Thematic Week 5 Expo Zaragoza 2008, Spain. Sustainable Management of Water, Towns and Cities: Potable Water, Sanitation and Development

The Efficient Management of Water Provision as the basis for Economic Development and Growth

by

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ABSTRACT

The sustainable provision of water resources forms the basis for economic growth and the development and management of our towns and cities. Sound water utility management is therefore a development imperative. Therefore public water and other utilities have to discharge their duties in an economically efficient and in an operationally responsible manner.

The paper demonstrates, using various financial and operational indicators, that Rand Water – arguably the largest public water utility in Africa – has been able to consistently discharge its duties in an economically efficient and operationally responsible manner. The result is that after 104 years of operation, Rand Water places no fiscal burden on the State, has cost reflective pricing, and is able to generate sufficient surpluses to invest in its current and future infrastructure needs. As a result of its efficient management and operations, Rand Water provides the basis for economic growth and development of the Gauteng Province of South Africa, which is the economic heartland of South Africa, and the largest economy in Africa.

KEY WORDS: Water Utility Management, Financial Sustainability, Operational Sustainability, Cost Reflective Pricing, Economic Growth.

1. INTRODUCTION

The efficient management of water provision remains one of the key requirements for economic development and growth. However, in order for this to happen, water utilities need to be managed in an economically efficient and operationally responsible manner. The Gauteng Province is the economic heartland of South Africa – and is the largest economy in Africa. It provides more than 40% of the South African GDP and is home to some 25% of the South African population. For over 104 years Rand Water has been providing good quality bulk potable water that has formed the basis of the economic growth and development of the Gauteng Province.

2. ECONOMIC EFFICIENCY AND OPERATIONAL EFFICIENCY: THE DUAL IMPERATIVES OF UTILITIES

Water utilities (and other utilities in general) are the custodians of immense public trust. This trust is often taken for granted until the public lifestyle is radically affected by the non-provision or interruption in the provision of public goods and services. Let me use a real and current non-water example to demonstrate the nature of this implicit trust in public utilities. South Africa remains a country where there is an uninterrupted provision of basic good quality public goods and services on a 24 hours basis. This includes electricity, water and sanitation services. Recently however, from around the end of 2007, our national electricity utility – Eskom – has been experiencing difficulty in the provision of uninterrupted electricity on a 24 hour basis. As a result of this, government has declared that South Africa is currently experiencing an electricity crisis. Hence the phenomenon of 'load shedding' has become a way of life. Load shedding is when certain areas are systematically switched-off the national grid in order to conserve electricity. In a society where this has never happened before, this has had an immense impact on the lifestyles of the public and economy. All of a sudden, the collective South African psyche has been focused on the trust that the public has in utilities; and total blame for failing the South African society is placed at the door of Eskom.

Like the Eskom story, water utilities shoulder an immense burden of trust that is placed on it by society. In order to effectively deliver on this trust water utilities need to be efficiently managed. The question then arises: what does efficient management mean? A good starting point is to recognise the over-arching reason for the existence of public water (and other) utilities: they exist to efficiently meet the demands placed on them and to finance their investments – or put another way, to reduce prices and costs and to ensure equitable access to its services. Given this, perhaps a more fundamental set of questions should be: What is the value-add of public utilities? Do these utilities achieve pricing efficiencies? What is the nature of the capital intensity of these utilities? Are the rates of return earned by these utilities comparable to world-class utilities? Is the current ownership configuration of these utilities optimal in terms of ensuring both economic and non-economic objectives?

Researchers highlight the fact that the world over, public utilities are normally owned and usually managed by governments (Newbery, 1999; Short, 1984). Without going into the merits of government and other forms of ownership of public utilities, Newbery (1999) shows that public utilities are generally inefficient, not well managed and usually do not deliver in an economically efficient manner on their mandates. One of the reasons he attributes these inefficiencies to is the lack of adequate competition in the provision of basic public goods and services. (Other researchers however present a different view – see for example Hall & Lobina, 2005; and Willner & Parker, 2002).

