060	0.040	0.040	0.150	1.100	0.880	1.990	1.510	6.2
1961	0.360	0.120	0.070	0.050	0.050	0.100	0.160	0.130	4.000	2.300	3.660	1.120	12.1
1962	1.000	0.280	0.090	0.060	0.040	0.040	0.040	0.070	0.220	2.480	2.900	0.840	8.1
1963	0.190	0.140	0.120	0.070	0.070	0.050	0.050	0.230	1.510	1.860	1.930	0.580	6.8
1964	0.380	0.220	0.110	0.060	0.070	0.290	0.310	1.220	0.700	0.710	1.340	0.550	6.0
1965	0.190	0.110	0.090	0.060	0.040	0.410	0.210	0.410	1.060	2.380	1.830	0.930	7.7
1966	0.230	0.100	0.070	0.050	0.040	0.040	0.550	0.280	2.670	1.610	1.140	0.720	7.5
1967	0.900	0.270	0.090	0.090	0.060	0.050	0.160	1.110	2.170	2.350	1.940	0.420	9.6
1968	0.750	0.220	0.080	0.080	0.060	0.050	0.080	0.080	0.360	0.970	1.590	1.370	5.7
1969	0.760	0.200	0.070	0.050	0.040	0.040	0.030	1.120	1.450	1.750	2.590	1.300	9.4
1970	0.290	0.120	0.090	0.060	0.040	0.040	0.040	0.140	0.290	1.410	2.100	0.580	5.2
1971	0.180	0.110	0.070	0.050	0.040	0.040	0.350	1.420	1.420	0.860	1.370	0.780	6.7
1972	0.230	0.100	0.060	0.040	0.040	0.040	0.040	0.080	0.090	1.280	1.170	0.950	4.1
1973	0.380	0.150	0.090	0.050	0.040	0.040	0.040	0.820	1.120	1.850	3.670	1.670	9.9
1974	0.930	0.260	0.100	0.060	0.050	0.040	0.070	1.110	1.180	2.690	2.130	0.430	9.1
1975	0.190	0.130	0.080	0.050	0.040	0.040	0.060	0.100	3.180	2.440	2.040	1.600	10.0
1976	0.370	1.130	0.620	0.160	0.070	0.050	0.630	1.490	4.650	3.130	2.660	1.060	16.0
1977	0.240	0.110	0.080	0.060	0.040	0.040	0.120	0.170	0.140	0.190	1.800	1.430	4.4
1978	0.710	0.190	0.090	0.060	0.090	0.060	0.050	0.280	1.240	1.260	0.780	0.650	5.5
1979	1.340	0.320	0.070	0.050	0.050	0.040	0.120	0.450	2.100	0.600	1.130	0.470	6.7
1980	0.190	0.280	0.160	0.270	0.110	0.070	0.160	0.110	0.570	2.540	2.270	1.650	8.4
1981	0.360	0.150	0.100	0.070	0.050	0.040	0.350	0.160	0.700	1.310	1.040	0.290	4.6
1982	0.180	0.140	0.130	0.070	0.110	0.080	0.060	2.250	3.290	2.060	1.020	1.050	10.4
1983	0.280	0.090	0.060	0.040	0.040	0.050	0.070	1.250	0.660	1.380	0.770	1.410	6.1
1984	1.170	0.260	0.400	0.140	0.130	0.260	0.290	0.450	2.560	2.550	1.580	0.770	10.6
1985	0.230	0.110	0.070	0.050	0.050	0.070	0.190	0.210	1.960	1.960	3.320	1.440	9.7
1986	0.280	0.110	0.070	0.080	0.050	0.040	0.070	0.740	1.830	2.340	2.080	1.480	9.2
1987	0.340	0.110	0.110	0.060	0.040	0.040	0.220	0.200	1.180	2.060	2.410	1.490	8.3
1988	0.370	0.130	0.080	0.050	0.040	0.590	0.250	0.620	0.950	2.020	2.090	1.500	8.7
1989	0.800	0.240	0.090	0.050	0.050	0.040	0.470	0.880	1.990	3.150	1.390	0.300	9.5
1990	0.140	0.100	0.070	0.050	0.040	0.040	0.040	0.350	0.790	4.070	1.300	1.300	8.3
1991	0.360	0.120	0.070	0.040	0.040	0.040	0.460	0.260	2.930	2.130	1.210	0.900	8.6
1992	1.050	0.270	0.090	0.050	0.050	0.040	2.750	1.990	2.650	3.290	1.590	0.320	14.1
1993	0.120	0.080	0.050	0.040	0.040	0.030	0.040	0.060	1.840	1.490	0.900	0.460	5.2
1994	0.190	0.110	0.060	0.050	0.040	0.030	0.040	0.460	1.320	2.060	2.560	0.620	7.5
1995	1.030	0.270	0.120	0.070	0.060	0.060	0.080	0.080	1.710	1.830	1.890	1.410	8.6
1996	1.750	0.480	0.390	0.140	0.060	0.040	0.070	0.150	1.170	1.380	1.380	0.340	7.3
1997	0.130	1.550	0.360	0.070	0.040	0.040	0.090	2.270	1.820	1.670	0.960	0.260	9.3
1998	0.130	0.190	0.120	0.070	0.040	0.030	0.090	0.080	0.290	0.170	0.110	0.090	1.4
1999	0.070	0.060	0.040	0.040	0.030	0.030	0.030	0.160	0.140	1.260	1.540	1.900	5.3
2000	0.420	0.100	0.060	0.040	0.040	0.030	0.040	0.280	0.170	3.540	3.060	1.540	9.3
2001	0.690	0.190	0.080	0.480	0.150	0.060	0.070	0.350	1.820	2.910	1.770	0.770	9.3
2002	0.330	0.150	0.080	0.050	0.040	0.560	0.170	0.160	0.170	0.710	3.300	1.700	7.4
2003	0.390	0.130	0.090	0.070	0.050	0.040	0.290	0.120	0.250	0.940	1.870	0.750	5.0
2004	0.550	0.180	0.070	0.060	0.050	0.040	0.090	0.300	1.890	1.390	2.220	0.640	7.5
AVE :	0.49	0.21	0.11	0.07	0.06	0.07	0.23	0.67	1.48	1.86	1.83	1.06	8.1
SD :	0.40	0.21	0.09	0.06	0.08	0.10	0.39	0.69	1.13	0.94	0.73	0.60	2.5

Incremental Naturalised Flows at G2h015

File : G2H015.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	1.870	1.390	0.860	0.480	0.260	0.230	0.250	0.270	6.700	3.650	5.580	6.110	27.7
1928	3.990	1.650	0.580	0.250	0.170	0.160	1.460	2.570	3.490	6.600	8.370	6.200	35.5
1929	3.450	1.520	0.810	0.490	0.420	0.410	0.680	0.680	0.850	2.980	5.210	13.240	30.7
1930	5.670	2.600	0.910	0.280	0.310	0.240	2.770	3.080	3.670	4.890	11.380	9.480	45.3
1931	7.590	2.940	0.800	0.400	2.020	0.830	0.530	9.450	9.000	7.950	7.760	7.100	56.4
1932	4.240	1.590	0.680	0.390	0.240	0.200	0.220	1.180	9.290	10.320	10.250	6.080	44.7
1933	3.680	1.860	0.610	0.250	0.200	0.230	0.240	5.180	3.560	4.190	6.370	6.300	32.7
1934	4.570	2.340	0.760	0.260	0.180	0.210	1.180	3.470	3.870	8.130	8.480	7.690	41.1
1935	4.530	2.200	0.780	1.320	0.600	0.480	0.440	2.030	2.630	4.530	6.970	7.200	33.7
1936	4.320	1.680	0.870	0.480	0.250	0.350	0.940	2.940	16.130	20.600	8.300	6.270	63.1
1937	3.950	1.730	0.530	0.320	0.230	0.210	2.300	4.920	5.520	6.590	7.120	7.330	40.8
1938	5.280	2.410	0.820	0.290	0.610	0.390	0.830	5.210	4.050	8.100	9.400	6.230	43.6
1939	3.070	1.430	0.710	0.320	0.470	0.660	1.820	3.290	10.560	8.020	7.460	6.640	44.5
1940	4.790	2.930	1.110	0.550	0.350	0.230	7.290	11.410	15.620	13.310	9.790	18.470	85.8
1941	6.810	3.010	1.040	0.510	0.280	0.170	0.500	7.200	22.700	8.240	10.530	7.010	68.0
1942	4.370	1.750	0.540	0.590	0.480	0.560	0.620	1.590	2.600	5.830	10.500	7.120	36.6
1943	4.520	2.530	0.900	0.390	0.230	0.170	0.450	7.010	22.360	16.320	17.260	8.770	80.9
1944	5.880	2.640	1.320	0.510	0.200	0.150	0.470	18.130	19.970	29.090	13.530	5.710	97.6
1945	2.910	1.330	0.500	0.280	0.190	0.270	0.870	2.240	3.020	6.310	6.850	13.620	38.4
1946	5.950	2.300	0.680	0.260	0.150	0.650	0.700	3.970	3.760	18.300	8.720	6.130	51.6
1947	3.530	1.510	0.490	0.220	0.180	0.320	0.700	3.750	5.380	11.880	7.970	7.540	43.5
1948	5.730	2.410	0.730	0.340	0.200	0.160	1.640	1.740	3.020	6.570	8.150	7.620	38.3
1949	4.900	2.260	0.790	0.300	0.170	0.150	5.160	1.900	2.520	22.660	6.840	7.000	54.7
1950	4.540	2.730	1.320	0.710	0.350	0.190	8.760	3.160	24.740	11.660	7.960	6.770	72.9
1951	4.700	2.780	0.950	0.270	0.160	0.240	0.510	2.140	3.350	7.640	15.720	12.710	51.2
1952	5.750	4.330	1.440	0.380	0.180	0.170	22.480	13.170	9.560	15.500	12.000	5.910	90.9
1953	2.850	1.840	0.750	0.340	0.300	0.280	1.600	23.360	10.760	34.490	15.770	7.490	99.8
1954	4.960	2.050	0.750	0.320	4.410	0.940	0.850	0.960	3.250	12.020	26.080	7.220	63.8
1955	5.330	2.950	1.050	0.350	0.210	0.330	0.590	5.990	12.810	11.760	16.540	6.650	64.6
1956	4.490	1.910	0.940	0.460	0.490	0.560	0.660	12.350	18.330	22.990	17.520	7.250	87.9
1957	8.330	3.170	0.740	0.250	0.940	0.630	0.990	6.570	6.260	5.140	11.110	6.480	50.6
1958	4.500	2.440	0.790	0.330	0.230	0.400	6.330	24.910	6.750	5.020	8.930	6.840	67.5
1959	5.090	2.090	0.610	0.290	0.200	0.300	0.620	2.860	20.440	7.580	6.570	4.910	51.6
1960	2.780	1.040	0.390	0.470	0.320	0.220	0.230	0.880	5.190	5.590	9.530	11.180	37.8
1961	5.770	2.060	0.540	0.250	0.570	0.950	3.270	2.400	34.970	11.430	17.140	6.860	86.2
1962	9.090	3.880	1.180	0.380	0.200	0.160	0.180	0.550	2.400	13.440	15.490	7.040	54.0
1963	3.840	2.250	1.510	0.570	0.860	0.460	0.410	1.260	8.840	8.190	15.020	6.750	50.0
1964	4.380	2.510	0.910	0.360	0.470	1.000	1.910	3.530	4.620	4.660	8.020	5.530	37.9
1965	3.330	1.460	0.800	0.380	0.200	1.190	1.080	2.040	3.920	9.540	12.250	7.620	43.8
1966	4.160	1.580	0.600	0.350	0.210	0.170	2.160	2.200	9.940	7.540	6.940	5.450	41.3
1967	3.990	2.420	0.910	0.370	0.250	0.180	1.180	8.140	12.430	20.820	10.560	5.820	67.1
1968	5.030	2.160	0.670	0.590	0.390	0.350	0.820	0.870	3.930	4.290	6.890	7.020	33.0
1969	5.340	2.270	0.630	0.250	0.200	0.170	0.150	4.380	7.380	9.380	15.010	7.790	52.9
1970	5.280	2.190	0.900	0.420	0.200	0.180	0.230	1.150	3.140	5.860	8.690	6.110	34.3
1971	3.520	1.430	0.490	0.430	0.300	0.250	1.120	3.350	5.230	5.180	6.310	5.550	33.2
1972	3.290	1.210	0.540	0.280	0.160	0.180	0.200	0.720	0.990	7.200	5.540	5.540	25.9
1973	3.490	1.370	0.640	0.330	0.190	0.160	0.160	6.910	12.270	7.880	32.900	8.600	74.9
1974	5.990	2.770	0.850	0.400	0.250	0.190	0.620	9.290	5.940	18.580	9.440	6.010	60.3
1975	3.850	2.070	0.680	0.230	0.150	0.290	0.660	1.360	17.820	10.730	9.050	7.710	54.6
1976	4.110	3.360	2.140	0.810	0.800	0.550	3.680	9.620	27.540	25.600	18.660	6.900	103.8
1977	3.880	1.580	0.590	0.320	0.260	0.350	1.480	2.030	2.200	2.080	5.450	5.180	25.4
1978	3.840	1.660	0.640	0.430	0.630	0.460	0.350	2.620	4.630	5.200	5.200	4.610	30.3
1979	5.210	2.250	0.570	0.300	0.250	0.190	0.880	4.310	5.110	4.630	5.060	4.100	32.9
1980	2.390	2.560	1.200	1.190	0.520	0.500	1.270	1.220	2.340	12.040	8.290	9.440	43.0
1981	5.190	2.080	0.840	0.490	0.280	0.180	0.820	1.280	4.300	5.540	6.980	4.810	32.8
1982	3.060	1.800	1.060	0.480	0.750	0.710	0.570	7.250	14.290	9.750	7.910	6.690	54.3
1983	3.800	1.450	0.590	0.290	0.190	0.350	0.810	13.020	5.530	7.500	6.340	8.150	48.0
1984	6.910	2.740	2.070	0.970	0.620	1.520	1.980	2.270	9.030	18.000	10.930	7.530	64.6
1985	3.920	1.290	0.410	0.240	0.220	0.580	0.940	1.770	8.620	9.730	20.310	6.990	55.0
1986	4.010	1.710	0.630	0.990	0.550	0.440	0.710	4.170	7.900	18.320	16.870	8.600	64.9
1987	4.850	1.930	0.870	0.360	0.170	0.210	1.710	2.640	3.910	7.630	10.480	7.620	42.4
1988	4.490	1.720	0.600	0.320	0.390	1.950	2.360	5.060	6.390	15.250	20.620	9.700	68.8
1989	6.820	3.560	1.190	0.390	0.660	0.390	9.100	4.700	10.900	24.540	7.520	5.160	74.9
1990	2.640	1.090	0.630	0.310	0.180	0.170	0.250	2.460	8.130	26.570	7.440	9.500	59.4
1991	5.980	2.420	0.720	0.270	0.380	0.310	2.260	3.570	12.870	10.090	9.990	7.880	56.7
1992	6.430	2.730	0.730	0.270	0.240	0.210	16.500	10.090	7.750	16.460	8.520	5.460	75.4
1993	2.430	0.860	0.410	0.300	0.200	0.170	0.310	1.070	27.070	9.100	7.010	5.210	54.1
1994	3.220	1.390	0.480	0.230	0.250	0.340	0.360	1.300	5.940	11.780	12.250	6.340	43.9
1995	3.550	1.630	0.710	0.320	0.530	0.650	1.020	2.170	9.680	22.250	15.240	15.990	73.7
1996	11.280	4.550	1.940	0.790	0.330	0.180	2.030	3.760	12.770	6.620	7.820	4.920	57.0
1997	2.220	1.780	0.720	0.260	0.170	0.140	0.290	12.630	7.220	12.200	8.090	5.790	51.5
1998	3.240	2.620	1.850	0.660	0.230	0.150	0.630	2.980	5.350	6.610	8.710	10.210	43.2
1999	4.810	1.840	0.780	0.380	0.210	0.170	0.180	1.320	4.250	9.330	7.230	10.990	41.5
2000	4.850	1.520	0.490	0.270	0.200	0.150	0.500	8.270	5.460	40.030	23.660	9.290	94.7
2001	6.080	2.700	0.820	1.140	0.640	0.390	1.520	3.130	6.890	14.180	11.800	7.230	56.5
2002	4.630	2.190	0.890	0.400	0.230	0.550	0.520	0.890	1.310	2.730	11.070	10.030	35.4
2003	6.210	2.340	1.030	0.620	0.310	0.190	1.660	1.140	6.940	9.500	12.570	6.480	49.0
2004	9.220	3.240	0.830	0.430	0.270	0.180	4.650	6.120	10.080	7.760	9.360	6.950	59.1
AVE :	4.72	2.17	0.84	0.43	0.40	0.38	1.91	4.75	8.72	11.41	10.78	7.51	54.0
SD :	1.64	0.72	0.36	0.22	0.53	0.32	3.42	4.81	6.92	7.50	5.12	2.47	18.8

