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The uMkhomazi Water Project Phase 1: Module 1: Technical Feasibility Study: Raw Water

INSTITUTIONAL AND FINANCIAL ASPECTS REPORT

FINAL

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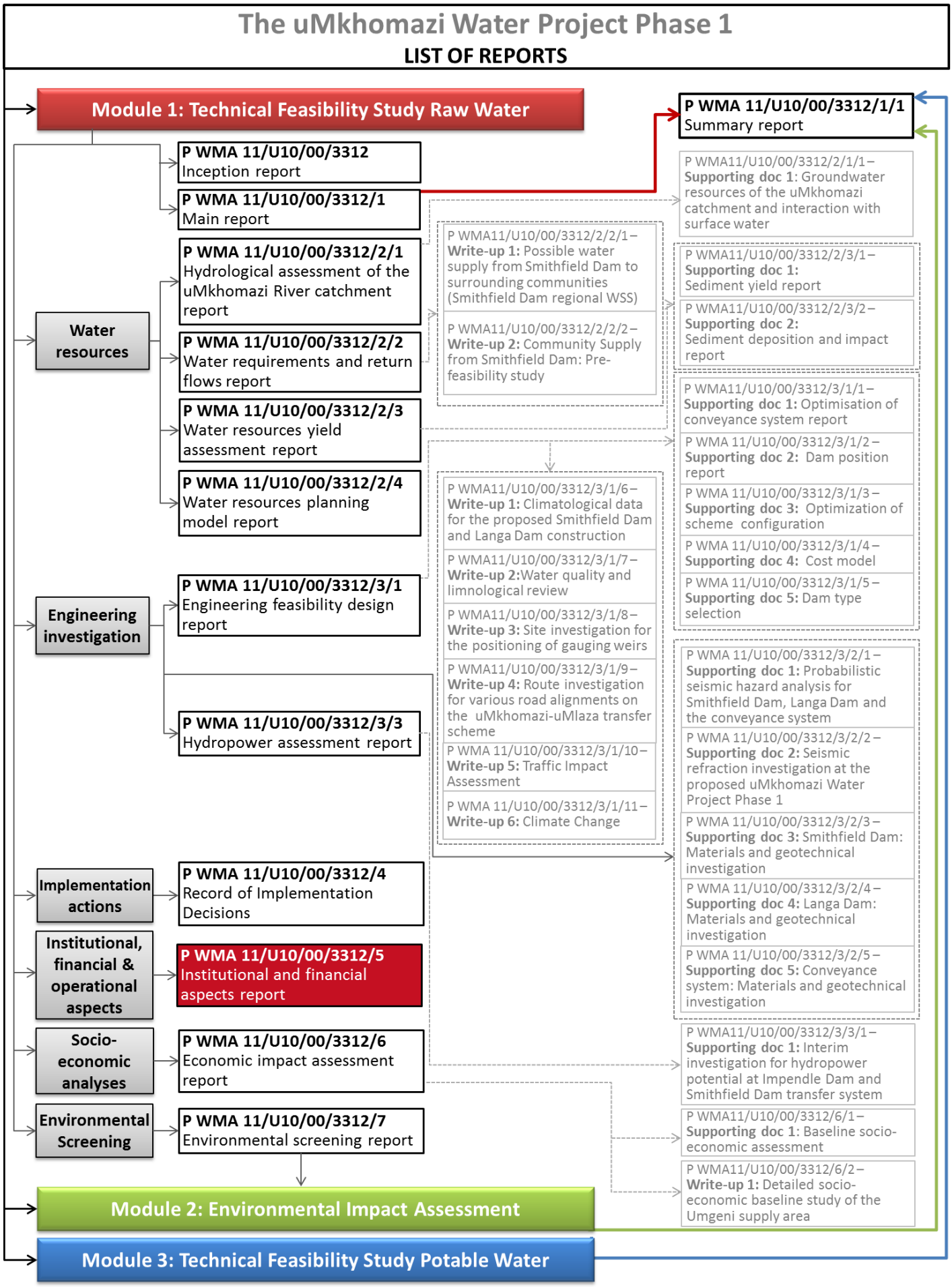
PREAMBLE

In June 2014, two years after the commencement of the uMkhomazi Water Project Phase 1 Feasibility Study, a new Department of Water and Sanitation was formed by Cabinet, incorporating the former Department of Water Affairs.

