JAPAN INTERNATIONAL COOPERATION AGENCY(JICA)

DEPARTMENT OF WATER AFFAIRS AND FORESTRY
REPUBLIC OF SOUTH AFRICA

# THE STUDY ON THE EXPANSION OF CAPACITY OF MAGALIES WATER IN THE REPUBLIC OF SOUTH AFRICA (PHASE 2 AND 3)

## FINAL REPORT

### VOLUME 5 : BOUNDARY ISSUES

JANUARY 1998



SANYU CONSULTANTS INC.
NIHON SUIDO CONSULTANTS CO.,LTD.



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# CURRENCY EQUIVALENTS

(As of September, 1997)

Currency Unit = South African Rand ( R )

US$1.00 = 4.69 R

US$1.00 = 122 Yen (Japanese Yen)

VOLUME 1 : EXECUTIVE SUMMARY

VOLUME 2 : FEASIBILITY STUDY FOR NORTH MANKWE AREA

VOLUME 3 : FEASIBILITY STUDY FOR KLIPVOOR AREA

VOLUME 4 : FEASIBILITY STUDY FOR MORETELE2 AREA

**VOLUME 5 : BOUNDARY ISSUES**

VOLUME 6 : PILOT PROJECTS

VOLUME 7 : DATA BOOK

# PREFACE

In response to request from the Government of the Republic of South Africa, the Government of Japan decided to conduct the Study on the Expansion of the Capacity of Magalies Water in the Republic of South Africa and entrusted the study to the Japan International Cooperation Agency ( JICA ).

JICA sent to South Africa a study team headed by Mr. Satoshi Kadowaki, SANYU CONSULTANTS INC., and composed of staff members of SANYU CONSULTANTS INC. and NIHON SUIDO CONSULTANTS CO. LTD., two times between February 1997 and November 1997.

The team held discussions with the officials concerned of the Government of South Africa, and conducted field surveys at the study area. After the team returned to Japan, further studies were made and the present report was prepared.

I hope that this report will contribute to the promotion of the project and to the enhancement of friendly relation between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of South Africa for their close cooperation extended to the Team.

January 1998

Kimio Fujita
President
Japan International Cooperation Agency

January 10, 1998

Mr. Kimio Fujita
President
Japan International Cooperation Agency
Tokyo, Japan

# Letter of Transmittal

Dear Sir,

We are pleased to submit the final report of the Phases 2 and 3 Study on the Expansion of Capacity of Magalies Water in Republic of South Africa. This report incorporates the views and suggestions of the authorities concerned of the Government of Japan and your Agency. It is also included the comments made by the Department of Water Affairs and Forestry, Magalies Water and other stakeholders in the Republic of South Africa during the meetings organized by Project Execution Group ( PEG ) and Project Steering Committee ( PSC ) in both Rustenburg and Pretoria where the Draft Final Report was discussed.

According to the South Africa's new water supply and sanitation policy, the specific challenges are to consolidate appropriate water supply infrastructures and to transform and empower institutions in the sector to deliver service so that all communities in the country can have access to safe water and sanitation in the near future. JICA has prepared Master Plan Reports for the area following these policies and strategy guidelines in 1996.

The main objectives of the Phase2 and Phase3 were to focus on the realisation of recomendations made in the Master Plan until the target year of 2015. Accordingly Phase2 dealt with the Feasibility Studies for the selected priority projects and Phase 3 implemented the pirot projects which were selected in the Master Plan.

This report contains the findings, conclusions and recommendations as outcome of the Phases 2 and 3 in which Feasibility Studies for three regional water supply projects and implementation of four pilot projects where involved.

The report consists of seven volumes. They are Executive Summary (1), Feasibility Reports (3), Boundary Issues (1), Pilot Projects (1) and Data Book (1).

We wish to take this opportunity to express our sincere gratitude to your Agency, the Ministry of Foreign Affairs, and the Ministry of Welfare of the Government of Japan for their valuable advice and suggestions. We would also like to express our deep appreciation to the relevant officers of the Department of Water Affairs and Forestry, Magalies Water and other related agencies of the Government of the Repubic of South Africa for their cooperation and the assistance extended to us during our study.

Very truly yours,

Satoshi KADOWAKI
Team Leader, Phases 2 and 3
Study on the Expansion of
Capacity of Magalies Water
in the Republic of South Africa

# JICA STUDY ON THE EXPANSION OF CAPACITY OF MAGALIES WATER LOCATION MAP

## LOCATION MAP OF BOUNDARY ISSUES STUDY

LEGEND :

- RIVERS
- DAMS
- TOWNS & VILLAGES
- WATER TREATMENT WORKS
- SEWAGE TREATMENT WORKS
- JICA STUDY AREA
- FEASIBILITY STUDY AREAS
- BOUNDARY ISSUES STUDY AREAS

SUPPLY ZONES :

- WESTERN ZONE
- CENTRAL ZONE
- EASTERN ZONE
- SUPPLY BLOCK BOUNDARIES

KEY MAP

NORTHERN PROVINCE
MPUMALANGA
NORTH WEST
GAUTENG
FREE STATE
KWA-ZULU NATAL
NORTHERN PROVINCE
EASTERN CAPE
WESTERN CAPE
Cape Town

NORTH MANKWE AREA

KLIPVOOR AREA

MORETELE 2 AREA

RAND WATER AREA

PRETORIA

JOHANNESBURG

RUSTENBURG

EKANGALA

BRONKHORSTSPRUIT

THABAZIMBI

N

0 25KM

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NORTHERN CAPE
EASTERN CAPE
WESTERN CAPE (Cape Town)

NORTH MANKWE AREA

KLIPVOOR AREA

MORETELE 2 AREA

BARNARDSVLEI AREA

RAND WATER AREA

PRETORIA

JOHANNESBURG

THABAZIMBI
NYLSTROOM
WARM BATHS
RUSTENBURG
SOSHANGUVE
EKANGALA
BRONKHORSTSPRUIT
PROPOSED KLIPVOOR WTW
KUDUBE

N

0 25KM

# EXECUTIVE SUMMARY

## 1. Background of the Issues

In order to rationalise and extend the activities of various water boards based on policy contained in the White Paper on Water Supply and Sanitation, the Minister of Water Affairs and Forestry approved and gazetted the proclamations of former Bophuthatswana territories and additional former RSA areas in favour of Magalies Water on 12 April 1996, and the proclamations of the Ga Rankuwa and Mabopane region in favour of Rand Water on 21 June 1996.

Trilateral discussions and negotiations regarding the boundary issues between MW and RW were held in which DWAF and the respective boards participated. These discussions were based on the newly proclaimed areas specifically the Rand Water (Hartbeeshoek Reservoir) Supply Area and the Barnardsvlei Supply Area. This process is still on going.