Incremental Naturalised Flows at G2H016

File : G2H016.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	1.140	1.300	0.750	0.470	0.260	0.210	0.210	0.190	5.360	3.200	7.430	7.050	27.6
1928	3.500	1.700	0.640	0.240	0.160	0.170	4.070	5.840	5.460	10.380	10.740	5.040	47.9
1929	2.530	1.490	0.860	0.610	0.520	0.390	1.040	0.860	1.710	3.970	7.660	13.130	34.8
1930	2.950	1.990	0.830	0.250	0.380	0.270	2.420	4.010	4.310	5.080	15.910	9.770	48.2
1931	25.150	2.440	0.570	0.280	1.380	0.740	0.510	5.370	9.940	11.770	5.790	6.000	69.9
1932	3.020	1.600	0.800	0.430	0.280	0.210	0.260	0.860	7.010	14.070	10.730	4.220	43.5
1933	3.030	1.540	0.510	0.210	0.180	0.230	0.230	5.950	2.810	3.910	3.290	4.940	26.8
1934	2.160	0.950	0.370	0.170	0.140	0.320	1.130	3.010	2.730	4.350	5.430	5.430	26.2
1935	2.500	1.670	0.700	2.740	0.800	0.520	0.500	1.830	3.710	5.880	7.530	7.170	35.5
1936	3.270	1.730	0.980	0.550	0.300	0.380	1.020	3.080	16.000	18.180	6.600	4.290	56.4
1937	3.040	1.600	0.550	0.480	0.330	0.260	2.190	5.770	5.300	6.330	6.510	8.870	41.2
1938	3.940	2.040	0.780	0.280	0.770	0.490	0.960	2.890	3.020	4.480	6.380	4.090	30.1
1939	2.470	1.360	0.770	0.370	0.430	0.540	3.670	4.540	8.500	6.560	4.060	4.320	37.6
1940	3.070	3.000	1.170	0.570	0.400	0.320	4.770	9.750	12.930	11.060	8.060	8.400	63.5
1941	3.780	2.060	0.980	0.480	0.240	0.160	0.360	4.840	15.480	7.060	10.450	4.430	50.3
1942	2.960	1.290	0.430	0.530	0.400	0.410	0.720	1.730	2.540	5.700	7.750	4.170	28.6
1943	3.030	1.740	0.670	0.310	0.200	0.150	0.280	3.850	13.340	12.450	11.530	9.140	56.7
1944	3.790	1.890	0.810	0.320	0.150	0.120	0.360	7.930	13.320	14.880	12.860	3.460	59.9
1945	2.370	1.340	0.510	0.270	0.180	0.270	0.760	1.760	2.880	6.630	6.520	12.320	35.8
1946	3.660	1.610	0.520	0.220	0.140	0.320	0.450	2.320	2.710	14.510	6.730	4.010	37.2
1947	2.550	1.130	0.380	0.190	0.160	0.220	0.640	2.520	6.140	10.020	6.590	8.610	39.2
1948	4.390	1.850	0.610	0.310	0.180	0.140	0.850	1.450	2.300	5.680	8.040	5.380	31.2
1949	3.060	1.730	0.730	0.280	0.160	0.140	3.860	1.880	3.150	18.230	4.550	5.820	43.6
1950	3.110	2.130	1.080	0.650	0.330	0.190	2.830	3.070	18.550	12.070	5.510	6.280	55.8
1951	3.410	2.330	0.870	0.260	0.150	0.240	0.610	2.460	3.680	6.790	14.290	10.320	45.4
1952	3.960	3.050	1.130	0.330	0.170	0.170	7.470	10.670	8.000	11.860	7.580	3.620	58.0
1953	2.450	2.010	0.850	0.480	0.380	0.480	4.180	30.290	18.000	41.500	22.240	5.560	128.4
1954	4.470	2.010	0.950	0.390	4.010	0.990	1.760	1.740	3.520	21.120	30.250	6.530	77.7
1955	8.810	3.630	1.550	0.560	0.250	0.260	0.570	5.190	13.450	11.980	12.910	4.140	63.3
1956	3.470	1.600	0.640	0.330	0.320	0.370	0.500	8.780	14.060	16.480	17.560	5.450	69.6
1957	9.550	2.400	0.620	0.280	1.060	0.870	2.100	11.830	9.750	4.070	16.150	4.990	63.7
1958	5.040	2.140	0.670	0.280	0.200	0.260	6.010	22.900	4.460	3.660	6.120	4.930	56.7
1959	3.640	1.590	0.500	0.270	0.200	0.340	0.780	4.170	13.350	5.050	4.110	3.250	37.3
1960	2.150	0.890	0.380	0.530	0.330	0.230	0.260	0.900	5.580	4.760	6.340	7.850	30.2
1961	3.870	1.600	0.520	0.300	0.310	0.570	1.670	1.610	21.670	11.280	14.520	4.660	62.6
1962	8.580	2.840	0.950	0.350	0.190	0.150	0.160	0.400	2.210	10.550	15.820	4.740	46.9
1963	2.850	1.680	0.960	0.400	0.550	0.360	0.380	1.620	8.060	7.150	12.720	4.120	40.9
1964	3.590	2.480	0.950	0.410	0.470	1.090	2.070	4.920	5.650	4.860	7.260	3.700	37.5
1965	2.740	1.380	0.660	0.330	0.200	1.110	1.240	2.710	4.460	9.930	11.040	5.460	41.3
1966	2.750	1.180	0.590	0.400	0.240	0.180	2.330	2.360	8.940	7.070	6.000	3.920	36.0
1967	3.450	2.120	0.820	0.480	0.370	0.220	1.100	8.470	15.180	16.970	13.090	3.820	66.1
1968	6.010	2.120	0.930	0.790	0.490	0.360	0.940	1.050	3.770	4.380	6.120	6.050	33.0
1969	5.270	1.960	0.580	0.240	0.200	0.170	0.140	7.000	9.870	12.160	9.160	6.120	52.9
1970	3.280	1.510	0.770	0.430	0.210	0.170	0.220	0.990	3.550	6.400	10.270	4.130	31.9
1971	2.950	1.400	0.500	0.500	0.360	0.280	2.790	5.930	6.220	5.170	7.730	4.250	38.1
1972	2.680	1.100	0.470	0.250	0.140	0.150	0.170	1.020	1.460	6.270	5.200	6.340	25.3
1973	3.040	1.470	0.680	0.330	0.180	0.150	0.150	4.550	14.490	7.870	30.740	6.740	70.4
1974	5.700	2.400	0.870	0.520	0.320	0.220	0.970	16.410	7.620	21.660	15.850	3.540	76.1
1975	3.110	1.800	0.620	0.210	0.140	0.280	0.850	1.950	20.850	10.160	8.230	7.210	55.4
1976	3.460	3.510	2.240	0.850	0.480	0.450	2.090	10.960	27.220	14.930	13.850	5.410	85.5
1977	2.830	1.170	0.510	0.300	0.470	0.600	1.470	1.990	2.190	2.260	8.070	6.590	28.5
1978	3.760	1.790	0.810	0.580	2.300	0.870	0.500	3.380	7.460	5.770	4.120	3.600	34.9
1979	6.160	1.890	0.540	0.290	0.290	0.270	0.840	5.710	11.010	4.150	5.290	3.380	39.8
1980	2.480	4.240	1.560	2.090	0.730	0.540	1.640	1.400	2.040	14.660	11.830	10.240	53.4
1981	3.280	1.680	0.770	0.480	0.280	0.180	1.800	1.680	5.410	5.590	6.110	3.180	30.4
1982	2.120	1.290	1.090	0.500	0.840	0.810	0.760	11.960	17.460	9.120	5.510	7.130	58.6
1983	3.020	1.170	0.470	0.260	0.170	0.310	0.670	12.770	4.500	6.610	4.020	7.580	41.6
1984	6.190	2.050	2.860	0.990	0.730	2.190	2.600	2.550	9.070	17.690	8.570	5.030	60.5
1985	2.810	1.120	0.410	0.290	0.300	0.770	1.660	2.930	11.330	10.310	18.920	5.140	56.0
1986	3.070	1.460	0.540	0.510	0.380	0.300	0.680	5.210	8.600	16.050	13.670	6.500	57.0
1987	3.070	1.280	0.700	0.360	0.160	0.200	1.260	2.700	5.700	8.540	12.860	6.280	43.1
1988	3.680	1.770	0.690	0.320	0.280	4.130	2.260	6.220	6.860	14.920	14.610	6.810	62.5
1989	4.420	2.420	0.860	0.340	0.310	0.230	6.130	4.830	14.320	21.400	5.970	3.670	64.9
1990	2.100	1.020	0.610	0.330	0.180	0.150	0.360	3.280	7.770	24.710	5.120	6.400	52.0
1991	3.580	1.630	0.490	0.180	0.210	0.270	2.500	3.390	15.690	8.790	6.640	8.640	52.0
1992	7.900	2.590	0.850	0.310	0.350	0.270	13.160	7.760	16.320	20.740	7.240	3.370	80.9
1993	1.580	0.730	0.400	0.310	0.210	0.150	0.250	0.580	14.120	6.760	4.100	3.560	32.8
1994	2.360	1.030	0.450	0.270	0.160	0.120	0.190	2.200	6.180	9.700	14.760	3.870	41.3
1995	4.810	1.960	1.000	0.430	0.280	0.400	0.650	0.770	5.250	8.270	9.650	5.600	39.1
1996	9.940	3.240	3.970	1.040	0.300	0.190	0.430	1.680	3.830	7.440	6.940	3.660	42.7
1997	2.040	9.630	1.620	0.540	0.240	0.180	0.650	13.080	10.970	9.490	6.850	3.810	59.1
1998	2.330	2.130	1.140	0.440	0.180	0.120	0.620	0.920	3.000	2.070	1.210	0.710	14.9
1999	0.490	0.410	0.240	0.150	0.220	0.210	0.170	1.480	2.100	7.020	6.950	10.200	29.6
2000	3.240	1.290	0.420	0.200	0.160	0.140	0.220	3.250	2.560	23.410	18.080	7.010	60.0
2001	4.610	2.110	0.740	2.490	0.910	0.480	0.570	2.550	9.240	20.900	6.070	4.600	55.3
2002	3.950	1.920	0.750	0.340	0.200	3.140	1.240	1.820	2.710	4.020	16.020	6.960	43.1
2003	4.010	1.710	0.720	0.540	0.280	0.210	2.020	1.180	2.660	4.000	9.230	4.460	31.0
2004	5.120	1.880	0.570	0.260	0.360	0.320	0.650	1.520	8.080	6.670	13.690	4.120	43.2
AVE :	3.97	1.92	0.82	0.47	0.41	0.45	1.56	4.68	8.21	10.28	9.79	5.71	48.3
SD :	2.99	1.10	0.54	0.43	0.52	0.61	1.99	5.00	5.62	6.63	5.47	2.23	17.5

Incremental Naturalised Flows at G2H020

File : G2H020.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	1.230	1.220	0.920	0.620	0.400	0.320	0.320	0.330	3.960	1.760	4.560	5.550	21.2
1928	2.990	1.740	0.900	0.480	0.310	0.260	2.040	2.300	2.290	6.430	6.810	3.950	30.5
1929	2.800	1.630	1.240	0.740	0.530	0.470	0.520	0.520	0.650	2.100	5.230	9.910	26.3
1930	3.850	2.610	1.250	0.540	0.390	0.320	1.520	1.980	2.140	4.780	7.730	7.920	35.0
1931	6.350	2.850	1.190	0.650	1.520	0.770	0.620	3.270	5.540	5.840	4.930	4.750	38.3
1932	3.170	1.770	0.880	0.520	0.360	0.300	0.290	0.590	4.270	5.370	6.910	3.620	28.1
1933	2.820	1.700	0.760	0.400	0.310	0.330	0.340	2.870	1.740	2.060	4.000	4.200	21.5
1934	2.990	2.510	1.230	0.560	0.370	0.350	0.770	2.300	1.810	5.100	5.370	4.150	27.5
1935	2.970	2.330	1.150	0.800	0.540	0.580	0.510	1.450	1.350	2.210	4.320	4.720	22.9
1936	2.650	1.540	0.920	0.580	0.380	0.360	0.610	1.690	11.290	14.600	6.140	4.520	45.3
1937	3.610	2.150	0.960	0.660	0.460	0.360	1.580	3.590	3.300	4.400	4.530	6.390	32.0
1938	3.530	2.210	1.060	0.490	0.480	0.380	0.720	1.990	1.620	2.770	5.250	2.930	23.4
1939	2.090	1.380	0.950	0.560	0.400	0.530	1.340	1.620	6.410	4.330	3.660	4.000	27.3
1940	3.100	2.230	1.140	0.630	0.450	0.350	4.710	5.840	10.450	13.260	12.220	20.290	74.7
1941	4.330	2.670	1.330	0.740	0.450	0.320	0.330	4.330	13.190	5.050	11.060	4.480	48.3
1942	3.360	1.840	0.810	0.620	0.510	0.500	0.640	1.270	1.930	5.260	7.970	4.320	29.0
1943	3.380	2.350	1.180	0.580	0.370	0.280	0.410	4.900	13.190	10.720	12.810	9.430	59.6
1944	4.350	2.640	1.370	0.680	0.360	0.280	0.440	9.890	13.240	26.400	15.610	4.050	79.3
1945	2.960	1.890	0.950	0.500	0.330	0.340	0.460	0.950	1.220	3.630	4.930	8.880	27.0
1946	3.800	2.230	1.050	0.520	0.310	0.400	0.490	2.070	1.840	11.560	5.880	4.020	34.2
1947	3.100	1.780	0.810	0.420	0.290	0.290	0.420	2.090	2.950	8.390	5.350	6.940	32.8
1948	4.400	2.550	1.190	0.650	0.390	0.300	1.010	0.940	1.410	3.270	5.300	4.400	25.8
1949	3.010	1.980	1.010	0.510	0.320	0.260	3.670	1.070	1.390	15.080	3.880	5.640	37.8
1950	3.490	2.620	1.580	0.930	0.540	0.350	1.680	1.560	18.900	9.920	6.140	6.170	53.9
1951	4.220	3.030	1.430	0.600	0.350	0.330	0.480	1.160	1.360	2.690	5.730	6.020	27.4
1952	3.470	2.950	1.420	0.630	0.370	0.310	7.490	6.080	5.270	8.330	11.050	4.030	51.4
1953	2.710	2.130	1.100	0.550	0.390	0.350	1.200	7.040	4.940	19.220	17.290	4.500	61.4
1954	3.590	2.120	1.070	0.560	2.680	0.760	0.650	0.700	1.930	8.320	18.190	5.050	45.6
1955	4.380	3.050	1.490	0.660	0.380	0.330	0.480	3.010	7.020	6.340	10.400	4.430	42.0
1956	3.480	1.990	0.960	0.540	0.500	0.460	0.530	6.580	8.200	13.900	11.390	4.860	53.4
1957	8.040	3.010	1.190	0.540	0.690	0.540	0.670	6.560	4.470	2.920	7.710	3.790	40.1
1958	3.110	2.010	0.950	0.490	0.350	0.310	3.080	16.690	3.950	3.260	5.790	4.250	44.2
1959	3.940	2.150	0.970	0.550	0.380	0.360	0.480	3.050	8.560	3.380	3.180	3.040	30.0
1960	2.350	1.280	0.650	0.530	0.390	0.310	0.310	0.700	2.990	2.220	7.150	6.050	24.9
1961	3.410	1.840	0.800	0.450	0.410	0.600	1.080	1.070	22.100	7.620	22.510	4.680	66.6
1962	5.280	2.820	1.310	0.670	0.410	0.300	0.290	0.500	1.320	8.580	8.990	4.300	34.8
1963	3.070	2.150	1.300	0.650	0.580	0.440	0.410	1.080	4.610	5.880	6.630	3.770	30.6
1964	3.180	2.320	1.180	0.610	0.570	1.120	1.490	2.300	2.670	3.060	5.770	3.410	27.7
1965	2.680	1.550	0.930	0.550	0.360	1.310	0.870	1.450	2.180	7.880	6.530	4.960	31.3
1966	3.180	1.720	0.890	0.540	0.360	0.290	1.890	1.310	7.350	5.140	4.580	3.530	30.8
1967	3.330	2.300	1.170	0.670	0.480	0.350	0.760	5.730	7.140	11.780	10.640	4.150	48.5
1968	4.060	2.300	1.090	0.750	0.550	0.460	0.610	0.650	1.730	2.020	4.720	4.620	23.6
1969	3.190	1.930	0.870	0.460	0.340	0.270	0.250	3.740	4.370	5.880	8.930	5.960	36.2
1970	3.930	2.220	1.160	0.630	0.370	0.300	0.290	0.760	1.580	3.140	6.360	3.140	23.9
1971	2.480	1.470	0.740	0.520	0.400	0.320	2.120	2.490	3.460	3.600	5.010	3.420	26.0
1972	2.650	1.410	0.730	0.440	0.290	0.280	0.280	0.540	0.610	3.900	2.990	3.860	18.0
1973	2.340	1.450	0.860	0.510	0.340	0.280	0.250	4.380	4.230	5.630	28.510	7.330	56.1
1974	5.680	3.020	1.370	0.700	0.450	0.340	0.630	6.260	3.590	11.020	10.940	4.080	48.1
1975	3.220	2.100	1.010	0.460	0.300	0.360	0.470	0.830	13.060	9.460	10.780	7.770	49.8
1976	3.890	4.210	2.760	1.230	0.690	0.540	2.320	6.180	20.270	24.220	17.440	4.690	88.4
1977	3.430	1.940	0.970	0.540	0.380	0.370	0.730	1.040	1.180	1.290	5.030	4.040	20.9
1978	2.810	1.720	0.960	0.610	0.790	0.550	0.430	1.560	2.830	3.850	3.320	3.490	22.9
1979	4.880	2.120	0.890	0.510	0.390	0.300	0.650	1.950	4.100	2.580	4.150	2.870	25.4
1980	2.210	2.210	1.300	1.170	0.640	0.530	0.930	0.910	1.680	8.680	6.730	6.910	33.9
1981	3.780	2.340	1.230	0.730	0.470	0.330	1.430	1.060	2.450	3.840	4.400	2.870	24.9
1982	2.390	1.710	1.140	0.640	0.670	0.580	0.530	6.870	8.990	6.830	5.480	5.240	41.1
1983	3.300	1.770	0.880	0.480	0.320	0.380	0.580	7.160	2.680	5.250	3.610	5.940	32.4
1984	5.080	2.440	2.290	1.070	0.760	1.260	1.620	1.730	7.220	11.710	10.420	5.190	50.8
1985	3.440	1.750	0.810	0.470	0.370	0.550	0.840	1.170	5.310	6.370	14.740	5.060	40.9
1986	3.510	1.980	0.940	0.690	0.480	0.380	0.520	3.870	4.930	8.030	14.590	7.450	47.4
1987	3.750	2.010	1.160	0.640	0.350	0.300	0.790	1.170	2.350	6.290	8.240	6.000	33.1
1988	3.790	2.210	1.060	0.550	0.360	3.330	1.230	2.410	3.040	7.200	6.940	6.520	38.6
1989	4.440	2.850	1.320	0.620	0.450	0.350	3.480	1.790	5.610	10.050	5.230	3.940	40.1
1990	2.700	1.540	0.900	0.500	0.320	0.270	0.310	1.740	3.770	22.650	5.580	6.810	47.1
1991	4.070	2.300	1.010	0.480	0.370	0.380	2.250	1.770	9.070	7.180	5.710	4.870	39.5
1992	4.900	2.570	1.190	0.590	0.450	0.370	16.590	5.710	8.550	20.200	7.950	4.040	73.1
1993	2.530	1.330	0.680	0.450	0.330	0.260	0.270	0.440	13.800	4.050	4.250	3.520	31.9
1994	2.660	1.520	0.750	0.450	0.330	0.270	0.320	2.070	5.240	8.110	14.560	4.340	40.6
1995	4.650	2.450	1.350	0.700	0.490	0.490	0.620	0.740	7.210	5.220	7.040	5.960	36.9
1996	7.090	3.730	2.770	1.180	0.550	0.350	0.470	0.860	4.920	4.250	4.900	2.930	34.0
1997	1.960	6.940	1.580	0.700	0.410	0.340	0.540	12.050	4.170	5.810	4.250	2.940	41.7
1998	1.990	1.610	1.110	0.610	0.350	0.290	0.530	0.620	1.620	2.320	2.990	3.010	17.1
1999	2.290	1.340	0.730	0.450	0.350	0.320	0.310	0.710	0.930	3.280	4.870	6.630	22.2
2000	3.050	1.600	0.770	0.430	0.310	0.250	0.280	0.960	0.970	11.690	9.620	6.170	36.1
2001	4.300	2.580	1.180	2.220	0.840	0.510	0.590	1.770	4.720	8.660	7.330	4.710	39.4
2002	3.620	2.170	1.100	0.580	0.370	2.030	0.860	1.240	1.470	1.790	11.710	5.780	32.7
2003	3.570	1.940	1.020	0.680	0.430	0.340	1.180	0.760	1.370	2.330	5.700	3.120	22.4
2004	2.820	1.670	0.780	0.580	0.430	0.350	0.590	1.910	5.470	4.690	8.210	4.200	31.7
AVE :	3.52	2.20	1.12	0.63	0.47	0.47	1.21	2.77	5.14	7.15	7.91	5.12	37.7
SD :	1.10	0.78	0.37	0.24	0.31	0.42	2.09	2.84	4.56	5.27	4.66	2.33	14.5

