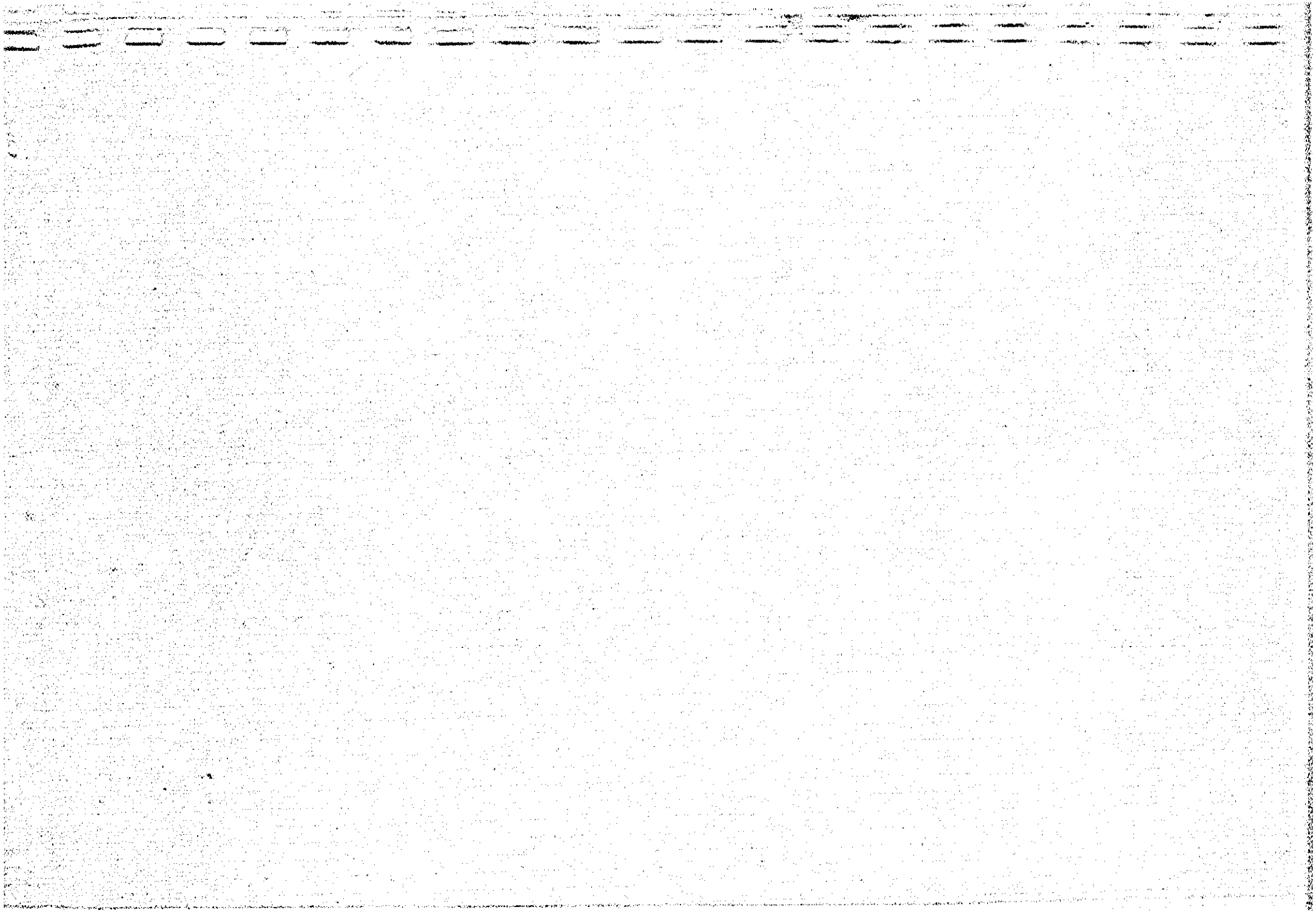

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
THE REPUBLIC OF SOUTH AFRICA

THE STUDY ON THE EXPANSION OF CAPACITY OF MAGALIES WATER IN THE REPUBLIC OF SOUTH AFRICA (PHASE 1)

FINAL REPORT

SUPPORTING REPORT (G)
ECONOMIC / FINANCIAL ANALYSIS

DECEMBER 1996

SANYU CONSULTANTS INC.

NIHON SUIDO CONSULTANTS CO., LTD.

SUPPORTING REPORT G : ECONOMIC/FINANCIAL ANALYSIS

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ABBREVIATIONS AND TERMINOLOGY

The following abbreviations are used in this report:

AADD	Annual Average Daily Demand
ANC	African National Congress
BLA	Black Local Authorities
BODA	British Overseas Development Agency
CAPEX	Capital Expenditure
CASE	Community Agency for Social Inquiry
CBOs	Community Based Organisations
CDE	Centre for Development and Enterprise
CIP	Capital Investment Plan
CRDC	Community Reconstruction and Development Committee
CRCS	Crocodile River Catchment Study
CSIR	Council for Scientific and Industrial Research
CWSS	Community Water Supply and Sanitation
DAF	Dissolved Air Flotation
DANIDA	Danish International Development Agency
DBSA	Development Bank of Southern Africa
DC	District Council
DCF	Discounted Cash Flow
DFA	Development Facilitation Act
DWAF	Department of Water Affairs and Forestry
ESA	Extended Supply Area of Magalies Water Board as gazetted in April 1996
ESCOM	Electricity Supply Commission
GIS	Geological Information System
GNU	Government of National Unity
GSWCA	Government Subterranean Water Control Area
GWCA	Government Water Control Area
GWS	Government Water Scheme
IB	Irrigation Board

IBS	Irrigation Board Scheme
IDT	Independent Development Trust (NGO)
IFR	Instream Flow Requirements
IMT	Interim Management Team
INR	Institute of National Resources
JICA	Japan International Cooperation Agency (the official agency responsible for the implementation of the technical cooperation programmes of the Government of Japan)
LAPC	Land and Agricultural Policy Centre
LRDC	Local Reconstruction and Development Committee (Local RDP Committee)
LWC	Local Water Committee
MSF	Medicines Sans Frontiers
MEC	Member of Executive Committee
MW	Magalies Water Board
NELF	National Electrification Forum (ESKOM Database)
NGOs	Non-Governmental Organisations
NPV	Nett Present Value
NWP	North West Province
NWWA	North West Water Supply Authority
O&M	Operation and Maintenance
ODA	Official Development Assistance
ODO	Organisation Development Officer
OECF	Overseas Economic Cooperation Fund of Japan
PLP	Presidential Lead Project
PMC	Project Management Committee of the JICA Study
PSC	Project Steering Committee of the JICA Study
PWB	Phalaborwa Water Board
PWG	Project Working Group of the JICA Study
PWSSD	Provincial Water Supply and Sanitation Directorate
PWV	Pretoria Witwatersrand Vereeniging triangle (geographical area)
RBC	Rotating Biological Contactor
RDP	Reconstruction and Development Programme

RSA	Republic of South Africa
RSC	Regional Service Council (regional bodies established to facilitate and coordinate service provision across local boundaries. To be replaced by Regional and District Councils)
RWB	Rand Water Board
S/W	Scope of Works
SAMWU	South African Municipal Workers Union
SANCO	South African National Civic Organisation
SCOWSAS	Standing Committee on Water Supply and Sanitation
SDD	Summer Daily Demand
Setplan	Settlement Planning Services Consulting Engineers
SGT	Self-Governing Territories
SR	Service Reservoir
STW	Sewage Treatment Work
SWET	Sanitation and Water Education and Training Program
TA	Tribal Authority
TBVC	Transkei, Bophuthatswana, Venda, Ciskei (former ""independant"" homelands)
TDS	Total Dissolved Salts
THM	Trihalomethanes
TLC	Transitional Local Council
TMC	Transitional Metropolitan Council
TOR	Terms of Reference
TRC	Transitional Rural Council
VIDP	Ventilated Improved Double Pit toilet (latrine)
VIP	Ventilated Improved Pit Latrine
WP	White Paper
WRC	Water Research Commission
WRYM	Water Resources Yield Model
WTW	Water Treatment Works

UNITS

c	Cent (100c = R1)
ha	Hectare
kg/c/year	Kilograms per capita per year
kl	Kilolitre
kld	Kilolitres per day
km	Kilometre
km2	Square kilometre
l/c/yr	Litres per capita per year
lcd	Litres per capita per day
m3/c/yr	Cubic metres per capita per year
mcm	Million cubic metres
mcm/a	Million cubic metres per annum
mg/l	Milligrams per litre
Mld	Megalitres per day
R	Rand (R1 = 100c)

CHAPTER 1 INTRODUCTION

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CHAPTER 1 INTRODUCTION

1.1 Background

In August 1995, the Governments of South Africa and Japan agreed the scope of work for a technical co-operation programme focused on the expansion of the capacity of Magalies Water (MW). The Japan International Cooperation Agency (JICA) is currently undertaking the study in close co-operation with the Department of Water Affairs and Forestry (DWAF) in South Africa. The initiative to expand the capacity of Magalies Water is a direct outcome of South Africa's new Water and Sanitation policy, which is based on the Reconstruction and Development Programme (RDP). In terms of the policy, institutions like Magalies Water will extend bulk supply networks in the longer term, and will assist in stimulating and supporting local level water supply and management institutions in the short to medium term.

The overall framework of the JICA Study is as follows:

PHASE 1 - Formulation of a Master Plan

Stage 1 - Situational Analysis

Stage 2 - Formulation of a Master Plan up to the year 2015 and priority projects to the year 2002

Stage 3 - Recommendations on study methods and terms of reference for Phases 2 and 3

PHASE 2 - Feasibility Study on priority projects

PHASE 3 - Implementation of selected water supply and sanitation pilot initiatives

Against the background of the overall framework described above, the present JICA Study is concerned only with the Phase 1, formulation of an overall and strategic framework / master plan for the appropriately phased, long term, sustainable development of water supply infrastructure and sanitation, including appropriate Second and Third Tier support, in the Study Area. The formulation of a priority project to the year 2002, and an extended programme up to the year 2015 is included in the present JICA Study.

The first Stage of this Phase was a Situational Analysis. The purpose of this was to understand the socio-economic conditions, hydrological and hydrogeological resources, demand for water, supply of water, existence and condition of infrastructure, present standard and coverage of services, environmental conditions, policy implications, capacity and roles of the First, Second and Third Tiers, water supply attitudes and practices at the community level, financial situation, and water tariffs and cost recovery systems.

The second Stage of the Phase is to formulate a Master Plan which includes the Gap Analysis,

the Policy / Strategy Recommendation / Plan, the Preliminary Study of Water Supply System (Technical Solution), and the Economic/Financial Analysis of the formulated project(s) under pre-feasibility level including an initial capital investment plan.

The objective of the Gap Analysis was to establish a complete understanding of the Gap between the Current State (institutional, technical and financial) of water infrastructures in the Magalies Water Study Area and the desired future state, as presented in the Water Supply and Sanitation policy. The current state has been determined in the Situational Analysis. The future state is identified through key policy documents such as the White Paper on Water Supply and Sanitation, as well as the needs and expectations of the communities and other consumers in the Study Area.

The objective of the Policy / Strategy Recommendation / Plan was: to facilitate and guide the expansion of Magalies Water through practical recommendations regarding policy and strategy; to identify areas of national policy that support/hinder the expansion of MW, and to propose actions to be taken; to identify areas of policy in specific water sector and related institutions that require attention, and to propose appropriate actions; and to propose strategies to deal with institutional and technical gaps that are likely to hinder the expansion of MW, together with strategies that will facilitate the expansion process.

The objective of the Technical Solution was to quantify the technical requirements to achieve the standards and levels of service identified in the desired future state and bridge the Gap mapped out in the Gap Analysis.

The objective of the Economic/Financial Analysis is to quantify both the cost and the benefit to be incurred by and arising from the project proposals which are to be evaluated from various viewpoints of RSA's national economy and the second and third tiers' entrepreneurial stance. The lessons obtained from a series of analysis will be fed to further Phases 2 and 3 of this Study.

Key to the success of the JICA Study is the support and involvement of the main stakeholders in water supply and sanitation in the Study Area - Magalies Water Board, national and regional offices of DWAF, local authorities, district councils, local and Provincial Government, communities and their representative organisations, and NGOs. To ensure that this involvement occurs the following institutional arrangements have been put in place:

- The entire JICA Study is managed by a Project Management Committee (PMC), on which sits representatives of Magalies Water, Department of Water Affairs and Forestry and JICA. The PMC sits approximately once a month; and

- Project Working Groups (PWGs) have been established to oversee the activities of the Study Team and the local consultants. Three PWGs were established, which include representatives of key stakeholders, as well as MW, DWAF and JICA.

1.2 Composition of Master Plan Report

The Final Report is composed of an Executive Summary, Main Report, Supporting Reports and a Data Book. Each Supporting Report covers an individual part of the Study and has been prepared to provide detailed information to the more interested or specialist reader. The Supporting Reports are as follows:

A General Affairs
B Situational Analysis
C Gap Analysis
D Policy and Strategy Options
E Preliminary Study of Water Supply System
F Institutional Development Plan
G Economic/Financial Analysis

The Data Book contains primary data and information, and only a limited number of hard copies will be produced which will be held by key stakeholders (such as DWAF and MW). The contents of the Data Book will be made available in electronic format whenever applicable.

1.3 Supporting Report G

The supporting report should deal with all relevant data and information derived from all the other aspects which are mostly outcome from the Supporting Report B to F, towards evaluation and prioritisation of the project proposals, and further input for the succeeding phases of 2 and 3 under the framework of this Study. In this connection, the report is compiling many of tables fulfilled by numeric materials as a form of main table and appendices.

Chapter 2 of this report describes various dimensions of the project proposals, basic concepts and assumptions to be introduced into a series of analysis. Chapter 3 deals with financial aspects of the master plan from enterpreneurial viewpoints which include an initial capital investment plan with preliminary tariff caluculation and a cash flow analysis and a financial rate of return. In Chapter 4, these project proposals were evaluated from RSA's national economic viewpoints by caluculating an economic internal rate of return. Chapter 5 deals with other implications and benefits arising from implementation of the master plan basically in qualitative and descriptive manners.