During the final presentation of the Master Plan Report in November 1996, DWAF requested the Study Team to provide a suitable water resources allocation plan for the Rand Water and Barnardsvlei supply areas.

The terms of reference of this study were to provide the technical and financial information required by stakeholders to make long term decisions regarding the boundary between Rand Water and Magalies Water. Specific information on the cost of Rand Water supply options (marginal cost level) compared with the cost of alternative local supply options was also requested in the TOR.

## 2. Technical Options

In order to compare the marginal cost of the water supplied by Rand Water, the following options were considered for the two subject areas.

(1) Rand Water ( Hartebeeshoek ) Supply Area :

- Supply from Temba to Soshanguve with 47 Mld capacity
- Supply from Brits to Ga Rankuwa with 44 Mld capacity

(2) Barnardsvlei Supply Area :

- Supply from Brits to Barnardsvlei East with 45 Mld capacity
- Supply from Vaalkop to Rustenburg with 40 Mld capacity

## 3. Economic Evaluation

The results of an economic comparison to derive the cost per kilolitre for the above options can be summarised as follows. The costs comprised capital and replacement costs, energy and purification costs, administration and raw water cost.

| Supply Area and Option | | | Unit cost (c/kl) |
|---|---|---|---|
| | Production Cost | Raw W.Cost | Total |
| (1) Rand Water S.A. | | | |
| - Temba WTW | 115.00 | 14.70 | 129.70 |
| - Brits WTW | 144.00 | 2.00 | 146.00 |
| (2) Barnardsvlei S.A. | | | |
| - Brits WTW | 142.00 | 2.00 | 144.00 |
| - Vaalkop WTW | 167.00 | 23.00 | 190.00 |

The least cost options are therefore 129.70 c/kl for the Rand Water Supply Area and 144.00 c/kl for the Barnardsvlei Supply Area respectively.

These figures were compared to the Rand Water marginal costs. The projected raw water costs for Rand Water were based on proposed increases in the raw water charges levied by DWAF in 1998, 1999 and 2000 and are as follows.

| Supply Area | Cost Item | | Unit Cost (c/kl) | |
|---|---|---|---|---|
| | | 1998 | 1999 | 2000 |
| Rand Water SA | RW marginal cost | 129.2 | 155.1 | 165.2 |
| | Temba WTW cost | 129.7 | 129.7 | 129.7 |
| | Difference ( Gap ) | (-) 0.5 | 25.4 | 35.5 |
| Barnardsvlei SA | RW marginal cost | 139.2 | 165.1 | 175.2 |
| | Brits WTW cost | 144.0 | 144.0 | 144.0 |
| | Difference ( Gap ) | (-) 4.8 | 21.1 | 31.2 |

The results of comparative study indicate that the Rand Water marginal cost will become higher than that of Temba WTW and Brits WTW options for both Rand Water and Barnardsvlei supply areas in near future.

## 4. Conclusions

The Boundary Issues Study has considered technical alternatives to the existing Rand Water supplies to the two areas and the economic implication of these options. The final decision on long term strategy for water supply to these areas must also be based on political and institutional aspects (such as the existing customer base of the boards concerned) which were outside the scope of this study.

The analysis indicated that there is a need to formulate appropriate public policy towards water supply sources in the two zones in near future. There are economic and political incentives for DWAF policy makers to consider the implications of these alternatives for the future. Future public policy towards water supply in these two areas for the 21st century should be designed around those incentives.

In order to accurately reflect the true cost of water it is important that there is a consistent strategy and policy regarding raw water tariffs. At present there do appear to be some anomolies (such as the very low cost of raw water purchased by Brits TLC) that could be addressed.

It is important that a clear long term policy is developed by DWAF to enable long term coherent planning to take place and to provide a sufficient level of confidence to allow large scale infrastructure to be developed where necessary. Once decided such policy will impose binding constraints of bulk supply stakeholders in the two areas of supply and significantly affect their business development. The choice of alternatives in the long-term must be in the overall economic interest of the country as a whole.

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## ABBREVIATIONS AND TERMINOLOGY

**The following abbreviations are used in this report:**

| | |
|---|---|
| **AADD** | Annual Average Daily Demand |
| **ANC** | African National Conggress |
| **APF** | Area Planning Forum |
| **AWSC** | Area Water Service Cooperative |
| **BOTT** | Build, Operate, Train, and Transfer |
| **BWSC** | Block Water Service Cooperative |
| **CAPLEX** | Capacity Expenditure |
| **CEO** | Chief Executive Officer |
| **CIP** | Capital Investment Plan |
| **CRDC** | Central Reconstructions Development Committee |
| **CSS** | Central Statistics Service |
| **CWSS** | Community Water Supply and Sanitation |
| **DAF** | Dissolved Air Flotation |
| **DANDIA** | Danish International Development Agency |
| **DBSA** | Development Bank of South Africa |
| **DC** | District Council |
| **DCC** | Direct Construction Cost |
| **DCF** | Discounted Cash Flow |
| **DFA** | Development Facilitation Act |
| **DFID** | Department for International Development (UK)(formerly British ODA) |
| **DWAF** | Department of Water Affairs and Forestry |
| **EDC** | Eastern District Council |
| **EIRR** | Economic Internal Rate of Return |
| **ESA** | Expanded Supply Area of Magalies Water Board as gazetted in April 1996 |
| **ESKOM** | Electricity Supply Commission |
| **EVN** | EVN Consulting Engineers (Pty) Ltd |

| | |
|---|---|
| **FIRR** | Financial Internal Rate of Return |
| **FS** | Feasibility Study |
| **FVDF** | Five Villages Development Forum |
| **GIS** | Geological Information System |
| **HW** | Highveld Water Board |
| **HWSA** | Highveld Water and Sanitation Association |
| **IFR** | Instream Flow Requirements |
| **IRR** | Internal Rate of Return |
| **IMT** | Interim Management Team |
| **ISD** | Institutional and Social Development Department |
| **JV** | Joint Venture |
| **JICA** | Japan International Cooperation Agency (the official agency responsible for the implementation of the technical cooperation programmes of the government of Japan) |
| **LDO** | Labour Desk Officer |
| **LPSC** | Local Project Steering Committee |
| **LRDC** | Local Reconstruction and Development Committee (Local RDP Committee) |
| **LWC** | Local Water Committee |
| **M&E** | Monitoring and Evaluation |
| **MANCO** | Management Comittee |
| **MEC** | Member of Executive Committee |
| **MP** | Management Plan |
| **MW** | Magalies Water Board |
| **NGOs** | Non-Governmental Organizations |
| **NP** | Northern Province |
| **NPV** | Nett present Value |
| **NWP** | North West Province |
| **NWWA** | North West Water Supply Authority |