In order to be consistent, all reports emanating from Module 1 of the study will be published under the Department of Water Affairs name.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EXECUTIVE SUMMARY

The purpose of the uMkhomazi Water Project (uMWP) Feasibility Study is to formulate proposals for the augmentation of the water stressed Mgeni Water Supply System (WSS).

Phase 1 of the uMWP comprises a new dam at Smithfield on the uMkhomazi River, raw water conveyance infrastructure (tunnel and pipeline) to the uMlaza River valley, a balancing dam, and a water treatment works with a gravity potable water pipeline to the Umgeni Water (UW) bulk distribution system, at a total capital cost of R16.4 billion (excl. VAT and at 2014 prices).

Numerous large bulk water supply schemes have been implemented in South Africa over the last two decades while government structures have transformed, institutional arrangements evolved and water policy has developed. Each scheme will have had its own set of political, institutional, financial, social and technical circumstances which would have made it unique and upon which management decisions would have been made. Implementing arrangements, delivery mechanisms and assumptions applicable at the time may be regarded as creating precedent but situations change and evolve, and therefore decisions regarding implementation of the next large bulk water supply scheme must be based on the circumstances that prevail at the time and especially those relating to institutional and financial arrangements.

This Institutional and Financial Aspects Report, as part of the uMWP Feasibility Study, considers institutional and funding options available, investigates the implications of implementation and funding scenarios, draws conclusions and makes recommendations for institutional and funding arrangements for implementing and operating the proposed uMWP-1.

The key matters addressed in the report relate to:

(i) ***Institutional**: Identification of the most appropriate institutional arrangement for uMWP considering that it needs to make provision for resource development, bulk water supply, treatment and distribution across municipal boundaries and supply water into an existing complex Mgeni WSS. Lessons learnt from implementation of previous schemes and the capacity developed in institutions such as TCTA and UW are considered taking cognizance of the roles of DWA as Custodian of South Africa's water resources and of Municipalities as customers in supplying water to the end users.*

(ii) ***Financial:*** *The Government of South Africa has limited financial resources and is therefore unable to fully fund the provision of all bulk water supply infrastructure in the country. Reliance is therefore made on private sector loan financing and the TCTA was created as an Agent of Government to implement bulk water supply schemes on behalf of DWA. Due to Governments commitment to provide basic water to the poor, the financing of projects is challenged in that the principle of the 'user must pay' implies that those that can pay must pay an acceptable tariff and then Government must subsidise municipalities through the equitable share fund or further grant funding to cover the social component of the project.*

The above are the fundamental issues raised in the report and addressed.

Various institutional arrangements and options for funding and operating the project are considered bearing in mind the roles and responsibilities of DWA, National Treasury, TCTA, UW and Municipalities. While the establishment of the National Water Resources Infrastructure Agency (NWRIA) is introduced in the report, it is not currently considered as an option for the implementation of the uMWP-1 as progress on its establishment is inadequate for it to make timely contribution. The institutional arrangement as shown in ***Figure i*** *below is recommended.*

The costs for the development of uMWP-1 are presented and scenarios for the determination of water tariffs are considered in light of sources of funding including off-budget loan financing and possible partial subsidisation through grant funding.

There are policy considerations that must be taken into account when making a final decision regarding funding of the uMWP-1.