CHAPTER 2 BASIC CONSIDERATION AND ASSUMPTIONS

CHAPTER 2 BASIC CONSIDERATION AND ASSUMPTIONS

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CHAPTER 2 BASIC CONSIDERATION AND ASSUMPTIONS

2.1 Objective of the Study

The Study is being undertaken within the context of the goals of South Africa's first democratically elected government. In the broadest sense the overall goal of the government is to redress the imbalances of the past. A major challenge is therefore to provide services to the people and communities who have not had access to them. Water and sanitation are major areas of past service deficiency with most of South Africa's population not having access to even the most basic levels of service.

Many of the constraints to achieving these goals are also noted. It is inevitable that there will be differences between the views of government and communities. This in itself is a constraint.

In the section we consider two main sources of development objectives in some depth:

(1) The RDP

(2) The White Paper on Water Supply and Sanitation

The latter document draws heavily on the RDP principles and the two are therefore highly integrated. Objectives and principles flowing from these two sources are therefore very useful and in our opinion clearly set out a vision of the future.

It is clearly an objective of the study to interpret these overall objectives and principles in the context of expanded area of supply of MW. Recommendations made in the course of the study will serve the overall goals of government. In this sense the study is a proving ground for ideas that could accelerate water supply and sanitation in South Africa.

The study has pursued an interactive approach to the identification and definition of more detailed development objectives. The Gap Analysis revealed several key objectives, around which there was considerable consensus:

(1) *All South Africans should enjoy at least the RDP minimum level of water supply and* sanitation service, but should also have the opportunity to pursue higher levels of service, if desired, and if consumers are able and willing to pay.

(2) For service delivery in the water sector to be effective, roles and responsibilities should be clearly assigned and accepted.

(3) The economic value of water has to be recognised and accepted by all users. In this context cost recovery is an important development objective and a foundation to further development.

(4) Participation is a fundamental development objective, based on the notion of demand-driven planning and service provision.

These development objectives underpin the study and its recommendations including:

- to satisfy RDP Minimum standard for all inhabitants in the Study Area by year 2002;
- to possibly supply potable water *through a surface water system* taking into consideration both inferior quality and quantity of groundwater available in the Study Area;
- to clarify Role and Responsibilities of all stakeholders concerned with the Study;
- to confirm Users Pay Principle for sustainable water supply in the Study Area;
- to address People's Participation in the process of implementation of the master plan; and
- to verify possible way to resolve the gaps identified in this Study.

2.2 Zoning of Study Area

2.2.1 Purpose and Basic Concept

Since the JICA Study Area covers quite vast areas extending almost 28,000 sq.km comprising parts of four Provinces of North-West, Gauteng, Mpumalanga and Northern, it was divided into a hierarchy of spatially identified supply areas. From the largest to the smallest division these have been termed Supply Zones, Supply Areas and Supply Blocks. The purpose of these groupings was to serve as a basis for the arrangement of water demands and supply sources, and an infrastructural planning as well as for the management of water supply schemes within the Study Area (See Table 2-1).

2.2.2 Supply Zone

A Supply Zone comprises a grouping of bulk demands that are served by one management unit of Magalies Water, or an expected future management unit of the Board.

Three Supply Zones were selected in this Study, viz a Western, a Central and an Eastern Supply Zones. These Supply Zones were selected primarily to accord with the natural drainage system of the Study Area. As mentioned elsewhere, the Study Area comprises basically two main river drainage systems. Those are the Olifants River system in the east and the Crocodile River system in the centre and west. Existing water supply infrastructure has for obvious reasons also been developed around this natural drainage system.

2.2.3 Supply Areas

A Supply Area comprises a grouping of bulk demands that are supplied from a common surface water resource or a set of resources, eg. dams and/or weirs, but allowing also for imported and exported water.

Based on this concept, each of the above three Supply Zones was further subdivided into a number of Supply Areas. Ten (10) Supply Areas were finally established within the Study Area. The Western Supply Zone was subdivided into four Supply Areas, viz the Vaalkop North, Vaalkop South, Barnardsvlei and Koster Supply Areas. The Central Supply Zone was also subdivided into four Supply Areas, viz the Brits, Klipvoor, Temba and Rand Water Supply Areas. The Eastern Supply Zone was only subdivided into two Supply Areas, viz the Bronkhorstspruit and the Weltevreden Supply Areas.

2.2.4 Supply Blocks

Some of the above Supply Areas have further been subdivided into a number of Supply Blocks. A Supply Block comprises a grouping of bulk demands that are supplied from a single bulk supply pipeline (with branched if applicable). The bulk supply pipeline either originates from a water treatment works, or is a branch to a pipeline serving an entire service area that originates at such a water treatment works. In conclusion, the Study Area was divided into 28 Supply Blocks.

2.3 Basic Information of Proposed Projects

2.3.1 Beneficiary

Basically, the proposed projects have been planned to supply water by using a surface water as much as possible, except for those remote areas far away from the existing water treatment works where groundwater resources are available and satisfy both in quality and quantity.

Beneficiaries under this master plan can be divided into two, namely, primary and secondary groups, of which the former is being categorised in the following:

(1) Primary Beneficiary

Category 1: Those people will be served by the proposed infrastructure, who are presently obtaining water from not a surface water supply system but other sources including groundwater, river runoff, vendors, etc;

Category 2: Increased number of population who are located in the existing supply area of surface water systems;

Category 3: Very limited number of people dwelling in Koster and Swartruggens service blocks who could be supplied by the proposed bore holes.

(2) Secondary Beneficiary

The secondary group of beneficiary is defined in the following as the last category:

Category 4: Those people who will be able to enjoy higher level of services, who are located in the existing supply area of surface water systems.

Summary of the said categories of beneficiary are indicated in Table 2-2.

2.3.2 Projected Water Demand

The overall water demand comprises basically of the primary water demand and the non-primary one. The former is further divided into the domestic water as potable water and the non-domestic one including those demand arising from mines, industries, commerce and institutions. The non-primary demand includes those demand arising from irrigation, stock-watering and environmental and other requirements.

From viewpoints of assessment of the project proposals under the Study, incremental demand by the primary water sector is worked out on the basis of the projected primary water demand for the entire Study Area.

In the preliminary study of water supply system (Technical Solution), water demand analysis was made for the target years of 2002 and 2015, on the basis of projected population and mixture of water supply services. Summary of the said analysis for the primary water demand which includes domestic, industrial, commercial, institutional uses and mine is given below (Refer to Table 2-3 for more details):

	Water Demand (MCM/year)			Increment (MCM/year)	
	1995	2002	2015	1995-2002	1995-2015
Western Zone	77.590	102.350	121.030	24.760	43.440
Central Zone	64.473	114.864	163.066	50.391	98.593
Eastern Zone	21.545	31.223	36.834	9.678	15.289
Study Area	163.608	248.437	320.930	84.829	157.322

Annual growth rate of water demand between 1995 and 2015 shows 4.7% as the highest in Central Zone, followed by 2.7% in Eastern Zone and 2.2% in Western Zone as the lowest among the three zones, resulted in 3.4% on the average of the study area.

2.3.3 Summary of Infrastructure Development Proposals

The proposals for infrastructure development was basically prepared by each supply area dividing into the bulk (second tier) supply system and the retail (third tier) supply system. Table 2-4 summarises basic information relating to these proposals in each zonal basis. From this table, the beneficiary and the incremental primary water demand were discussed and described in the above, the required cost per primary beneficiary is one of key parameter, showing 1,234 Rand for bulk supply system in the Western Zone and 1,436 Rand for retail supply system in the Eastern Zone as the highest, and for both bulk and retail supply systems 405 Rand in the Central Zone as the lowest and more or less 1,900 Rand both in the Western and Eastern Zone. The reason why the required cost in the Central Zone is largely cheaper than the other two zones is non inclusion of the prior investment made by Rand Water Board in the estimated initial costs.

2.4 Other Assumptions

2.4.1 Affordability and Willingness to Pay

Since it was rather difficult to obtain proper information about an affordability and willingness to pay of people in the Study Area through a reliable statistics and/or other related studies, these parameters were worked out through the following procedures:

- it was reported from the local consultants who made the situational analysis that utmost affordability for potable water is 15 Rand per household per month on the average in the Study Area;
- assuming 25 to 30 litters per day per person and six members per household, total monthly consumption of water is calculated at 4.5 to 5.4 kl per household;
- thus, average affordability per kl can be worked out ranging between 2.78 to 3.33 Rand, and 2.5 and 3.0 Rand/kl are considered applicable for the affordability and the willingness to pay in this Study, respectively, taking rather conservative stance into account.

2.4.2 Water Tariff

As clearly mentioned in the situational analysis, water tariff charged by the related institutions in the Study Area differs each other with wider range of variation. For the purpose of this economic and financial analysis, the water tariff of bulk supply system was derived from MW's historical experiences obtained from its annual report for 1996, indicating about 1.13 R/kl. Taking allowances for future changes into consideration, the Study shall apply 1.20 R/kl for the tariff of bulk supply system. On the other hand, the tariff for retail supply system is assumed at 1.30 R/kl, which is difference between the assumed affordability and the bulk water tariff.

2.4.3 Staged Development Concept

Although the target year of the master plan is set at year of 2015, the proposed infrastructure development shall be implemented in the staged manner by segmenting the proposals into three parts. The first stage should aim to achieve the RDP minimum standard by year of 2002, and the rest will be further divided into two stages until year 2009 (seven years) and until 2015 (six years). Both the economic and financial analysis should follow the concept accordingly.

2.4.4 Concept of "With" and "Without" Project

Basically, a series of economic and financial analysis should be based on the concept of "with" and "without" project concept, which would give a different situation from "before" and "after" project concept. While the "before" project means just the current situation prevailing in the Study Area, the "without" project focuses future change of the present situation even not implementation of the proposed plan and/or project. In this Study, only the concept of "before/after" concept has been applied due to limitation of available data and information, resulted in having a certain tendency to overestimate project benefits.

Table 2-1 Zoning of Study Area

Supply Zone	Supply Area	Supply Block
WESTERN	1. Vaalkop North	1. Thabazimbi 2. Mokgalewaneng 3. Sefikile 4. Ramokokstad 5. Saulspoort 6. Mogwase/Sun City
	2. Vaalkop South	7. Bethanie 8. Vaalkop Southern/Bospoort
	3. Barnardsvlei	9. Barnardsvlei Western 10. Barnardsvlei Eastern
	4. Koster	11. Koster 12. Swartrugens
CENTRAL	1. Brits	1. Brits 2. Hartbeespoort
	2. Kipvoor	3. Klipvoor West 4. Klipvoor East 5. Moretele North
	3. Temba	6. Kudube North 7. Kudube South 8. Wallmannsthal 9. Warmbaths/Nylstroom
	4. Rand Water	10. Rand Water
EASTERN	1. Weltervreden	1. Bloedfontein 2. Kameelriver 3. Mapoch 4. Walkraal
	2. Bronkhorstspruit	1. Bronkhorstspruit 2. Cullinan

Table 2-2 Category of Beneficiary

	Primary Beneficiary			Secondary	
Supply Area	Category 1	Category 2	Category 3	Category 4	Total
Vaalkop North	86,560	39,359	0	82,448	208,367
Vaalkop South	184,938	29,305	0	91,006	305,249
Barnardsvlei	26,293	141,498	0	239,042	406,833
Koster	0	0	6,153	0	6,153
W. Zone Total	297,791	210,162	6,153	412,496	926,602
Brits	46,402	85,349	0	105,148	236,899
Klipvoor	51,034	0	0	0	51,034
Temba	608,236	73,276	0	118,976	800,488
Rand Water	479,328	938,809	0	650,451	2,068,588
C. Zone Total	1,185,000	1,097,434	0	874,575	3,157,009
Weltervreden	101,910	110,589	0	418,777	631,276
Bronkhorstspruit	16,339	109,887	0	218,568	344,794
E. Zone Total	118,249	220,476	0	637,345	976,070

Note: For more details, refer to Appendix 1 of this report.

Table 2-3 Incremental Primary Water Demand in 2015 (MCM/year)

Supply Area	Domestic	Mine	Others	Total
Vaalkop North	4.429	7.150	2.401	13.980
Vaalkop South	15.053	-	1.741	16.794
Barnardsvlei	8.296	2.219	1.828	12.343
Koster	0.333	-	-0.100	0.323
W. Zone Total	28.111	0.369	5.960	43.440
Brits	10.642	-	2.553	13.195
Klipvoor	0.900	-	-	0.900
Temba	24.547	-	0.300	24.847
Rand Water	52.291	-	7.360	59.651
C. Zone Total	88.380	-	10.213	98.593
Weltervreden	10.519	-	-	10.519
Bronkhorstspruit	4.307	-	0.463	4.770
E. Zone Total	14.826	-	0.463	15.289

Note: For more details, refer to Appendix 2 of this report.

Table 2-4 Summarised Information on Proposed Project by Supply Zone

Particulars		Unit	Study Area for MW Expansion			
1. Name of Supply Zone		-	Western	Central	Eastern	Total
2. Population Served						
2.1 1995		nos.	427,901	874,846	637,345	1,940,092
2.2 2015		- " -	941,917	3,157,009	976,070	5,074,996
2.3 Increment		- " -	514,016	2,282,163	338,725	3,134,904
3. Primary Water Supply						
3.1 1995	Domestic	MCM/yr	20.778	50.879	16.234	87.891
	Mine	- " -	34.402	-	1.110	35.512
	Others	- " -	11.314	13.594	4.201	29.109
	Total	- " -	66.494	64.473	21.545	152.512
3.2 2015	Domestic	- " -	48.889	139.259	31.060	219.208
	Mine	- " -	43.771	-	1.110	44.881
	Others	- " -	17.274	23.807	4.664	45.745
	Total	- " -	109.934	163.066	36.834	309.834
3.3 Increment	Domestic	- " -	28.111	88.380	14.826	131.317
	Mine	- " -	9.369	-	-	9.369
	Others	- " -	5.960	10.213	0.463	16.636
	Total	- " -	43.440	98.593	15.289	157.322
4. Capital Cost						
4.1 Bulk	Direct C.	R'000	403,210	224,851	94,355	722,416
	Indirect C.	- " -	231,120	128,886	54,083	414,089
	S-total	- " -	634,330	353,737	148,438	1,136,505
4.2 Retail	Direct C.	- " -	228,510	362,760	309,266	900,536
	Indirect C.	- " -	130,982	207,933	177,271	516,186
	S-total	- " -	359,492	570,693	486,537	1,416,722
4.3 Total		- " -	993,822	924,430	634,975	2,553,227
5. Cost per person						
5.1 Bulk		R/person	1,234	155	438	363
5.2 Retail		- " -	699	250	1,436	452
5.3 Total		- " -	1,933	405	1,874	815
6. Cost per Kl						
6.1 Bulk		R/kl	14.6	3.6	9.7	7.2
6.2 Retail		- " -	8.3	5.8	31.8	9.0
6.3 Total		- " -	22.9	9.4	41.5	16.2

Note: For more details, see Appendix 2 of this report.