| | |
|---|---|
| **O&M** | Operation and Maintenance |
| **ODA** | Overseas Development Assistance |
| **ODO** | Organisation Development Officer |
| **OECF** | Overseas Economic Cooperation Fund of Japan |
| | |
| **P&G** | Provisional and General |
| **PEF** | Project Execution Forum |
| **PEG** | Project Execution Group |
| **PLP** | Presidential Lead Project |
| **PMC** | Project Management Committee |
| **PSC** | Project Steering Committee |
| **PWV** | Pretoria Witwatersrand Vereeniging triangle(geographical area) |
| | |
| **RDC** | Rustenburg District Council |
| **RDP** | Reconstruction and Development Program |
| **RF** | Representative Forum |
| **ROIP** | Relevant Environmental Impact Prognosis |
| **RPM** | Rustenburg Platinum Mine |
| **RR** | Regional Reservoir |
| **RSA** | Republic of South Africa |
| **RSC** | Regional Service Council (regional bodies established to facilitate and coordinate service provision across local boundaries - now replaced by Regional and District Councils) |
| **RW** | Rand Water |
| | |
| **S/W** | Scope of Works |
| **SAMWU** | South African Municipal Workers Union |
| **SANCO** | South African National Civic Organization |
| **SPDD** | Summer Peak Daily Demand |
| **SR** | Service Reservoir |
| **STW** | Sewage Treatment Work |
| **SWET** | Sanitation and Water Education Training Programme |

| | |
|---|---|
| **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 |
| **TT** | Task Team |
| **VAT** | Value-added Tax |
| **VIP** | Ventilated Improved Pit Latrine |
| **WATSAN** | Water and Sanitation Management Committee |
| **WP** | White Paper |
| **WRYM** | Water Resources Yield Model |
| **WSA** | Water Service Authority |
| **WSP** | Water Service Provider |
| **WTP** | Willingness to Pay |
| **WTW** | Water Treatment Works |

## UNITS

| | |
|---|---|
| **ha** | Hectare |
| **kg/c/year** | Kilograms per capita per year |
| **kl** | Kilolitre |
| **kld** | Kilolitres per day |
| **km** | Kilometre |
| **l/c/yr** | Litres per capita per year |
| **lcd** | Litres per capita per day |
| **$m^3$/c/yr** | Cubic metres per capita per year |
| **mcm** | Million cubic metres |
| **mcm/a** | Million cubic metres per annum |
| **mg/l** | Milligrams per litres |
| **Mld** | Megalitre per day |
| **R** | Rand |

# CHAPTER 1

# INTRODUCTION

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# CHAPTER 1 INTRODUCTION

## 1.1 Background of the Study

### 1.1.1 Overall Framework of the Water Sector

(1) Historical Background

Historically the water sector in South Africa has been administered within the framework of The Water Act (Act 54 of 1956) which established centralised control over public water resources in South Africa and made some attempt to accommodate the expanding urban and industrial economy. The Act however still primarily served the interests of the agricultural sector. Homelands had their own water legislation that covered the areas under their jurisdiction.

(2) Transition

Since the transformation of South Africa with the election of a democratic government and the re-incorporation of the former homelands, a process of transition has commenced in the water sector. The first step in this process was the passing of the Water Laws Rationalisation and Amendment Act (Act 32 of 1994). While a major purpose of the act was to rationalise laws in force in the former homelands it also provided the Minister of Water Affairs and Forestry with the authority to provide water supply and sanitation services. This changed the emphasis in the public sector to the provision of basic services to the majority of the population who had not had these services in the past.

(3) Future Vision

The democratically elected government in South Africa has as its vision the total transformation of many aspects of society. The supply of basic services to those people who have been deprived of these services is central to this vision. To achieve this a number of strategies and programmes have been developed. Those relevant to the water sector are:

(a) The Reconstruction and Development Programme (RDP).

(b) White Paper on Water Supply and Sanitation Policy

(c) Water Law Review Programme

(d) The Water Services Act, 1997

Each of these four key initiatives is discussed in further detail in the paragraphs that follow.

### 1.1.2 Reconstruction and Development Programme (RDP)

(1) Background

Transformation is a key objective of the democratic Government of South Africa. While there are many aspects of this, the *Reconstruction and Development Program* (RDP) which is aimed at social and economic development is the central program. It is an integrated and comprehensive initiative, which is based on an extensive process of consultation and joint policy formulation.

A *National Growth and Development Strategy* has been formulated which sets out the objectives, priorities and strategies required to accelerate growth/development so as to reduce poverty and increase employment. This strategy provides a guiding framework for the RDP and facilitates making strategic choices and trade-offs during implementation of the RDP.

(2) Principles of the RDP

The RDP has as its foundation six principles, which apply to the overall programme and to RDP projects.

(a) It must be an integrated and sustainable programme.

(b) The programme must become a people-driven process.

(c) The program and process must be closely bound to creating peace and security for all.

(d) As peace and security are established it will be possible to embark upon nation building.

(e) Nation building is an integral part of reconstruction and development.

(f) The preceding five principles all depend upon thorough and ongoing democratisation.

(3) Programs of the RDP

To achieve its aims the RDP was designed around five sub programs: meeting basic needs, developing human resources, building the economy, democratising the state and society, and implementing the RDP itself i.e. projects in various sectors.

(4) Implementation Roles

All levels of government have a role to play in implementing the RDP: Central Government sets the broad objectives and programmes; provincial governments develop the strategies and programmes for their own provinces; and local authorities are the key institutions for delivering basic services, extending local control and managing local economic development. Obviously the role of local authorities is closely integrated with the activities of communities they serve.

(5) DWAF RDP BOTT Programme

In order to accelerate implementation of RDP water projects, DWAF has enlisted the support of the private sector in a build, operate, train and transfer programme, which is being managed at a provincial level.

### 1.1.3 White Paper on Water Supply and Sanitation

(1) Purpose

The White Paper was published in November 1994 as a policy document with the aim of clearly setting out the position and strategies to be followed by the Department of Water Affairs and Forestry (DWAF) and other institutions involved in water supply. It covers the historical background; explains the development approach which has guided policy formulation; puts forward basic policy principles; outlines the institutional framework for water supply and sanitation services; provides standards and guidelines for basic service delivery; sets out policy for financing of service delivery; outlines some immediate initiatives being taken and provides supplementary briefing information on important related topics.

(2) Principles

The White Paper outlines a number of principles to guide the formulation of policy and strategy in the supply of water and sanitation services. These are:

(a) Development should be demand driven and community based.

(b) Basic services are a human right.

(c) The philosophy of "some for all" rather than "all for some".

(d) Equitable regional allocation of development resources.

(e) Water has an economic value.

(f) The user of the service must pay for it.

(g) Integrated development and environmental integrity.

To give effect to (c) above a minimum standard has been set for water supply in the country, which is referred to as the RDP minimum. This states that all persons shall have access to 25 litres of clean and safe water per day within 200 m of their household. The Government will meet the capital cost of providing this RDP level of service but consumers must pay operation and maintenance costs.