Incremental Naturalised Flows at G2h037

File : G2H037.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.160	0.590	0.390	0.210	0.140	0.120	0.120	0.120	3.730	2.170	5.570	6.030	19.4
1928	1.250	0.310	0.220	0.140	0.100	0.090	1.850	1.950	2.540	5.840	5.610	1.810	21.7
1929	0.460	0.290	1.070	0.380	0.190	0.170	0.190	0.180	0.220	2.260	6.210	8.600	20.2
1930	2.770	0.760	0.290	0.140	0.120	0.100	1.710	2.690	3.310	5.190	6.880	6.510	30.5
1931	5.600	1.060	0.190	0.140	1.020	0.350	0.220	2.140	7.060	5.830	3.390	2.890	29.9
1932	0.780	0.300	0.210	0.150	0.120	0.110	0.110	0.330	3.940	5.710	6.560	1.430	19.8
1933	0.770	0.360	0.170	0.110	0.100	0.120	0.120	3.130	2.340	1.810	4.150	3.740	16.9
1934	2.150	1.000	0.340	0.160	0.120	0.130	0.510	2.910	1.940	5.290	4.620	2.520	21.7
1935	0.800	1.240	0.410	0.260	0.170	0.350	0.210	1.390	1.590	3.250	4.410	4.520	18.6
1936	1.000	0.290	0.240	0.180	0.130	0.200	0.360	2.080	11.480	10.100	4.290	2.120	32.5
1937	1.420	0.470	0.200	0.330	0.170	0.120	1.440	4.440	3.780	3.680	3.610	5.050	24.7
1938	1.880	0.540	0.240	0.140	0.260	0.150	0.730	2.340	1.780	3.390	5.040	1.680	18.2
1939	0.450	0.330	0.400	0.210	0.160	0.260	1.250	1.870	7.160	3.830	1.760	2.660	20.3
1940	1.660	0.690	0.290	0.190	0.140	0.120	4.140	5.680	8.770	6.430	5.330	8.710	42.2
1941	3.060	0.570	0.230	0.170	0.120	0.100	0.120	4.190	10.620	4.130	6.250	2.200	31.8
1942	0.540	0.270	0.160	0.200	0.160	0.170	0.470	1.360	3.430	5.680	6.810	3.380	22.6
1943	1.600	0.610	0.260	0.150	0.110	0.100	0.260	4.600	11.620	7.170	6.700	5.660	38.8
1944	2.010	0.540	0.260	0.160	0.110	0.090	0.190	1.720	9.840	5.610	5.480	1.170	27.2
1945	0.590	3.410	0.820	0.170	0.120	0.130	0.250	0.340	1.770	4.160	2.190	5.820	19.8
1946	2.990	0.660	0.230	0.140	0.100	0.190	0.140	2.140	0.700	9.950	2.950	2.350	22.5
1947	0.740	0.320	0.200	0.130	0.100	0.110	0.120	0.610	1.590	6.520	2.270	3.370	16.1
1948	3.690	0.790	0.200	0.140	0.110	0.090	0.220	0.270	0.600	3.540	2.390	3.180	15.2
1949	2.870	0.800	0.530	0.250	0.130	0.100	0.790	0.830	0.770	9.710	2.960	1.520	21.3
1950	2.930	1.020	0.400	0.310	0.180	0.120	0.490	0.830	4.970	8.000	4.460	1.500	25.2
1951	3.630	1.250	0.320	0.140	0.110	0.100	0.370	0.820	1.310	3.070	1.190	4.950	17.3
1952	1.730	0.440	0.320	0.190	0.120	0.110	4.980	5.700	2.090	9.830	3.630	4.720	33.9
1953	1.130	0.800	0.340	0.170	0.120	0.130	0.890	1.890	7.010	13.180	9.050	2.160	36.9
1954	1.450	0.470	0.280	0.160	0.390	0.730	0.490	0.330	2.450	7.190	5.360	7.030	26.3
1955	5.870	1.350	0.300	0.180	0.130	0.140	0.150	3.230	3.570	6.280	10.910	3.360	35.5
1956	0.600	0.300	0.200	0.150	0.520	0.230	0.340	4.290	3.970	8.970	11.310	2.250	33.1
1957	7.210	1.510	0.180	0.110	0.260	0.580	0.290	3.300	9.710	2.940	3.080	4.750	33.9
1958	2.780	0.600	0.190	0.150	0.110	0.100	1.460	9.040	8.210	2.220	2.380	3.520	30.8
1959	3.180	0.720	0.220	0.150	0.120	0.130	0.470	3.420	8.140	1.690	0.890	2.570	21.7
1960	0.750	0.260	0.160	0.180	0.140	0.120	0.120	0.270	6.120	1.890	5.760	6.690	22.5
1961	2.500	0.490	0.160	0.120	0.130	0.460	0.680	0.440	6.120	5.820	11.060	2.230	30.2
1962	2.210	2.350	0.570	0.180	0.120	0.100	0.110	0.280	0.670	3.870	12.380	2.420	25.3
1963	0.830	0.550	0.380	0.210	0.140	0.190	0.190	0.740	5.310	5.060	5.600	1.200	20.4
1964	2.350	0.690	0.280	0.180	0.200	0.550	1.050	3.340	4.810	2.580	5.830	2.520	24.4
1965	0.610	0.290	0.200	0.170	0.140	0.290	2.000	0.930	2.400	9.210	3.340	5.120	24.7
1966	1.130	0.240	0.170	0.140	0.120	0.110	0.550	2.620	10.120	3.090	5.280	1.330	24.9
1967	2.630	0.720	0.250	0.260	0.170	0.120	0.160	4.860	7.590	4.000	8.980	2.190	31.9
1968	2.570	0.670	0.220	0.160	0.160	0.180	0.310	0.250	0.370	3.840	4.680	4.740	18.2
1969	1.070	0.380	0.240	0.140	0.120	0.100	0.100	0.580	4.160	9.570	4.630	6.270	27.4
1970	1.330	0.330	0.260	0.170	0.120	0.100	0.130	0.460	0.380	4.540	6.350	4.290	18.5
1971	0.870	0.280	0.210	0.140	0.120	0.110	0.220	5.530	2.470	2.850	4.450	3.140	20.4
1972	0.760	0.260	0.160	0.110	0.090	0.120	0.110	0.140	0.460	1.560	7.360	1.920	13.1
1973	1.900	0.730	0.270	0.140	0.100	0.100	0.090	1.670	3.770	7.710	7.570	6.500	30.6
1974	1.410	0.620	0.350	0.190	0.140	0.130	0.150	3.050	4.820	7.270	5.940	1.200	25.3
1975	1.400	0.470	0.190	0.130	0.100	0.100	0.110	0.260	9.590	4.200	8.260	4.460	29.3
1976	0.830	4.320	2.600	0.550	0.180	0.160	2.900	4.100	12.910	11.620	11.750	4.080	56.0
1977	0.740	0.280	0.240	0.210	0.150	0.120	0.560	0.800	0.650	1.890	8.040	5.250	18.9
1978	2.850	0.670	0.240	0.220	0.190	0.170	0.160	0.780	7.130	4.320	2.730	1.790	21.3
1979	3.970	0.930	0.200	0.150	0.130	0.110	0.490	2.030	5.830	1.650	4.180	1.700	21.4
1980	0.610	0.760	0.540	0.910	0.330	0.230	0.450	0.310	2.010	7.390	7.660	6.100	27.3
1981	1.180	0.490	0.280	0.200	0.140	0.110	0.980	0.570	2.590	4.710	3.480	1.460	16.2
1982	1.630	0.570	0.330	0.200	0.300	0.220	0.170	4.870	7.410	6.480	2.750	4.780	29.7
1983	1.100	0.260	0.170	0.120	0.100	0.140	0.220	5.950	1.930	6.140	3.570	4.420	24.1
1984	3.450	0.740	1.190	0.430	0.380	1.180	0.920	1.610	7.950	6.950	5.390	2.730	32.9
1985	0.670	0.320	0.210	0.140	0.130	0.170	0.790	1.070	8.040	6.820	10.530	4.390	33.3
1986	0.790	0.280	0.180	0.240	0.150	0.130	0.250	2.350	5.640	7.600	5.920	4.940	28.5
1987	1.070	0.300	0.350	0.190	0.120	0.100	1.020	0.690	4.450	6.030	6.980	4.180	25.5
1988	1.580	0.440	0.220	0.140	0.110	1.140	1.010	3.160	3.430	5.770	5.880	5.720	28.6
1989	2.630	0.690	0.250	0.150	0.170	0.130	0.220	5.370	5.120	9.740	4.860	1.350	30.7
1990	0.430	0.270	0.190	0.140	0.110	0.100	0.130	2.380	6.360	6.590	4.300	4.750	25.8
1991	1.890	0.450	0.180	0.120	0.120	0.110	1.540	2.820	9.340	6.750	4.330	2.970	30.6
1992	3.590	0.840	0.220	0.140	0.130	0.110	5.410	5.360	7.310	8.810	4.800	0.940	37.7
1993	0.320	0.220	0.160	0.130	0.110	0.100	0.200	0.280	9.570	5.580	2.620	2.170	21.5
1994	0.640	0.280	0.180	0.140	0.110	0.100	0.130	1.200	4.890	8.030	6.780	1.760	24.2
1995	2.870	0.730	0.400	0.200	0.170	0.150	0.240	0.340	7.620	5.180	1.950	6.000	25.9
1996	6.170	2.760	0.920	0.320	0.170	0.120	0.220	0.550	7.190	3.180	3.970	0.950	26.5
1997	0.790	0.620	1.210	0.440	0.180	0.130	0.280	0.830	6.640	8.750	3.460	1.280	24.6
1998	0.440	0.860	0.900	0.310	0.130	0.100	0.320	0.360	2.180	5.260	7.740	4.880	23.5
1999	0.930	0.220	0.140	0.100	0.090	0.090	0.100	0.110	2.350	3.900	1.500	7.250	16.8
2000	1.570	0.260	0.170	0.120	0.100	0.090	0.090	1.310	0.470	8.940	8.410	4.500	26.0
2001	0.890	2.200	0.610	1.720	0.480	0.150	0.130	4.350	5.780	2.480	8.090	1.720	28.6
2002	3.650	0.880	0.180	0.120	0.110	0.220	0.150	0.270	1.400	4.170	3.420	1.440	16.0
2003	0.540	0.510	0.390	0.290	0.170	0.250	1.120	2.150	1.180	4.280	5.110	2.190	18.2
2004	2.830	0.750	0.270	0.320	0.220	0.210	0.320	1.270	10.000	4.770	8.040	2.600	31.6
AVE :	1.86	0.73	0.35	0.22	0.17	0.19	0.67	2.09	4.85	5.58	5.43	3.57	25.7
SD :	1.43	0.69	0.34	0.21	0.13	0.20	1.00	1.87	3.30	2.60	2.58	1.92	7.1

Incremental Naturalised Flows at G4h005

File : G4H005.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	1.620	4.670	2.270	0.930	0.540	0.730	1.140	1.070	14.020	11.130	6.880	9.140	54.1
1928	4.370	1.430	0.970	0.540	0.410	0.400	3.720	4.190	5.080	15.720	15.240	5.940	58.0
1929	1.840	0.970	0.690	0.530	0.660	0.790	0.860	1.100	1.590	3.620	8.830	19.060	40.5
1930	8.310	2.960	1.180	0.450	0.390	0.370	5.920	5.690	4.550	7.130	16.940	12.970	66.9
1931	8.810	3.050	1.130	0.700	1.460	0.950	0.660	7.980	11.100	13.140	7.810	11.120	67.9
1932	5.870	1.770	0.720	0.480	0.440	0.450	0.540	3.410	18.120	17.070	13.810	6.580	69.3
1933	3.670	1.670	0.550	0.350	0.450	0.460	0.410	3.050	6.280	6.820	11.920	11.030	46.7
1934	7.390	2.670	0.660	0.350	0.350	1.110	3.120	9.560	10.300	9.710	6.360	5.970	57.6
1935	3.500	2.860	1.210	2.320	1.180	0.690	0.730	7.300	6.850	10.800	10.260	6.990	54.7
1936	3.760	2.870	3.060	1.290	0.450	0.620	1.850	4.730	20.100	24.170	10.360	5.620	78.9
1937	4.150	1.870	0.660	0.590	0.510	0.580	3.360	5.530	4.530	5.040	8.050	12.270	47.1
1938	5.990	1.890	0.790	0.410	1.590	0.970	2.370	6.570	4.600	6.840	11.690	5.880	49.6
1939	2.180	1.350	0.770	0.450	2.090	1.450	7.610	7.160	14.670	10.440	4.990	5.690	58.9
1940	3.460	3.220	1.410	0.870	0.660	0.440	10.080	18.610	20.060	14.390	11.590	20.190	105.0
1941	10.450	2.880	1.330	0.800	0.480	0.420	0.930	9.220	24.310	11.860	9.600	5.850	78.1
1942	2.510	0.940	0.580	5.390	2.400	0.980	1.530	2.750	4.070	12.350	18.630	9.110	61.2
1943	4.070	2.340	0.900	0.470	0.380	0.420	0.790	8.870	31.960	16.940	16.650	13.800	97.6
1944	7.090	2.740	1.100	0.510	0.340	0.320	1.260	16.890	27.600	30.460	20.260	6.400	115.0
1945	5.000	2.870	0.970	0.480	0.380	1.370	1.410	2.330	4.010	6.470	11.050	12.100	48.4
1946	5.210	1.340	0.480	0.340	0.310	1.810	1.530	3.610	4.070	21.570	13.070	5.130	58.5
1947	2.710	1.290	0.560	0.380	0.370	0.940	1.290	3.620	6.560	12.450	7.120	10.790	48.1
1948	10.160	3.450	0.730	0.490	0.410	0.360	3.230	4.510	5.720	8.580	10.360	9.080	57.1
1949	4.510	3.080	1.360	0.510	0.350	0.320	5.280	2.840	1.510	18.360	9.420	11.140	58.7
1950	8.350	9.240	3.970	1.340	0.620	0.380	8.170	5.920	22.600	19.260	10.940	19.240	110.0
1951	9.010	3.960	1.480	0.440	0.330	0.610	0.940	6.390	5.500	11.310	18.150	12.030	70.2
1952	5.170	3.600	1.500	0.560	0.440	0.380	8.000	9.940	6.880	12.100	9.540	4.410	62.5
1953	2.740	2.350	1.080	0.460	0.400	0.580	2.820	19.880	18.290	27.920	25.240	10.270	112.0
1954	3.890	1.850	0.960	0.520	8.790	3.470	1.470	1.430	6.560	17.670	26.740	11.350	84.7
1955	8.980	4.270	1.070	0.450	0.380	0.690	0.860	8.060	15.270	12.160	10.850	5.350	68.4
1956	3.730	1.730	0.760	0.480	1.430	1.560	1.760	18.950	23.190	20.710	17.870	9.070	101.2
1957	14.360	5.420	0.670	0.340	1.630	1.560	1.350	7.520	10.050	5.070	14.170	7.390	69.5
1958	3.620	1.970	0.720	0.430	0.390	0.530	12.020	25.520	11.240	5.670	14.300	7.790	84.2
1959	4.340	1.860	0.590	0.390	0.370	0.620	1.000	5.150	15.740	8.770	5.040	4.800	48.7
1960	3.020	1.200	0.720	2.750	1.310	0.480	0.560	2.860	7.030	10.530	15.790	10.550	56.8
1961	5.110	1.770	0.560	0.420	0.530	0.850	3.500	2.650	19.590	12.200	17.970	8.650	73.8
1962	11.360	4.930	0.900	0.720	0.510	0.430	0.620	3.230	9.630	21.140	21.590	8.680	83.7
1963	3.000	1.520	0.950	0.550	0.780	0.700	1.080	2.160	12.480	16.450	20.000	9.270	68.9
1964	7.260	5.140	1.570	0.510	0.910	1.710	3.310	7.400	6.300	7.650	9.250	5.360	56.4
1965	3.580	1.870	1.500	0.770	0.440	2.320	2.300	4.450	5.770	14.500	15.620	9.220	62.3
1966	3.540	1.110	0.490	0.370	0.340	0.480	10.880	6.510	13.520	11.610	8.100	4.770	61.7
1967	5.330	2.860	0.890	0.630	0.690	0.490	1.490	9.910	14.500	13.430	13.010	5.840	69.1
1968	6.400	2.790	0.810	0.860	0.730	0.660	1.670	1.550	6.370	7.400	8.750	8.590	46.6
1969	8.130	3.110	0.690	0.380	0.420	0.410	0.380	5.900	14.470	15.450	16.300	9.240	74.9
1970	4.200	1.880	1.130	0.650	0.410	0.390	0.420	2.020	4.860	11.790	13.590	6.160	47.5
1971	2.370	1.210	0.660	0.560	0.670	0.670	5.070	7.940	6.700	7.260	9.060	5.460	47.6
1972	2.470	0.980	0.590	0.450	0.370	0.380	0.550	1.800	2.320	13.570	9.730	7.690	40.9
1973	4.280	1.590	0.740	0.470	0.370	0.370	0.370	6.700	9.480	9.110	34.850	18.080	86.4
1974	10.640	4.110	0.910	0.590	0.460	0.380	1.000	10.500	9.710	19.380	17.450	6.490	81.6
1975	4.730	2.390	0.700	0.350	0.350	0.650	1.730	3.370	21.690	17.210	7.910	7.310	68.4
1976	3.920	7.890	5.280	1.490	0.700	0.890	3.730	17.520	21.690	21.860	18.120	8.900	112.0
1977	3.660	1.630	0.800	0.510	0.460	0.690	1.860	2.060	2.230	5.290	12.210	10.570	42.0
1978	5.700	2.090	0.830	0.880	3.200	1.500	0.450	8.990	10.300	8.210	7.120	7.190	56.5
1979	10.890	4.100	0.650	0.450	0.800	0.580	1.550	6.440	11.510	6.350	6.340	4.210	53.9
1980	3.470	8.690	3.900	5.630	2.220	1.340	2.890	2.020	2.080	16.040	18.930	16.380	83.6
1981	6.020	1.560	0.740	0.510	0.390	0.370	6.120	3.860	8.230	7.010	6.150	4.280	45.2
1982	3.270	1.680	2.040	1.040	3.350	2.340	1.110	13.840	20.610	16.280	10.520	11.230	87.3
1983	5.280	1.380	0.540	0.410	0.370	0.690	1.770	19.430	10.630	11.620	6.620	10.200	68.9
1984	9.010	3.030	4.410	2.090	0.970	5.980	6.120	3.300	5.450	18.770	15.830	7.370	82.3
1985	4.200	1.940	0.760	0.440	0.490	2.460	2.820	3.170	12.900	14.530	27.580	11.510	82.8
1986	3.360	1.830	0.740	0.460	0.590	0.550	2.490	9.810	14.500	11.620	13.770	7.860	67.6
1987	2.990	1.010	0.790	0.520	0.340	0.380	2.300	4.260	6.800	10.740	13.770	10.010	53.9
1988	4.550	1.560	0.580	0.390	0.380	8.190	8.870	11.950	13.240	16.120	17.570	12.990	96.4
1989	9.210	3.470	0.810	0.400	0.970	0.700	5.000	11.220	18.160	18.610	9.590	4.850	83.0
1990	2.840	1.730	0.790	0.430	0.350	0.340	0.500	5.420	15.930	31.160	12.730	6.780	79.0
1991	6.020	2.390	0.630	0.340	0.570	0.580	3.830	10.180	23.690	17.630	13.740	8.820	88.4
1992	13.150	5.050	0.770	0.380	0.770	0.590	15.480	11.020	14.420	23.300	12.060	4.340	101.3
1993	1.710	0.860	0.630	0.460	0.380	0.360	0.700	3.090	26.250	16.080	6.180	4.820	61.5
1994	3.260	1.370	0.790	0.520	0.370	0.590	0.760	5.710	9.920	18.980	15.340	6.720	64.3
1995	9.010	3.950	2.030	0.900	0.650	0.940	0.870	2.010	17.030	20.200	16.210	14.330	88.1
1996	10.810	5.320	3.470	1.290	0.440	0.410	1.350	4.970	15.130	7.780	5.170	3.260	59.4
1997	1.560	4.830	2.330	0.700	0.410	0.350	1.290	14.730	13.800	12.540	8.130	4.480	65.2
1998	2.220	6.110	3.270	0.870	0.390	0.320	0.870	2.930	6.180	3.960	1.590	0.720	29.4
1999	0.450	0.510	0.500	0.770	0.520	0.520	0.520	1.920	6.250	15.620	11.310	13.600	52.5
2000	5.780	1.260	0.580	0.420	0.370	0.340	0.630	10.430	6.490	27.430	23.170	14.960	91.9
2001	5.630	1.430	0.550	4.450	1.960	0.490	1.290	2.510	9.600	18.420	14.880	6.880	68.1
2002	3.550	2.180	1.070	0.560	0.420	4.100	2.190	2.160	2.150	2.540	18.770	13.690	53.4
2003	5.700	1.840	0.860	0.960	0.590	0.450	1.780	1.630	3.670	7.860	11.550	8.040	44.9
2004	10.250	3.950	0.760	0.690	0.510	0.380	8.210	9.030	15.460	9.200	16.260	8.520	83.2
AVE :	5.43	2.74	1.19	0.83	0.83	0.98	2.82	6.85	11.48	13.59	13.13	8.88	68.7
SD :	2.97	1.74	0.97	0.97	1.10	1.22	3.05	5.19	7.00	6.29	5.81	3.90	19.3