CHAPTER 3 FINANCIAL ASPECTS

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CHAPTER 3 FINANCIAL ASPECTS

3.1 Estimated Investment Cost

Since the proposed project plans for infrastructure were formulated on the basis of the zoning designed by the Study Team, namely the supply block as the bottom, of which several blocks are merged into a supply area, and the several supply areas form a supply zone. The Study Area consists of three supply zones, namely, Western, Central and Eastern Zones.

The initial investment cost for the infrastructure component was calculated by dividing it into two major supply systems, namely, a bulk supply system for which the second tier is basically responsible, and a retail supply system with responsibilities of the third tier.

Table 3-1 shows a total capital investment of R2.55 billion (in 1996 values) for both bulk and retail water supply infrastructure projects. The cost of bulk supply infrastructure is estimated at approximately R1.14 billion while the remainder (R1.41 billion) is the estimated cost for the retail supply infrastructure. These capital expenditures would be incurred over 20 years span towards the target year 2015 of the master plan. This includes the RDP contribution amounting to R743 million (R188.6 million for the bulk and R554.7 million for the retail), which is about 30 percent of the total cost.

It is planned to implement the infrastructure development in three stages during the master plan period by year of 2015, the estimated initial investment cost will be disbursed as shown in Tables 3-2 and 3-3.

3.2 *Initial Capital Investment Plan (ICIP)*

3.2.1 Basic Concept

The Initial Capital Investment Plan (ICIP) is essentially the Business Plan (Capital Budgeting Plan) for the investment of capital in community water supply and sanitation projects in the Study Area. Its the "blueprint" for attracting the financial investment required and must give potential lenders and investors a real sense of assurance that the projects are financially sound and economically viable. The financial viability of the project (s) must be shown. Conservative projections of assured cash flows must be prepared and justified by appropriate feasibility and engineering studies (technical solutions). The cash flow projections must be sufficient to service any debt obligations, provide for cash needs, cover operation and maintenance expenditures and still provide for some contingencies.

The ICIP involves the long-term commitment of invested funds not only in new projects, but also in the expansion and refurbishment of existing projects. It forms the basis for determining whether the projects will be successful for three reasons. First, the cost commitment of some projects may be enormous. Second, it is not only the monetary value of the capital investment that has a bearing on the project's success, but also the strategic role the project (s) will play in setting the long-term goals and objectives of water supply and sanitation delivery in the Study Area. Finally, most decisions taken on projects in the ICIP will be irreversible. For example,

once a commitment is made to undertake the construction of community water supply scheme or water treatment plant, the decision cannot be reversed after one or two years to stop construction with having a devastating financial impact on the capital investment program. Consequently, the ICIP is forward looking and includes a solid economic evaluation and an assessment of the critical success factors and the risks involved in undertaking the necessary investment in the projects.

The ICIP must focus on how the projects will be cost effective (i.e. identification of cost recovery goals and analysis of financial cost recovery pricing) and how to meet the investment criteria of potential lenders so that the payback of the loan or return on investment is evident and assured. A detailed description of each project should be documented in detail and the financial analysis and projections to support the objectives set out in the ICIP specifying when the projects will be realized. What the project will do and how it fits into the overall picture of community water supply and sanitation delivery in the Study Area will be of paramount importance in the ICIP.

In the management area, the financial capability and technical expertise must be available to cover the cost overruns and complete the project (s) so that it operates in accordance with cost and production specifications (as described in the technical solutions). The beneficiaries of the project must have available expertise to operate the facility and management personnel to manage the project effectively.

Although the initial investment plan for this Study should fundamentally follow the basic concept described in the above, the following two studies were made in this Study, due to limitation of available data and information, which are a case study on preliminary tariff calculation applying three parameters for loan interest rate and a simplified cash flow analysis. The full scale initial investment planning shall take place in the Phase 2 of this Study.

3.2.3 Preliminary Tariff Calculation

(1) Basic Principles

Proper water pricing is necessary, but not sufficient, to ensure efficient allocation and improved services. The ability to collect and recover costs should be accompanied by a set of incentives that encourage accountability for cost recovery. Decentralized service delivery can overcome declines with collections making consumers more willing to pay. Preliminary tariff calculations are based on full cost recovery pricing and the *user pays principle* which is the underlying basis for setting the tariff. The *user pays principle* relates to cost recovery, whereby users are required to pay for services received and possible additional measures to make the water supply facilities self-financing. There must be unequivocal acceptance of the *user pays principle* by all stakeholders in respect of cost recovery for services of direct relevance to users. It is absolutely essential that the principle be well understood and accepted because it has a direct bearing on the user's willingness to pay for services. The *user pays principle* is consistent with the long-term vision for bulk and retail water supply and with financial viability and sustainability of the water supply infrastructure projects.

(2) Tariff Calculation (Case Study)

On the basis of an incremental basis in the water demand and the incurred capital and recurrent cost, water tariff both for bulk and retail water supply under user pays principle was calculated on trial basis with three scenarios for repayment of loan borrowed, in terms of interest rate on loan. Three rates under these scenario were selected based on the following rationale: 18% was based on the current rates paid on loan stock by water boards; 12% was based on loans borrowed by public institutions directly from the central government's treasury; and 6% was based on low interest rate or soft loans from multilateral or bilateral agencies through the central government.

Bases for other costs such as purchase of raw water, operating and maintenance cost, overhead and so on, historical information obtained from MW's annual reports is applied for a bulk water and several assumptions on the basis of capital expenditure is applied for a retail water (See Appendix 3 of this report for more details). Typical case of calculated tariffs in each supply areas are presented in Table 3-4.

The case study reveals that except for four supply areas of Barnardsvlei, Brits, Temba and Rand Water in which incremental expenditure for bulk supply infrastructure would not be required too much, calculated overall tariff with condition of lowest interest of six percent ranges from 3.15 R/kl in Vaalkop South as the lowest and 7.43 R/kl in Klipvoor as the highest.

According to the basic assumption mentioned earlier, taking the assumed affordability of 2 to 3 R/kl into consideration, only four supply areas of Barnardsvlei, Brits, Temba and Rand Water where significant incremental expenditure for bulk supply infrastructure would not be required, show favourable situation in any case, and two areas of Vaalkop South and Koster do marginal situation in case of six percent interest rate only. In the other cases, calculated tariff (underlined) exceeds well beyond the average affordability (See Table 3-4).

3.2.4 Cash Balance Analysis

The first stage in the Initial Capital Investment Plan (ICIP) is the identification of potential capital investment projects and the estimation of relevant cash flow associated with the projects. The major emphasis is on relevant net cash flow which is defined as *total cash inflow associated with the capital investment less its net cash outflow*. Estimation of the economic consequences associated with each project is based on the cash flow. There are no income tax implications because the projects are managed strictly on a not-for-profit basis.

In order to make the cash flow analysis, a simplified model has been established, in which several basic assumptions were introduced (a simple model applied in the analysis is compiled in Appendix 10 of this report):

- Implementing agency or institution of the proposed project(s) is irrespective of the

existing ones;

- RDP funding is treated as a grant;
- No initial working capital has bee taken into account;
- Interest on outstanding of capital investment is accumulated on to the principle
- Repayment terms are 25 years annual amortisation after completion of capital expenditure; and
- Applicable water tariff is 1.20 and 1.30 R/kl for bulk and retail supply, respectively with sensitivity analysis on cost recovery rate.

A series of simulation has been made in each supply zone by three stages and by supply systems. Table 3-5 indicated overall cash balance in each supply area by the bulk and the retail supply system as likely implication of loan interest rates of 2.5% (refer to Appendix 4 for more details) and 18% (Appendix 5). In case of 2.5% interest rate, four supply areas of Vaalkop North, Klipvoor, Weltervreden and Bronkhorstspruit seem to be not viable, and only Eastern Zone remains still unfavourable situation when aggregating each areas figures into the respective zone. In case of 18%, only three supply areas of Barnardsvlei, Temba and Rand Water seem to be viable, and Central Zone locates on favourable situation in the aggregate manner.

On the other hand, Table 3-6 shows how much interest rate be required for viability of each proposals with sensitivity of cost recovery rate of 100, 60 and 30 percent. In this analysis, only Barnardsvlei provides a positive rate for the recovery rate of 30%. When considering balancing and/or equalising between and/or bulk and retail systems, supply areas and supply zones, 10% of interest rate would be able to make the entire infrastructure development proposal viable.

3.3 Financial Rate of Return

In similar manner of the cash flow analysis, a financial internal rate of return for the respective supply area and zone as well as the Study Area has bee worked out (Calculation table for these areas is compiled in Appendix 7 of this report). In this analysis, sensitivity on cost recovery was also carried out. Table 3-7 indicates results of the analysis, giving that every case (supply area and zone) has positive rate, 2.0% in Weltervreden as the lowest and 73.9% in Barnardsvlei as the highest under the 100 percent cost recovery, and 13.3% for the entire Study Area. Under the cost recovery 60 percent, the overall rate for the Study Area decreases to 6.1%, and those rate in each area also decreases to unfavourable situation accordingly, except three areas of Barnardsvlei, Temba and Rand Water in which the market loan rate (18%) is still applicable. Only Barnardsvlei seems to be viable for the market rate under the recovery rate 30 percent.

Table 3-1 Total Requirement of Fund for 2015 Demands
(Infrastructure Only)

(Unit: Million Rand)

Supply Area	Bulk Infrastructure			Secondary Infrastructure			Bulk + Secondary Infrastructure			Primary Beneficiaries
	RDP	Others	Total	RDP	Others	Total	RDP	Others	Total	
1. Western S. Zone										
1-1. Vaalkop North	18.899	346.758	365.657	51.889	105.208	157.097	70.788	451.966	522.754	125,919
- Accelerated Prg.	*12.625*	*39.978*	*52.603*	*11.872*	*27.892*	*39.764*	*24.497*	*67.870*	*92.367*	*34,409*
- Other Program	*6.274*	*306.780*	*313.054*	*40.017*	*77.316*	*117.333*	*46.291*	*384.096*	*430.387*	*91,510*
1-2. Vaalkop South	30.771	225.963	256.734	42.967	109.992	152.959	73.738	335.955	409.693	214,243
1-3. Barnardsvlei	0.967	8.584	9.551	33.519	9.379	42.898	34.486	17.963	52.449	167,791
1-4. Koster	0.834	1.554	2.388	1.194	5.344	6.538	2.028	6.898	8.926	6,063
1-5. Total	51.471	582.859	634.330	129.569	229.923	359.492	181.040	812.782	993.822	514,016
2. Central S. Zone										
2-1. Brits	6.276	59.190	65.466	17.695	43.799	61.494	23.971	102.989	126.960	131,481
2-2. Klipvoor	31.787	21.639	53.426	23.180	12.460	35.640	54.967	34.099	89.066	51,034
- Accelerated Prg.	*31.787*	*21.639*	*53.426*	*23.180*	*12.460*	*35.640*	*54.967*	*34.099*	*89.066*	*51,034*
- Other Program	-	-	-	-	-	-	-	-	-	-
2-3. Temba	37.489	78.264	115.753	93.039	27.462	120.501	130.528	105.726	236.254	681,512
2-4. Rand Water	14.031	105.061	119.092	197.531	155.526	353.057	211.562	260.587	472.149	1,418,136
2-5. Total	89.583	264.154	353.737	331.445	239.247	570.692	421.028	503.401	924.429	2,282,163
3. Eastern S. Zone										
3-1. Weltervreden	40.933	76.513	117.446	66.802	293.152	359.954	107.735	369.665	477.400	212,499
- Accelerated Prg.	*23.585*	*44.086*	*67.671*	*19.750*	*86.668*	*106.418*	*43.335*	*130.754*	*174.089*	*80,023*
- Other Program	*17.348*	*32.427*	*49.775*	*47.052*	*206.484*	*253.536*	*64.400*	*238.911*	*303.311*	*132,476*
3-2. Bronkhorstspruit	6.640	24.352	30.992	26.877	99.706	126.583	33.517	124.058	157.575	126,226
3-3. Total	47.573	100.865	148.438	93.679	392.858	486.537	141.252	493.723	634.975	338,725
4. Grand Total	188.627	947.878	1,136.505	554.693	862.028	1,416.721	743.320	1,809.906	2,553.226	3,134,904

Table 3-2 Project Cost and Disbursement (Financial Cost)

(Unit: R million)