(3) Institutional Development

The White Paper also provides some guidelines for institutional reform in the water sector. This is particularly important because of the government's emphasis on service delivery and obviously this requires institutional capacity. In terms of the White Paper there are phased goals:

(a) In the short term:

To maintain service delivery whilst rationalising DWAF and transforming and democratising the second tier (i.e. Water Boards)

(b) In the medium term:

To support institutional development at the third tier level (i.e. local level) and to provide financial and technical assistance for water supply and sanitation services. The restructured DWAF (especially at provincial level) and second tier institutions will work towards this goal together with the private and NGO sectors.

(c) In the long term:

To ensure that the provision of services to customers is the function of local government supported by provincial government. The second tier will provide bulk and wastewater disposal services, and DWAF will manage water resources and monitor and regulate policy implementation.

### 1.1.4 Sanitation Policy

The White Paper on Water Supply and Sanitation dealt at a high level with policy and strategy regarding sanitation. The need for more detailed inputs in this area has subsequently been addressed in the Draft White Paper entitled national Sanitation Policy issued in June 1996.

### 1.1.5 Water Law Review

(1) Background

As indicated there has only been a rationalisation of legislation since the democratically elected government came to power in 1994 (Water Laws Rationalisation and Amendment Act) (Act 32 of 1992). A major review of legislation to transform the water sector in accordance with the ideals of the RDP and White Paper is therefore necessary. To this end the Minister appointed a special Water Law Review Panel in June 1995 to develop a set of policy principles on which a new act could be based. The brief has been to make the new law simple, equitable, environmentally integrated and sustainable, economically viable and conducive to equitable economic growth, non-bureaucratic, and capable of simple and easy administration.

(2) Progress

The Panel has completed its work and reported (Fundamental Principles and Objectives of a New Water Law in South Africa). Nine fundamental categories were developed. These were:

(a) Hydrological cycle.

(b) Aquatic ecosystem.

(c) Legal status of water.

(d) Demand apportionment and usage.

(e) Water quality management.

(f) Value of water.

(g) Existing rights to the use of water.

(h) Management, administration and enforcement.

(i) Water supply and sanitation services.

There are a number of areas identified which are not included in the above and need further investigation. It is noted that one of these is institutional and administrative structures.

The law review process was taken forward by a Steering Committee and a major step in this process was a Water Law Review Conference. A final set of principles were embodied in the draft Water Services Act, 1997.

### 1.1.6 Water Services Act

(1) Background

The draft Water Services Act, 1997 was published in the Government Gazette dated 23 May 1997 and interested parties were requested to submit comments within 30 days. A large number of comments were received from many of the stakeholders which are currently being reviewed in order to finalise the bill to put it before parliament.

(2) Provisions

The provisions of the Act include the following:

(a) to provide for the right of access to basic water supply and basic sanitation

(b) to provide for the setting of national standards and norms and standards for tariffs

(c) to provide for water services development plans

(d) to provide a regulatory framework for water services institutions and intermediaries

(e) to provide for the establishment and de-establishment of water boards and water services committees and their powers and duties

(f) to provide for the monitoring of water services and intervention by the Minister or by the relevant Province

(g) to provide for financial assistance to water services institutions

(h) to equip the Minister with certain powers

(i) to provide for the gathering of information in a national information system and the distribution of that information

(j) to repeal certain laws

(3) Role of Local Government

National water policy has consistently emphasised the responsibility of local government in the provision of water services. The Water Services Bill has made it very clear that local government (as the service authority) is accountable for the provision of local water services. Local government may delegate the role of Services Provider to other bodies, but the authority function cannot be transferred.

Against this background, it is clear that capable and effective local government is critical to the implementation of national water policy. This imperative is reflected in the attention given to local government support strategies by DWAF (at national and regional levels), by other government departments, and by agencies such as Water Boards.

### 1.1.7 Quantitative Overview of the Water Supply Scenario

The preceding paragraphs describe the overall framework of change in which the HCA study is taking place. To more fully illustrate the necessity for change the following statistics illustrate the historical imbalances and lack of service provision, which the changes seek to address. Historically, the population of the RSA was classified in terms of population groups, namely, blacks, whites, coloureds and Asians. The classification is no longer enshrined in law, but it has relevance when considering demographic and socio-economic characteristics. Some baseline statistics for water supply and sanitation are summarised in the tables below:

**Table 1-1 : Population of South Africa According to Population Group**

| | | | | | |
|---|---|---|---|---|---|
| 1995 | 31,676 | 5,215 | 3,602 | 1,051 | 41,544 |
| | (76.2%) | (12.6%) | (8.7%) | (2.5%) | (100%) |

Source: October Household Survey, 1995, Central Statistical Service

**Table 1-2: Percentage Covered by Water Reticulation System According to Population Groups**

| | | | | |
|---|---|---|---|---|
| House Connection | 17.5 | 99.7 | 78.9 | 99.2 |
| Yard Connection | 25.8 | 0.2 | 16.5 | 0.8 |
| Public Standpipe | 23.8 | 0.1 | 3.0 | - |
| No Service | 32.9 | - | 1.6 | - |
| **Total** | **100%** | **100%** | **100%** | **100%** |

Source: South Africa Labour and Development Research Unit, UCT, 1994

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| Yard Connection | 25.8 | 0.2 | 16.5 | 0.8 |
| Public Standpipe | 23.8 | 0.1 | 3.0 | - |
| No Service | 32.9 | - | 1.6 | - |
| **Total** | **100%** | **100%** | **100%** | **100%** |

Source: South Africa Labour and Development Research Unit, UCT, 1994

**Table 1-3: Percentage of Population with Flush Toilet According to Population Group**

| Population Group | Black | White | Coloured | Asian |
|---|---|---|---|---|
| Diffusion of Flush Toilet (%) | 34.2 | 99.8 | 88.0 | 99.6 |

Source: South Africa Labour and Development Research Unit, UCT, 1994

As clearly expressed the above, the black population group (who comprise about 70 percent of the total population) have access to characteristically low level of services in the water supply and sanitation sector. In view of RSA's policy to upgrade the quality of life of all South Africans, it is appropriate that high priority should be given to those people who are facing inferior service quality in the water supply and sanitation sector.

### 1.1.8 JICA Study Arrangements

(1) JICA's Preliminary Survey and Scope of Work

In response to the request of the Government of the Republic of South Africa, the Japanese Preparatory Study Team sent by JICA visited South Africa from 18 July to 11 August, 1995. The objectives of the Team were: to conduct a preliminary survey of the proposed study area and to discuss and finalise the Scope of Work for the proposed study among key stakeholders concerned, including DWAF, the Department of Finance, the Department of Foreign Affairs, MW, NWWA and the Embassy of Japan.