In order to provide the basis for economic growth and development, public water utilities need to be managed in an economically efficient manner so as to ensure the sustainable provision of water and sanitation services in a cost-effective manner. This would usually translate into water utilities providing an uninterrupted supply of good quality water services in a manner that ensures all its costs are covered, whilst at the same time generating sufficient surplus to ensure investment in existing and new infrastructure in order to meet the demands of society over the long-term.

3. RAND WATER – CONTRIBUTING TO ECONOMIC DEVELOPMENT AND GROWTH IN SOUTH AFRICA

Rand Water is a government owned public water utility in South Africa and has been in existence since 1904. It provides bulk potable water to the Gauteng Province and surrounding areas. Its area of service spans some 25,000 square kilometres and provides water to some 11 million people. Rand Water provides a daily average of around 3 700 megalitres (refer to Annexure I for the Rand Water's geographical context). Rand Water's customer base is shown in Table 1.

Customer Type	Number	Percentage of Demand
Municipalities	18	92,4
Direct Mines/Industries	42	6,04
Other direct customers	1500	1,56

Table 1: Rand Water's Customer Base

As shown in Annexure I, although Rand Water's supply area is extensive, it predominantly provides water to the Gauteng Province of South Africa. In the early 1900's Rand Water was established to support the 'gold rush' to what is now known as the Gauteng Province. Until recently, South Africa was the world's largest producer of gold and a significant proportion of our GDP is still based on the production of gold. Without the efficient management of Rand Water since its inception, the economic development and growth of the South African economy would not have been as successful as it has been. The Gauteng Province covers just over 17 000sq km - approximately 1.4% of the total land surface of South Africa. It is the smallest of the nine provinces. Despite its size, Gauteng has the highest population density in South Africa is has is 99% urban. The province has a highly developed transport and communications infrastructure, excellent financial institutions and is the economic heartland of South Africa.

4. RAND WATER – AN EFFICIENTLY MANAGED WATER UTILITY

The efficient management of Rand Water spans several areas that are too numerous to mention in this paper. I shall therefore focus on the two pillars of financial and operational management.

4.1 Financial Management

Financial sustainability remains a cornerstone of efficient water utility management. Researchers argue that due to governments' ability to usually bail-out public utilities, public utilities are generally immune to the threats of bankruptcy. From international research it is evident that as a result, public utilities in general are not financially as efficient as they should be (Newbery, 1999). One of the proud achievements of Rand Water is that for over 104 years, it has never relied on government funding – all of its financial requirements were provided from

internally generated funds. Through its tariff, Rand Water has been able to finance its operating and capital requirements and to generate sufficient surplus to provide for its long-term infrastructure investments. Rand Water therefore remains an example of public sector excellence in Africa.

4.1.1 Tariff Management

4.1.1.1 Tariff Efficiency

At Rand Water – and in South Africa as a whole – water tariffs are used as one lever for social transformation. Through the tariff, water utilities are expected to ensure equitable and affordable access to good quality water services. In early 2001 Rand Water effectively highlighted and eradicated tariff related inefficiencies. Prior to this time (and for historical reasons) the mines enjoyed preferential tariffs – in other words, municipalities and other customers effectively provided a subsidy for mining operations. This was not in keeping with the new democracy at the time and also went against the provisions of national legislation. Given the need to pursue efficiencies, Rand Water engaged with its mines and managed to negotiate the phasing out of the preferential water tariff. Although this was not an easy settlement it was a very necessary one. The result of phasing out this economic inefficiency was that Rand Water was able to generate additional revenue which went directly into the refurbishment of infrastructure. Table 2 highlights the additional revenue that was generated from this exercise.

Year Ending	R million	US $ million
June 2002	26	3,7
June 2003	43	6,1
June 2004	70	10,0
June 2005	87	12,4
6 months to December 2005	53	7,6

Table 2: Additional revenue from phasing out of the preferential tariff

4.1.1.2 The "tariff squeeze" – keeping an eye on inflation

One key requirement of our Government is that public utilities should as far as possible keep tariff increases below the prevailing levels of inflation. In a high inflationary environment this is not an easy task. Some of the key reasons for this relate to ensuring that basic services like water are affordable to the majority of the population, to encourage economic development and growth by keeping the costs of doing business as low as possible, and to help achieve a lower inflationary environment for the country as a whole. Table 3 shows that although Rand Water's input costs have remained generally above inflation, its annual tariff increases have increased at rates that were below the prevailing inflation rates (refer to Figure 1). Rand Water has managed to thrive amid this tariff squeeze by aggressively pursuing efficiencies within the organisation.