	Stage / Year	Western Supply Zone			Central Supply Zone			Eastern Supply Zon			Total of Study Area		
		Bulk	Retail	Total	Bulk	Retail	Total	Bulk	Retail	Total	Bulk	Retail	Total
A	Stage 1	267.7	157.9	425.6	152.2	209.2	361.4	86.5	273.5	360.0	506.4	640.6	1,147.0
	Stage 2	183.3	100.8	284.1	100.8	180.7	281.5	50.6	166.7	217.3	334.7	448.2	782.9
	Stage 3	183.3	100.8	284.1	100.8	180.7	281.5	11.3	46.3	57.6	295.4	327.8	623.2
	Total	634.3	359.5	993.8	353.8	570.6	924.4	148.4	486.5	634.9	1,136.5	1,416.6	2,553.1
B	RDP Cost	51.5	129.6	181.1	89.6	331.4	421.0	47.6	93.7	141.3	188.7	554.7	743.4
	(B/A) (%)	8.1	36.1	18.2	25.3	58.1	45.5	32.1	19.3	22.3	16.6	39.2	29.1
C	Accel. Proj.	52.6	39.8	92.4	53.4	35.6	89.0	67.7	106.4	174.1	173.7	181.8	355.5
D	Stage 1												
	1998	26.8	15.8	42.6	15.2	20.9	36.1	8.7	27.4	36.0	50.6	64.1	114.7
	1999	40.2	23.7	63.8	22.8	31.4	54.2	13.0	41.0	54.0	76.0	96.1	172.1
	2000	80.3	47.4	127.7	45.7	62.8	108.4	26.0	82.1	108.0	151.9	192.2	344.1
	2001	80.3	47.4	127.7	45.7	62.8	108.4	26.0	82.1	108.0	151.9	192.2	344.1
	2002	40.2	23.7	63.8	22.8	31.4	54.2	13.0	41.0	54.0	76.0	96.1	172.1
	Total	267.7	157.9	425.6	152.2	209.2	361.4	86.5	273.5	360.0	506.4	640.6	1,147.0
E	Stage 2												
	2003	18.3	10.1	28.4	10.1	18.1	28.2	5.1	16.7	21.7	33.5	44.8	78.3
	2004	18.3	10.1	28.4	10.1	18.1	28.2	5.1	16.7	21.7	33.5	44.8	78.3
	2005	27.5	15.1	42.6	15.1	27.1	42.2	7.6	25.0	32.6	50.2	67.2	117.4
	2006	36.7	20.2	56.8	20.2	36.1	56.3	10.1	33.3	43.5	66.9	89.6	156.6
	2007	36.7	20.2	56.8	20.2	36.1	56.3	10.1	33.3	43.5	66.9	89.6	156.6
	2008	27.5	15.1	42.6	15.1	27.1	42.2	7.6	25.0	32.6	50.2	67.2	117.4
	2009	18.3	10.1	28.4	10.1	18.1	28.2	5.1	16.7	21.7	33.5	44.8	78.3
	Total	183.3	100.8	284.1	100.8	180.7	281.5	50.6	166.7	217.3	334.7	448.2	782.9
F	Stage 3												
	2010	18.3	10.1	28.4	10.1	18.1	28.2	1.1	4.6	5.8	29.5	32.8	62.3
	2011	27.5	15.1	42.6	15.1	27.1	42.2	1.7	6.9	8.6	44.3	49.2	93.5
	2012	36.7	20.2	56.8	20.2	36.1	56.3	2.3	9.3	11.5	59.1	65.6	124.6
	2013	36.7	20.2	56.8	20.2	36.1	56.3	2.3	9.3	11.5	59.1	65.6	124.6
	2014	36.7	20.2	56.8	20.2	36.1	56.3	2.3	9.3	11.5	59.1	65.6	124.6
	2015	27.5	15.1	42.6	15.1	27.1	42.2	1.7	6.9	8.6	44.3	49.2	93.5
	Total	183.3	100.8	284.1	100.8	180.7	281.5	11.3	46.3	57.6	295.4	327.8	623.2

Table 3-3 Stage wise Capital Expenditure

		Water Demand (MCM)	Bulk Water Supply				Retail Water Supply			
			Total Cost			Direct Cost	Total Cost			Direct Cost
			RDP	Others	Total		RDP	Others	Total	
Vaalkop North	Stage 1	5.294	7.2	131.3	138.5	88.0	19.6	39.8	59.5	37.8
	Stage 2	4.343	5.9	107.7	113.6	72.2	16.1	32.7	48.8	31.0
	Stage 3	4.343	5.9	107.7	113.6	72.2	16.1	32.7	48.8	31.0
	Total	13.980	18.9	346.8	365.7	232.4	51.9	105.2	157.1	99.9
Vaalkop South	Stage 1	8.021	14.7	107.9	122.6	77.9	20.5	52.5	73.1	46.4
	Stage 2	4.387	8.0	59.0	67.1	42.6	11.2	28.7	40.0	25.4
	Stage 3	4.386	8.0	59.0	67.1	42.6	11.2	28.7	40.0	25.4
	Total	16.794	30.8	226.0	256.7	163.2	43.0	110.0	153.0	97.2
Barnards-vlei	Stage 1	5.422	0.4	3.8	4.2	2.7	14.7	4.1	18.8	12.0
	Stage 2	3.461	0.3	2.4	2.7	1.7	9.4	2.6	12.0	7.6
	Stage 3	3.460	0.3	2.4	2.7	1.7	9.4	2.6	12.0	7.6
	Total	12.343	1.0	8.6	9.6	6.1	33.5	9.4	42.9	27.3
Koster	Stage 1	0.323	0.8	1.6	2.4	1.5	1.2	5.3	6.5	4.2
	Stage 2	-	-	-	-	-	-	-	-	-
	Stage 3	-	-	-	-	-	-	-	-	-
	Total	0.323	0.8	1.6	2.4	1.5	1.2	5.3	6.5	4.2
Western Zone Total	Stage 1	19.060	23.1	244.6	267.7	170.1	56.1	101.8	157.9	100.4
	Stage 2	12.191	14.2	169.2	183.3	116.5	36.7	64.0	100.8	64.1
	Stage 3	12.189	14.2	169.1	183.3	116.5	36.7	64.0	100.8	64.1
	Total	43.440	51.5	582.9	634.3	403.2	129.6	229.9	359.5	228.5
Brits	Stage 1	4.822	2.3	21.6	23.9	15.2	6.5	16.0	22.5	14.3
	Stage 2	4.187	2.0	18.8	20.8	13.2	5.6	13.9	19.5	12.4
	Stage 3	4.186	2.0	18.8	20.8	13.2	5.6	13.9	19.5	12.4
	Total	13.195	6.3	59.2	65.5	41.6	17.7	43.8	61.5	39.1
Klipvoor	Stage 1	0.900	31.8	21.6	53.4	34.0	23.2	12.5	35.6	22.7
	Stage 2	-	-	-	-	-	-	-	-	-
	Stage 3	-	-	-	-	-	-	-	-	-
	Total	0.900	31.8	21.6	53.4	34.0	23.2	12.5	35.6	22.7
Temba	Stage 1	7.907	11.9	24.9	36.8	23.4	29.6	8.7	38.3	24.4
	Stage 2	8.470	12.8	26.7	39.5	25.1	31.7	9.4	41.1	26.1
	Stage 3	8.470	12.8	26.7	39.5	25.1	31.7	9.4	41.1	26.1
	Total	24.847	37.5	78.3	115.8	73.6	93.0	27.5	120.5	76.6
Rand Water	Stage 1	19.051	4.5	33.6	38.0	24.2	63.1	49.7	112.8	71.7
	Stage 2	20.300	4.8	35.8	40.5	25.8	67.2	52.9	120.1	76.4
	Stage 3	20.300	4.8	35.8	40.5	25.8	67.2	52.9	120.1	76.4
	Total	59.651	14.0	105.1	119.1	75.7	197.5	155.5	353.1	224.4
Central Zone Total	Stage 1	32.680	50.5	101.7	152.2	96.8	122.3	86.9	209.2	133.0
	Stage 2	32.957	19.5	81.2	100.8	64.0	104.6	76.2	180.7	114.9
	Stage 3	32.956	19.5	81.2	100.8	64.0	104.6	76.2	180.7	114.9
	Total	98.593	89.6	264.2	353.7	224.9	331.4	239.2	570.7	362.8
Weltevr-eden	Stage 1	7.001	27.2	50.9	78.2	49.7	44.5	195.1	239.6	152.3
	Stage 2	3.518	13.7	25.6	39.3	25.0	22.3	98.0	120.4	76.5
	Stage 3	-	(0.0)	-	(0.0)	-	-	-	-	-
	Total	10.519	40.9	76.5	117.4	74.7	66.8	293.2	360.0	228.8
Bronkhor-stspruit	Stage 1	1.277	1.8	6.5	8.3	5.3	7.2	26.7	33.9	21.5
	Stage 2	1.747	2.4	8.9	11.4	7.2	9.8	36.5	46.4	29.5
	Stage 3	1.746	2.4	8.9	11.3	7.2	9.8	36.5	46.3	29.5
	Total	4.770	6.6	24.4	31.0	19.7	26.9	99.7	126.6	80.5
Eastern Zone Total	Stage 1	8.278	29.0	57.4	86.5	55.0	51.7	221.8	273.5	173.8
	Stage 2	5.265	16.1	34.6	50.6	32.2	32.2	134.6	166.7	106.0
	Stage 3	1.746	2.4	8.9	11.3	7.2	9.8	36.5	46.3	29.5
	Total	15.289	47.6	100.9	148.4	94.4	93.7	392.9	486.5	309.3
Study Area Total	Stage 1	60.018	102.6	403.7	506.4	321.9	230.1	410.5	640.6	407.2
	Stage 2	50.413	49.8	284.9	334.7	212.8	173.5	274.8	448.3	284.9
	Stage 3	46.891	36.2	259.3	295.4	187.8	151.1	176.7	327.8	208.4
	Total	157.32	188.6	947.9	1,136.5	722.4	554.7	862.0	1,416.7	900.5

Table 3-4 Typical Case of Calculated Tariff (R/kl)

	Bulk	Retail	Bulk+Retail
Case 1 (Interest: 18%)			
- Vaalkop North	6.00	1.89	7.89
- Vaalkop South	3.53	1.62	5.15
- Barnardsvlei	0.68	0.29	0.97
- Koster	1.66	3.97	5.63
- Brits	1.53	0.82	2.35
- Klipvoor	6.91	4.30	11.21
- Temba	1.27	0.42	1.69
- Rand Water	0.92	0.74	1.66
- Weltervreden	2.25	6.69	8.94
- Bronkhorstspruit	1.69	5.06	6.75
Case 2 (Interest: 12%)			
- Vaalkop North	4.69	1.49	6.18
- Vaalkop South	2.82	1.27	4.09
- Barnardsvlei	0.65	0.25	0.90
- Koster	1.41	3.09	4.50
- Brits	1.29	0.65	1.94
- Klipvoor	5.64	3.57	9.21
- Temba	1.10	0.36	1.46
- Rand Water	0.83	0.61	1.44
- Weltervreden	1.86	5.22	7.08
- Bronkhorstspruit	1.42	3.95	5.37
Case 3 (Interest: 6%)			
- Vaalkop North	3.52	1.14	4.66
- Vaalkop South	2.19	0.96	3.15
- Barnardsvlei	0.62	0.22	0.84
- Koster	1.18	2.32	3.50
- Brits	1.08	0.49	1.57
- Klipvoor	4.51	2.92	7.43
- Temba	0.95	0.31	1.26
- Rand Water	0.75	0.48	1.23
- Weltervreden	1.52	3.91	5.43
- Bronkhorstspruit	1.18	2.97	4.15

(For more details, refer to Appendix 3 of this report)

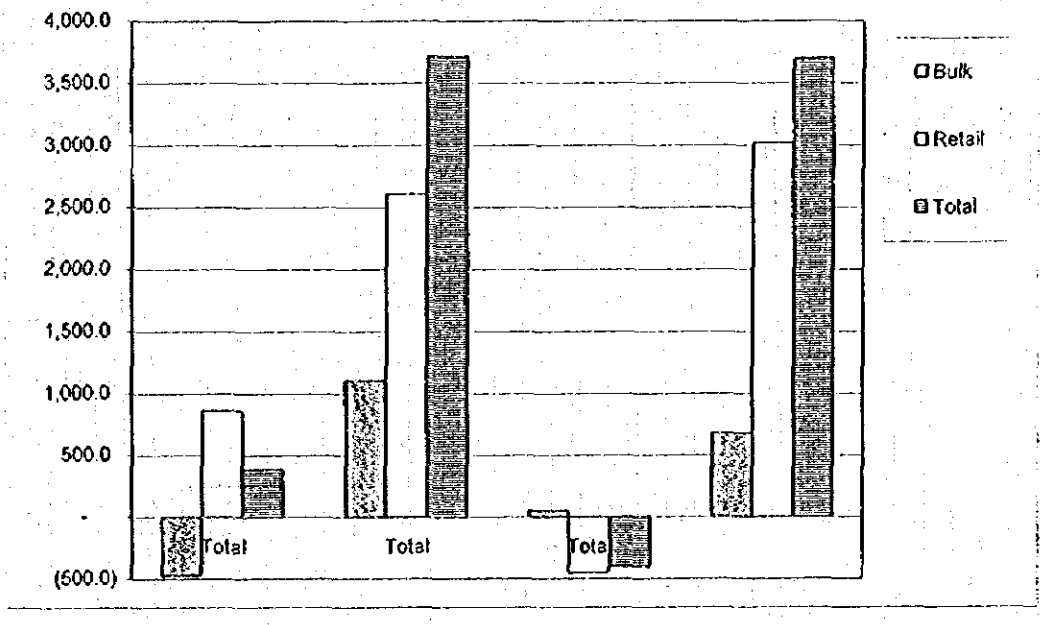
Table 3-5 Overall Cash Balance

(1) Interest Rate: 2.5%

(Unit: R Million)

		Bulk	Retail	Total
Western Zone	Vaalkop North	(484.0)	199.4	(284.6)
	Vaalkop South	(185.1)	286.2	101.1
	Barnardsvlei	190.3	379.4	569.7
	Koster	2.2	(2.1)	0.1
	Total	(476.6)	862.9	386.3
Central Zone	Brits	99.2	329.6	428.8
	Klipvoor	(29.4)	(6.5)	(35.9)
	Temba	254.8	732.3	987.1
	Rand Water	783.4	1,553.1	2,336.5
	Total	1,108.0	2,608.5	3,716.5
Eastern Zone	Weltervreden	19.7	(365.4)	(345.7)
	Bronkhorstspruit	29.6	(86.9)	(57.3)
	Total	49.3	(452.3)	(403.0)
Study Area		680.7	3,019.1	3,699.8

Note: Figures in parentheses are negative.



(For more details, see Appendix 4 of this report)

Table 3-6 Viable Rate of Loan Interest

(Unit: %/year)

		Cost Recovery Rate		
		100%	60%	30%
Western Zone	Vaalkop North	N.A.	N.A.	N.A.
	Vaalkop South	4.0	N.A.	N.A.
	Barnardsvlei	43.0	29.0	6.0
	Koster	2.5	N.A.	N.A.
	Total	4.5	N.A.	N.A.
Central Zone	Brits	15.0	6.0	N.A.
	Klipvoor	N.A.	N.A.	N.A.
	Temba	23.5	13.0	N.A.
	Rand Water	23.0	12.5	N.A.
	Total	20.5	10.5	N.A.
Eastern Zone	Weltervreden	N.A.	N.A.	N.A.
	Bronkhorstspruit	N.A.	N.A.	N.A.
	Total	N.A.	N.A.	N.A.
Study Area		10.0	1.5	N.A.