Through a series of discussions, the implementing arrangement termed A Scope of Work for the Study on Expansion of Capacity of the Magalies Water in the Republic of South Africa was agreed upon between DWAF and JICA on 4 August 1995. The Scope of Work and the Minutes of Meeting on S/W are compiled in the Data Book.

(2) Overall Framework of the Study

The Study has three phases; the first was completed in 1996 while Phases 2 and 3 will be completed by the end of 1997. The Phases are as follows:

(a) Phase 1: Formulation of a Master Plan.

Phase 1 comprised a situational analysis (an investigation to understand the circumstances prevailing in the Study Area including policy, socio-economic

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(a) Phase 1: Formulation of a Master Plan.

Phase 1 comprised a situational analysis (an investigation to understand the circumstances prevailing in the Study Area including policy, socio-economic

conditions, institutional arrangements, water resources, water demand, physical infrastructure, water tariffs and cost recovery systems); the formulation of a Master Plan up to the year 2015 and priority projects to the year 2002 (which incorporated a process leading to the formulation of policy and strategy recommendations; an investigation of technical solutions to water supply challenges identified throughout the Study Area; an institutional development plan; and an initial capital investment plan); and recommendations on study methods and terms of reference for Phases 2 and 3.

(b) Phase 2: Feasibility study on priority projects.

During Phase 1,many projects were identified by the master plan study in order to meet the requirements of the policy. The identified projects cover a range of infrastructure from modernised supply systems to the minimum level of the RDP.

There are priority projects in two-time frames. Firstly, the project target to the year 2002 involved areas where communities have no water supply, or where supply is below RDP requirements. In this context, the objective is to provide safe and hygienic drinking water to RDP service levels. Secondly, areas where incremental water demands will be high within the selected target years will be given high priority to implement expansion or improvement projects. Three priority areas under the first categories were identified and agreement was reached with all key stakeholders that these should be the subject of subsequent feasibility studies. The three feasibility study areas identified were North Mankwe, Klipvoor and Moretele 2. This report is the culmination of Phase 2 and is concerned with the second of these areas, Klipvoor. The scope of work for each area under Phase 2 included the preparation of a plan for a regional water supply system using surface water, an environmental impact assessment of the proposals, a plan for institutional development, proposals for implementation, a financial analysis of the proposed scheme and an overall evaluation and recommendations concerning implementation.

(c) Phase 3: Implementation of selected water supply and sanitation pilot initiatives.

Phase 3, which comprises four pilot projects, was carried out in parallel with Phase 2 and is reported on in Volume 6. The pilot projects were primarily institutional and intended to explore, in a practical context, institutional and technical options for water supply in previously unserved or under served communities. This was achieved by establishing or reinforcing sustainable management structures and systems (including cost recovery where appropriate) to support the long-term use of the infrastructure developed.

The pilot projects were carried out in four communities. Three of these, namely Kameelboom in North Mankwe, Ga Rasai in the Klipvoor Area and Segokgo in Moretele 2 contained an infrastructural element and were located in each of the Feasibility Study areas, while the fourth in Bapong was purely institutional in nature.

The technical component comprised design, preparation of tender documents, tendering and contract award, construction and commissioning of water supply infrastructure in each of the three communities. At Kameelboom an RDP level reticulated groundwater system was constructed, at Ga Rasai a prepayment system was installed to operate with the infrastructure already provided under an RDP scheme and in Segokgo an RDP level system was provided by extending the existing surface water supply network.

(d) Boundary issues between Magalies Water and Rand Water

The Scope of Work for the Phase 1 Master Plan Study required that any sensitive areas peripheral to the Study Area be identified, and taken into account where relevant to the creation of a master plan for the extended supply area of Magalies Water. Boundary area issues usually relate to the identification and proclamation of supply areas for water boards, and are therefore sensitive issues that cannot be resolved quickly. A number of criteria have been developed by DWAF for setting the boundaries of water boards or water authorities. These criteria in conjunction with technical and financial considerations should inform and govern peripheral area debates regarding appropriate long-term solutions.

Two specific peripheral areas that could either be included or excluded from the expanded MW area of supply were identified during Phase 1 of the Study. These are the Rand Water Supply Area served by the Hartebeeshoek Reservoir and the Barnardsvlei Supply Area served by the Barnardsvlei Reservoir and lie on the boundary between MW and RW. It was agreed that further investigation during Phase 2 was required to determine the most optimal long-term solution.

Agreement had been reached between RW and MW to include the Rand Water (Hartebeeshoek) Supply Area and the Barnardsvlei Supply Area in the RW area of supply, and not in that of MW. The Department of Water Affairs and Forestry expressed concern that, given the projected increases in Vaal River System tariffs, the supplies from RW may not be the most economical long term solution and that it may be more cost effective to them with supplies from local sources.

(3) Milestones

Work on Phases 2 and 3 has been carried out by a single Study Team working almost exclusively in South Africa with only the production of the Final Report being

undertaken in Japan. Figure 1-1 shows the detailed work schedule from February to December 1997. The study was undertaken in two stages with a break in April corresponding to the change in the Japanese fiscal year. With regard to the Feasibility Study, data was collected and planning criteria were established and confirmed with key stakeholders during Stage 1. During the subsequent Stage 2 the water supply plan was developed and costed and financial, institutional and overall project evaluation took place.

The various reports produced by the Study Team during Phases 2 and 3 formed key milestones for the Study. These reports and their respective dates are as follows:

| | |
|---|---|
| Inception Report | February 1997 |
| Progress Report | March 1997 |
| Interim Report | July 1997 |
| Draft Final Report | October 1997 |
| Final Report | December 1997 |

The first three reports have already been issued and served several important functions:

(1) they have provided regular opportunities for stakeholders to provide valuable input to the Study,

(2) they have enabled a wider audience than those able to actively participate in the management structures of the Study to be kept informed of progress,

(3) being accepted formally by the stakeholders they have provided the Study Team with a mandate to move forward to the subsequent stages of the Study, and

(4) they have recorded the methodology and findings of the Study for future use as a resource by stakeholders both within the Study Area and beyond in other parts of the country.

## 1.2 Composition of the Final Report

The Final Report for Phases 2 and 3 comprises a total of seven volumes. These are as follows:

Volume 1: Executive Summary
Volume 2: Feasibility Study for North Mankwe
Volume 3: Feasibility Study for Klipvoor
Volume 4: Feasibility Study for Moretele 2
Volume 5: Study on Boundary Issues

Volume 6: Pilot Projects
Volume 7: Data Book

The Executive Summary contained in Volume 1 summarised the conclusions of the Study. The other volumes are self-contained so as to facilitate access by those concerned with only individual parts of the overall study. Back-up information, which may be of interest to the specialist reader, is provided as an Annex to each report.

This Report forms Volume 5 of the Final Report and is concerned with the Boundary Issues between Magalies Water and Rand Water. The Report comprises a main report and an annex.