Key Inputs	Percentage contribution	Multi-year input cost increases	Annual tariff increases
Raw water	55.3	Above inflation	Below inflation
Labour	18.2	Above inflation	
Other	12.2	Above inflation	
Electricity	10.1	Above inflation	
Chemicals	4.2	Above inflation	

Table 3: Key cost inputs

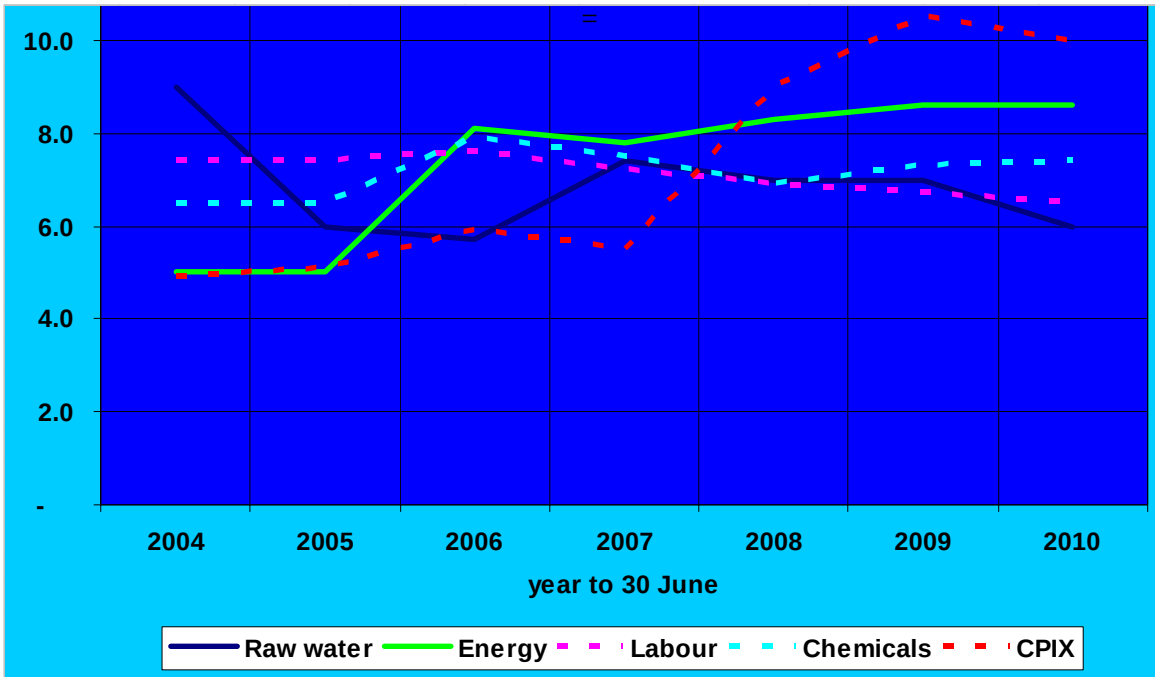

Figure 1: Tariff increases vs. Inflation

These efficiencies have been made possible by consistently looking out for the possible outsourcing of non-core activity, zero-based budgeting and control, plant automation and efficient energy management. The total nominal value of these efficiencies over the last 6 years has been in excess of R500 million. All of this was passed on to our customers as a result of passing on lower than inflation tariff increases.