Note: N.A.: not available

Table 3-7 Financial Internal Rate of Return

(Unit: %)

		Cost Recovery Rate		
		100%	60%	30%
Western Zone	Vaalkop North	3.2	-2.8	-26.1
	Vaalkop South	7.7	2.5	-2.9
	Barnardsvlei	73.9	44.6	17.6
	Koster	6.8	0.3	-48.2
	Total	8.9	3.9	-0.8
Central Zone	Brits	20.8	10.1	-4.1
	Klipvoor	2.2	-3.7	-50.8
	Temba	34.7	18.8	1.4
	Rand Water	33.7	18.1	0.5
	Total	27.8	16.9	-0.6
Eastern Zone	Weltervreden	2.0	-4.5	N.A.
	Bronkhorstspruit	4.3	-2.6	N.A.
	Total	2.5	-4.0	N.A.
Study Area		13.3	6.1	-2.9

(For more details on FIRR, see Appendix 6 and 7 of this report)

CHAPTER 4 ECONOMIC ASPECTS

CHAPTER 4 ECONOMIC ASPECTS

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4.2 Economic Cost and Benefit 4-1
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Table 4-1 : Summary of Capital Expenditure for Infrastructure Development 4-3
Table 4-2 : Conversion of Financial to Economic Cost 4-4

CHAPTER 4 ECONOMIC ASPECTS

4.1 General Description

In order to briefly examine an economic impact of implementation of proposed project(s) under the master plan stage on to RSA's economy, an economic internal rate of return (EIRR) of each project is calculated which should be compared with the opportunity cost of capital (real value of interest rate) in RSA. Taking into consideration prevailing current market value of interest rate as 18% and the prevailing inflation rate of 8% on the average, this Study utilises 10% of discount rate as the opportunity cost of capital (hurdle rate) for the assessment of economic viability of the proposed projects.

Since lack of precise information on benefit calculation, in other words, willingness to pay by possible future beneficiary, it has been assumed that the same level of average affordability in the study area equals to the expected willingness to pay for this economic evaluation, which is based on inquiries made by the local consultants during the Situational Analysis stage as mentioned earlier. Taking into account the average affordability of one household comprising six members as 15 Rands per month, the willingness to pay can be worked out approximately 3 Rands per kl.

4.2 Economic Cost and Benefit

On the basis of the results obtained from the cost estimate for infrastructural development, Table 4-1 summarises the required initial capital costs, amounting to about 2.553 billion Rand in 1996 prices, which contains both infrastructures for bulk supply systems and retail supply systems. The required cost consists of a direct cost and an indirect cost, and the latter includes an engineering services cost, VAT and a physical contingencies.

Table 4-1 shows a per capita cost by supply areas on the basis of the primary beneficiary, indicating 333 R/capita in Rand Water Supply Area as the lowest and 4,152 R/capita in Vaalkop North Supply Area, because the cost required for main supply system (pipeline and regional reservoirs) is not included in the cost estimate for both supply areas of Barnardsvlei in Western Zone and Rand Water in Central Zone because such facilities have been provided Rand Water Board already.

Table 4-2 gives conversion procedure from the estimated financial cost to the economic one. Since the economic cost is to be measured at real cost the national economy of RSA, those transfer payment of tax is excluded but RDP fund is included.

While primary benefit of the water supply sector is to be measured by willingness to pay of targeted beneficiary, other benefit arising from saving labour force to fetch water ca be expected when the RDP minimum standard would be satisfied. However, the benefit estimation for labour saving is not included in this economic analysis due to lack of reliable information and data. The other benefits should be duly discussed and examined in the Phase 2 Study.

4.3 Economic Rate of Return

Using the assumptions stated above, the disbursement schedule on the basis of the implementation schedule and project life of 40 years, an economic internal rate of return has been computed by supply area (refer to Appendix 9 of this report for calculation table for each area), of which results are summarised below:

Economic Internal Rate of Return (EIRR)

Supply Area	Total Cost	Total Benefit	Net Benefit	EIRR
	----------	(Million Rand)	----------	(%)
Vaalkop North	791.491	1,272.061	480.570	5.3
Vaalkop South	724.721	1,573.601	848.880	9.7
Barnardsvlei	246.209	1,143.592	897.382	46.4
Koster	18.751	34.884	16.133	7.8
Western Z. Total	1,781.172	4,024.138	2,242.966	10.6
Brits	337.018	1,195.859	858.841	24.3
Klipvoor	127.259	97.200	-30.059	-2.6
Temba	626.196	2,219.744	1,593.547	24.5
Rand Water	1,422.025	5,330.883	3,908.858	28.4
Central Z. Total	2,512.498	8,843.686	6,331.188	22.7
Weltervreden	796.068	1,075.367	279.298	3.2
Bronkhorstspruit	262.966	419.549	156.583	5.7
Eastern Z. Total	1,059.034	1,494.916	435.882	3.8
Study Area	**5,352.704**	**14,362.740**	**9,010.036**	**13.7**

In the above, the total cost includes an initial capital investment, an operation and maintenance cost and a replacement cost to be incurred during 40 years analysis period, and the total benefit covers all accrual over the same period.

Although it is necessary to incorporate the prior investment made by Rand Water in both areas of Barnardsvlei and Rand Water, for which the Study Team is awaiting provision of the required information from Rand Water Boards (some information has been given), the calculated EIRRs varies from the negative in Klipvoor Supply Area and 3.2% in Weltervreden S.A. as the lowest in the positive side, and 46.4% in Barnardsvlei as the highest.

From the precise economic viewpoints, those supply areas having lower EIRR than 10% as the assumed opportunity cost of capital, seem to be not viable for further implementation, however, various efforts should be made to increase the calculated rate with re-planning of the present proposals in future. In addition to the measures, the same basic concept of balancing and/or equalising benefit as mentioned in Section 3.3 should be given due attention during the succeeding phases.

Table 4-1 Summary of Capital Expenditure for Infrastructure Development

Supply Area	Primary* Beneficiaries	Total Cost (R million)			Cost per capita (R)			Remarks
		Bulk	Retail	Total	Bulk	Retail	Total	
1. Western S. Zone								
1-1. Vaalkop North	125,919	365.657	157.097	522.754	2,904	1,248	4,152	
- Accelerated Prg.	34,409	52.603	39.764	92.367	1,529	1,156	2,684	Priority Area for Phase 2 (F/S)
- Other Program	91,510	313.054	117.333	430.387	3,421	1,282	4,703	
1-2. Vaalkop South	214,243	256.734	152.959	409.693	1,198	714	1,912	
1-3. Barnardsvlei	167,791	9.551	42.898	52.449	57	256	313	*Not including Prior Investment*
1-4. Koster	6,063	2.388	6.538	8.926	394	1,078	1,472	
1-5. Total of W.S. Zone	514,016	634.330	359.492	993.822	1,234	699	1,933	
2. Central S. Zone								
2-1. Brits	131,481	65.466	61.494	126.960	498	468	966	
2-2. Klipvoor	51,034	53.426	35.640	89.066	1,047	698	1,745	
- Accelerated Prg.	51,034	53.426	35.640	89.066	1,047	698	1,745	Priority Area for Phase 2 (F/S)
- Other Program								
2-3. Temba	681,512	115.753	120.501	236.254	170	177	347	
2-4. Rand Water	1,418,136	119.092	353.057	472.149	84	249	333	*Not including Prior Investment*
2-5. Total of C.S. Zone	2,282,163	353.737	570.692	924.429	155	250	405	
3. Eastern S. Zone								
3-1. Weltervreden	212,499	117.446	359.954	477.400	553	1,694	2,247	
- Accelerated Prg.	80,023	67.671	106.418	174.089	846	1,330	2,175	Priority Area for Phase 2 (F/S)
- Other Program	132,476	49.775	253.536	303.311	376	1,914	2,290	
3-2. Bronkhorstspruit	126,226	30.992	126.583	157.575	246	1,003	1,248	
3-3. Total of E.S. Zone	338,725	148.438	486.537	634.975	438	1,436	1,875	
4. Grand Total	3,134,904	1,136.505	1,416.721	2,553.226	363	452	814	

Note: For more details, reference is made to Supporting Report H.

* Primary beneficiary does not include those who enjoy higher level of services than the present.

Table 4-2 Conversion of Financial to Economic Cost

(Unit: R million)

		Financial Cost			Economic Cost		
		Direct	Indirect	Total	Direct	Indirect	Total
Vaalkop North	Bulk	232.400	133.212	365.612	232.400	88.312	320.712
	Retail	99.800	57.205	157.005	99.800	37.924	137.724
	Total	332.200	190.417	522.617	332.200	126.236	458.436
Vaalkop South	Bulk	163.100	93.489	256.589	163.100	61.978	225.078
	Retail	97.200	55.715	152.915	97.200	36.936	134.136
	Total	260.300	149.204	409.504	260.300	98.914	359.214
Barnardsv-lei	Bulk	6.100	3.497	9.597	6.100	2.318	8.418
	Retail	27.200	15.591	42.791	27.200	10.336	37.536
	Total	33.300	19.088	52.388	33.300	12.654	45.954
Koster	Bulk	1.500	0.860	2.360	1.500	0.570	2.070
	Retail	4.200	2.407	6.607	4.200	1.596	5.796
	Total	5.700	3.267	8.967	5.700	2.166	7.866
Wetern Z. Total	Bulk	403.100	231.057	634.157	403.100	153.178	556.278
	Retail	228.400	130.919	359.319	228.400	86.792	315.192
	Total	631.500	361.976	993.476	631.500	239.970	871.470
Brits	Bulk	41.600	23.845	65.445	41.600	15.808	57.408
	Retail	39.100	22.412	61.512	39.100	14.858	53.958
	Total	80.700	46.257	126.957	80.700	30.666	111.366
Klipvoor	Bulk	33.960	19.466	53.426	33.960	12.905	46.865
	Retail	22.655	12.986	35.641	22.655	8.609	31.264
	Total	56.615	32.452	89.067	56.615	21.514	78.129
Temba	Bulk	73.600	42.188	115.788	73.600	27.968	101.568
	Retail	76.600	43.907	120.507	76.600	29.108	105.708
	Total	150.200	86.095	236.295	150.200	57.076	207.276
Rand Water	Bulk	75.800	43.449	119.249	75.800	28.804	104.604
	Retail	224.500	128.683	353.183	224.500	85.310	309.810
	Total	300.300	172.132	472.432	300.300	114.114	414.414
Central Z. Total	Bulk	224.960	128.947	353.907	224.960	85.485	310.445
	Retail	362.855	207.988	570.843	362.855	137.885	500.740
	Total	587.815	336.936	924.751	587.815	223.370	811.185
Weltervred-en	Bulk	74.700	42.818	117.518	74.700	28.386	103.086
	Retail	228.800	131.148	359.948	228.800	86.944	315.744
	Total	303.500	173.966	477.466	303.500	115.330	418.830
Bronkhorst-spruit	Bulk	19.700	11.292	30,992	19.700	7.486	27.186
	Retail	80.500	46.143	126.643	80.500	30.590	111.090
	Total	100.200	57.435	157.635	100.200	38.076	138.276
Eastern Z. Total	Bulk	94.400	54.110	148.510	94.400	35.872	130.272
	Retail	309.300	177.291	486.591	309.300	117.534	426.834
	Total	403.700	231.401	635.101	403.700	153.406	557.106
Grand Total	Bulk	722.460	414.114	1,136.574	722.460	274.535	996.995
	Retail	900.555	516.198	1,416.753	900.555	342.211	1,242.766
	Total	1,623.015	930.312	2,553.327	1,623.015	616.746	2,239.761

(See Appendix 8 of this report for staged-wise expenditure)

CHAPTER 5 OTHER CONSIDERATION

CHAPTER 5 OTHER CONSIDERATION

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Figure 5-1 : Schematic Layout of Community Based Water Management 5-4

CHAPTER 5 OTHER CONSIDERATION

5.1 Technical/Engineering Aspect

Basically, there are two main sources for water supply, namely, a surface water and a groundwater. In the Situational Analysis, it was revealed that the groundwater resources in the Study Area are generally inferior to a surface water because of both quality and quantity, and considered not best alternative for long-term perspectives.

Although the water balance study has concluded that new project for water resources development would not be needed in the Study Area due to increasing amount of return flow from PWV areas could be expected, which would meet with overall demand both for the primary and the non-primary water except a certain period in a certain Supply Area. However, as an emerging issue, more careful attention should be paid on water quality in the existing river system which will receive a return flow from the metropolitan areas. Especially, the quality of water in Apies River flowing down from Pretoria is badly affected, from which Kudube WTW obtains raw water.

5.2 Institutional and Organisational Aspect

It is rather difficult to clearly demarcate at this stage which role players should be responsible for implementation of the proposed project, amounting about 2.56 billion Rands in 1996 price level towards the year of 2015. The total fund requirement of 2.56 billion Rand is divided into a bulk portion of 1.15 billion Rand and a 1.41 billion Rand for a retail portion, for which the second tier and the third tier shall be basically responsible, respectively in the long term perspectives.

When considering time frame of 20 years for the said capital investment, avenge annual capital expenditure come at about 57.5 million and 70.4 million for a bulk and a retail portion, respectively. The key issue is locating whether the third tier concerned could manage the said huge amount of capital expenditure, for which every effort shall be taken by utilising the available any resources belonging to the upper tiers, the external or internal, and the statutory or non-statutory.

The issue is closely related to the proposed project management structure which seems to be difficult to conclude in this master plan stage.

5.3 Social Consideration

5.3.1 Women's Role

The community case study found a typical example to show how women play a vital role in the community water supply management which briefs hereunder:

In Norokie Community of Moretele 1 District, women established themselves to manage the water scheme put in place by the water authority in Hammanskraal in January 1995. The water

scheme consists of a borehole with a diesel pump feeding to a tank at the top of a slope. Theoretically once the tank is full the borehole pump must be switched off. However, there was no valve in the system preventing the water from flowing backwards, resulting in the diesel machine constantly flooding, leading to a shortage of water for the people at the top of the slope. This was a constant source of tension in the community and the assistants who safeguard the taps have to resolve the conflicts that emerge between people in different parts of the village (See Figure 5-1).