Incremental Naturalised Flows at G4H007

File : G4H007A.INC
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	1.810	5.210	3.070	0.950	0.580	0.770	1.090	0.960	10.000	11.110	5.230	6.300	47.1
1928	3.950	1.480	0.840	0.520	0.430	0.440	4.370	4.220	4.150	12.760	12.290	5.510	51.0
1929	2.150	1.210	0.870	0.650	0.680	0.750	0.830	0.900	1.220	3.380	6.980	14.360	34.0
1930	7.860	2.580	1.210	0.550	0.550	0.490	3.250	4.150	3.740	5.920	13.530	11.360	55.2
1931	6.430	2.580	1.150	0.830	1.700	1.250	0.680	7.020	8.790	8.910	6.530	7.700	53.6
1932	4.740	1.740	0.910	0.640	0.560	0.500	0.570	2.960	13.780	13.820	11.200	5.830	57.3
1933	3.250	1.780	0.690	0.430	0.440	0.640	0.570	5.970	5.130	4.250	7.650	7.860	38.7
1934	5.370	2.520	0.930	0.480	0.420	1.220	2.460	6.910	7.780	8.330	6.190	6.160	48.8
1935	4.010	2.060	0.980	2.370	1.470	0.580	0.690	5.400	5.440	6.220	8.130	7.680	45.0
1936	4.240	2.030	1.850	1.200	0.600	0.870	1.860	4.650	17.700	21.870	11.690	5.310	73.9
1937	3.760	1.930	0.730	0.880	0.710	0.590	3.070	5.500	4.070	4.510	6.040	9.220	41.0
1938	5.720	2.220	0.950	0.470	1.160	0.870	2.820	4.470	3.290	5.290	9.760	6.020	43.0
1939	2.390	2.230	1.610	0.770	2.010	1.760	5.610	6.650	11.410	8.560	4.210	5.280	52.5
1940	3.750	3.680	1.990	1.890	1.220	0.570	6.960	13.220	15.000	12.180	9.160	13.630	83.3
1941	8.920	2.950	1.320	0.940	0.610	0.480	0.870	6.060	14.960	9.360	8.680	5.630	60.8
1942	2.280	1.040	0.590	1.080	0.830	0.860	2.730	3.360	3.440	8.440	12.080	7.230	44.0
1943	3.720	2.280	1.000	0.720	0.570	0.530	1.100	7.620	24.660	17.290	13.080	11.290	83.9
1944	7.280	3.250	1.460	0.730	0.430	0.390	1.620	11.350	19.820	23.190	16.510	6.150	92.2
1945	3.390	2.200	1.070	0.630	0.450	0.960	2.090	2.960	3.550	5.510	9.310	10.610	42.7
1946	5.450	1.680	0.710	0.460	0.390	1.420	1.950	3.290	3.000	13.780	10.780	4.780	47.7
1947	2.810	1.510	0.710	0.460	0.420	1.000	1.080	3.400	5.860	8.730	6.680	7.720	40.4
1948	6.910	2.890	0.880	0.530	0.440	0.420	2.420	3.360	4.310	6.950	8.340	7.810	45.3
1949	4.540	2.460	1.290	0.610	0.420	0.410	6.920	4.270	1.830	11.440	7.760	7.960	49.9
1950	5.910	3.990	2.570	1.390	0.700	0.440	6.910	6.040	18.060	17.940	9.890	10.650	84.5
1951	6.450	3.150	1.410	0.510	0.410	1.190	1.330	2.860	3.380	9.260	13.790	9.760	53.5
1952	4.470	2.570	1.260	0.540	0.430	0.480	8.550	12.520	7.880	11.870	11.140	5.050	66.8
1953	2.420	1.910	1.050	0.590	0.500	0.560	2.510	14.010	13.640	17.150	17.460	8.730	80.5
1954	3.750	1.870	1.150	0.690	4.400	2.560	1.390	1.230	4.390	12.520	20.040	10.870	64.9
1955	7.720	4.630	1.410	0.600	0.470	0.830	0.900	5.390	10.800	10.500	9.370	5.100	57.7
1956	3.270	1.780	1.030	0.680	1.730	1.590	1.720	14.550	17.050	16.300	15.360	8.530	83.6
1957	11.650	5.950	0.980	0.470	2.410	2.040	1.230	4.970	7.380	4.410	10.210	6.860	58.6
1958	3.510	2.240	0.940	0.600	0.500	0.570	9.340	21.050	11.540	4.730	10.400	7.220	72.6
1959	3.930	1.950	0.690	0.460	0.430	0.730	1.040	4.080	10.760	7.220	4.680	3.800	39.8
1960	2.440	1.210	0.780	3.980	2.270	0.560	0.590	2.280	6.370	7.730	12.060	9.420	49.7
1961	4.530	1.760	0.670	0.490	0.710	1.020	3.630	2.690	14.210	11.470	13.460	8.250	62.9
1962	8.470	4.760	1.110	0.650	0.500	0.550	0.670	2.350	8.110	16.410	18.880	8.990	71.5
1963	3.170	2.070	1.330	0.760	1.050	0.840	1.590	2.580	8.320	10.920	15.230	9.020	56.9
1964	7.490	6.510	2.390	0.770	1.100	2.050	3.360	5.920	4.940	6.230	7.080	4.490	52.3
1965	3.060	1.780	1.720	1.030	0.600	3.260	3.070	4.730	4.840	11.030	12.680	7.720	55.5
1966	3.240	1.290	0.660	0.480	0.420	0.570	8.970	6.590	9.800	9.840	6.570	4.120	52.6
1967	4.750	3.150	1.140	1.470	1.320	0.700	1.730	6.730	10.500	11.800	10.420	5.300	59.0
1968	4.570	2.500	1.110	1.620	1.230	0.910	1.990	1.650	4.930	5.560	6.670	6.400	39.1
1969	5.950	2.940	0.870	0.480	0.500	0.480	0.440	5.290	9.840	10.980	13.310	8.740	59.8
1970	4.240	2.180	1.440	0.860	0.500	0.480	0.520	1.430	3.920	7.570	10.710	6.260	40.1
1971	2.610	1.370	0.740	0.660	0.830	0.770	4.800	7.540	5.960	5.840	7.860	5.340	44.3
1972	2.530	1.170	0.960	0.720	0.470	0.440	0.500	1.440	1.820	9.410	8.340	6.150	34.0
1973	3.570	1.430	0.760	0.580	0.480	0.440	0.430	6.760	10.020	7.850	19.560	13.110	65.0
1974	8.050	3.970	1.060	0.870	0.640	0.480	1.290	7.170	7.660	13.790	12.450	5.610	63.0
1975	4.070	2.600	0.980	0.470	0.450	0.760	1.680	3.360	15.690	14.230	7.270	6.840	58.4
1976	4.450	6.520	4.720	1.540	1.020	1.530	3.690	10.610	15.110	16.590	15.930	9.420	91.1
1977	4.040	1.760	0.980	0.640	0.580	0.970	1.610	2.170	2.220	4.670	9.510	9.010	38.2
1978	5.070	2.050	0.970	0.800	4.000	2.350	0.630	6.890	9.420	7.250	5.920	6.160	51.5
1979	11.590	5.750	0.960	0.720	1.010	0.720	2.270	6.420	11.230	6.620	5.770	4.390	57.5
1980	3.220	6.770	4.940	5.640	2.770	1.210	3.580	2.510	2.300	10.640	12.340	9.710	65.6
1981	4.590	1.930	1.050	0.850	0.620	0.510	2.500	2.290	5.520	5.090	6.240	4.650	35.8
1982	2.850	1.860	2.600	1.520	3.630	3.200	1.410	9.710	16.730	12.340	8.350	8.600	72.8
1983	4.750	1.540	0.790	0.600	0.520	1.090	1.970	12.760	9.130	8.100	5.890	6.490	53.6
1984	7.940	3.660	3.800	2.370	1.180	3.940	5.620	3.230	4.310	11.410	11.550	6.980	66.0
1985	4.620	2.280	0.920	0.570	0.750	2.580	3.480	3.080	8.620	11.490	20.160	11.030	69.6
1986	3.530	1.980	0.910	0.880	1.020	0.810	2.290	6.790	9.460	9.940	12.750	9.770	60.1
1987	4.150	1.410	1.730	1.080	0.470	0.690	3.310	4.550	5.520	10.480	11.080	7.110	51.6
1988	4.080	1.960	0.880	0.550	0.620	5.820	7.410	7.990	7.500	11.960	13.510	9.960	72.2
1989	8.590	4.050	1.100	0.700	2.190	1.400	5.120	6.430	10.050	15.250	8.690	3.820	67.4
1990	2.350	1.490	0.860	0.570	0.450	0.440	0.490	4.820	16.990	21.490	10.520	9.040	69.5
1991	8.470	3.450	0.970	0.540	0.810	0.820	1.940	3.960	17.120	18.190	10.110	6.180	72.6
1992	10.180	5.410	1.230	0.750	1.020	0.830	7.800	7.830	9.050	20.580	14.050	4.900	83.6
1993	2.180	1.320	2.170	1.330	0.610	1.100	1.130	2.930	16.610	13.510	5.960	4.660	53.5
1994	3.590	1.750	1.580	1.220	0.640	0.770	1.630	3.940	6.920	15.510	12.820	6.250	56.6
1995	5.680	3.650	4.030	2.020	0.910	0.950	0.780	2.500	10.620	15.000	12.170	10.470	68.8
1996	8.050	5.350	2.870	1.170	0.770	0.640	0.870	3.870	10.980	7.040	7.020	4.590	53.2
1997	2.520	3.650	2.060	1.190	0.780	0.870	1.550	6.460	7.030	10.930	8.500	4.820	50.4
1998	2.970	5.080	4.230	1.650	0.620	0.500	1.540	2.600	5.720	4.930	4.670	4.580	39.1
1999	2.840	1.450	0.750	0.860	0.640	1.550	1.200	1.610	3.700	6.960	7.580	9.890	39.0
2000	5.380	1.490	0.680	0.550	0.560	0.480	0.670	7.450	5.790	16.770	22.990	15.450	78.3
2001	6.220	1.990	1.020	5.530	3.220	0.720	0.980	4.680	6.650	9.920	10.540	5.510	57.0
2002	2.840	2.280	1.150	1.060	0.950	1.850	1.370	3.120	2.630	2.880	10.570	9.040	39.7
2003	4.610	1.990	1.120	1.130	0.970	1.040	1.790	1.430	3.540	7.410	8.040	6.030	39.1
2004	7.820	3.940	1.180	0.710	0.570	0.510	13.810	12.070	11.580	7.360	10.080	6.830	76.5
AVE :	4.87	2.72	1.40	1.02	0.97	1.06	2.67	5.49	8.68	10.57	10.51	7.55	57.5
SD :	2.24	1.42	0.94	0.93	0.84	0.89	2.54	3.66	5.03	4.64	3.97	2.54	14.6

Incremental Naturalised Flows at G4H007 including G4H030

File : G4H007B.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	4.130	9.600	6.210	3.000	1.900	2.190	2.880	2.530	27.970	24.650	17.750	20.340	123.2
1928	11.390	4.350	3.080	1.920	1.330	1.310	6.700	7.820	9.130	36.560	36.790	16.260	136.6
1929	5.980	3.430	2.630	1.990	2.120	2.540	2.330	2.720	4.380	7.480	18.060	36.870	90.5
1930	21.290	8.150	3.680	1.580	1.550	1.420	13.140	11.980	7.870	13.370	28.980	24.370	137.4
1931	21.430	10.180	3.490	2.270	3.850	2.850	1.670	10.820	17.190	21.840	16.670	23.770	136.0
1932	15.420	5.280	2.560	1.720	1.440	1.460	1.580	7.210	32.160	33.100	29.580	17.350	148.9
1933	9.100	4.710	1.990	1.310	1.510	1.680	1.470	7.990	9.850	12.250	24.010	26.000	101.9
1934	19.170	8.520	2.640	1.370	1.220	2.420	6.500	19.590	19.870	19.200	14.630	12.890	128.0
1935	8.460	7.050	3.760	5.020	3.280	2.760	2.490	13.680	13.870	19.470	21.870	19.560	121.3
1936	11.510	7.970	7.050	3.560	1.580	1.970	4.240	8.430	37.220	50.140	26.680	14.690	175.0
1937	10.510	5.260	2.270	1.950	1.660	1.920	7.800	14.490	10.750	10.400	15.170	24.140	106.3
1938	16.120	6.520	2.900	1.560	3.660	3.300	5.710	9.900	8.520	13.310	25.010	16.300	112.8
1939	7.250	5.110	3.240	1.780	5.140	4.290	14.310	13.990	24.810	21.120	12.000	12.790	125.8
1940	9.110	8.200	4.440	3.140	2.360	1.530	20.090	37.630	38.160	28.520	21.780	39.070	214.0
1941	25.060	8.110	3.920	2.930	1.890	1.490	2.670	16.050	44.000	27.250	18.110	13.140	164.6
1942	6.740	3.150	2.060	11.440	7.060	2.920	4.700	6.830	8.740	20.860	34.580	21.710	130.8
1943	10.460	6.460	2.970	1.740	1.430	1.430	2.390	16.470	54.660	37.280	37.970	34.550	207.8
1944	17.750	6.930	3.210	1.770	1.250	1.200	3.390	33.970	52.090	57.200	43.980	17.960	240.7
1945	15.640	9.410	3.030	1.680	1.390	4.320	4.920	5.200	7.490	11.700	18.340	21.420	104.5
1946	12.230	4.380	1.930	1.320	1.190	4.570	4.710	9.410	10.550	38.180	27.340	11.610	127.4
1947	7.170	4.310	2.220	1.450	1.320	2.410	3.200	6.970	11.980	21.160	15.960	20.790	98.9
1948	23.820	10.700	2.760	1.710	1.430	1.280	6.660	8.940	10.360	14.960	19.780	19.110	121.5
1949	11.270	6.930	3.680	1.740	1.280	1.200	11.630	7.790	3.890	30.830	20.810	19.760	120.8
1950	17.270	16.960	9.500	3.650	1.890	1.600	13.590	12.830	39.920	38.810	23.080	36.110	215.2
1951	21.730	8.470	3.770	1.550	1.240	2.120	2.570	7.980	9.010	18.770	32.480	25.530	135.2
1952	12.810	8.050	4.010	1.690	1.340	1.330	16.290	22.690	15.560	21.940	21.150	11.590	138.5
1953	7.070	5.930	3.260	1.660	1.430	1.740	5.280	37.450	36.210	52.870	53.400	25.550	231.9
1954	10.310	5.230	2.980	1.820	17.770	10.020	3.530	3.190	11.170	29.320	47.960	26.860	170.2
1955	18.300	10.850	3.530	1.640	1.410	2.070	2.400	15.610	27.700	23.750	21.960	13.800	143.0
1956	9.740	5.340	2.570	1.670	3.210	3.940	4.030	34.710	47.530	44.850	40.750	23.110	221.5
1957	28.720	14.770	2.730	1.340	3.710	4.030	3.860	14.700	19.640	12.000	27.920	18.900	152.3
1958	9.320	5.640	2.440	1.770	1.540	1.830	24.240	52.640	27.910	12.600	28.860	19.820	188.6
1959	11.520	5.920	2.210	1.460	1.300	1.770	2.280	9.950	25.690	18.890	11.520	11.020	103.5
1960	7.600	3.540	3.150	6.500	3.750	1.490	1.650	4.800	11.270	16.200	26.550	22.100	108.6
1961	12.350	5.260	2.010	1.440	1.660	2.560	7.300	6.030	39.110	30.230	41.920	25.410	175.3
1962	25.110	14.500	3.470	2.520	1.870	1.480	1.880	4.630	14.620	38.620	44.060	20.930	173.7
1963	7.720	4.960	3.100	1.800	2.510	2.290	3.090	4.770	24.900	29.470	36.590	22.270	143.5
1964	13.980	11.560	4.860	1.830	2.640	3.990	6.850	14.050	12.390	17.370	18.670	12.290	120.5
1965	9.820	6.130	4.580	2.710	1.590	4.680	4.760	7.860	10.580	24.010	33.510	23.600	133.8
1966	10.290	3.870	1.830	1.340	1.220	1.740	20.940	17.220	25.550	27.030	20.230	12.880	144.1
1967	11.030	7.100	2.900	2.450	2.430	1.700	3.850	19.900	30.330	27.210	26.360	14.960	150.2
1968	13.150	7.390	2.770	2.880	2.700	2.300	4.190	3.700	12.830	14.100	16.860	16.190	99.1
1969	17.650	9.180	2.570	1.440	1.630	1.490	1.320	9.540	22.040	28.210	33.770	22.180	151.0
1970	12.010	6.620	4.750	2.770	1.540	1.460	1.530	5.120	11.880	25.620	30.270	16.590	120.2
1971	7.750	4.320	2.230	1.840	2.450	2.440	9.920	15.810	14.260	14.820	19.440	13.910	109.2
1972	6.880	3.190	2.320	1.790	1.330	1.270	1.560	3.990	4.850	25.100	21.750	18.880	92.9
1973	11.590	4.420	2.250	1.620	1.360	1.330	1.300	14.700	17.810	15.960	67.700	46.640	186.7
1974	22.930	10.550	2.980	1.960	1.540	1.280	2.700	16.730	17.840	33.690	35.500	16.910	164.6
1975	9.990	6.140	2.490	1.360	1.260	2.000	3.720	7.440	43.420	39.390	19.450	17.830	154.5
1976	12.050	19.770	13.550	4.400	3.110	3.460	7.890	30.230	42.940	49.140	47.100	24.490	258.1
1977	9.200	4.630	2.860	1.810	1.640	2.260	3.500	4.480	4.760	14.020	25.750	23.290	98.2
1978	13.440	5.690	2.800	2.240	8.260	5.070	1.680	20.730	25.940	20.200	17.050	18.620	141.7
1979	26.180	12.770	2.720	1.820	2.130	1.680	4.970	12.910	23.320	15.580	12.650	9.590	126.3
1980	8.230	15.240	10.410	14.940	7.770	3.410	7.830	5.740	5.660	30.320	36.730	31.110	177.4
1981	14.850	5.350	2.720	1.900	1.480	1.360	8.390	7.010	12.440	13.090	14.240	11.180	94.0
1982	7.630	4.520	4.510	2.900	6.920	6.020	3.040	26.280	45.560	41.200	27.290	24.930	200.8
1983	13.800	4.410	2.000	1.480	1.370	2.240	4.160	35.110	25.780	19.270	14.570	20.570	144.8
1984	23.750	10.590	9.260	6.030	3.150	11.870	13.250	7.350	10.090	33.070	33.240	18.450	180.1
1985	12.570	6.740	2.680	1.580	2.610	5.880	6.780	5.920	18.240	25.920	55.630	30.990	175.5
1986	9.460	5.290	2.500	1.920	2.200	1.890	5.360	18.510	26.340	23.770	32.850	23.780	153.9
1987	9.870	3.710	3.100	2.090	1.270	1.520	6.430	9.190	13.040	21.530	26.340	19.000	117.1
1988	10.460	4.870	2.200	1.460	1.470	14.190	18.470	18.990	22.880	34.070	37.520	27.560	194.1
1989	20.810	9.860	2.970	1.680	4.370	3.100	12.100	19.180	30.360	39.160	23.220	11.240	178.1
1990	7.020	4.300	2.320	1.510	1.280	1.240	1.470	9.970	34.580	57.320	30.010	18.390	169.4
1991	19.050	8.870	2.620	1.480	1.840	1.860	5.100	11.430	45.550	44.000	26.290	16.930	185.0
1992	28.570	15.140	3.100	1.730	2.160	1.860	26.270	24.680	28.120	64.140	41.430	13.860	251.1
1993	5.940	3.080	3.600	2.420	1.450	1.980	2.270	6.330	54.490	40.390	16.140	13.180	151.3
1994	9.440	4.350	3.460	2.500	1.490	1.600	2.690	10.430	18.280	34.460	30.570	16.600	135.9
1995	17.650	10.440	9.060	4.730	2.090	2.370	2.090	4.870	28.410	41.380	31.410	26.950	181.4
1996	27.940	17.270	6.970	2.660	1.730	1.570	3.140	9.360	30.470	20.710	16.210	11.000	149.0
1997	6.180	13.960	7.960	2.700	1.750	1.850	3.380	27.230	23.900	23.430	18.890	11.730	143.0
1998	6.890	9.920	8.900	3.800	1.560	1.290	3.470	5.320	11.840	15.540	28.790	30.940	128.3
1999	14.190	4.170	1.950	1.970	1.600	2.980	2.490	5.030	12.070	22.160	22.650	28.470	119.7
2000	15.560	4.560	2.070	1.480	1.440	1.310	2.080	22.160	16.420	39.390	48.730	34.090	189.3
2001	15.570	5.360	2.500	9.940	6.110	1.830	2.910	9.700	18.150	36.810	36.690	18.420	164.0
2002	8.830	5.490	2.810	2.140	1.850	8.290	5.670	7.210	6.340	6.870	29.810	24.530	109.8
2003	12.680	5.720	3.400	2.590	1.870	1.920	3.960	3.370	9.070	21.080	23.720	17.120	106.5
2004	27.120	14.060	3.170	2.330	1.800	1.390	29.220	24.100	36.260	28.380	33.330	20.550	221.7
AVE :	13.62	7.57	3.71	2.60	2.50	2.74	6.28	13.48	22.06	27.28	28.03	20.74	150.6
SD :	6.25	3.77	2.23	2.21	2.33	2.30	6.04	9.85	13.29	12.46	11.12	7.31	39.9