(i) *Section 7.1 of the 2007 Pricing Strategy for Raw Water Use Charges stipulates that "State funding will in the future be confined mostly to social water resource development or betterment projects, which conform to the purpose, set out in section 2 of the NWA, 1998 and where the demand is not driven by specific commercial water users or sectors". It goes further to say that "New infrastructure development or betterment may have a social as well as a commercial component in which case State funding and related charges will apply on the social component, while loan funding and related charges will apply on the commercial component."* ***This strategy thus explicitly supports the concept of allocating State Funding to the social component of the water supply.***

(ii) *Precedent was established with the implementation of schemes such as MMTS2 and the Berg Water Project where decisions were made regarding the status and intention of the project and the levels of social and commercial / economic benefits to be derived from the project. DWA adopted the stance that large municipalities have the economic*

and financial capacity to cover the costs of large bulk water supply schemes and can also cross-subsidise water tariffs internally without requiring additional project specific grant funding from National Treasury.

*(iii) However, the Pricing Strategy also recognises that the debts on projects where loan repayments overlap should not cause "**…..financial strain to end users or unhealthy financial balance in the water sector.**"*

The report shows that the additional water supply to be provided by the uMWP-1 is substantial relative to the current supply, and the resulting increase to the UW Bulk Potable Tariff is significant, being approximately 50% higher which raises concerns regarding 'financial strain' and affordability to pay for the water.

A considerable portion (25%) of the households in the Mgeni WSS area of supply, are regarded as low income households and therefore eligible for free basic water supply in accordance with eThekwini's current water supply policy. It is therefore suggested that there is at least a 25% social component in the project which should then be financed with grant funding to facilitate continued access to water for these poorer households and also lessen the total cost burden on those consumers that are required to pay the full tariff.

The balance of the financing requirements are then to be secured through private loans and it is recommended that that this be sourced by TCTA as Implementing Agent for the Raw water component and UW for the Potable water component.

It is recommended that the TCTA proceed with implementation of the project as soon as off-take agreements have been signed with water service authorities that constitute 85% of the current water users as this has proven to be acceptable to DWA and bankers on previous projects.

It is further recommended that UW fund and implement the potable bulk water component of the project and that Umgeni Water operate the complete project (raw and potable water supply) once it has been commissioned.

The TCTA loans should be recovered through the UW tariff. This is the same approach as that adopted for the funding of the MMTS2 project.

Should uMWP-1 have to be fully funded off-budget, then the increase in the UW tariff will be about R 2.71/kℓ at 2014 prices or R 4.57 at 2023 prices. (The year 2023 is the estimated date when the project could be commissioned to provide water into the Mgeni WSS.) This constitutes a 59% increase which will financially strain end users. If 25% funding assistance by National Treasury were therefore to be made available, the tariff

of R 2.71/kℓ will reduce to an estimated R 1.86/kℓ depending on scenarios for phased implementation of tariff increases and loan repayment periods.

As the uMWP-1 is estimated to be commissioned in 2023 at best, the Mgeni WSS will be stressed until then and alternative augmentation schemes were investigated including desalination of sea water desalination and/or re-use of waste water. The implementation of either or both of these alternatives will have a further substantial impact on the water tariff and also on the financial burden or borrowing capacity of eThekwini Municipality and UW depending on who is to actually implement the projects. Implementation of one of these alternatives is regarded as important for addressing the possible risk of short term water supply shortages and avoiding major water restrictions. This will further add to the strain on end users and once again the social component of the project will need to be factored in.

As DWA has confirmed that the uMWP-1 needs to be implemented as a priority project, the crucial next steps towards implementation of the uMWP-1 are as follows:

(i) Appointment of TCTA as the Implementing Agent by the Minister for DWA for the uMWP-1 Raw water component,

(ii) Determination of the availability of funds for National Treasury for subsidisation of the costs of the project through grant funding,