Once the engineer finished the upgrading project, it was suggested that the women who are living next to the tank should manage the water supply to the village. All the women in the village were called together to design a management system. As shown in Figure 5-1, the village was divided into four sections, each managed by women who operate on a roster system - each woman having the responsibility for one year as one term. The role of the women is to collect money to buy diesel fuel and pay a salary to the machine operator. When the pipes break, they go to Hammanskraal to inform the maintenance team. Collecting money differs between sections. In the western section, money is collected monthly and in the eastern section it is collected when the funds run out. Every time money is collected the person name and stand number is entered into a book as a record. On the day of collecting the money, the people have to bring it with them when they collect water from the tap. If they haven't payed money they are prohibited from taking water from the system.

Each section is allocated a different day to draw water from the system in order to ensure a constant water supply. Tuesday, Thursday and Saturday are reserved for the eastern section and Monday, Wedensday and Friday for the western section.

This case illustrates how women can come to dominate and control a formal system of community water domain. It serves to emphasis the important point that women are not inevitably confined to the domestic domain, even in cultural contexts where this may be expected. It also shows that how externally inspired initiatives provide the opportunity for the realisation of a local management potential that has previously been masked and unrecognised.

5.3.2 Non-Payment Issue

Although many key role players recognise non-payment is the biggest issue to be tackled as quickly as possible that is not only Magalies Water's case but also a nation wide problem, no positive initiative on the issue has not been taken. The non-payment culture originates from various factors such as a historical background inherited from ex-homeland situation, not anticipated level of services, lack of motivation caused by neighbours who don't care for payment, unaffordability and so on.

In order to make a third tier sustainable and self-help as a key player for retail water supply, it is no doubt that cost recovery is considered one of key factors, and due consideration should be paid to support and strengthen such key players from the upper tiers. Therefore, establishment of cost recovery attitude through positive participation of beneficiary since the beginning.

During the process of tackling the non-payment issue, most concern should be paid to those

people who has enough affordability but no willingness to pay currently. In this context, the coming Phase 3 (Pilot Project) shall seriously considers the issues by selecting one of typical peri-urban areas where unauthorised and/or illegal connection is prevailing.

5.4 Way Ahead

In this master plan, it has been set as the primary objective to meet with at least RDP standard for those who are suffering from lower level of water supply and sanitation services than the standard by the year of 2002. Under the preliminary study of water supply system within the framework of the master plan study, the groundwater resource would not be ultimate solution due to its lower exploitability and inferior quality over almost the study area. Therefore, every effort has been made to accommodate those objective people by providing a supply system based on utilisation of surface water, which is more reliable in quantity and quality.

In this connection, the proposed planning for infrastructure development to meet with the projected water demand in year of 2015 has been made in each supply areas in which higher priority area to be implemented in the short-term is identified: (a) Northern Mankwe area in the Vaalkop North supply area of Western Supply Zone, the entire Klipvoor supply area of Central Supply Zone and Moretele 2 area in the Weltervreden Supply area of Eastern Supply Zone.

In the longer perspectives, it may need a certain time to prioritise the proposed projects in each supply area until the role and responsibilities setting would be concluded among the key role players concerned with this study. In this connection, proper attention should be paid on the following points:

- to introduce Equalisation/Balancing concept of project benefit between and/or among bulk and retail supply systems, the supply zones and the supply areas;
- to seek possibility to mobilise softer/concessional loan funding for less viability area(s) and project(s);
- to tackle non-payment issue towards realisation of full cost recovery; and
- to implement Phase 2 (Feasibility Study) and Phase 3 (Pilot Project) within the framework of this Study.

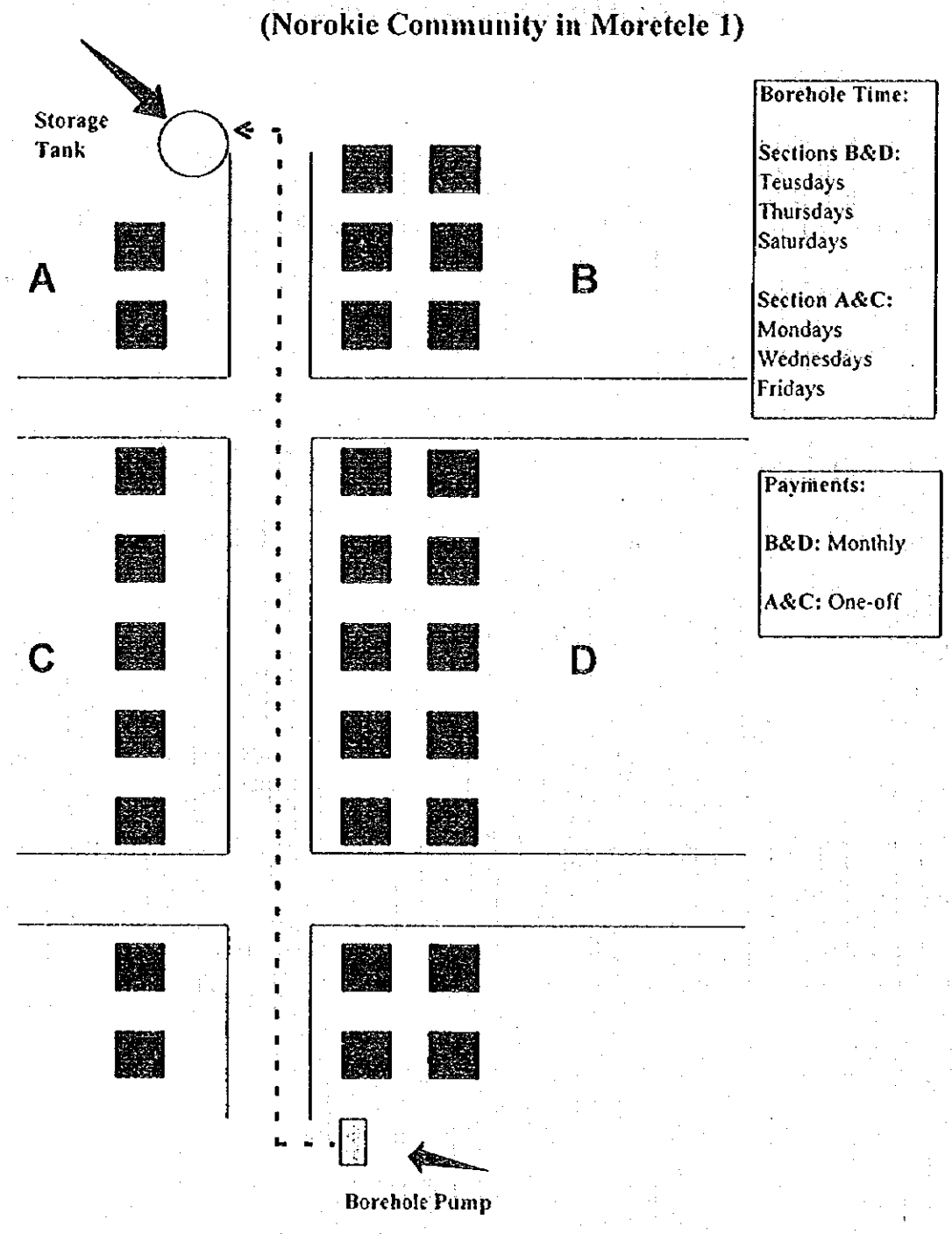

Figure 5-1 Schematic Layout of Community Based Water Management

APPENDIX 1 POPULATION BY SOURCE OF SUPPLY

Appendix 1 Population by Source of Supply

(1) Western Supply Zone

Block	Year	Source of Supply						G. Total
	1995	Surface W	Groundwater/Others					
	2015	Surface Water	Ground Water	Surface Water			Total	
				Accelerat.	Ordinary	S-total		
Thabazimbi	1995	9,178	41,623	-	-	-	41,623	50,801
	2015	12,867	50,085	-	-	-	50,085	62,952
Mokgalwaneng	1995	-	-	3,969	-	3,969	3,969	3,969
	2015	-	-	3,969	-	3,969	3,969	3,969
Sefikile	1995	8,670	-	7,713	-	7,713	7,713	16,383
	2015	13,402	-	7,713	-	7,713	7,713	21,115
Ramokokstad	1995	-	-	9,770	-	9,770	9,770	9,770
	2015	-	-	11,920	-	11,920	11,920	11,920
Saulspoort	1995	48,678	830	10,807	5,585	16,392	17,222	65,900
	2015	70,819	830	10,807	6,310	17,117	17,947	88,766
Mogwase/Sun City	1995	15,922	-	-	27,061	27,061	27,061	42,983
	2015	24,719	-	-	45,841	45,841	45,841	70,560
Total	1995	82,448	42,453	32,259	32,646	64,905	107,358	189,806
(Vaalkop North)	2015	121,807	50,915	34,409	52,151	86,560	137,475	259,282
Bethnie	1995	22,205	-	-	15,238	15,238	15,238	37,443
	2015	35,682	-	-	24,488	24,488	24,488	60,170
Vaal. S. & Bospoolt	1995	68,801	-	-	80,207	80,207	80,207	149,008
	2015	84,629	-	-	160,450	160,450	160,450	245,079
Total	1995	91,006	-	-	95,445	95,445	95,445	186,451
(Vaalkop South)	2015	120,311	-	-	184,938	184,938	184,938	305,249
Barnardsvlei West	1995	214,422	-	-	-	-	-	214,422
	2015	337,369	-	-	-	-	-	337,369
Barnardsvlei East	1995	24,620	-	-	12,000	12,000	12,000	36,620
	2015	43,171	-	-	26,293	26,293	26,293	69,464
Total	1995	239,042	-	-	12,000	12,000	12,000	251,042
(Barnardsvlei)	2015	380,540	-	-	26,293	26,293	26,293	406,833
Koster*	1995	11,319	22,905	-	-	-	22,905	34,224
	2015	11,319	32,604	-	-	-	32,604	43,923
Swartruggens*	1995	4,086	10,241	-	-	-	10,241	14,327
	2015	4,086	13,993	-	-	-	13,993	18,079
Total	1995	15,405	33,146	-	-	-	33,146	48,551
(Koster)	2015	15,405	46,597	-	-	-	46,597	62,002
Grand Total	1995	427,901	75,599	32,259	140,091	172,350	247,949	675,850
(Western S. Zone)	2015	638,063	97,512	34,409	263,382	297,791	395,303	1,033,366

Note: * In year of 2015, 4,656 and 1,497 persons in Blocks of Koster and Swartruggens, respectively, will benefit by the ground water development schemes under this Master Plan

Appendix 1 Population by Source of Supply (cont'd)

(2) Central Supply Zone

Block	Year	Source of Supply						G. Total
	1995	Surface W	Groundwater/Others					
	2015	Surface Water	Ground Water	Surface Water			Total	
				Acceleral.	Ordinary	S-total		
Kudube North	1995	66,607	2,931	-	131,096	131,096	134,027	200,634
	2015	124,470	4,898	-	219,282	219,282	224,180	348,650
Kudube South	1995	-	1,923	-	209,427	209,427	211,350	211,350
	2015	-	1,923	-	388,954	388,954	390,877	390,877
Wallmansthall	1995	6,000	-	-	-	-	-	6,000
	2015	9,642	-	-	-	-	-	9,642
Warmbad/	1995	46,369	61,995	-	-	-	61,995	108,364
Nylstroom	2015	58,140	75,646	-	-	-	75,646	133,786
Total	1995	118,976	66,849	-	340,523	340,523	407,372	526,348
(Temba)	2015	192,252	82,467	-	608,236	608,236	690,703	882,955
Moretele North	1995	-	-	15,830	-	15,830	15,830	15,830
	2015	-	-	15,830	-	15,830	15,830	15,830
Klipvoor West	1995	-	1,010	8,687	-	8,687	9,697	9,697
	2015	-	1,010	8,687	-	8,687	9,697	9,697
Klipvoor East	1995	-	2,272	26,517	-	26,517	28,789	28,789
	2015	-	2,272	26,517	-	26,517	28,789	28,789
Total	1995	-	3,282	51,034	-	51,034	54,316	54,316
(Klipvoor)	2015	-	3,282	51,034	-	51,034	54,316	54,316
Brits	1995	97,698	-	-	45,164	45,164	45,164	142,862
	2015	178,525	-	-	46,402	46,402	46,402	224,927
Hartbeespoort	1995	7,450	-	-	-	-	-	7,450
	2015	11,972	-	-	-	-	-	11,972
Total	1995	105,148	-	-	45,164	45,164	45,164	150,312
(Brits)	2015	190,497	-	-	46,402	46,402	46,402	236,899
Rand Water	1995	650,451	-	-	286,869	286,869	286,869	937,320
(Total)	2015	1,589,260	-	-	479,328	479,328	479,328	2,068,588
Grand Total	1995	874,575	70,131	51,034	672,556	723,590	793,721	1,668,296
(Central Zone)	2015	1,972,009	85,749	51,034	1,133,966	1,185,000	1,270,749	3,242,758

Appendix 1 Population by Source of Supply (cont'd)

(3) Eastern Supply Zone

Block	Year	Source of Supply						G. Total
	1995	Surface W	Groundwater/Others					
	2015	Surface Water	Ground Water	Surface Water			Total	
				Acceleral.	Ordinary	S-total		
Bloedfontein	1995	70,487	-	80,023	8,610	88,633	88,633	159,120
	2015	71,158	-	80,023	8,610	88,633	88,633	159,791
Kameelriver	1995	41,381	-	-	-	-	-	41,381
	2015	47,941	-	-	-	-	-	47,941
Mapoch	1995	16,254	-	-	-	-	-	16,254
	2015	23,223	-	-	-	-	-	23,223
Walkraal	1995	290,655	-	-	11,717	11,717	11,717	302,372
	2015	387,044	-	-	13,277	13,277	13,277	400,321
Total	1995	418,777	-	80,023	20,327	100,350	100,350	519,127
(Waltervreden)	2015	529,366	-	80,023	21,887	101,910	101,910	631,276
Bronkhorstspruit	1995	200,099	962	-	809	809	1,771	201,870
	2015	293,235	1,374	-	968	968	2,342	295,577
Cullinan	1995	18,469	24,288	-	7,015	7,015	31,303	49,772
	2015	35,220	29,675	-	15,371	15,371	45,046	80,266
Total	1995	218,568	25,250	-	7,824	7,824	33,074	251,642
(Bronkhorstspruit)	2015	328,455	31,049	-	16,339	16,339	47,388	375,843
Grand Total	1995	637,345	25,250	80,023	28,151	108,174	133,424	770,769
(Eastern S. Zone)	2015	857,821	31,049	80,023	38,226	118,249	149,298	1,007,119