Incremental Naturalised Flows at G4H030

File : G4H030.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	2.320	4.390	3.140	2.050	1.320	1.420	1.790	1.570	17.970	13.540	12.520	14.040	76.1
1928	7.440	2.870	2.240	1.400	0.900	0.870	2.330	3.600	4.980	23.800	24.500	10.750	85.7
1929	3.830	2.220	1.760	1.340	1.440	1.790	1.500	1.820	3.160	4.100	11.080	22.510	56.6
1930	13.430	5.570	2.470	1.030	1.000	0.930	9.890	7.830	4.130	7.450	15.450	13.010	82.2
1931	15.000	7.600	2.340	1.440	2.150	1.600	0.990	3.800	8.400	12.930	10.140	16.070	82.5
1932	10.680	3.540	1.650	1.080	0.880	0.960	1.010	4.250	18.380	19.280	18.380	11.520	91.6
1933	5.850	2.930	1.300	0.880	1.070	1.040	0.900	2.020	4.720	8.000	16.360	18.140	63.2
1934	13.800	6.000	1.710	0.890	0.800	1.200	4.040	12.680	12.090	10.870	8.440	6.730	79.3
1935	4.450	4.990	2.780	2.650	1.810	2.180	1.800	8.280	8.430	13.250	13.740	11.880	76.2
1936	7.270	5.940	5.200	2.360	0.980	1.100	2.380	3.780	19.520	28.270	14.990	9.380	101.2
1937	6.750	3.330	1.540	1.070	0.950	1.330	4.730	8.990	6.680	5.890	9.130	14.920	65.3
1938	10.400	4.300	1.950	1.090	2.500	2.430	2.890	5.430	5.230	8.020	15.250	10.280	69.8
1939	4.860	2.880	1.630	1.010	3.130	2.530	8.700	7.340	13.400	12.560	7.790	7.510	73.3
1940	5.360	4.520	2.450	1.250	1.140	0.960	13.130	24.410	23.160	16.340	12.620	25.440	130.8
1941	16.140	5.160	2.600	1.990	1.280	1.010	1.800	9.990	29.040	17.890	9.430	7.510	103.8
1942	4.460	2.110	1.470	10.360	6.230	2.060	1.970	3.470	5.300	12.420	22.500	14.480	86.8
1943	6.740	4.180	1.970	1.020	0.860	0.900	1.290	8.850	30.000	19.990	24.890	23.260	124.0
1944	10.470	3.680	1.750	1.040	0.820	0.810	1.770	22.620	32.270	34.010	27.470	11.810	148.5
1945	12.250	7.210	1.960	1.050	0.940	3.360	2.830	2.240	3.940	6.190	9.030	10.810	61.8
1946	6.780	2.700	1.220	0.860	0.800	3.150	2.760	6.120	7.550	24.400	16.560	6.830	79.7
1947	4.360	2.800	1.510	0.990	0.900	1.410	2.120	3.570	6.120	12.430	9.280	13.070	58.6
1948	16.910	7.810	1.880	1.180	0.990	0.860	4.240	5.580	6.050	8.010	11.440	11.300	76.3
1949	6.730	4.470	2.390	1.130	0.860	0.790	4.710	3.520	2.060	19.390	13.050	11.800	70.9
1950	11.360	12.970	6.930	2.260	1.190	1.160	6.680	6.790	21.860	20.870	13.190	25.460	130.7
1951	15.280	5.320	2.360	1.040	0.830	0.930	1.240	5.120	5.630	9.510	18.690	15.770	81.7
1952	8.340	5.480	2.750	1.150	0.910	0.850	7.740	10.170	7.680	10.070	10.010	6.540	71.7
1953	4.650	4.020	2.210	1.070	0.930	1.180	2.770	23.440	22.570	35.720	35.940	16.820	151.3
1954	6.560	3.360	1.830	1.130	13.370	7.460	2.140	1.960	6.780	16.800	27.920	15.990	105.3
1955	10.580	6.220	2.120	1.040	0.940	1.240	1.500	10.220	16.900	13.250	12.590	8.700	85.3
1956	6.470	3.560	1.540	0.990	1.480	2.350	2.310	20.160	30.480	28.550	25.390	14.580	137.9
1957	17.070	8.820	1.750	0.870	1.300	1.990	2.630	9.730	12.260	7.590	17.710	12.040	93.8
1958	5.810	3.400	1.500	1.170	1.040	1.260	14.900	31.590	16.370	7.870	18.460	12.600	116.0
1959	7.590	3.970	1.520	1.000	0.870	1.040	1.240	5.870	14.930	11.670	6.840	7.220	63.8
1960	5.160	2.330	2.370	2.520	1.480	0.930	1.060	2.520	4.900	8.470	14.490	12.680	58.9
1961	7.820	3.500	1.340	0.950	0.950	1.540	3.670	3.340	24.900	18.760	28.460	17.160	112.4
1962	16.640	9.740	2.360	1.870	1.370	0.930	1.210	2.280	6.510	22.210	25.180	11.940	102.2
1963	4.550	2.890	1.770	1.040	1.460	1.450	1.500	2.190	16.580	18.550	21.360	13.250	86.6
1964	6.490	5.050	2.470	1.060	1.540	1.940	3.490	8.130	7.450	11.140	11.590	7.800	68.2
1965	6.760	4.350	2.860	1.680	0.990	1.420	1.690	3.130	5.740	12.980	20.830	15.880	78.3
1966	7.050	2.580	1.170	0.860	0.800	1.170	11.970	10.630	15.750	17.190	13.660	8.760	91.6
1967	6.280	3.950	1.760	0.980	1.110	1.000	2.120	13.170	19.830	15.410	15.940	9.660	91.2
1968	8.580	4.890	1.660	1.260	1.470	1.390	2.200	2.050	7.900	8.540	10.190	9.790	59.9
1969	11.700	6.240	1.700	0.960	1.130	1.010	0.880	4.250	12.200	17.230	20.460	13.440	91.2
1970	7.770	4.440	3.310	1.910	1.040	0.980	1.010	3.690	7.960	18.050	19.560	10.330	80.1
1971	5.140	2.950	1.490	1.180	1.620	1.670	5.120	8.270	8.300	8.980	11.580	8.570	64.9
1972	4.350	2.020	1.360	1.070	0.860	0.830	1.060	2.550	3.030	15.690	13.410	12.730	59.0
1973	8.020	2.990	1.490	1.040	0.880	0.890	0.870	7.940	7.790	8.110	48.140	33.530	121.7
1974	14.880	6.580	1.920	1.090	0.900	0.800	1.410	9.560	10.180	19.900	23.050	11.300	101.6
1975	5.920	3.540	1.510	0.890	0.810	1.240	2.040	4.080	27.730	25.160	12.180	10.990	96.1
1976	7.600	13.250	8.830	2.860	2.090	1.930	4.200	19.620	27.830	32.550	31.170	15.070	167.0
1977	5.160	2.870	1.880	1.170	1.060	1.290	1.890	2.310	2.540	9.350	16.240	14.280	60.0
1978	8.370	3.640	1.830	1.440	4.260	2.720	1.050	13.840	16.520	12.950	11.130	12.460	90.2
1979	14.590	7.020	1.760	1.100	1.120	0.960	2.700	6.490	12.090	8.960	6.880	5.200	68.9
1980	5.010	8.470	5.470	9.300	5.000	2.200	4.250	3.230	3.360	19.680	24.390	21.400	111.8
1981	10.260	3.420	1.670	1.050	0.860	0.850	5.890	4.720	6.920	8.000	8.000	6.530	58.2
1982	4.780	2.660	1.910	1.380	3.290	2.820	1.630	16.570	28.830	28.860	18.940	16.330	128.0
1983	9.050	2.870	1.210	0.880	0.850	1.150	2.190	22.350	16.650	11.170	8.680	14.080	91.1
1984	15.810	6.930	5.460	3.660	1.970	7.930	7.630	4.120	5.780	21.660	21.690	11.470	114.1
1985	7.950	4.460	1.760	1.010	1.860	3.300	3.300	2.840	9.620	14.430	35.470	19.960	106.0
1986	5.930	3.310	1.590	1.040	1.180	1.080	3.070	11.720	16.880	13.830	20.100	14.010	93.7
1987	5.720	2.300	1.370	1.010	0.800	0.830	3.120	4.640	7.520	11.050	15.260	11.890	65.5
1988	6.380	2.910	1.320	0.910	0.850	8.370	11.060	11.000	15.380	22.110	24.010	17.600	121.9
1989	12.220	5.810	1.870	0.980	2.180	1.700	6.980	12.750	20.310	23.910	14.530	7.420	110.7
1990	4.670	2.810	1.460	0.940	0.830	0.800	0.980	5.150	17.590	35.830	19.490	9.350	99.9
1991	10.580	5.420	1.650	0.940	1.030	1.040	3.160	7.470	28.430	25.810	16.180	10.750	112.5
1992	18.390	9.730	1.870	0.980	1.140	1.030	18.470	16.850	19.070	43.560	27.380	8.960	167.4
1993	3.760	1.760	1.430	1.090	0.840	0.880	1.140	3.400	37.880	26.880	10.180	8.520	97.8
1994	5.850	2.600	1.880	1.280	0.850	0.830	1.060	6.490	11.360	18.950	17.750	10.350	79.3
1995	11.970	6.790	5.030	2.710	1.180	1.420	1.310	2.370	17.790	26.380	19.240	16.480	112.7
1996	19.890	11.920	4.100	1.490	0.960	0.930	2.270	5.490	19.490	13.670	9.190	6.410	95.8
1997	3.660	10.310	5.900	1.510	0.970	0.980	1.830	20.770	16.870	12.500	10.390	6.910	92.6
1998	3.920	4.840	4.670	2.150	0.940	0.790	1.930	2.720	6.120	10.610	24.120	26.360	89.2
1999	11.350	2.720	1.200	1.110	0.960	1.430	1.290	3.420	8.370	15.200	15.070	18.580	80.7
2000	10.180	3.070	1.390	0.930	0.880	0.830	1.410	14.710	10.630	22.620	25.740	18.640	111.0
2001	9.350	3.370	1.480	4.410	2.890	1.110	1.930	5.020	11.500	26.890	26.150	12.910	107.0
2002	5.990	3.210	1.660	1.080	0.900	6.440	4.300	4.090	3.710	3.990	19.240	15.490	70.1
2003	8.070	3.730	2.280	1.460	0.900	0.880	2.170	1.940	5.530	13.670	15.680	11.090	67.4
2004	19.300	10.120	1.990	1.620	1.230	0.880	15.410	12.030	24.680	21.020	23.250	13.720	145.3
AVE :	8.75	4.85	2.31	1.57	1.52	1.68	3.61	7.98	13.39	16.71	17.52	13.19	93.1
SD :	4.25	2.58	1.40	1.50	1.65	1.52	3.67	6.45	8.57	8.22	7.64	5.23	26.2

Incremental Naturalised Flows at G4r001

File : G4R001.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	1.970	5.460	2.440	0.850	0.440	0.930	1.270	0.820	8.990	8.630	3.170	5.570	40.5
1928	2.670	0.970	0.560	0.330	0.300	0.350	3.810	4.570	3.830	9.330	6.460	3.380	36.6
1929	1.660	1.120	2.410	1.330	1.820	1.410	1.050	0.820	2.090	4.530	6.220	9.460	33.9
1930	4.850	2.330	0.880	0.330	0.590	0.430	3.470	3.750	3.040	6.010	9.290	6.540	41.5
1931	7.230	2.470	0.730	0.910	2.480	1.110	0.400	6.780	7.130	4.940	4.680	4.610	43.5
1932	2.140	0.730	0.760	0.540	0.360	0.320	0.480	2.550	8.610	7.030	6.400	3.150	33.1
1933	1.840	0.990	0.420	0.280	0.280	1.090	0.640	6.140	3.680	3.350	5.770	4.900	29.4
1934	4.880	3.020	0.890	0.320	0.280	0.740	2.580	5.430	4.080	5.320	4.250	4.620	36.4
1935	2.310	1.280	0.580	2.880	1.240	0.510	0.470	3.130	2.460	3.060	5.680	6.030	29.6
1936	2.530	1.190	1.330	0.990	0.470	1.140	2.640	3.620	13.410	12.920	7.530	4.700	52.5
1937	2.930	1.160	0.410	1.090	0.600	0.470	4.390	5.690	3.470	5.430	5.630	7.320	38.6
1938	4.080	1.950	0.740	0.310	1.770	0.880	2.750	3.580	2.620	4.340	7.650	4.270	34.9
1939	1.700	2.100	1.670	0.680	2.290	2.050	4.160	3.760	8.720	6.090	3.140	5.350	41.7
1940	3.720	3.240	1.480	1.100	0.590	0.420	7.790	10.690	10.670	7.560	5.120	7.530	59.9
1941	5.170	2.490	1.340	1.200	0.630	0.430	1.110	5.870	12.450	5.850	6.650	3.560	46.8
1942	1.650	0.770	0.450	1.490	1.040	0.850	2.580	3.660	3.590	5.270	6.310	4.090	31.8
1943	2.490	1.390	0.550	0.830	0.480	0.330	1.240	7.000	15.910	10.400	10.170	10.630	61.4
1944	5.660	1.810	1.190	0.540	0.270	0.280	2.510	12.070	13.830	13.240	9.700	3.320	64.4
1945	3.990	1.840	0.700	0.570	0.380	2.090	2.870	3.810	4.310	5.900	7.890	9.130	43.5
1946	3.940	1.020	0.510	0.330	0.270	1.540	2.400	4.810	3.570	11.330	7.510	3.120	40.4
1947	1.710	0.870	0.400	0.290	0.300	0.620	1.080	3.530	5.920	8.440	5.530	5.410	34.1
1948	5.750	2.000	0.560	0.390	0.310	0.310	3.550	3.260	4.460	5.810	7.260	5.250	38.9
1949	2.330	1.200	0.740	0.400	0.280	0.320	7.150	3.300	2.540	11.180	5.360	5.770	40.6
1950	4.090	2.740	2.490	1.700	0.610	0.300	5.910	6.110	15.500	11.390	5.940	8.850	65.6
1951	4.030	2.700	1.060	0.320	0.280	1.490	1.870	2.490	3.270	6.470	8.810	6.610	39.4
1952	2.860	2.260	1.010	0.410	0.320	0.420	6.910	9.820	5.910	7.750	6.090	2.380	46.1
1953	1.590	1.500	0.730	0.460	0.570	0.570	2.730	12.790	8.960	12.180	12.290	6.180	60.5
1954	3.080	1.380	1.190	0.560	5.900	2.310	2.210	1.310	3.950	9.390	11.610	6.310	49.2
1955	5.850	2.990	1.010	0.490	0.410	1.340	2.640	7.700	10.430	7.460	7.480	3.450	51.3
1956	3.660	1.550	0.970	0.640	1.600	0.960	2.460	12.430	11.150	10.080	9.390	5.840	60.7
1957	8.650	3.160	0.470	0.340	2.820	1.460	1.620	9.410	8.060	2.910	9.110	6.020	54.0
1958	4.310	2.150	0.630	0.570	0.430	0.850	8.290	17.340	6.880	3.150	8.730	5.440	58.8
1959	4.630	1.750	0.650	0.430	0.400	0.820	1.560	5.750	11.490	5.580	4.420	3.310	40.8
1960	1.600	0.660	0.720	4.320	1.670	0.390	0.440	3.620	8.160	5.890	8.840	7.580	43.9
1961	4.050	1.250	0.510	0.670	0.940	1.420	5.200	3.200	16.030	10.090	11.610	6.340	61.3
1962	8.520	4.080	0.850	0.450	0.320	0.310	0.450	2.100	5.610	12.650	12.240	4.690	52.3
1963	1.540	2.700	1.620	0.560	1.080	0.600	1.220	4.190	8.990	8.250	9.950	5.290	46.0
1964	3.480	2.950	1.060	0.980	1.610	3.360	4.210	6.160	4.520	5.160	6.510	3.450	43.5
1965	2.540	1.180	1.680	0.770	0.540	3.290	2.500	4.740	4.870	10.660	9.360	5.700	47.8
1966	2.110	1.210	1.060	0.600	0.330	0.680	8.850	5.460	9.120	6.460	4.390	3.310	43.6
1967	4.230	2.140	0.650	2.400	1.650	0.550	2.180	7.500	10.340	9.380	7.500	3.220	51.7
1968	4.090	1.670	1.630	2.310	1.180	0.860	2.460	1.470	5.460	4.670	5.810	4.230	35.8
1969	4.180	1.680	0.460	0.370	0.360	0.320	0.370	7.310	8.680	7.990	10.290	5.790	47.8
1970	3.180	1.350	1.220	0.650	0.330	0.350	0.420	2.030	4.230	6.010	9.580	4.600	34.0
1971	2.300	1.120	0.500	0.580	1.500	0.870	4.970	7.450	5.400	4.700	6.300	4.060	39.8
1972	1.840	0.730	1.310	0.690	0.310	0.340	0.370	2.540	2.200	8.310	6.900	6.410	32.0
1973	2.820	0.960	0.620	0.500	0.350	0.320	0.310	7.900	9.140	6.050	16.760	10.310	56.0
1974	6.720	2.560	0.620	1.150	0.610	0.320	1.550	7.540	7.940	11.310	8.140	3.130	51.6
1975	3.490	2.390	0.760	0.300	0.300	0.900	3.690	3.970	14.380	9.660	6.180	6.310	52.3
1976	2.990	5.290	4.470	1.370	0.650	1.490	4.000	10.730	13.490	11.820	8.550	6.560	71.4
1977	3.040	1.140	0.600	0.390	0.810	1.130	2.580	2.980	2.180	2.220	6.250	7.000	30.3
1978	4.460	1.690	0.800	0.730	5.450	2.080	0.340	8.770	8.290	6.220	4.240	4.990	48.1
1979	10.460	3.650	0.460	0.580	1.110	0.580	3.290	7.520	11.190	4.650	3.430	3.120	50.0
1980	2.810	5.110	3.780	6.270	2.120	1.740	3.930	1.750	3.180	11.850	11.580	8.940	63.1
1981	3.260	1.340	1.150	1.550	0.680	0.410	2.860	2.290	5.490	4.910	5.280	2.720	31.9
1982	1.810	1.940	3.350	1.280	3.410	4.080	1.540	9.020	13.190	8.950	6.490	9.250	64.3
1983	3.680	0.820	0.660	0.480	0.360	1.430	2.140	10.240	6.720	5.930	3.640	4.960	41.1
1984	6.300	2.170	5.570	2.330	1.350	4.660	5.000	2.900	4.950	10.310	8.970	5.490	60.0
1985	2.780	1.020	0.560	0.370	0.610	2.970	3.980	3.720	8.900	10.000	14.240	6.840	56.0
1986	2.280	1.000	0.530	1.940	1.120	0.610	3.630	8.290	8.910	10.680	10.210	7.800	57.0
1987	2.860	0.880	1.750	0.790	0.290	0.670	2.670	5.440	5.740	8.000	8.860	5.930	43.9
1988	4.400	1.710	0.600	0.350	0.460	6.910	4.250	7.220	8.460	10.800	9.860	6.730	61.8
1989	3.090	1.680	1.300	1.170	1.160	1.200	2.380	1.500	4.040	9.630	10.380	5.850	43.4
1990	5.810	3.300	1.470	0.650	0.450	1.980	3.570	9.010	10.520	8.240	8.850	4.380	58.2
1991	4.860	1.940	1.050	0.750	1.380	0.810	2.960	12.450	10.990	9.730	8.980	5.980	61.9
1992	8.520	3.130	0.490	0.360	2.850	1.380	1.790	10.570	8.020	2.770	9.050	6.440	55.4
1993	4.750	2.550	0.760	0.460	0.370	0.600	7.040	15.930	5.880	2.630	8.850	5.280	55.1
1994	4.690	1.820	0.820	0.480	0.390	0.750	1.520	5.530	11.940	5.580	4.040	3.540	41.1
1995	1.620	0.600	0.500	3.010	1.250	0.380	0.370	3.690	7.650	4.870	7.730	7.540	39.2
1996	4.220	1.280	0.660	0.660	0.610	1.130	4.260	2.850	15.360	9.800	10.020	5.300	56.2
1997	8.010	3.860	0.820	0.410	0.310	0.280	0.370	1.350	4.040	9.990	10.090	4.230	43.8
1998	1.420	1.780	1.620	0.640	0.730	0.450	1.120	3.490	7.470	7.210	8.270	4.460	38.7
1999	3.420	2.510	0.920	0.930	1.210	2.920	3.400	5.170	4.050	4.420	6.550	3.570	39.1
2000	2.210	0.990	1.330	0.640	0.630	2.670	1.850	3.750	4.640	10.910	8.540	4.930	43.1
2001	1.940	1.040	0.930	0.580	0.330	0.650	8.860	5.660	8.610	6.030	4.370	3.750	42.8
2002	4.180	2.010	0.630	2.410	1.830	0.610	1.530	7.390	9.860	8.690	6.910	3.080	49.1
2003	4.210	1.710	1.570	1.810	0.960	0.750	2.470	1.440	5.070	4.420	5.720	3.400	33.5
2004	3.460	1.470	0.430	0.340	0.330	0.300	0.340	7.710	8.470	7.560	10.020	5.200	45.6
AVE :	3.77	1.94	1.11	0.96	0.99	1.15	2.82	5.76	7.53	7.54	7.71	5.43	46.7
SD :	1.89	1.05	0.90	0.96	1.03	1.13	2.10	3.52	3.73	2.83	2.60	1.85	10.3