Financial Year	Efficiency %	Value of efficiencies	
		Rand Million	US $ Million
2002/03	1.3	117	16,7
2003/04	1.0	90	12,9
2004/05	0.4	36	5,1
2005/06	1.2	108	15,4
2006/07	1.5	135	19,3
2007/08	0.5	45	6,4

Table 4: Efficiency savings passed on to customers

4.1.2 From revenue to surplus – the basis of sustainability

The basis of financial and operational sustainability is directly dependent on the utility's ability to generate sufficient revenue to cover its costs and to generate sufficient a surplus in order to invest in its infrastructure. Rand Water has consistently shown over the years that it is able to do this without any form of assistance or subsidy from Government. All of its operating costs are covered by its sales revenue, and the surplus generation is used for, amongst other things, the refurbishment and augmentation of infrastructure as well as for "tariff smoothing". In addition, its rate of return on investments in infrastructure compares favourably with market indicators. Table 5 illustrates key financial indicators.

Financial Year End	Revenue		Gross Margin (R million)		Surplus (R million)		Return on Assets (%)	Market Related Return on Assets (%)[1]
	Rm	US$m	Rm	US$m	Rm	US$m		
2001	2,189	312,71	1,218	174.0	84	12,0	5,1	
2002	2,481	354,43	1,366	195,1	193	27,6	7,5	
2003	2,884	412,00	1,578	225,4	281	40,1	9,0	
2004	3,258	456,43	1,769	252,7	392	56,0	10,0	
2005	3,460	494,29	1,888	269,7	494	70,5	10,8	
2006	3,475	496,43	2,000	285,7	593	84,7	12,5	
2007	4,119	588,43	2,202	314,6	743	106,1	12,0	10,23

Table 5: Financial Sustainability

Notwithstanding the many ethical and social views relating to the generation of a surplus by public water utilities, Rand Water continues to generate a surplus as it is the foundation of sustainable operations and in the long-term the basis of affordable water services. Other more specific reasons for surplus generation are: to access funds (debt) at the lowest cost to fund capital investments; and Rand Water does not receive any loans or guarantees from government. The generation of a surplus is therefore aimed at recovering the costs of capital and not for profiteering.

4.2 Operational Management

The second pillar of the efficient management of water utilities in order to ensure economic growth and development is efficient operational management. Rand Water is a capital intensive organization and hence the nature and state of our infrastructure determines the success of the organization. The net asset value of Rand Water's infrastructure is in excess of R7 billion (about US$ 1 billion). The replacement value of the infrastructure is well in excess of R35 billion (about US$5 billion). The infrastructure can be categorized into the following:

- Raw/untreated water supply systems
- Water treatment plant
- Pumping stations (primary, secondary and tertiary)
- Pipelines (in excess of 3,200 km varying from 600mm to 3,500 mm in diameter)
- Valves and meters
- Reservoirs and break pressure tanks

The on-going investments in maintenance, refurbishment and augmentation of infrastructure is one of the key reasons that Rand Water has been able to supply good quality potable water on an 24 hour basis for the past 104 years and hence the basis for economic growth and development in South Africa.

4.2.1 Integrated Strategic Asset Management Plan

Prior to 2005 Rand Water did not have an integrated strategic asset management plan. After consulting with leading water utilities internationally Rand Water started the implementation of an integrated strategic asset management plan. To date (a little over 2 years since we started) the Strategic Asset Management Plan is almost completed. The plan consists of the following

[1] This rate of return is the maximum coupon rate that South African parastatals currently (May 2008) would pay on bonds

components: the financial asset register, the spatial asset register, the technical asset register and the maintenance management module that is done using Maximo. In addition to allowing us to have a long-term strategic investment programme, the asset management plan enables us to effectively manage our assets in order to ensure adequate maintenance and upgrading, and to forecast appropriate replacement time-frames.

4.2.2 Long-term planning

In order to ensure long-term adequacy of infrastructure to meet growing demands, Rand Water embarks on long-term demand forecasting. The demand forecasting is done in conjunction with the National Ministry of Water Affairs and Forestry. Based on several scenarios, we are able to relatively accurately forecast the demands over a 20-year horizon. These forecasts are embodied in our Annual Infrastructure Development Reports which outline infrastructure adequacy and infrastructure augmentation needs over the 20-year horizon. These reports are revised annually and are the source of all infrastructure upgrading and augmentation. The current programme of infrastructure is scheduled for completion by September 2009 and will ensure adequate infrastructure provision to meet the demands for the next 20 years.