## 1.3 Project Management Structure

### 1.3.1 Study Management

The project management structure for the JICA Study is shown in Figure 1-2. The four levels are as follows:

(1) Project Steering Committee

The PSC remained in place from Phase 1 and is a high level body which discusses and resolves matters of policy and major issues relating to implementation. It has the following responsibilities:

(a) To discuss and resolve matters of policy relating to the agreement between the governments of Japan and South Africa.

(b) To discuss and resolve matters of study design, management and implementation that have major implications for the governments of Japan and South Africa, and for JICA, DWAF and MW; and

(c) To monitor overall project progress, especially with reference to the delivery and quality of major products.

(2) Project Execution Group

This replaced the former Project Working Groups (and aspects of the Project Management Committee). Membership consists of representatives of MW, the District Councils covering the three FS Areas, DWAF Provincial Officials and the JICA Study Team. This group is responsible for the efficient implementation of the Study by providing guidance and co-ordination between the Phases 2 and 3.

(3) Local Project Steering Committees

These were created at community level where pilot projects are being implemented to facilitate joint control of pilot projects and to oversee handover of the completed projects.

(4) Project Execution Forum

The forum is a reference group for the Study. It was created to formalise the interaction with the more than forty stakeholders that participated in Phase 1 and provides a vehicle for considering the many capacity building recommendations which emerged from Phase1.

The above structure was approved by the key stakeholders at the Project Steering Committee Meeting held on 18 February 1997.

### 1.3.2 Study Implementation

JICA entrusted implementation of the Study, based on the Scope of Works, to a consortium of Japanese consultants comprising Sanyu Consultants Inc. (SCI) as the managing company and Nihon Suido Consultants Co., Ltd. (NSC). This consortium was selected through open tendering.

SCI and NSC together established the Study Team, which for Phases 2 and 3 has mobilised the experience gained during Phase 1. The team of 12 members is composed of 7 members from the Phase 1 Study Team and a further 3 people who participated in sub-contract work during Phase 1. The team includes six Japanese, one British and five South African Nationals.

During Stage 1, the Study Team sub-contracted some minor components of the Study to South African consultants. Their work included providing support for the environmental impact assessments and for gathering cost data for engineering aspects of the Feasibility Studies.

## 1.4 Acknowledgements

The numerous organisations and individuals that contributed to the work of the Study Team during Phase 1 have continued to provide excellent support to the Study. Whilst taking responsibility for this report, the Study Team wishes to acknowledge the help and support of the following:

### 1.4.1 Japanese Government

Embassy of Japan in South Africa
JICA Head Office
JICA local office in Pretoria
JICA Advisory Committee

The continued financial support of the Government of Japan has made the Study possible and the guidance and support provided by the Advisory Committee has played a crucial role in the strategic direction that the project has taken. The Study Team hopes that this first experience of this type of technical aid support in South Africa will provide a good precedent and contribute to further collaboration on future projects.

### 1.4.2 Department of Water Affairs and Forestry

DWAF Head Office
DWAF - Mpumalanga
DWAF - North West Province

Due to the more applied nature of the work, Phases 2 and 3 of the Study have required closer links with the Provincial staff of DWAF. In particular the Directors of DWAF in the two Provinces within whose jurisdiction the feasibility studies fall have participated actively in the Study despite the very pressing nature of their many other commitments. Senior staff from the Provinces have also provided valuable strategic and operational support. The senior managers and directors of DWAF in Pretoria have continued to provide excellent support through chairing and participating in meetings, providing insight and direction and not least by making available office space and other facilities to the Study Team.

### 1.4.3 Local Government

North West Province
Mpumalanga
Northern Province
Gauteng

Rustenburg DC
Eastern DC
Highveld DC

Mbibane TLC

It is clear from the Water Services Act that local government is responsible for service delivery and the responsibilities of Services Provider cannot be abrogated. Representatives of local government have played a crucial role in the project as it has been necessary to ensure that the institutional recommendations of the Study in each area are appropriate to the capacity and direction of the relevant local government institutions.

The organisations listed above have enthusiastically supported the Study by attending and actively participating in meetings. The senior members of staff at the district councils have met with the Study Team and provided guidance in interpretation of policy and new and ongoing service delivery initiatives.

In particular, Rustenburg DC must be thanked for providing office space and logistical support to the Team during their stay in Rustenburg. The system of zonal councillors and engineers has also provided something of a model and is rightly viewed with interest.

### 1.4.4 Water Boards

Magalies Water
Rand Water

Magalies Water in particular have provided invaluable ongoing help and support to the Study by participating in and chairing meetings but also by providing many hours of advice through reviewing reports and providing feedback to the Study Team. Of course Magalies Water is at the hub of the Study and the dialogue between the Study Team and Magalies Water has confirmed that the initiative is of value. The team hopes that the Study has provided a firm foundation for Magalies Water to lead the way as a representative of the new generation of second tier water supply institutions envisaged in the White Paper of 1994.

### 1.4.5 Pilot Project Communities

Kameelboom, Ramoshibitswana and Mphonyoke Communities
Ga Rasai Community
Segokgo, Moletsi, Semohlase and Loding Communities
Bapong Community

The members and leadership of the communities which have been the subject of the pilot projects have played an important role by giving of their time and hospitality most generously and affording the Study Team the privilege of working with them. The Team has certainly learnt much from working together with the communities and hope that this feeling is mutual. With regards to the Feasibility Studies, the Study Team is especially grateful to the pilot

project communities for their co-operation with the questionnaire surveys and for providing feedback to inform Phase 2.

### 1.4.6 Other Stakeholders

There are more stakeholders in the Study than can be listed in this short acknowledgement. The Study Team interacted with many of these, and was pleased with the level of involvement and commitment. Since the Study area is large, many of the stakeholders demonstrated their interest by travelling long distances to meetings. A hallmark of the Study has been the high level of stakeholder involvement and the loyalty and commitment of participating stakeholders. The Team extends thanks to all who have played a role in the execution of the Study.