Incremental Naturalised Flows at G4r002

File : G4R002.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.830	2.700	1.040	0.760	0.540	0.550	0.530	0.520	15.380	7.820	7.810	11.580	50.1
1928	2.000	1.520	1.060	0.650	0.510	0.430	2.630	1.680	2.140	13.920	14.360	2.260	43.2
1929	1.790	1.310	1.010	0.700	0.630	0.590	0.610	0.670	0.730	1.760	3.410	19.460	32.7
1930	2.350	2.080	1.230	0.730	0.520	0.420	2.190	2.590	1.990	5.360	19.310	12.780	51.6
1931	6.160	1.680	1.220	0.860	0.960	0.680	0.640	5.570	6.430	15.040	6.450	11.340	57.0
1932	2.300	1.650	1.040	0.700	0.540	0.460	0.460	1.490	13.500	15.280	12.490	3.070	53.0
1933	2.600	1.710	0.940	0.570	0.490	0.420	0.380	1.760	2.770	2.110	7.840	9.140	30.7
1934	4.560	1.730	0.980	0.590	0.450	0.770	1.190	3.630	4.300	9.910	4.630	6.700	39.4
1935	2.140	2.150	1.180	1.530	0.810	0.670	0.620	3.480	2.090	8.800	10.500	4.860	38.8
1936	2.190	1.990	2.160	1.130	0.710	0.700	1.100	2.710	18.770	22.320	5.810	3.070	62.7
1937	2.580	1.770	1.020	0.850	0.610	0.530	1.270	2.170	1.830	2.560	9.970	13.220	38.4
1938	2.330	1.760	1.120	0.660	0.900	0.600	1.350	2.780	1.670	2.850	11.160	2.350	29.5
1939	1.930	1.510	1.010	0.660	1.070	0.760	3.630	2.960	14.200	8.700	2.430	6.990	45.8
1940	2.130	2.450	1.310	1.100	0.780	0.580	5.070	12.700	24.450	14.730	13.970	22.580	101.8
1941	4.910	1.830	1.330	0.940	0.630	0.510	0.630	4.070	20.360	6.410	12.980	2.460	57.1
1942	2.070	1.360	0.880	2.060	0.850	0.860	0.990	1.420	2.250	11.160	18.770	5.440	48.1
1943	2.460	2.040	1.200	0.790	0.560	0.500	0.610	4.360	32.090	12.190	16.770	12.450	86.0
1944	5.740	2.010	1.430	0.820	0.510	0.400	0.780	9.310	22.590	32.770	18.230	2.170	96.8
1945	2.730	1.960	1.240	0.760	0.530	0.730	0.740	1.510	1.810	4.320	13.500	14.430	44.3
1946	2.190	1.470	0.870	0.540	0.380	0.850	0.680	1.970	1.520	20.690	10.820	2.940	44.9
1947	2.240	1.610	0.960	0.610	0.460	0.710	0.670	2.150	2.690	10.560	5.970	15.320	44.0
1948	6.550	1.770	1.060	0.760	0.550	0.430	1.650	1.890	2.470	7.910	10.610	9.600	45.3
1949	2.350	3.050	1.540	0.910	0.580	0.430	3.150	0.900	1.110	18.700	2.790	13.140	48.7
1950	3.490	4.040	2.050	1.500	0.880	0.600	3.890	1.840	25.200	14.430	10.370	16.380	84.7
1951	3.840	3.050	1.460	0.770	0.510	0.590	0.630	3.780	1.770	8.570	14.360	7.650	47.0
1952	2.250	1.930	1.160	0.740	0.530	0.420	6.910	12.880	6.040	14.680	11.700	2.220	61.5
1953	2.120	1.960	1.170	0.710	0.530	0.520	1.550	14.130	12.840	31.000	22.400	5.500	94.4
1954	2.480	1.830	1.260	0.780	3.050	0.850	1.100	0.970	3.030	15.210	28.850	5.070	64.5
1955	9.730	2.150	1.270	0.760	0.540	0.640	0.630	3.590	9.340	11.450	11.600	2.350	54.0
1956	2.620	1.640	1.110	0.710	1.000	0.860	1.040	13.680	18.830	19.540	16.510	5.700	83.2
1957	14.430	1.770	0.960	0.580	1.010	0.820	0.840	3.540	5.010	2.250	16.120	2.410	49.7
1958	2.570	1.900	1.100	0.700	0.520	0.540	7.010	20.370	4.670	4.590	15.100	3.540	62.6
1959	2.800	1.670	0.950	0.630	0.470	0.620	0.680	2.070	9.410	3.920	4.880	3.650	31.8
1960	2.130	1.450	1.000	1.960	0.810	0.610	0.590	1.360	3.300	5.920	16.750	9.760	45.6
1961	2.430	1.580	0.920	0.650	0.580	0.670	1.910	1.090	18.950	8.570	20.650	3.120	61.1
1962	11.160	2.070	1.190	0.870	0.590	0.490	0.530	1.390	3.580	16.330	22.360	4.560	65.1
1963	2.170	1.620	1.220	0.770	0.870	0.650	0.780	1.100	6.270	13.980	19.970	3.830	53.2
1964	6.580	2.740	1.400	0.860	0.930	1.200	1.710	3.490	3.630	7.380	10.410	2.580	42.9
1965	2.460	1.750	1.550	0.890	0.630	1.550	1.200	2.000	2.780	16.400	13.480	6.770	51.5
1966	1.960	1.330	0.840	0.560	0.410	0.420	5.760	1.540	10.080	9.940	7.900	2.510	43.3
1967	5.680	2.050	1.210	0.920	0.750	0.560	1.110	5.510	9.390	14.400	12.880	2.280	56.7
1968	6.660	1.760	1.210	1.000	0.770	0.680	1.150	0.890	2.750	2.780	8.940	8.950	37.5
1969	6.340	1.730	0.980	0.630	0.510	0.430	0.380	4.040	9.140	13.630	15.430	7.010	60.3
1970	2.250	1.730	1.310	0.830	0.560	0.470	0.430	1.000	1.800	5.450	12.830	2.330	31.0
1971	1.980	1.470	0.980	0.740	0.680	0.590	2.240	3.530	3.010	7.040	8.960	2.440	33.7
1972	2.030	1.350	0.920	0.650	0.470	0.440	0.460	0.870	0.850	10.850	6.010	8.690	33.6
1973	2.290	1.630	1.110	0.720	0.520	0.440	0.390	2.910	5.660	7.090	41.590	9.000	73.4
1974	9.140	1.930	1.200	0.860	0.620	0.500	0.960	7.300	5.620	23.230	15.790	2.310	69.5
1975	3.320	1.930	1.120	0.630	0.460	0.530	0.840	1.770	19.100	15.340	5.970	6.740	57.8
1976	2.110	6.240	3.280	1.470	1.000	0.930	2.280	15.310	27.640	23.370	22.910	6.750	113.3
1977	2.210	1.650	1.070	0.750	0.580	0.630	1.000	1.020	1.220	1.910	12.710	10.750	35.5
1978	3.100	1.770	1.290	1.000	1.500	0.790	0.590	6.030	4.900	7.780	7.830	8.130	44.7
1979	10.950	1.730	0.950	0.670	0.710	0.520	0.990	4.110	8.490	2.790	10.150	2.290	44.4
1980	2.470	6.930	2.300	3.020	1.210	1.160	1.440	1.130	1.960	15.270	16.210	17.360	70.5
1981	2.180	1.620	1.090	0.780	0.540	0.460	2.990	1.340	4.350	5.400	5.810	2.320	28.9
1982	2.680	1.830	1.820	1.000	1.810	1.260	0.950	10.880	18.910	16.510	9.270	11.190	78.1
1983	2.120	1.410	0.900	0.620	0.470	0.590	1.010	12.290	2.350	11.840	2.900	11.610	48.1
1984	6.120	1.720	2.810	1.230	1.020	3.880	2.300	2.130	9.470	21.670	15.240	5.880	73.5
1985	2.410	1.690	1.090	0.700	0.570	1.410	1.330	1.680	11.550	14.510	29.170	3.880	70.0
1986	2.260	1.820	1.090	0.730	0.610	0.510	1.090	5.740	11.570	13.740	15.560	6.050	60.8
1987	1.980	1.270	1.150	0.690	0.460	0.420	1.480	2.140	2.820	9.500	13.320	8.640	43.9
1988	2.210	1.550	0.950	0.630	0.490	3.500	2.550	6.730	11.020	14.520	16.930	11.670	72.8
1989	5.560	1.880	1.100	0.690	0.750	0.540	2.530	3.780	13.770	20.170	7.790	2.440	61.0
1990	2.170	1.840	1.120	0.690	0.480	0.400	0.440	4.200	12.950	30.550	3.950	11.940	70.7
1991	4.990	1.750	1.000	0.600	0.590	0.560	1.790	3.560	25.040	14.880	12.760	6.730	74.3
1992	14.470	1.840	1.060	0.650	0.620	0.480	11.760	2.950	11.370	28.120	8.420	2.260	84.0
1993	1.740	1.250	0.910	0.620	0.470	0.400	0.610	1.300	22.100	7.540	2.930	4.980	44.8
1994	2.130	1.440	1.070	0.720	0.500	0.500	0.520	3.420	3.640	16.220	13.090	2.500	45.8
1995	10.630	1.900	1.750	0.920	0.710	0.640	0.650	0.760	13.600	13.710	14.930	13.020	73.2
1996	9.700	2.710	2.450	1.210	0.710	0.550	0.810	2.090	13.410	4.260	8.430	2.070	48.4
1997	1.630	3.440	1.480	0.990	0.630	0.470	0.620	9.040	4.060	16.010	5.840	2.300	46.5
1998	1.880	3.400	1.660	0.950	0.590	0.430	1.450	1.160	3.380	1.750	1.400	1.100	19.1
1999	0.840	0.670	0.530	0.560	0.410	0.640	0.480	1.920	2.440	11.050	8.920	13.830	42.3
2000	2.100	1.400	0.880	0.570	0.420	0.340	0.450	4.190	1.510	25.610	18.320	12.980	68.8
2001	2.200	1.510	0.910	2.150	0.810	0.610	0.870	1.680	5.300	17.890	13.690	2.470	50.1
2002	2.280	1.740	1.160	0.760	0.540	1.570	0.770	1.020	0.970	1.150	7.660	9.040	28.7
2003	2.590	1.640	1.050	0.900	0.590	0.470	0.770	0.630	1.420	2.450	3.980	4.580	21.1
2004	8.370	1.710	1.120	0.820	0.570	0.440	4.420	2.900	13.150	7.200	21.260	4.260	66.2
AVE :	3.82	1.98	1.24	0.87	0.69	0.71	1.61	3.90	8.51	12.02	12.36	7.02	54.7
SD :	3.01	0.92	0.44	0.40	0.36	0.55	1.83	3.99	7.68	7.43	6.84	4.82	18.9