4.2.3 Capital Expenditure

As alluded to earlier, Rand Water invests heavily in its infrastructure. The following table illustrates Rand Water's capital expenditure over the years to ensure operational sustainability.

Financial Year Ending	Capital Budget (Million)		Capital Spend (Million)		% Spend of Budget
	Rand	US $	Rand	US $	
2001	346	49,4	307	43,8	88.8%
2002	271	38,7	270	38,5	99.7%
2003	295	42,1	254	36,3	86.3%
2004	375	53,5	272	38,8	72.4%
2005	543	77,5	369	52,7	68.1%
2006	600	85,7	380	54,3	63.3%
2007	630	90,0	472	67,4	74.9%
2008	754	107,7	562	80,2	74.5%
2009[2]	789	112,7			
2010	790	112,8			
2011	800	114,3			
2012	820	117,1			

Table 6: Capital Expenditure

4.2.4 Pipeline Management

Given the importance of our bulk conveyancing system Rand Water invests heavily to ensure that the distribution network is adequately protected and managed. The pipeline network spans some 3,200 km and varies from 600 mm to 3,500 mm in diameter. The pipeline network comprises

[2] From financial year 2009 onwards these are projected capital expenditure figures.

of both steel and concrete pipes, most of which were installed some 85 years ago. The key to our operational success is that Rand Water has concentrated on the replacement/refurbishment of its pipeline network. Internationally it is recognised that efficient water utilities ought to replace/refurbish at minimum between 1,5 to 2% of their distribution network annually (Madiec, H., et al, 1997; Geering, F. & Lohner, E, 1997). Since 2007 Rand Water has accelerated the replacement/refurbishment of its pipeline network to 1,7% of its network annually (Figure 2).

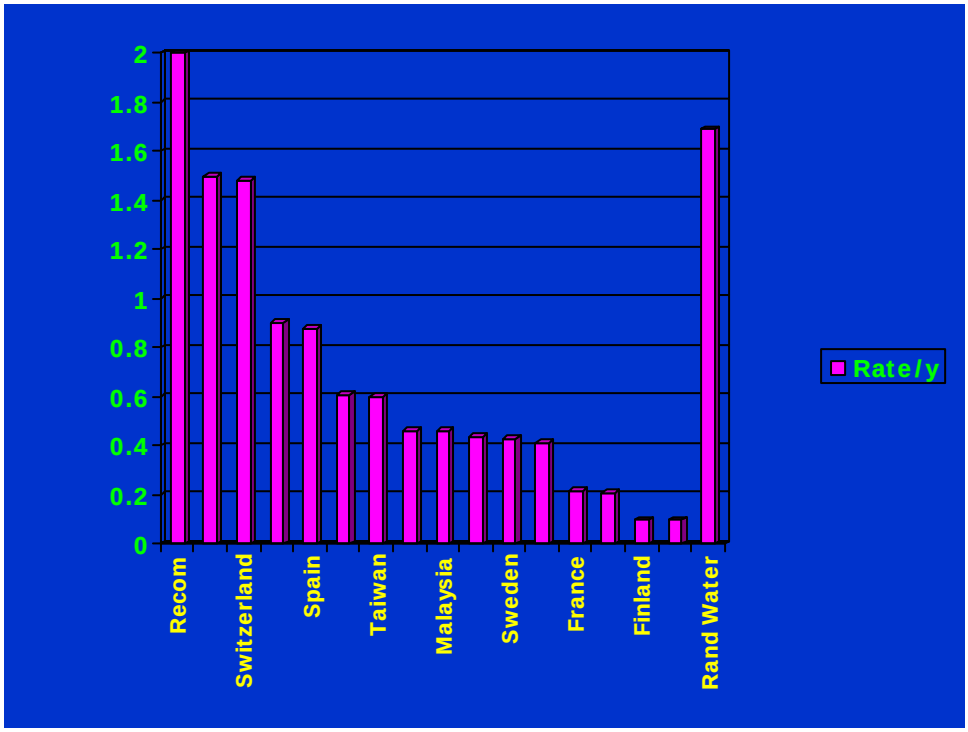

Figure 2: Replacement/Refurbishment Rates for Distribution Networks

As a result of our focused attention to operational management, Rand Water has been able to provide good quality bulk potable water to the economic heartland of South Africa on an uninterrupted basis. The following indicators attest to this:

KPI	Unit	2007	2006	2005	2004	2003	2002	2001
Average daily supply	Ml/d	3,550	3,457	3,452	3,414	3,340	3,143	3,005
Increase in sales volumes	%	2,7	0,15	1,1	2,2	6,3	4,6	2,2
Compliance with quality standards	%	99	99	99	99	99	99	99
Unplanned interruptions >4 hours	No.	0	0	0	0	0	0	0
Increase in revenue	%	12,1	6,1	6,2	13,0	16,2	13,8	8,7

Table 7: Other Key Performance Indicators

The success in the area of effective pipeline management can be attributed to the use of state of the art technology. Some of these technologies that we use in pipeline management are remote field eddy current testing, guided ultra sonic, thermal remote sensing and repeated scanning investigations.

5. CONCLUSION

The provision of water services provides the basis for sustainable economic growth and development. To achieve this, water utilities must be managed in an economically efficient and socially responsible manner. Rand Water has (since its inception over 104 years ago) been managed in this manner. Since its inception it has not relied on any form of Government subsidy, it has been able to cover its costs and generate sufficient a surplus to invest in its infrastructure, and has managed to ensure meaningful management of its infrastructure and operations. As a result of this efficient management, Rand Water has provided the basis for the economic development and growth of the South African economic heartland. Gauteng Province remains the economic heartland of South Africa and Rand Water is the blood that flows through that heart.