**Figure 1-1 : Master Work Schedule for Phases 2 and 3 of Magalies Water Study**

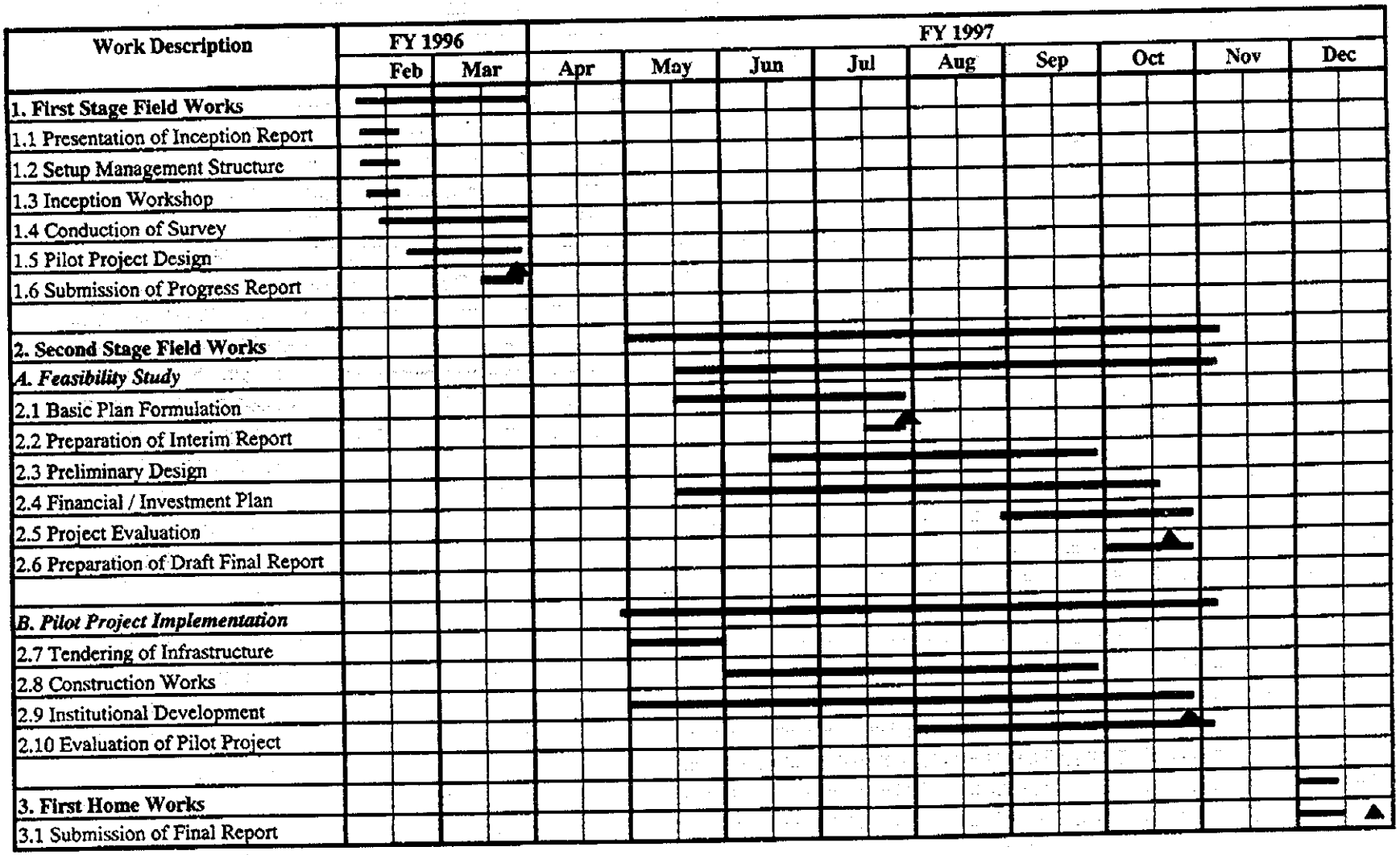
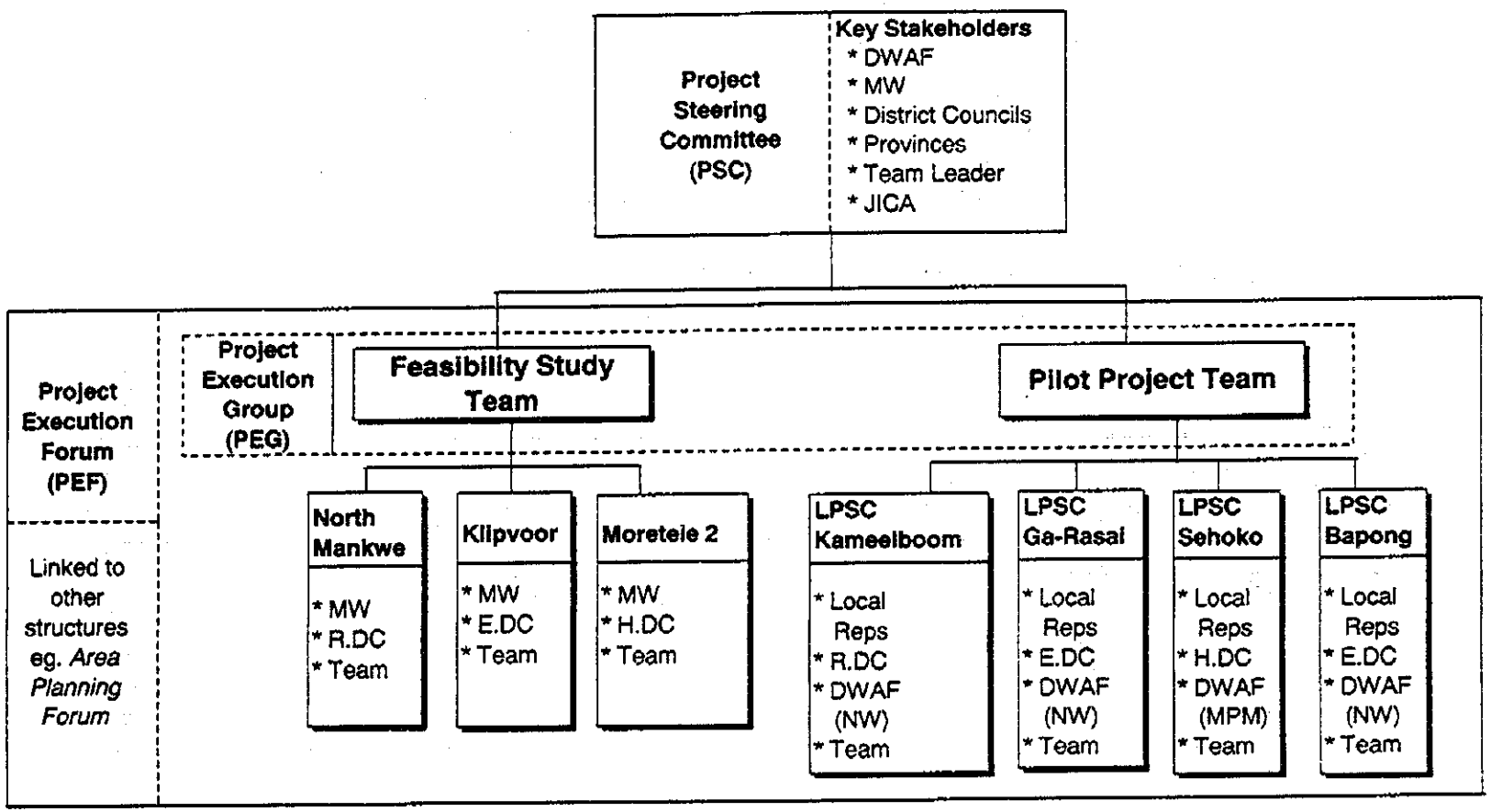


**Figure 1-2 : Management Structure for Phases 2 and 3**




Note: R.DC: Rustenburg D.C., E.DC: Eastern D.C., H.DC: Highveld D.C.