Incremental Naturalised Flows at H6h007

File : H6H007.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.970	1.500	0.910	0.550	0.300	0.390	0.420	0.390	14.740	4.800	4.420	5.270	34.7
1928	2.660	1.320	0.700	0.340	0.210	0.180	1.370	3.200	2.350	6.990	5.280	3.300	27.9
1929	2.160	1.220	0.770	0.490	0.370	0.740	0.600	0.510	0.500	3.870	4.840	10.480	26.6
1930	3.060	2.160	0.970	0.400	0.310	0.230	1.280	0.890	1.040	1.850	4.130	3.380	19.7
1931	3.830	1.590	0.600	0.310	0.590	0.330	0.270	5.030	3.110	3.600	3.390	3.270	25.9
1932	2.230	1.140	0.550	0.310	0.220	0.190	0.190	2.340	11.510	9.310	5.660	3.430	37.1
1933	2.400	1.240	0.620	0.330	0.270	0.260	0.220	2.620	2.990	2.650	3.120	4.220	20.9
1934	3.630	1.710	0.660	0.300	0.270	0.320	1.360	3.980	3.240	4.620	3.790	3.520	27.4
1935	2.090	1.560	0.710	0.680	0.370	0.280	0.240	1.230	1.510	4.450	6.540	3.720	23.4
1936	2.290	1.510	2.290	0.700	0.330	0.360	1.420	4.440	14.390	10.980	3.790	2.960	45.5
1937	1.940	1.160	0.540	0.490	0.300	0.240	1.190	2.880	1.980	3.060	3.680	5.670	23.1
1938	2.660	1.720	0.850	0.390	0.780	0.560	1.060	6.540	2.080	2.130	6.320	3.070	28.2
1939	1.900	1.220	0.740	0.370	0.870	0.480	2.430	2.260	6.990	4.590	3.670	3.440	29.0
1940	2.420	2.980	1.000	1.080	0.460	0.280	6.290	12.230	10.010	9.650	7.870	15.720	70.0
1941	4.320	1.950	0.890	0.430	0.240	0.180	0.190	4.440	19.250	3.220	7.860	3.060	46.0
1942	2.090	1.070	0.470	0.440	0.290	0.590	0.700	1.310	5.050	5.230	9.120	3.940	30.3
1943	2.810	1.970	0.850	0.380	0.230	0.220	0.470	4.150	14.870	6.110	9.610	4.680	46.3
1944	3.290	1.920	1.110	0.480	0.230	0.170	0.660	10.190	15.260	18.140	9.930	3.090	64.5
1945	2.330	1.420	0.680	0.330	0.220	0.290	0.460	1.820	1.390	2.710	3.900	7.460	23.0
1946	4.880	2.000	0.750	0.320	0.190	0.860	0.480	2.540	1.820	12.990	4.820	3.310	35.0
1947	2.820	1.500	0.620	0.280	0.190	0.310	0.300	3.440	2.520	5.370	3.720	9.070	30.1
1948	4.500	1.950	0.770	0.360	0.210	0.160	0.730	1.040	2.130	3.910	4.890	4.770	25.4
1949	3.380	2.420	0.990	0.390	0.210	0.160	3.410	0.750	1.150	13.350	2.640	7.640	36.5
1950	2.620	3.190	1.160	0.750	0.390	0.230	4.840	1.380	10.360	3.860	4.040	5.970	38.8
1951	3.040	2.190	0.890	0.340	0.210	0.200	0.390	2.470	1.860	3.540	8.480	7.120	30.7
1952	3.430	3.800	1.220	0.520	0.320	0.260	9.310	6.190	2.680	7.730	5.420	3.250	44.1
1953	2.460	1.900	0.880	0.390	0.270	0.350	3.100	12.480	7.090	20.130	12.660	3.550	65.3
1954	2.780	1.520	0.880	0.410	4.640	0.570	0.620	0.650	3.560	9.070	16.950	3.700	45.4
1955	4.650	3.160	1.210	0.510	0.290	0.270	0.710	4.330	10.800	6.750	11.490	4.470	48.6
1956	3.210	1.530	0.850	0.420	1.210	0.690	1.040	14.370	12.800	14.160	10.920	4.050	65.3
1957	6.610	2.000	0.700	0.310	0.640	0.430	0.540	6.370	3.180	2.230	7.450	2.770	33.2
1958	2.330	1.590	0.700	0.380	0.260	0.240	4.050	15.140	2.300	2.180	5.350	2.780	37.3
1959	3.130	1.400	0.580	0.350	0.230	0.300	0.420	1.730	9.380	2.480	2.120	1.960	24.1
1960	1.650	0.910	0.460	0.430	0.290	0.230	0.390	1.240	3.890	3.700	6.210	7.670	27.1
1961	3.000	1.360	0.600	0.340	0.370	0.640	1.920	1.170	20.260	5.100	15.300	3.940	54.0
1962	7.770	2.370	0.940	0.490	0.290	0.210	0.240	0.570	1.780	9.490	10.200	3.540	37.9
1963	2.360	1.470	0.950	0.450	1.230	0.500	0.620	1.960	8.470	5.910	6.820	3.570	34.3
1964	2.660	2.150	0.920	0.640	0.650	1.860	2.210	6.770	3.500	4.290	5.650	3.780	35.1
1965	2.610	1.510	1.270	0.530	0.280	3.650	0.990	1.920	5.710	9.910	7.490	4.420	40.3
1966	2.450	1.150	0.620	0.390	0.240	0.180	3.150	2.490	11.110	3.620	3.570	3.420	32.4
1967	2.730	1.760	0.760	0.470	0.320	0.220	2.400	8.620	6.430	8.760	7.030	3.230	42.7
1968	6.400	1.900	0.830	0.650	0.390	0.270	0.560	0.500	3.150	2.880	5.120	5.520	28.2
1969	4.700	1.880	0.660	0.290	0.250	0.200	0.170	5.100	8.830	6.170	8.690	4.190	41.1
1970	2.900	1.540	0.800	0.380	0.210	0.240	0.270	1.250	3.110	7.130	7.480	3.220	28.5
1971	1.940	0.980	0.510	0.360	0.270	0.210	0.480	3.290	3.190	2.470	3.200	2.860	19.8
1972	1.900	0.920	0.480	0.270	0.180	0.190	0.200	0.430	0.470	10.540	3.040	2.600	21.2
1973	1.960	1.130	0.860	0.430	0.250	0.190	0.170	2.180	6.040	3.890	23.720	5.280	46.1
1974	4.210	2.190	0.950	0.460	0.290	0.220	0.860	10.850	4.360	11.160	6.800	3.200	45.6
1975	2.620	1.490	0.640	0.280	0.180	0.240	0.330	0.730	16.010	9.100	4.010	3.220	38.9
1976	2.130	7.170	2.210	0.910	0.680	0.450	4.280	16.600	18.250	19.330	16.790	4.080	92.9
1977	2.580	1.400	0.830	0.480	0.300	0.360	0.450	0.730	0.760	0.950	9.760	3.150	21.8
1978	2.730	1.360	0.910	0.500	0.860	0.420	0.330	3.980	6.900	3.900	4.920	5.650	32.5
1979	5.490	2.020	0.710	0.500	0.400	0.270	1.010	4.850	5.730	2.900	5.280	3.210	32.4
1980	2.550	4.690	2.030	4.240	0.850	0.790	0.900	0.860	2.090	9.800	5.480	7.620	41.9
1981	3.070	1.650	0.770	0.460	0.280	0.210	2.320	1.540	5.080	6.730	4.290	3.030	29.4
1982	2.440	1.440	1.050	0.480	0.640	0.630	0.550	10.650	11.000	9.320	4.380	8.120	50.7
1983	2.850	1.330	0.600	0.340	0.230	0.450	0.850	13.950	2.590	5.550	3.680	8.570	41.0
1984	5.530	2.020	2.040	0.970	0.870	3.170	1.990	1.780	9.990	12.010	8.560	4.310	53.2
1985	3.070	1.600	0.760	0.400	0.280	0.900	0.980	1.790	9.150	7.040	13.620	4.090	43.7
1986	2.470	1.310	0.620	0.480	0.320	0.270	0.640	7.480	5.230	5.210	10.140	5.000	39.2
1987	2.770	1.340	1.030	0.460	0.240	0.240	2.550	3.020	3.300	4.740	7.520	4.200	31.4
1988	2.640	1.320	0.620	0.320	0.280	2.420	1.570	3.680	4.420	7.610	9.400	6.480	40.8
1989	3.570	2.190	0.930	0.390	0.370	0.290	7.540	2.780	8.050	12.750	4.760	3.210	46.8
1990	1.910	1.180	0.730	0.380	0.240	0.200	0.360	4.750	13.910	13.560	4.300	7.400	48.9
1991	3.400	1.720	0.690	0.300	0.260	0.350	1.640	2.420	15.950	8.450	4.710	3.730	43.6
1992	5.710	2.020	0.800	0.360	0.330	0.250	10.790	5.860	5.680	19.200	5.300	3.050	59.4
1993	1.710	0.840	0.520	0.330	0.220	0.180	0.460	0.730	20.620	5.100	3.430	4.630	38.8
1994	2.510	1.220	0.620	0.410	0.270	0.270	0.270	2.400	6.110	10.540	7.040	3.260	34.9
1995	4.960	1.830	1.310	0.550	0.390	0.400	0.480	1.410	16.840	7.870	9.330	10.540	55.9
1996	5.060	3.740	1.960	0.770	0.330	0.220	0.480	1.520	13.300	2.930	5.200	2.670	38.2
1997	1.950	1.820	1.130	0.630	0.340	0.260	0.850	12.530	3.600	7.450	3.920	3.160	37.6
1998	2.020	2.180	1.520	0.590	0.270	0.180	0.770	2.400	7.280	3.740	6.130	3.650	30.7
1999	2.190	1.170	0.770	0.540	0.310	0.360	0.300	3.420	3.720	7.080	5.640	5.960	31.5
2000	2.810	1.410	0.670	0.380	0.280	0.210	0.580	8.440	2.790	19.360	13.200	10.650	60.8
2001	3.210	1.530	0.600	1.070	0.490	0.330	1.030	3.620	5.930	9.620	6.800	3.630	37.9
2002	3.710	1.910	1.000	0.480	0.270	0.570	0.540	0.720	0.820	1.380	8.170	3.950	23.5
2003	2.650	2.420	1.200	0.720	0.370	0.260	0.840	4.380	4.240	6.300	12.500	3.470	39.4
2004	3.280	1.540	0.590	0.990	0.380	0.230	0.520	4.790	8.670	8.610	10.760	4.020	44.4
AVE :	3.10	1.83	0.89	0.52	0.43	0.46	1.43	4.17	6.82	7.16	7.02	4.70	38.5
SD :	1.24	0.91	0.39	0.46	0.53	0.59	1.97	3.94	5.32	4.54	3.83	2.34	13.1

Incremental Naturalised Flows at H6h008

File : H6H008.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.440	5.760	2.870	0.800	0.300	0.740	0.370	0.180	21.740	15.870	11.590	11.200	71.9
1928	3.360	1.370	0.670	0.240	0.450	0.390	6.860	6.190	4.680	14.180	13.690	4.250	56.3
1929	1.050	0.780	3.220	1.310	0.750	0.900	0.650	1.200	0.820	4.570	7.820	14.000	37.1
1930	5.360	2.050	0.810	0.310	0.210	0.170	5.400	9.250	4.260	5.690	11.550	10.790	55.9
1931	8.890	2.590	1.480	1.570	1.330	0.480	0.200	7.980	9.820	12.550	7.310	8.380	62.6
1932	4.930	1.350	0.570	0.440	0.250	0.190	0.240	5.420	20.280	21.100	12.970	7.030	74.8
1933	4.270	1.460	0.410	0.270	0.320	0.200	0.140	6.350	10.690	5.260	6.930	8.980	45.3
1934	7.760	2.320	0.400	0.220	0.180	1.310	3.760	9.050	7.690	7.970	4.330	4.330	49.3
1935	2.070	5.440	2.000	3.690	1.490	1.420	0.650	11.090	8.630	12.430	12.230	7.300	68.4
1936	2.510	2.990	4.890	1.670	0.260	1.260	4.000	7.630	18.610	17.260	7.310	3.580	72.0
1937	3.590	1.860	0.600	2.170	0.930	0.280	4.030	9.300	5.650	5.980	8.840	11.300	54.5
1938	4.650	1.780	0.810	0.310	2.820	1.230	4.210	8.550	3.330	4.050	6.430	3.570	41.7
1939	1.240	1.720	1.430	0.530	1.520	1.390	9.130	7.200	10.230	7.930	3.610	3.990	49.9
1940	2.910	5.420	1.930	2.030	0.920	0.240	8.790	18.220	19.520	14.800	14.030	19.290	108.1
1941	8.520	2.340	1.690	1.130	0.390	0.250	1.360	9.130	25.030	10.770	10.300	4.830	75.7
1942	1.730	0.780	0.590	2.640	1.280	1.950	1.510	5.120	8.520	11.130	14.560	7.360	57.2
1943	4.460	3.500	1.290	0.400	0.220	0.330	1.240	10.500	24.920	14.970	12.910	10.460	85.2
1944	6.420	3.040	2.110	0.710	0.190	0.210	2.540	10.990	20.450	18.890	14.970	4.350	84.9
1945	4.500	6.550	2.280	0.390	0.240	1.660	2.440	4.810	5.460	7.850	7.320	11.450	55.0
1946	6.050	1.880	0.640	0.270	0.170	2.690	1.370	6.850	4.450	16.590	9.500	4.700	55.2
1947	3.110	1.470	0.540	0.260	0.250	1.120	1.120	5.950	6.740	10.030	5.560	10.450	46.6
1948	9.180	2.490	0.810	0.520	0.230	0.170	3.540	4.720	5.560	6.440	5.320	6.800	45.8
1949	5.730	6.480	3.860	0.920	0.200	0.180	5.580	3.850	2.460	18.930	7.480	5.770	61.4
1950	5.870	5.480	3.100	2.890	0.930	0.190	4.230	4.960	15.510	13.850	8.530	7.010	72.6
1951	7.710	7.200	2.050	0.260	0.250	0.320	2.350	8.730	5.020	8.990	9.130	8.330	60.3
1952	4.580	3.450	1.840	0.520	0.210	0.210	14.640	19.090	7.430	12.910	10.050	6.290	81.2
1953	3.230	4.370	1.570	0.410	0.260	0.830	5.570	15.280	15.080	24.240	20.590	7.410	98.8
1954	5.000	2.050	2.170	0.840	5.540	3.740	3.230	1.500	6.440	12.850	16.260	10.860	70.5
1955	10.950	5.970	1.400	0.620	0.350	1.090	1.080	8.260	11.210	11.460	14.490	7.410	74.3
1956	3.310	1.520	0.840	0.490	3.140	2.310	2.840	12.830	12.730	16.820	17.300	6.490	80.6
1957	11.350	4.110	0.460	0.240	1.910	3.460	2.290	8.760	12.490	4.380	8.220	6.820	64.5
1958	5.380	2.120	0.590	0.660	0.390	0.640	7.630	20.460	11.720	3.210	6.630	6.030	65.5
1959	5.690	1.980	0.970	0.620	0.340	1.330	3.210	8.030	14.680	4.870	1.890	4.750	48.4
1960	2.260	0.670	0.630	2.650	1.110	0.350	0.480	3.440	10.480	5.600	9.760	11.910	49.3
1961	6.690	1.680	0.410	0.570	0.710	2.760	5.050	2.860	15.740	11.320	20.400	7.550	75.7
1962	7.220	7.120	1.970	0.810	0.370	0.190	0.800	2.690	4.780	8.780	20.760	7.540	63.0
1963	2.390	1.980	2.340	0.820	1.470	1.560	1.120	3.260	11.970	11.110	11.330	4.660	54.0
1964	4.410	3.210	1.210	0.480	1.640	3.830	5.160	7.630	7.040	4.330	7.810	5.250	52.0
1965	2.450	1.210	1.860	1.140	0.500	2.980	6.480	3.460	6.970	13.620	8.810	8.100	57.6
1966	2.780	0.870	0.550	0.410	0.260	0.230	4.350	7.540	15.210	8.210	8.010	4.870	53.3
1967	5.120	2.700	1.070	1.090	0.520	0.230	3.110	10.680	12.560	10.370	13.420	4.900	65.8
1968	7.640	3.000	1.150	0.810	1.060	1.040	3.240	1.490	4.010	6.210	8.530	8.860	47.0
1969	6.160	2.560	0.710	0.280	0.570	0.290	0.170	7.120	13.600	15.160	10.260	9.200	66.1
1970	3.520	1.720	1.920	0.760	0.230	0.350	0.780	4.320	5.160	10.750	11.980	6.140	47.6
1971	2.000	1.440	1.040	0.500	0.510	0.720	3.790	12.720	7.390	4.100	5.950	4.810	45.0
1972	2.210	0.770	0.460	0.280	0.190	1.350	0.610	1.740	2.710	12.630	10.940	6.370	40.3
1973	4.540	2.790	1.010	0.340	0.240	0.240	0.230	5.140	10.700	11.060	22.050	15.250	73.6
1974	6.200	3.840	1.590	0.540	0.530	0.400	1.450	11.440	9.560	12.460	12.040	4.020	64.1
1975	4.770	2.260	0.670	0.300	0.170	0.650	1.360	3.920	19.110	13.730	10.720	7.540	65.2
1976	3.270	12.830	10.910	2.710	0.950	1.020	9.170	13.710	25.130	20.220	22.630	9.370	131.9
1977	2.540	1.590	2.210	1.420	0.600	0.520	3.480	4.650	2.170	3.810	13.660	10.890	47.5
1978	6.350	2.210	1.240	1.970	2.580	1.100	0.490	7.920	13.650	9.260	6.880	6.140	59.8
1979	8.600	2.980	0.480	0.920	0.830	0.320	3.220	8.670	12.040	5.060	7.980	4.390	55.5
1980	3.220	6.220	5.120	7.190	2.210	2.190	3.860	1.470	5.150	14.200	13.680	13.700	78.2
1981	4.530	2.960	1.470	0.920	0.390	0.330	6.310	5.420	7.680	6.730	5.010	2.610	44.4
1982	3.860	2.170	2.290	0.990	2.450	1.980	0.670	19.150	21.600	16.180	7.450	7.710	86.5
1983	2.990	0.800	0.510	0.310	0.240	1.400	3.220	15.620	5.970	8.140	6.120	9.150	54.5
1984	9.240	2.740	5.780	2.930	3.550	7.570	5.720	4.740	13.100	14.830	12.210	6.760	89.2
1985	3.440	1.830	1.090	0.570	1.040	2.940	4.480	4.230	13.430	12.130	18.150	9.590	72.9
1986	2.980	1.820	0.800	1.890	0.860	0.390	2.660	10.650	12.330	11.870	12.020	8.560	66.8
1987	3.200	1.070	2.620	0.990	0.190	0.580	6.010	6.250	8.430	9.910	11.460	8.530	59.2
1988	4.260	1.620	0.700	0.320	0.430	6.480	7.230	7.770	6.960	9.770	11.650	9.860	67.1
1989	6.850	4.000	1.150	0.400	1.510	0.630	5.290	12.270	10.590	15.380	9.090	3.450	70.6
1990	1.710	1.730	0.850	0.390	0.240	0.220	1.220	8.110	23.220	18.910	8.910	10.930	76.4
1991	7.190	2.010	0.500	0.250	0.770	0.750	5.240	6.910	18.210	14.050	9.040	6.450	71.4
1992	11.170	4.320	0.720	0.320	1.110	0.490	18.930	12.810	12.490	25.560	12.600	2.790	103.3
1993	0.970	0.700	0.870	0.530	0.240	0.210	1.920	3.290	23.390	12.170	3.370	3.920	51.6
1994	2.190	0.780	1.380	0.750	0.250	0.270	0.600	7.410	8.560	10.770	11.780	5.110	49.9
1995	7.930	3.040	3.570	1.310	1.450	1.050	2.230	1.250	13.150	11.250	7.260	11.950	65.4
1996	13.000	7.900	6.780	2.090	0.270	0.240	2.240	5.420	13.060	7.880	6.850	2.470	68.2
1997	1.840	7.040	5.970	2.340	0.510	0.340	2.050	9.250	11.990	13.160	7.390	3.310	65.2
1998	1.400	5.510	5.340	1.390	0.190	0.140	4.770	3.780	7.220	2.460	0.350	0.290	32.8
1999	0.250	0.270	0.210	0.400	0.430	1.110	0.530	3.900	7.830	9.560	5.720	11.070	41.3
2000	4.210	0.740	0.440	0.270	0.190	0.150	0.500	10.750	5.540	12.620	11.030	6.540	53.0
2001	3.090	8.980	3.210	6.450	2.570	0.340	1.010	9.040	11.890	10.610	11.000	4.260	72.5
2002	6.180	2.510	0.590	0.490	0.340	4.140	1.670	2.460	4.140	5.130	7.720	5.600	41.0
2003	3.130	1.440	0.870	1.910	0.710	0.610	2.400	2.680	3.510	3.090	4.380	2.660	27.4
2004	7.330	3.010	1.580	1.490	1.490	0.980	4.670	5.850	14.580	8.920	14.490	7.180	71.6
AVE :	4.78	3.03	1.78	1.10	0.86	1.14	3.41	7.47	10.97	11.05	10.29	7.28	63.2
SD :	2.72	2.26	1.77	1.22	0.94	1.37	3.19	4.43	6.07	4.98	4.52	3.31	17.5