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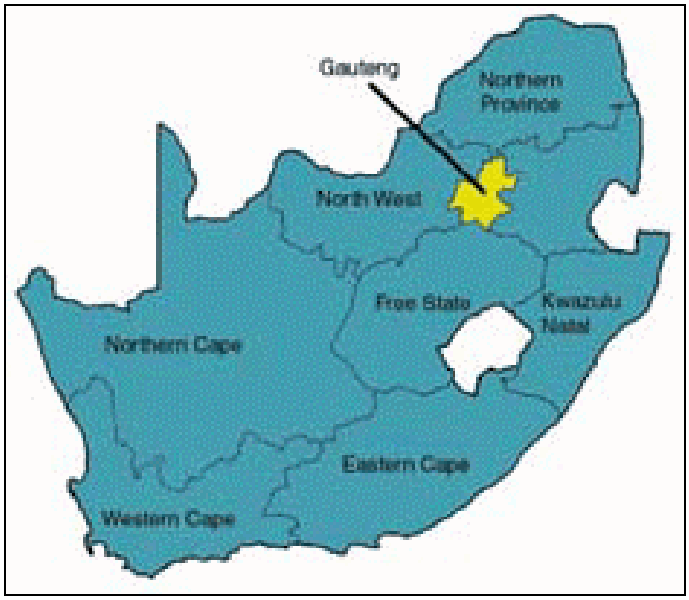
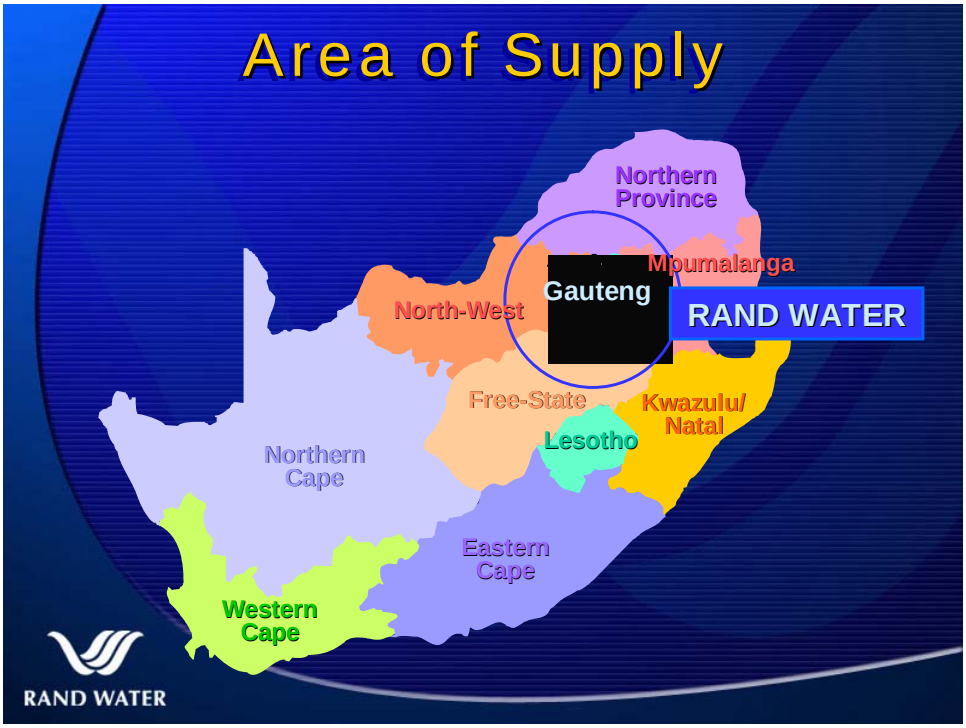
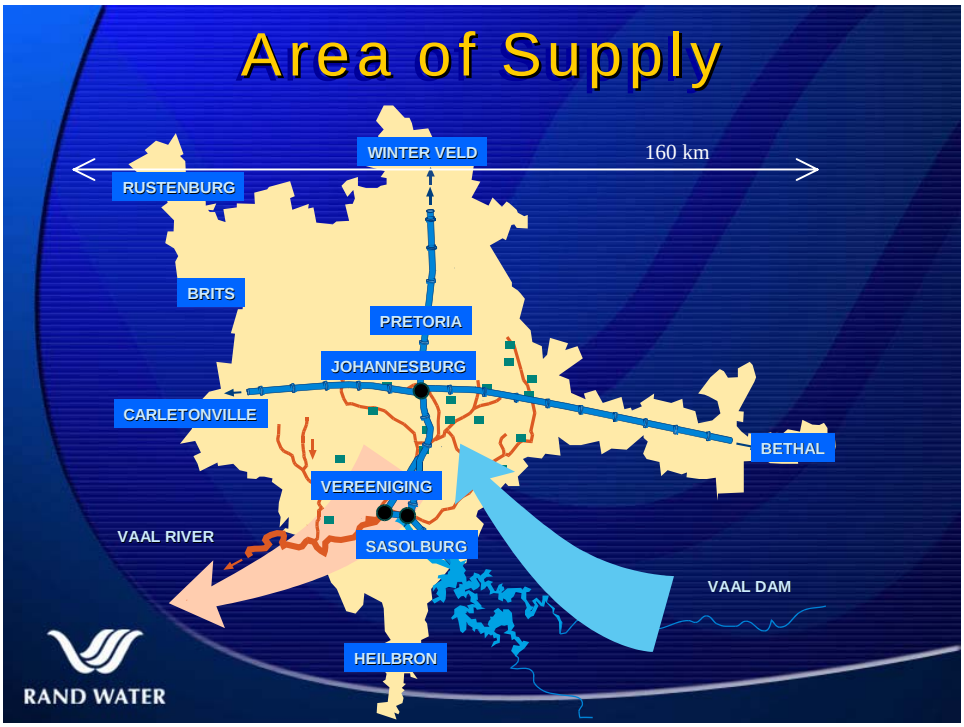
ANNEXURE I

RAND WATER'S GEOGRAPHICAL CONTEXT

Rand Water is a bulk water utility and operates predominantly within the Gauteng Province of South Africa. The following diagrams show Rand Water's geographical context:




Area of Supply
Northern Province
Mpumalanga
Gauteng
North-West
RAND WATER
Free-State
Kwazulu/ Natal
Lesotho
Northern Cape
Eastern Cape
Western Cape
RAND WATER


Area of Supply
WINTER VELD
160 km
RUSTENBURG
BRITS
PRETORIA
JOHANNESBURG
CARLETONVILLE
BETHAL
VEREENIGING
VAAL RIVER
SASOLBURG
VAAL DAM
HEILBRON
RAND WATER