# CHAPTER 2

# BOUNDARY ISSUES AND CONSTRAINTS

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# CHAPTER 2 BOUNDARY ISSUES AND CONSTRAINTS

## 2.1 Background of the Boundary Issues

### 2.1.1 Proclaimed Areas of Jurisdiction

At the commencement of the Study, Magalies Water supplied bulk water to consumers within those portions of the Study Area that were proclaimed in favor of the Board. These supply areas were, for historical political reasons, restricted to the former South Africa (excluding homelands), and the Board's water supply function excluded any form of retail supply or support. The White Paper on Water Supply and Sanitation requires that the areas of supply of the various water boards be rationalized and extended, and/or that new water boards be created to achieve the goals and objectives of the White Paper. The goal is to extend access to affordable and hygienic water supply and sanitation to all the residents of the Republic, including previously neglected rural communities within the former TBVC States and within former self-governing territories.

To achieve the objective of creating rationalized areas of jurisdiction for water boards within North West Province, the Minister of Water Affairs & Forestry approved, in a Government Gazette of 12 April 1996, revised proclamations for those water boards that operated within North West Province at that stage. In terms of this proclamation, Magalies Water was empowered to act within certain former Bophuthatswana territories (Moretele 1, Bafokeng, Odi 1 and 2, and parts of Mankwe district). Additional supply areas were also proclaimed for Magalies Water in the former RSA districts of Swartruggens, Koster, Brits, Rustenburg and Warmbaths. As Rand Water was, on the date of the proclamation, actually supplying water to certain of the Bophuthatswana areas formerly under the control of NWWA (Ga-Rankuwa and Mabopane, parts of the Bafokeng district, and the Rustenburg - Bapong axis), Rand Water initiated trilateral discussions with DWAF and Magalies Water, regarding the proclamation of the affected supply areas in favor of Rand Water.

A proclamation for the Ga-Rankuwa and Mabopane region to this effect was approved by the Minister and gazetted on 21 June 1996 (Government Notice No.1025). This proclamation was required in order to legalize an already existing situation, i.e. where Rand Water already supplied water to local authorities within the former Bophuthatswana State, or where Rand Water was fulfilling the third tier function on behalf of local authorities. Pursuant to bilateral discussions that were held between RW and DWAF during December 1995 regarding areas of jurisdiction, DWAF instructed the boards of MW and RW in writing to continue with discussions and negotiations regarding their limits of supply within the affected areas, based on certain guidelines that were laid down in the directive. This process is still on going.

### 2.1.2 Terms of Reference for the Study

The Terms of Reference requires the JICA Study Team to provide DWAF and other stakeholders with the technical and financial information required by them to make long term decisions regarding the boundary between RW and MW, and specifically with information on the cost of RW supply options compared with the cost of local supply options.

## 2.2 Alternative Plans and Relationship with Master Plan

### 2.2.1 General

The boundary question between RW and MW is focussed in two separate supply regions; the extent of the area of supply of RW along the Rustenburg to Western Platinum axis, (Barnardsvlei Supply Area and peripheral areas); and the extent of the area of supply of RW from Hartbeeshoek Reservoir, (Rand Water Supply Area). The Location Maps shows the position of these two areas with respect to the rest of the JICA Study Area.

### 2.2.2 Rand Water (Hartbeeshoek) Supply Area

A detailed plan of the Rand Water Supply Area is shown in Figure 2-1. The supply from RW in the Central Supply Zone is being upgraded from a capacity of 40.6 mcm/a to 86.9 mcm/a. The Phase 1 Study recommended that the upgraded RW infrastructure should be utilized up to the maximum pipeline capacity to meet the 2015 water demand estimated for this area and any deficit is supplemented from Temba WTW (formerly known as Kudube WTW) via the Soshanguve Reservoir. This recommendation was informed by the following:

- Both MW and RW are operating within the current legal and institutional frameworks and both water boards are satisfied with the current boundary arrangements.
- There exist many contracts between RW and its customers including communities and industry.
- RW has already invested a large amount of capital to develop water supply infrastructure.
- There are still many unserved areas of South Africa that should attract investment ahead of a scheme to replace existing infrastructure before the end of its useful life despite any possible long-term benefits.
- The pipeline from Temba WTW is the lowest cost option for the further augmentation of this area.

### 2.2.3 Barnardsvlei Supply Area

A detailed plan of the Barnardsvlei Supply Area is shown on Figure 2-2. The supply from RW in the Western Zone has already reached the maximum capacity of the infrastructure (39.3 mcm/a). The Phase 1 Master Plan Study evaluated the following three technical alternatives that would satisfy the 2015 water demand estimated for this area.

- **Alternative 1:** Expand the capacity of the RW infrastructure.

- **Alternative 2:** Discontinue the existing RW supply to Rustenburg North, Phokeng and Thlabane and instead supply these areas from Vaalkop WTW.

- **Alternative 3:** Discontinue the existing RW supply to the Barnardsvlei Eastern Supply Block and instead supply the area from Brits WTW.

The Study concluded that Alternative 2 is the most preferable option among the three options considered.

## 2.3 Changes Since Master Plan Stage

During and since the preparation of the Phase 1 Study Master Plan, a number of decisions were taken that have a significant impact on the supply to these two peripheral areas, and hence on the analysis that was required during the investigation of the boundary issues.

Firstly, RW and MW agreed to implement the Vaalkop to Barnardsvlei Pipeline that had been proposed during the Masterplan Study. As shown below, the implementation of this pipeline, together with the existing supply capacity, will satisfy the demand of the Barnardsvlei Supply Area until year 2015.

Secondly, RW upgraded the supply to the RW Supply Area (Hartbeeshoek Reservoir) with a much larger pipeline than previously envisaged because of limited servitude's available for future expansion. This new pipeline, together with the existing supply capacity, will meet the demand of the Rand Water Supply Area until the year 2015.

The capacity of the supplies to the Rand Water and Barnardsvlei Supply areas are discussed in more detail under the technical evaluation below.

## 2.4 Supplementary Work During Study Period

To further inform the on-going dialogue between stakeholders including DWAF, MW and RW, the Study Team has conducted supplementary studies on the following issues during this Boundary Issue Study.

(1) Evaluation of return flows and water resources availability

(2) Evaluation of existing supply capacities.

(3) Technical evaluation of local options to augment the supply to the peripheral areas.

(4) Current water tariffs applied by MW and RW.

(5) Marginal cost of water supplied by RW.

(6) Vaal River development program and assessment of water availability for the Master Plan Study Area.