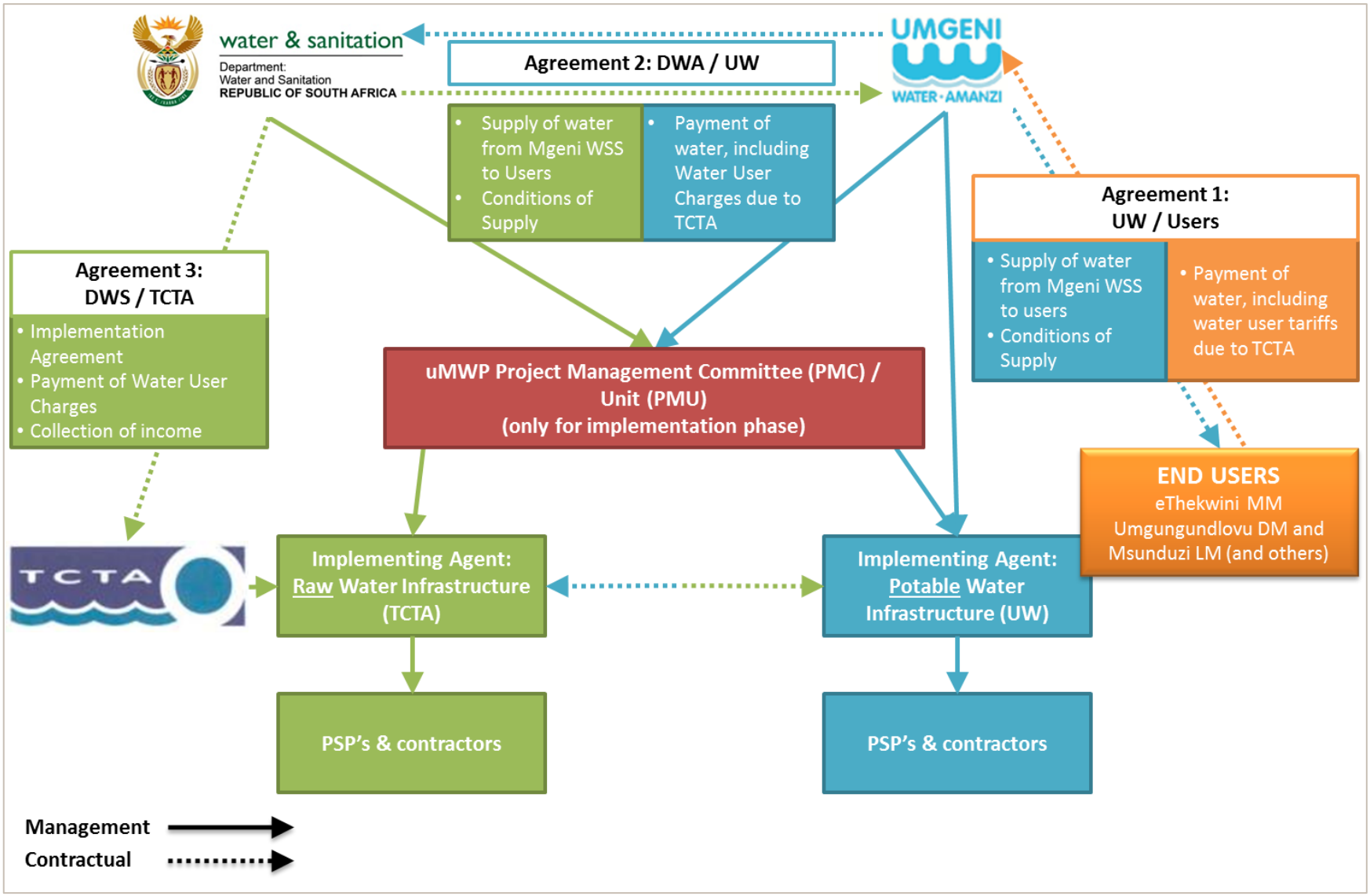
(iii) Development of the financial models for the raw water and potable water components by TCTA and UW respectively,

(iv) Finalise off-take agreements with Water Service Authorities[1] that constitute 85% of the current water users, by September 2017,

(v) Formulation of a procurement strategy and programme for the implementation of the uMWP-1 by TCTA and UW to ensure an integrated approach towards timeous completion of the project in 2023, and

(vi) Appointment of UW as operator for the whole uMWP-1 (raw and potable water components).