Incremental Naturalised Flows at H6r002

File : H6R002.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	0.500	1.000	0.380	0.240	0.110	0.100	0.080	0.070	5.800	1.620	2.870	3.000	15.8
1928	1.570	0.960	0.490	0.190	0.080	0.070	0.320	0.500	0.740	4.180	3.630	1.930	14.7
1929	1.190	0.710	0.380	0.210	0.260	0.230	0.170	0.180	0.410	0.440	4.370	5.740	14.3
1930	1.500	0.890	0.380	0.180	0.140	0.100	3.700	0.620	0.620	1.620	3.720	2.540	16.0
1931	4.890	1.280	0.450	0.330	0.580	0.250	0.160	0.610	0.880	2.620	1.380	3.750	17.2
1932	1.610	0.880	0.410	0.180	0.090	0.070	0.070	0.820	9.170	8.530	5.070	2.200	29.1
1933	1.490	0.740	0.340	0.150	0.100	0.080	0.060	0.730	2.370	1.460	2.080	2.790	12.4
1934	2.230	1.080	0.370	0.130	0.080	0.080	0.490	2.280	1.890	2.040	1.880	1.760	14.3
1935	1.140	1.230	0.420	0.280	0.130	0.090	0.080	1.020	0.800	5.140	5.260	2.250	17.8
1936	1.490	1.710	1.710	0.410	0.150	0.140	0.350	1.180	9.990	7.320	2.110	1.840	28.4
1937	1.260	0.710	0.300	0.160	0.090	0.100	0.390	1.490	0.920	1.250	2.100	3.070	11.8
1938	1.680	0.850	0.350	0.150	0.200	0.200	0.240	1.490	0.710	0.840	2.020	1.370	10.1
1939	0.900	0.470	0.210	0.090	0.250	0.110	3.000	0.930	3.670	2.290	1.910	1.640	15.5
1940	1.140	1.500	0.460	0.370	0.150	0.080	1.580	9.190	7.020	8.490	7.560	11.160	48.7
1941	2.310	1.110	0.500	0.210	0.100	0.070	0.070	1.410	14.860	1.550	3.120	1.760	27.1
1942	1.220	0.610	0.290	0.370	0.170	0.290	0.200	0.490	2.570	2.880	6.490	2.330	17.9
1943	1.650	1.080	0.450	0.160	0.070	0.080	0.090	0.580	10.910	1.730	4.570	3.230	24.6
1944	1.780	0.900	0.360	0.140	0.060	0.040	0.180	2.950	9.050	15.510	10.730	1.850	43.5
1945	1.630	0.870	0.340	0.120	0.070	0.090	0.080	0.240	0.300	0.810	1.290	3.430	9.3
1946	1.390	0.680	0.240	0.090	0.050	0.340	0.130	0.380	0.410	4.780	1.930	1.680	12.1
1947	1.310	0.740	0.300	0.120	0.070	0.310	0.160	1.100	1.060	2.390	1.740	7.140	16.4
1948	2.220	1.060	0.370	0.140	0.070	0.040	0.220	0.410	0.700	1.300	1.940	2.630	11.1
1949	1.770	1.570	0.560	0.190	0.080	0.050	0.600	0.230	0.320	9.540	1.220	4.030	20.2
1950	1.570	1.630	0.590	0.390	0.160	0.080	0.540	0.350	9.130	1.930	2.420	6.570	25.4
1951	2.040	1.950	0.640	0.200	0.090	0.060	0.060	2.150	0.900	2.660	6.580	4.950	22.3
1952	2.320	2.980	0.820	0.330	0.190	0.110	5.360	2.870	1.300	3.530	3.750	1.860	25.4
1953	1.390	0.980	0.410	0.150	0.080	0.140	0.380	9.530	3.910	17.540	11.380	2.390	48.3
1954	1.760	0.920	0.440	0.180	3.890	0.270	0.270	0.300	2.460	4.610	15.060	2.140	32.3
1955	3.020	1.410	0.570	0.250	0.140	0.100	0.090	0.890	4.700	2.000	2.830	2.130	18.1
1956	1.710	0.860	0.460	0.180	0.340	0.230	0.240	7.150	8.700	10.710	7.990	2.320	40.9
1957	3.050	1.170	0.370	0.120	0.110	0.160	0.170	2.160	1.480	1.080	4.630	1.610	16.1
1958	1.460	0.850	0.340	0.170	0.110	0.090	2.280	11.010	1.320	1.390	3.770	1.910	24.7
1959	2.010	0.920	0.340	0.170	0.090	0.080	0.090	0.460	3.320	1.100	1.010	1.620	11.2
1960	1.000	0.530	0.250	0.200	0.110	0.080	0.160	0.420	1.140	1.500	2.390	4.230	12.0
1961	1.810	0.850	0.290	0.140	0.090	0.100	0.780	0.380	10.430	2.240	15.850	2.110	35.1
1962	5.460	1.650	0.630	0.250	0.120	0.070	0.080	0.160	0.520	2.260	6.700	1.840	19.7
1963	1.250	0.690	0.350	0.150	0.280	0.140	0.160	0.280	6.500	2.530	4.270	2.360	19.0
1964	1.570	1.050	0.410	0.150	0.150	0.520	0.480	1.240	1.180	1.600	2.160	1.900	12.4
1965	1.740	1.030	0.790	0.270	0.110	0.240	0.240	0.310	4.520	2.720	2.630	2.320	16.9
1966	1.480	0.680	0.240	0.090	0.050	0.040	0.380	0.680	4.000	1.860	2.170	1.790	13.5
1967	1.390	0.890	0.360	0.130	0.080	0.060	0.250	1.910	2.730	4.150	5.070	1.890	18.9
1968	3.510	1.150	0.420	0.160	0.100	0.070	0.220	0.150	0.580	0.590	1.130	1.630	9.7
1969	2.510	0.950	0.340	0.120	0.090	0.060	0.050	0.610	2.170	3.810	4.150	2.240	17.1
1970	1.750	0.860	0.330	0.140	0.070	0.070	0.070	0.730	1.020	3.970	3.230	1.860	14.1
1971	1.130	0.600	0.260	0.190	0.120	0.100	0.290	3.080	1.370	1.360	1.740	1.550	11.8
1972	1.090	0.550	0.230	0.110	0.060	0.050	0.080	0.120	0.150	5.590	2.050	1.810	11.9
1973	1.210	0.620	0.290	0.130	0.070	0.060	0.050	0.680	1.880	1.640	27.730	2.770	37.1
1974	2.280	1.130	0.420	0.170	0.100	0.060	0.230	6.020	1.180	2.810	5.240	1.980	21.6
1975	1.610	0.860	0.320	0.110	0.060	0.120	0.130	0.440	9.100	4.100	2.070	1.830	20.8
1976	1.410	4.520	1.400	0.480	0.380	0.210	0.950	11.670	5.500	13.920	14.530	2.100	57.1
1977	1.310	0.690	0.420	0.220	0.110	0.100	0.150	0.170	0.220	0.380	5.160	1.400	10.3
1978	1.100	0.580	0.380	0.210	0.440	0.160	0.100	1.250	4.380	2.340	2.720	3.100	16.8
1979	2.230	1.060	0.360	0.170	0.090	0.060	0.120	1.440	1.540	1.460	2.630	1.710	12.9
1980	1.370	2.620	1.030	4.510	0.460	0.330	0.500	0.360	0.420	7.360	3.950	9.070	32.0
1981	1.770	0.860	0.320	0.140	0.080	0.050	2.560	0.520	1.950	1.630	1.910	1.500	13.3
1982	1.080	0.570	0.280	0.130	0.300	0.270	0.200	4.950	6.780	11.460	2.470	4.660	33.2
1983	1.690	0.780	0.280	0.120	0.070	0.110	0.310	11.850	1.440	3.660	2.290	8.700	31.3
1984	4.000	1.290	0.810	0.570	0.400	1.920	0.930	0.790	2.760	8.810	8.390	2.190	32.9
1985	1.980	1.010	0.470	0.180	0.150	0.380	0.260	0.310	3.390	2.490	8.360	2.170	21.2
1986	1.480	0.920	0.370	0.130	0.080	0.060	0.370	4.870	2.390	1.910	7.400	2.500	22.5
1987	1.540	0.680	0.300	0.130	0.060	0.050	1.550	0.550	1.540	1.410	3.530	2.170	13.5
1988	1.470	0.720	0.270	0.110	0.070	1.240	1.450	1.040	2.160	2.720	7.300	5.260	23.8
1989	2.500	1.240	0.440	0.150	0.130	0.100	1.330	1.720	4.230	4.370	4.700	1.880	22.8
1990	1.180	0.690	0.320	0.140	0.070	0.050	0.130	1.230	6.800	10.460	2.430	5.230	28.7
1991	2.190	1.070	0.380	0.130	0.090	0.110	0.590	0.660	9.020	4.960	6.170	2.060	27.4
1992	4.540	1.240	0.410	0.150	0.200	0.100	9.620	1.290	2.470	20.600	3.530	1.940	46.1
1993	1.160	0.540	0.390	0.160	0.080	0.060	0.160	0.380	14.850	2.280	1.850	2.580	24.5
1994	1.560	0.740	0.540	0.220	0.110	0.120	0.110	1.860	2.120	3.570	4.070	2.020	17.0
1995	2.690	1.270	1.320	0.360	0.180	0.160	0.140	0.770	11.400	6.360	7.860	5.400	37.9
1996	3.550	2.060	0.920	0.320	0.120	0.070	0.150	1.810	10.890	1.760	2.460	1.630	25.7
1997	1.000	1.260	0.460	0.230	0.110	0.080	0.180	7.530	1.100	3.810	2.200	1.710	19.7
1998	1.050	1.150	1.300	0.340	0.130	0.070	0.330	0.930	2.180	1.270	1.310	1.170	11.2
1999	0.810	0.440	0.380	0.220	0.110	0.260	0.160	0.500	1.630	5.560	2.370	2.630	15.1
2000	1.620	0.810	0.350	0.180	0.090	0.060	0.290	4.090	1.170	12.340	9.680	7.960	38.6
2001	2.050	1.040	0.400	0.870	0.270	0.150	0.330	1.500	1.310	8.580	8.350	2.410	27.3
2002	1.730	1.060	0.520	0.220	0.100	0.840	0.280	0.520	0.440	0.680	5.450	2.660	14.5
2003	1.770	0.860	0.340	0.230	0.110	0.110	0.230	0.170	0.800	1.460	1.480	1.260	8.8
2004	2.890	0.890	0.340	0.500	0.160	0.090	4.910	1.660	2.870	2.020	6.240	2.280	24.9
AVE :	1.84	1.06	0.47	0.27	0.19	0.17	0.69	1.92	3.57	4.20	4.72	2.90	22.0
SD :	0.90	0.59	0.27	0.50	0.44	0.27	1.43	2.76	3.65	4.12	4.17	1.94	10.6

Incremental Naturalised Flows at H6R001

File : H6R001.NAT
Units : Mm3
Descrip. : Simulated for 1927 to 2004

Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1927	3.950	18.500	8.760	3.320	1.880	2.520	0.560	0.230	62.480	50.230	42.810	39.870	235.1
1928	13.350	5.740	3.390	1.690	1.610	1.730	15.370	16.990	16.330	50.140	51.250	17.520	195.1
1929	4.890	3.490	5.630	3.380	4.110	4.300	1.530	2.100	5.280	11.140	37.490	57.450	140.8
1930	20.440	6.340	2.860	1.850	1.990	1.660	27.280	24.950	10.830	22.910	44.280	36.570	202.0
1931	38.640	12.020	2.700	4.790	8.100	3.820	0.320	19.560	26.940	42.310	21.880	33.770	214.9
1932	18.400	4.970	2.650	1.900	1.550	1.540	0.380	17.560	73.800	85.090	50.560	23.190	281.6
1933	10.560	3.730	2.030	1.600	1.880	1.700	0.130	17.870	37.340	25.240	27.380	32.760	162.2
1934	26.300	7.920	1.780	1.410	1.570	2.630	11.500	33.100	31.910	29.230	17.530	14.230	179.1
1935	7.040	16.640	6.500	7.420	3.550	2.510	0.690	27.150	24.670	50.380	53.500	26.520	226.6
1936	8.930	14.460	23.490	7.570	1.460	3.230	9.770	25.170	75.790	70.970	25.480	11.980	278.3
1937	8.100	4.270	2.100	2.860	1.990	2.180	9.010	27.750	18.610	19.170	31.970	38.430	166.4
1938	15.530	3.930	2.180	1.620	6.650	5.130	6.600	27.220	12.950	11.030	24.420	13.860	131.1
1939	5.270	2.910	1.920	1.470	6.860	3.740	33.570	25.140	40.340	33.270	14.570	10.970	180.0
1940	6.890	18.600	7.070	7.280	3.470	1.460	24.720	73.020	80.280	64.240	57.080	73.610	417.7
1941	33.940	6.710	4.220	2.640	1.560	1.560	1.070	24.890	105.160	44.470	37.260	16.270	279.8
1942	6.620	2.970	2.700	7.840	3.940	7.240	3.510	11.990	34.190	43.430	55.910	28.580	208.9
1943	12.360	9.050	3.600	1.560	1.420	2.000	1.790	22.740	88.290	52.900	50.110	35.540	281.4
1944	17.580	6.460	3.460	1.890	1.390	1.410	5.750	37.820	78.260	93.250	70.670	20.630	338.6
1945	14.530	12.410	4.170	1.550	1.520	3.620	2.800	12.280	13.870	23.750	25.550	40.670	156.7
1946	22.240	5.580	1.860	1.420	1.370	9.920	3.750	15.070	11.910	56.960	37.560	16.700	184.3
1947	10.280	4.640	2.000	1.470	1.450	6.290	2.850	20.430	22.440	35.890	21.620	46.090	175.5
1948	33.370	8.210	1.970	1.570	1.410	1.400	8.120	13.710	19.140	25.220	24.960	28.700	167.8
1949	20.410	19.380	7.420	1.900	1.410	1.390	15.620	8.900	7.210	71.180	31.320	31.060	217.2
1950	20.880	19.770	7.710	6.390	3.000	1.470	15.470	12.750	55.410	43.340	28.490	32.440	247.1
1951	23.710	20.230	6.380	1.460	1.460	1.490	1.680	27.710	19.300	31.960	42.330	35.550	213.3
1952	18.970	17.140	6.590	1.940	1.670	1.520	50.500	60.270	23.530	44.050	38.160	17.780	282.1
1953	10.680	10.330	3.980	1.560	1.570	3.400	14.940	64.300	62.210	98.580	84.220	31.310	387.1
1954	15.260	5.750	4.420	2.340	26.650	11.120	5.310	4.050	26.510	49.740	78.510	37.870	267.5
1955	34.470	17.370	4.040	2.170	1.790	2.360	1.320	23.810	45.580	41.660	46.930	24.930	246.4
1956	12.340	4.550	3.260	2.030	9.490	7.450	5.280	50.690	63.880	73.210	67.220	26.920	326.3
1957	34.340	12.070	1.700	1.390	3.910	7.030	3.860	27.360	37.990	15.570	35.600	20.840	201.7
1958	15.370	7.020	2.240	2.370	1.930	2.100	25.230	78.680	37.490	13.450	31.380	18.870	236.1
1959	17.820	6.600	2.190	1.900	1.570	2.670	3.740	17.780	49.090	22.200	7.850	16.720	150.1
1960	9.310	2.930	2.020	4.930	2.800	1.820	1.800	9.700	30.380	24.700	35.600	45.730	171.7
1961	20.310	4.360	1.710	1.840	2.260	5.540	16.160	8.660	72.300	48.420	81.360	32.700	295.6
1962	35.490	21.880	5.020	1.960	1.570	1.470	0.910	5.600	15.830	38.430	70.190	27.690	226.0
1963	8.820	4.660	4.120	2.190	7.390	5.080	2.880	8.740	48.870	45.570	43.590	19.880	201.8
1964	10.580	8.730	3.490	1.930	4.010	11.390	14.810	26.980	24.410	21.380	31.120	19.290	178.1
1965	11.330	5.920	7.450	3.380	1.540	12.340	13.380	10.020	35.810	53.470	38.020	27.780	220.4
1966	10.110	2.510	1.710	1.600	1.460	1.430	13.310	24.370	55.370	32.850	26.910	16.530	188.2
1967	12.480	6.770	2.580	1.910	1.690	1.490	11.070	41.310	46.860	47.620	47.410	17.530	238.7
1968	31.260	12.010	2.190	2.140	2.090	1.850	6.370	3.640	15.550	20.200	29.810	31.820	158.9
1969	27.090	8.710	1.930	1.430	2.190	1.720	0.090	21.150	47.500	55.150	44.870	29.270	241.1
1970	12.770	4.130	2.980	1.900	1.430	1.950	1.340	15.260	22.050	45.910	47.940	19.030	176.7
1971	6.310	3.240	2.130	2.290	2.320	2.280	5.450	35.560	26.790	16.070	19.680	14.820	136.9
1972	7.290	2.680	1.750	1.550	1.420	1.990	0.860	2.630	3.830	52.160	46.000	22.270	144.4
1973	10.120	4.760	2.780	1.750	1.510	1.520	0.140	11.380	36.110	37.370	121.790	65.410	294.6
1974	21.840	7.590	2.600	1.740	1.720	1.600	5.710	49.210	37.870	46.240	46.810	17.270	240.2
1975	14.290	6.510	2.010	1.420	1.410	2.570	1.840	11.810	71.710	60.770	32.130	16.980	223.5
1976	9.460	42.750	31.580	7.740	4.300	2.980	24.030	69.700	87.530	84.340	95.870	34.950	495.2
1977	7.370	4.350	5.220	3.330	1.830	2.160	4.730	6.280	5.110	10.470	55.880	36.970	143.7
1978	15.320	4.860	4.220	4.300	8.310	3.760	0.370	26.200	53.020	39.270	32.140	28.110	219.9
1979	26.480	8.400	1.720	2.390	2.000	1.520	5.750	29.750	38.750	22.830	33.510	15.890	189.0
1980	9.590	23.440	17.290	31.090	10.490	5.640	7.510	3.550	10.100	57.170	54.110	59.910	289.9
1981	21.390	4.290	2.210	2.060	1.600	1.590	22.300	17.220	30.750	26.020	21.490	10.440	161.4
1982	9.890	4.680	3.940	2.330	5.840	5.920	1.930	58.460	77.490	76.240	35.040	33.700	315.5
1983	13.890	2.900	1.660	1.520	1.510	3.330	7.910	69.370	32.520	35.950	25.440	43.560	239.6
1984	38.940	10.590	12.890	8.630	8.090	25.570	17.250	12.070	42.630	65.720	57.970	26.280	326.6
1985	14.200	5.550	2.850	1.830	2.710	8.780	7.690	9.750	48.310	47.950	64.820	30.940	245.4
1986	9.510	5.630	2.590	2.090	1.860	1.700	7.100	44.440	46.050	36.520	52.170	32.240	241.9
1987	9.880	2.660	4.190	2.340	1.400	1.800	20.410	21.120	27.390	30.110	40.850	26.640	188.8
1988	10.560	3.500	1.830	1.510	1.860	19.060	23.170	25.210	28.840	37.040	47.500	40.480	240.6
1989	24.520	9.310	2.680	1.550	3.570	2.430	20.800	35.120	41.530	56.580	37.060	13.230	248.4
1990	5.820	4.420	2.460	1.640	1.480	1.510	2.460	28.010	94.270	84.040	38.570	44.020	308.7
1991	26.470	6.620	1.790	1.410	2.230	3.040	14.080	21.470	73.680	63.640	40.130	20.410	275.0
1992	40.060	14.350	1.960	1.470	3.350	2.170	60.720	42.450	38.490	107.410	53.890	12.680	379.0
1993	4.470	2.120	3.860	2.360	1.510	1.510	4.780	10.230	101.150	58.050	18.020	20.860	228.9
1994	10.750	3.030	5.340	3.030	1.590	2.240	1.080	24.130	35.470	50.090	42.750	17.660	197.2
1995	27.510	11.460	12.650	5.010	2.610	2.880	2.170	10.630	72.240	61.310	44.140	49.970	302.6
1996	41.620	24.260	12.040	3.580	1.460	1.430	3.720	20.830	71.770	34.320	28.030	11.310	254.4
1997	6.420	11.320	11.060	4.940	1.870	1.800	5.110	44.230	36.270	49.440	28.160	11.080	211.7
1998	5.230	14.700	20.030	6.330	1.430	1.380	10.550	18.960	34.090	18.110	12.400	6.730	149.9
1999	3.530	2.140	2.950	3.460	2.030	5.140	1.960	14.290	29.470	45.700	29.210	32.180	172.1
2000	13.190	3.110	2.020	1.800	1.550	1.410	4.130	41.820	25.040	66.620	60.480	44.370	265.5
2001	17.170	16.140	6.140	15.720	6.800	1.750	3.880	27.790	34.940	50.640	52.300	20.970	254.2
2002	18.920	8.410	2.810	1.870	1.560	9.520	3.880	5.750	6.640	13.630	34.540	27.140	134.7
2003	12.930	5.220	2.720	4.190	2.310	2.280	3.720	8.420	16.450	22.630	23.990	11.470	116.3
2004	26.940	10.360	2.850	8.280	3.830	1.840	25.260	29.850	50.090	35.050	52.840	27.370	274.6
AVE :	16.60	8.95	4.86	3.40	3.12	3.79	9.34	24.82	41.03	44.61	42.21	27.87	230.6
SD :	9.84	6.88	5.13	3.99	3.44	4.02	10.99	17.87	24.66	21.46	19.36	13.29	69.7