APPENDIX 2 SUMMARISED INFORMATION ON PROPOSED PROJECT BY SUPPLY AREA

Appendix 2 Summarised Information on Proposed Project by Supply Area

(1) Western Zone

Particulars		Unit	Name of Supply Area				
1. Name of Supply Area		-	Vaalkop N.	Vaalkop S.	Barnardsvlei	Koster	Total
2. Population Served							
2.1 1995		nos.	82,448	91,006	239,042	15,405	427,901
2.2 2015		- " -	208,367	305,249	406,833	21,468	941,917
2.3 Increment		- " -	125,919	214,243	167,791	6,063	514,016
3. Primary Water Supply							
3.1 1995	Domestic	MCM/yr	3.280	6.055	10.593	0.850	20.778
	Mine	- " -	14.887	2.896	16.619	-	34.402
	Others	- " -	7.629	0.981	2.604	0.100	11.314
	Total	- " -	25.796	9.932	29.816	0.950	66.494
3.2 2015	Domestic	- " -	7.709	21.108	18.889	1.183	48.889
	Mine	- " -	22.037	2.896	18.838	-	43.771
	Others	- " -	10.030	2.722	4.432	0.090	17.274
	Total	- " -	39.776	26.726	42.159	1.273	109.934
3.3 Increment	Domestic	- " -	4.429	15.053	8.296	0.333	28.111
	Mine	- " -	7.150	-	2.219	-	9.369
	Others	- " -	2.401	1.741	1.828	(0.010)	5.960
	Total	- " -	13.980	16.794	12.343	0.323	43.440
4. Capital Cost							
4.1 Bulk	Direct C.	R'000	232,429	163,192	6,071	1,518	403,210
	Indirect C.	- " -	133,228	93,542	3,480	870	231,120
	S-total	- " -	365,657	256,734	9,551	2,388	634,330
4.2 Retail	Direct C.	- " -	99,858	97,228	27,268	4,156	228,510
	Indirect C.	- " -	57,239	55,731	15,630	2,382	130,982
	S-total	- " -	157,097	152,959	42,898	6,538	359,492
4.3 Total		- " -	522,754	409,693	52,449	8,926	993,822
5. Cost per person							
5.1 Bulk		R/perso	2,904	1,198	57	394	1,234
5.2 Retail		- " -	1,248	714	256	1,078	699
5.3 Total		- " -	4,152	1,912	313	1,472	1,933
6. Cost per Kl							
6.1 Bulk		R/kl	26.2	15.3	0.8	7.4	14.6
6.2 Retail		- " -	11.2	9.1	3.5	20.2	8.3
6.3 Total		- " -	37.4	24.4	4.2	27.6	22.9

Appendix 2 Summarised Information on Proposed Project by Supply Area (cont'd)

(2) Central Zone

Particulars		Unit	Name of Supply Area				
1. Name of Supply Area		-	Brits	Klipvoor	Temba	Rand W.	Total
2. Population Served							
2.1 1995		nos.	105,418	-	118,976	650,452	874,846
2.2 2015		- " -	236,899	51,034	800,488	2,068,588	3,157,009
2.3 Increment		- " -	131,481	51,034	681,512	1,418,136	2,282,163
3. Primary Water Supply							
3.1 1995	Domestic	MCM/yr	10.722	-	10.969	29.188	50.879
	Mine	- " -	-	-	-	-	-
	Others	- " -	2.013	-	1.661	9.920	13.594
	Total	- " -	12.735	-	12.630	39.108	64.473
3.2 2015	Domestic	- " -	21.364	0.900	35.516	81.479	139.259
	Mine	- " -	-	-	-	-	-
	Others	- " -	4.566	-	1.961	17.280	23.807
	Total	- " -	25.930	0.900	37.477	98.759	163.066
3.3 Increment	Domestic	- " -	10.642	0.900	24.547	52.291	88.380
	Mine	- " -	-	-	-	-	-
	Others	- " -	2.553	-	0.300	7.360	10.213
	Total	- " -	13.195	0.900	24.847	59.651	98.593
4. Capital Cost							
4.1 Bulk	Direct C.	R'000	41,613	33,960	73,578	75,700	224,851
	Indirect C.	- " -	23,853	19,466	42,175	43,392	128,886
	S-total	- " -	65,466	53,426	115,753	119,092	353,737
4.2 Retail	Direct C.	- " -	39,089	22,655	76,596	224,420	362,760
	Indirect C.	- " -	22,405	12,985	43,905	128,638	207,933
	S-total	- " -	61,494	35,640	120,501	353,058	570,693
4.3 Total		- " -	126,960	89,066	236,254	472,150	924,430
5. Cost per person							
5.1 Bulk		R/person	498	1,047	170	84	155
5.2 Retail		- " -	468	698	177	249	250
5.3 Total		- " -	966	1,745	347	333	405
6. Cost per Kl							
6.1 Bulk		R/kl	5.0	59.4	4.7	2.0	3.6
6.2 Retail		- " -	4.7	39.6	4.8	5.9	5.8
6.3 Total		- " -	9.6	99.0	9.5	7.9	9.4

Appendix 2 Summarised Information on Proposed Project by Suuply Area (cont'd)

(3) Eastern Zone

Particulars		Unit	Name of Supply Area		
1. Name of Supply Area		-	Waltervreden	Bronkhorstspruit	Total
2. Population Served					
2.1 1995		nos.	418,777	218,568	637,345
2.2 2015		- " -	631,276	344,794	976,070
2.3 Increment		- " -	212,499	126,226	338,725
3. Primary Water Supply					
3.1 1995	Domestic	MCM/yr	8.488	7.746	16.234
	Mine	- " -	-	1.110	1.110
	Others	- " -	-	4.201	4.201
	Total	- " -	8.488	13.057	21.545
3.2 2015	Domestic	- " -	19.007	12.053	31.060
	Mine	- " -	-	1.110	1.110
	Others	- " -	-	4.664	4.664
	Total	- " -	19.007	17.827	36.834
3.3 Increment	Domestic	- " -	10.519	4.307	14.826
	Mine	- " -	-	-	-
	Others	- " -	-	0.463	0.463
	Total	- " -	10.519	4.770	15.289
4. Capital Cost					
4.1 Bulk	Direct C.	R'000	74,655	19,700	94,355
	Indirect C.	- " -	42,791	11,292	54,083
	S-total	- " -	117,446	30,992	148,438
4.2 Retail	Direct C.	- " -	228,804	80,462	309,266
	Indirect C.	- " -	131,150	46,121	177,271
	S-total	- " -	359,954	126,583	486,537
4.3 Total		- " -	477,400	157,575	634,975
5. Cost per person					
5.1 Bulk		R/person	553	246	438
5.2 Retail		- " -	1,694	1,003	1,436
5.3 Total		- " -	2,247	1,249	1,874
6. Cost per Kl					
6.1 Bulk		R/kl	11.2	6.5	9.7
6.2 Retail		- " -	34.2	26.5	31.8
6.3 Total		- " -	45.4	33.0	41.5

APPENDIX 3 PRELIMINARY TARIFF CALCULATION (CASE STUDY)

Appendix 3 Preliminary Tariff Calculation (Case Study)

(1) Calculated Tariff (Unit: R/kl)

		Bulk Supply			Retail Supply			Bulk + Retail		
		Case 1	Case 2	Case 3	Case 1	Case 2	Case 3	Case 1	Case 2	Case 3
Vaalkop North	W. Tariff	6.00	4.69	3.52	1.89	1.49	1.14	7.89	6.18	4.66
	Loan	4.64	3.33	2.16	1.40	1.00	0.65	6.04	4.33	2.81
	Others	1.36	1.36	1.36	0.49	0.49	0.49	1.85	1.85	1.85
Vaalkop South	W. Tariff	3.53	2.82	2.19	1.62	1.27	0.96	5.15	4.09	3.15
	Loan	2.51	1.80	1.17	1.23	0.88	0.57	3.74	2.68	1.74
	Others	1.02	1.02	1.02	0.39	0.39	0.39	1.41	1.41	1.41
Barnadsvlei	W. Tariff	0.68	0.65	0.62	0.29	0.25	0.22			
	Loan	0.13	0.10	0.07	0.15	0.11	0.08	0.28	0.21	0.15
	Others	0.55	0.55	0.55	0.14	0.14	0.14	0.69	0.69	0.69
Koster	W. Tariff	1.66	1.41	1.18	3.97	3.09	2.32	5.63	4.50	3.50
	Loan	0.90	0.65	0.42	3.10	2.22	1.45	4.00	2.87	1.87
	Others	0.76	0.76	0.76	0.87	0.87	0.87	1.63	1.63	1.63
Brits	W. Tariff	1.53	1.29	1.08	0.82	0.65	0.49			
	Loan	0.84	0.60	0.39	0.61	0.44	0.28	1.45	1.04	0.67
	Others	0.69	0.69	0.69	0.21	0.21	0.21	0.90	0.90	0.90
Klipvoor	W. Tariff	6.91	5.64	4.51	4.30	3.57	2.92	11.21	9.21	7.43
	Loan	4.49	3.22	2.09	2.58	1.85	1.20	7.07	5.07	3.29
	Others	2.42	2.42	2.42	1.72	1.72	1.72	4.14	4.14	4.14
Temba	W. Tariff	1.27	1.10	0.95	0.42	0.36	0.31			
	Loan	0.59	0.42	0.27	0.21	0.15	0.10	0.80	0.57	0.37
	Others	0.68	0.68	0.68	0.21	0.21	0.21	0.89	0.89	0.89
Rand	W. Tariff	0.92	0.83	0.75	0.74	0.61	0.48			
	Loan	0.33	0.24	0.16	0.48	0.35	0.22	0.81	0.59	0.38
	Others	0.59	0.59	0.59	0.26	0.26	0.26	0.85	0.85	0.85
Weltervreden	W. Tariff	2.25	1.86	1.52	6.69	5.22	3.91	8.94	7.08	5.43
	Loan	1.37	0.98	0.64	5.21	3.74	2.43	6.58	4.72	3.07
	Others	0.88	0.88	0.88	1.48	1.48	1.48	2.36	2.36	2.36
Bronkhorstspruit	W. Tariff	1.69	1.42	1.18	5.06	3.95	2.97	6.75	5.37	4.15
	Loan	0.95	0.68	0.44	3.91	2.80	1.82	4.86	3.48	2.26
	Others	0.74	0.74	0.74	1.15	1.15	1.15	1.89	1.89	1.89

Note: Loan interest - Case 1:18%, Case 2:12%, Case 3: 6%

Appendix 3 Preliminary Tariff Calculation (Case Study) (cont'd)

(2) Tariff Calculation for Bulk Supply (Unit: R/Kl)

	Vaalkop North	Vaalkop South	Barnads-vlei	Koster	Brits	Klipvoor	Temba	Rand	Weltervre-den	Bronkhor-stspruit
1. Annual Demand (MCM)	13.980	16.794	12.353	0.323	13.195	0.900	24.847	59.651	10.519	4.770
2. Capital Cost (R mil.)	365.657	256.734	9.551	2.388	65.466	53.426	115.753	119.092	117.446	30.992
2.1 RDP portion	18.899	30.771	0.967	0.834	6.276	31.787	37.489	14.031	40.933	6.640
2.2 Other portion	346.758	225.963	8.584	1.554	59.190	21.639	78.264	105.061	76.513	24.352
3. Direct Cost (R mil.)	232.429	163.192	6.071	1.518	41.613	33.960	73.578	75.700	74.655	19.700
4. Production Cost										
4.1 Water Purchase						0.15				
4.2 Operating Cost										
- Electricity						0.11				
- Chemical						0.04				
- Salaries						0.14				
- Maintenance						0.03				
- Transport						0.02				
- Total						0.34				
4.3 Overhead Charges						0.04				
4.4 Depreciation	0.83	0.49	0.02	0.23	0.16	1.89	0.15	0.06	0.35	0.21
4.5 Loan Repayment										
4.5.1 Case 1	4.64	2.52	0.13	0.90	0.84	4.50	0.59	0.33	1.36	0.95
4.5.2 Case 2	3.32	1.80	0.09	0.64	0.60	3.22	0.42	0.24	0.97	0.68
4.5.3 Case 3	2.16	1.17	0.06	0.42	0.39	2.09	0.27	0.15	0.63	0.44
5. Tariff										
5.1 Case 1	6.00	3.53	0.68	1.66	1.53	6.91	1.27	0.92	2.25	1.69
5.2 Case 2	4.69	2.82	0.65	1.41	1.29	5.64	1.10	0.83	1.86	1.42
5.3 Case 3	3.52	2.19	0.62	1.18	1.08	4.51	0.95	0.75	1.52	1.18

Note: Production cost (4.1 - 4.3) is calculated from MW's historical experience in years of 1995 and 1996
Depreciation (4.4) is calculated at 5% of direct cost
Loan Repayment (4.5): Interest rate - 18%, 12% and 6% for Case 1, 2 and 3, respectively. Repayment period - 20 years

Appendix 3 Preliminary Tariff Calculation (Case Study) (cont'd)

(3) Tariff Calculation for Retail Supply (Unit: R/Kl)

	Vaalkop North	Vaalkop South	Barnads-vlei	Koster	Brits	Klipvoor	Temba	Rand	Weltervre-den	Bronkhor-stspruit
1. Annual Demand (MCM)	13.980	16.794	12.353	0.323	13.195	0.900	24.847	59.651	10.519	4.770
2. Capital Cost (R mil.)	157.097	152.959	42.898	6.538	61.494	35.640	120.501	353.057	359.954	126.583
2.1 RDP portion	51.889	42.967	33.519	1.194	17.695	23.180	93.039	197.531	66.802	26.877
2.2 Other portion	105.208	109.992	9.379	5.344	43.799	12.460	27.462	155.526	293.152	99.706
3. Direct Cost (R mil.)	99.858	97.228	27.268	4.156	39.089	22.655	76.596	224.420	228.804	80.462
4. Production Cost										
4.1 Water Purchase										
4.2 Operating Cost										
- Electricity	-	-	-	-	-	-	-	-	-	-
- Chemical	-	-	-	-	-	-	-	-	-	-
- Salaries	-	-	-	-	-	-	-	-	-	-
- Maintenance	-	-	-	-	-	-	-	-	-	-
- Transport	-	-	-	-	-	-	-	-	-	-
- Total	0.11	0.09	0.03	0.20	0.05	0.40	0.05	0.06	0.34	0.27
4.3 Overhead Charges	0.02	0.01	0.01	0.03	0.01	0.06	0.01	0.01	0.05	0.04
4.4 Depreciation	0.36	0.29	0.11	0.64	0.15	1.26	0.15	0.19	1.09	0.84
4.5 Loan Repayment										
4.5.1 Case 1	1.41	1.22	0.14	3.09	0.62	2.59	0.21	0.49	5.21	3.91
4.5.2 Case 2	1.01	0.88	0.10	2.22	0.44	1.86	0.15	0.35	3.73	2.80
4.5.3 Case 3	0.65	0.57	0.07	1.44	0.29	1.20	0.10	0.23	2.42	1.82
5. Tariff										
5.1 Case 1	1.89	1.62	0.29	3.97	0.82	4.30	0.42	0.74	6.69	5.06
5.2 Case 2	1.49	1.27	0.25	3.09	0.65	3.57	0.36	0.61	5.22	3.95
5.3 Case 3	1.14	0.96	0.22	2.32	0.49	2.92	0.31	0.48	3.91	2.97

Note: Production cost (4.2) is calculated at nominal 1% of capital cost
Overhead (4.3) is calculated 15% of production cost (4.2)
Depreciation (4.4) is calculated at 5% of direct cost
Loan Repayment (4.5): Interest rate - 18%, 12% and 6% for Case 1, 2 and 3, respectively. Repayment period - 20 years

Appendix 3 Preliminary Tariff Calculation (Case Study) (cont'd)

(4) Unit Cost Caluculation Table for Bulk Supply

Item	unit	1995	1996	Total	Average	Unit Value (R/kl)
1. Water Consumption	MCM	32.744	31.990	64.734	32.367	
2. Production Cost						
2.1 Water Purchases	R'000	4,704	5,002	9,706	4,853	0.15
2.2 Operating Cost						
2.2.1 Purification Cost						
- Electricity	R'000	3,396	3,664	7,060	3,530	0.11
- Chemical	- " -	1,129	1,452	2,581	1,291	0.04
- S-total	- " -	4,525	5,116	9,641	4,821	0.15
2.2.2 Salaries	- " -	3,923	5,244	9,167	4,584	0.14
2.2.3 Maintenande & Transport						
- Maintenance	- " -	827	857	1,684	842	0.03
- Transport	- " -	506	778	1,284	642	0.02
- S-total	- " -	1,333	1,635	2,968	1,484	0.05
2.2.4 Total	- " -	9,781	11,995	21,776	10,888	0.34
3. Overhead Charges	- " -	1,176	1,267	2,443	1,222	0.04

APPENDIX 4 SUMMARY OF CASH FLOW ANALYSIS (I=2.5%)

Appendix 4 Summary of Cash Flow Analysis (I=2.5%)

1. Study Area

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	60.018	*50.413*	*46.891*	*157.322*	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*403.7*	*102.6*	*256.6*	
	Stage 2	*284.9*	*49.8*	*181.1*	
	Stage 3	*259.3*	*36.2*	*164.8*	
	Total	947.9	188.6	602.5	
Retail Supply	Stage 1	*410.5*	*230.1*	*260.8*	
	Stage 2	*274.8*	*173.5*	*174.6*	
	Stage 3	*176.7*	*151.1*	*112.3*	
	Total	862.0	554.7	547.7	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	192.6	243.7	244.4	680.7	
Retail	981.7	949.0	1,088.0	3,018.7	
Total	1,174.3	1,192.6	1,332.4	3,699.4	

Note: Figures in parentheses are negative.

Interest Rate:	2.50 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (i=2.5%) (cont'd)

2. Western Zone Total

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	19.060	12.191	12.189	43.440	
	Bulk Supply		Retail Supply		
Water Tariff	1.20 R/kl		1.30 R/kl		
Prod. Cost:	0.49 R/kl		1.0 % of Capital Cost		
Overhead Cost:	0.04 R/kl		15.0 % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	244.6	23.1	155.4	
	Stage 2	169.2	14.2	107.5	
	Stage 3	169.1	14.2	107.5	
	Total	582.9	51.5	370.4	
Retail Supply	Stage 1	101.8	56.1	64.6	
	Stage 2	64.0	36.7	40.6	
	Stage 3	64.0	36.7	40.6	
	Total	229.8	129.5	145.8	

3. *Result*

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	(179.8)	(149.5)	(147.5)	(476.8)	
Retail	385.0	237.0	240.7	862.6	
Total	205.2	87.4	93.2	385.8	

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (I=2.5%) (cont'd)

2.1 Vaalkop North

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	5.294	*4.343*	*4.343*	*13.980*	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*131.3*	*7.2*	*83.4*	
	Stage 2	*107.7*	*5.9*	*68.5*	
	Stage 3	*107.7*	*5.9*	*68.5*	
	Total	346.7	19.0	220.4	
Retail Supply	Stage 1	*39.8*	*19.6*	*25.3*	
	Stage 2	*32.7*	*16.1*	*20.8*	
	Stage 3	*32.7*	*16.1*	*20.8*	
	Total	105.2	51.8	66.9	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	(181.1)	(151.9)	(151.0)	(484.0)	
Retail	78.3	59.9	61.3	199.4	
Total	(102.9)	(92.0)	(89.8)	(284.6)	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (i=2.5%) (cont'd)

2.2 Vaalkop South

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	8.021	*4.387*	*4.386*	*16.794*	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*107.9*	*14.7*	*68.6*	
	Stage 2	*59.0*	*8.0*	*37.5*	
	Stage 3	*59.0*	*8.0*	*37.5*	
	Total	225.9	30.7.	143.6	
Retail Supply	Stage 1	*52.5*	*20.5*	*33.3*	
	Stage 2	*28.7*	*11.2*	*18.2*	
	Stage 3	*28.7*	*11.2*	*18.2*	
	Total	109.9	42.9	69.7	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	(86.0)	(49.9)	(49.2)	(185.1)	
Retail	140.0	72.4	73.7	286.2	
Total	54.0	22.5	24.5	101.0	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (i=2.5%) (cont'd)

2.3 Barnardsvlei

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	5.422	*3.461*	*3.460*	*12.343*	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*3.8*	*0.4*	*2.4*	
	Stage 2	*2.4*	*0.3*	*1.5*	
	Stage 3	*2.4*	*0.3*	*1.5*	
	Total	8.6	1.0	5.4	
Retail Supply	Stage 1	*4.1*	*14.7*	*2.6*	
	Stage 2	*2.6*	*9.4*	*1.6*	
	Stage 3	*2.6*	*9.4*	*1.6*	
	Total	9.3	33.5	5.8	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	85.1	52.4	52.8	190.3	
Retail	169.0	104.6	105.7	379.4	
Total	254.1	157.1	158.5	569.6	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (I=2.5%) (cont'd)

2.4 Koster

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	0.323	-	-	*0.323*	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*1.6*	*0.8*	*1.0*	
	Stage 2	-	-	-	
	Stage 3	-	-	-	
	Total	1.6	0.8	1.0	
Retail Supply	Stage 1	*5.3*	*1.2*	*3.4*	
	Stage 2	-	-	-	
	Stage 3	-	-	-	
	Total	5.3	1.2	3.4	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	2.2	-	-	2.2	
Retail	(2.1)	-	-	(2.1)	
Total	0.2	-	-	0.2	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (I=2.5%) (cont'd)

3. Central Zone Total

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	32.680	32.957	32.956	98.593	
	Bulk Supply		Retail Supply		
Water Tariff	1.20 R/kl		1.30 R/kl		
Prod. Cost:	0.49 R/kl		1.0 % of Capital Cost		
Overhead Cost:	0.04 R/kl		15.0 % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	101.7	50.5	64.7	
	Stage 2	81.2	19.5	51.7	
	Stage 3	81.2	19.5	51.7	
	Total	264.1	89.5	168.1	
Retail Supply	Stage 1	86.9	122.3	55.3	
	Stage 2	76.2	104.6	48.5	
	Stage 3	76.2	104.6	48.5	
	Total	239.3	331.5	152.3	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	349.4	377.6	381.3	1,108.3	
Retail	860.2	869.0	879.3	2,608.5	
Total	1,209.6	1,246.6	1,260.6	3,716.8	

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (I=2.5%) (cont'd)

3.1 Brits

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	4.822	*4.187*	*4.186*	13.195	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*21.6*	*2.3*	*13.7*	
	Stage 2	*18.8*	*2.0*	*11.9*	
	Stage 3	*18.8*	*2.0*	*11.9*	
	Total	59.2	6.3	37.5	
Retail Supply	Stage 1	*16.0*	*6.5*	*10.2*	
	Stage 2	*13.9*	*5.6*	*8.8*	
	Stage 3	*13.9*	*5.6*	*8.8*	
	Total	43.8	17.7	27.8	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	37.9	30.4	30.9	99.2	
Retail	122.9	102.7	104.0	329.6	
Total	160.8	133.1	134.9	428.9	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (i=2.5%) (cont'd)

3.2 Klipvoor

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	0.900	-	-	0.900	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*21.6*	*31.8*	*13.8*	
	Stage 2	-	-	-	
	Stage 3	-	-	-	
	Total	21.6	31.8	13.8	
Retail Supply	Stage 1	*12.5*	*23.2*	*8.0*	
	Stage 2	-	-	-	
	Stage 3	-	-	-	
	Total	12.5	23.2	8.0	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	(29.4)	-	-	(29.4)	
Retail	(6.5)	-	-	(6.5)	
Total	(35.9)	-	-	(35.9)	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (i=2.5%) (cont'd)

3.3 Temba

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	7.907	*8.470*	*8.470*	24.847	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*24.9*	*11.9*	*15.8*	
	Stage 2	*26.7*	*12.8*	*17.0*	
	Stage 3	*26.7*	*12.8*	*17.0*	
	Total	78.3	37.5	49.8	
Retail Supply	Stage 1	*8.7*	*29.6*	*5.5*	
	Stage 2	*9.4*	*31.7*	*6.0*	
	Stage 3	*9.4*	*31.7*	*6.0*	
	Total	27.5	93.0	17.5	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	84.0	84.9	85.9	254.8	
Retail	237.5	246.1	248.7	732.3	
Total	321.5	331.0	334.6	987.1	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (I=2.5%) (cont'd)

3.4 Rand Water

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	19.051	*20.300*	*20.300*	59.651	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. *Required Capital Cost*

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*33.6*	*4.5*	*21.4*	
	Stage 2	*35.8*	*4.8*	*22.8*	
	Stage 3	*35.8*	*4.8*	*22.8*	
	Total	105.2	14.1	67.0	
Retail Supply	Stage 1	*49.7*	*63.1*	*31.6*	
	Stage 2	*52.9*	*67.2*	*33.7*	
	Stage 3	*52.9*	*67.2*	*33.7*	
	Total	155.5	197.5	99.0	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	256.9	262.1	264.4	783.4	
Retail	506.3	520.2	526.5	1,553.1	
Total	763.2	782.4	790.9	2,336.4	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (i=2.5%) (cont'd)

4. Eastern Zone Total

1. Basis of Calculation

Water Demand:	Stage 1	Stage 2	Stage 3	Total	Remarks
(mcm/year)	8.278	5.265	1.746	15.289	
	Bulk Supply		Retail Supply		
Water Tariff	1.20 R/kl		1.30 R/kl		
Prod. Cost:	0.49 R/kl		1.0 % of Capital Cost		
Overhead Cost:	0.04 R/kl		15.0 % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	57.4	29.0	36.5	
	Stage 2	34.5	16.1	21.9	
	Stage 3	8.9	2.4	5.6	
	Total	100.8	47.5	64.0	
Retail Supply	Stage 1	221.8	51.7	140.9	
	Stage 2	134.6	32.2	85.5	
	Stage 3	36.5	9.8	23.2	
	Total	392.9	93.7	249.6	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	23.0	15.6	10.7	49.3	
Retail	(263.5)	(157.0)	(31.9)	(452.5)	
Total	(240.5)	(141.4)	(21.2)	(403.2)	

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (I=2.5%) (cont'd)

4.1 Weltervreden

1. Basis of Calculation

Water Demand: (mcm/year)	Stage 1	Stage 2	Stage 3	Total	Remarks
	7.001	*3.518*	-	*10.519*	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*50.9*	*27.2*	*32.3*	
	Stage 2	*25.6*	*13.7*	*16.3*	
	Stage 3	-	-	-	
	Total	76.5	40.9	48.6	
Retail Supply	Stage 1	*195.1*	*44.5*	*124.0*	
	Stage 2	*98.0*	*22.3*	*62.3*	
	Stage 3	-	-	-	
	Total	293.1	66.8	186.3	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	14.6	5.1	-	19.7	
Retail	(241.0)	(124.4)	-	(365.4)	
Total	(226.4)	(119.3)	-	(345.7)	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %

Appendix 4 Summary of Cash Flow Analysis (i=2.5%) (cont'd)

4.2 Bronkhorstspruit

1. Basis of Calculation

Water Demand:	Stage 1	Stage 2	Stage 3	Total	Remarks
(mcm/year)	*1.277*	*1.747*	*1.746*	*4.770*	
	Bulk Supply		Retail Supply		
Water Tariff	*1.20* R/kl		*1.30* R/kl		
Prod. Cost:	*0.49* R/kl		*1.0* % of Capital Cost		
Overhead Cost:	*0.04* R/kl		*15.0* % of Production Cost		

2. Required Capital Cost

(Unit: R Million)

		Loan Portion	Grant Portion	Direct Cost	Remarks
Bulk Supply	Stage 1	*6.5*	*1.8*	*4.2*	
	Stage 2	*8.9*	*2.4*	*5.6*	
	Stage 3	*8.9*	*2.4*	*5.6*	
	Total	24.3	6.6	15.4	
Retail Supply	Stage 1	*26.7*	*7.2*	*16.9*	
	Stage 2	*36.5*	*9.8*	*23.2*	
	Stage 3	*36.5*	*9.8*	*23.2*	
	Total	99.7	26.8	63.3	

3. Result

Overall Cash Balance

(Unit: R. Million)

	Stage 1	Stage 2	Stage 3	Total	Remarks
Bulk	8.4	10.5	10.7	29.6	
Retail	(22.5)	(32.4)	(31.9)	(86.9)	
Total	(14.1)	(21.9)	(21.2)	(57.3)	

Note: Figures in parentheses are negative.

Interest Rate:	2.5 %/year	Recovey R:	100 %