[1] *This Institutional and financial aspects report were distributed during December 2015 for comments to all Water Services Authorities, and Project Management Committee members. Comments received were included.*



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LIST OF UNITS

m^3/a	cubic metres per annum
m^3/s	cubic metres per second
kℓ	kilolitre
Mℓ/d	mega litres per day
Mℓ/d/a	mega litres per day per annum
masl	metres above sea level
m/km	metres per kilometre
kw	kilo watt
Mw	mega watt
kWh	kilo watt hour
MWh	mega watt hour

LIST OF ABBREVIATIONS

AECOM	AECOM Technology Corporation
BOT	Build Operate Transfer
DM	District Municipality
DWA	Department of Water Affairs, now Department of Water and Sanitation
EPC	Engineer, Procure and Construct
FDCO	Finance, Design, Construction, Operate and Maintenance
FSL	Full supply level
IFR	Instream flow requirements
IPP	Independent Power Producer
IR	Institutional Reform
KZN	KwaZulu-Natal
LM	Local Municipality
MAR	Mean annual runoff
MMTS	Mooi-Mgeni Transfer System
MOL	Minimum operating level
M&E	Mechanical and Electrical
NPV	Net present value
NWRIA	National Water Resource Infrastructure Agency
NWRS	National Water Resource Strategy
PFMA	Public Finance Management Act
PMC	Project Management Committee
PSC	Project Steering Committee
PSP	Professional Services Providers
RBL	River bed level
RL	Reduced level
RWU	Regional Water Utilities
TBM	Tunnel boring machine
TCTA	Trans-Caledon Tunnel Agency
TOR	Terms of Reference
WSS	Water Supply System
uMWP	uMkhomazi Water Project
UW	Umgeni Water
WTW	Water treatment works
WwTW	Wastewater treatment works
WC/WDM	Water conservation and demand management

1 INTRODUCTION

The Department of Water Affairs appointed **BKS (Pty) Ltd** in association with three sub-consultants **Africa Geo-Environmental Services, MM&A and Urban-Econ** with effect from 1 December 2011 to undertake the **uMkhomazi Water Project Phase 1: Module 1: Technical Feasibility Study Raw Water** study.

On 1 November 2012, BKS (Pty) Ltd was acquired by **AECOM Technology Corporation**. As a result of the change in name and ownership of the company during the study period, all the final study reports will be published under the AECOM name.

In 2010, the Department of Arts and Culture published a list of name changes in the Government Gazette (GG No 33584, 1 October 2010). In this list, the Mkomazi River's name was changed to the **uMkhomazi River***. The published spelling will thus be used throughout this technical feasibility study.*

1.1 BACKGROUND TO THE PROJECT

The current water resources of the Mgeni Water Supply System (WSS) are insufficient to meet the long-term water demands of the system. The Mgeni WSS is the main water source that supplies about six million people and industries in the eThekwini Municipality, uMgungundlovu District Municipality (DM) and Msunduzi Local Municipality (LM), all of which comprise the economic powerhouse of the KwaZulu-Natal Province.

The Mgeni WSS comprises the Midmar, Albert Falls, Nagle and Inanda Dams in KwaZulu-Natal, a water transfer scheme from the Mooi River and the newly constructed Spring Grove Dam. The current system (Midmar, Albert Falls, Nagle and Inanda dams and the MMTS-1) has a stochastic yield of 334 million m³/annum (measured at Inanda Dam) at a 99% assurance of supply. The short-term augmentation measure, Phase 2 of the Mooi Mgeni Transfer Scheme (MMTS-2), the recently constructed Spring Grove Dam, will increase water supply from the Mgeni system by 60 million m³/year. However, this will not be sufficient to meet the long-term requirements of the system.

Pre-feasibility investigations indicated that the development of the undeveloped uMkhomazi River, to transfer water to the existing Mgeni system, most likely will fulfil this requirement. The uMkhomazi River is the third-largest river in KwaZulu-Natal in terms of mean annual runoff (MAR).

Eight alternative schemes were initially identified as possible alternatives, and the Impendle and Smithfield scheme configurations have emerged as suitable for further investigation. The pre-feasibility investigation, concluded in 1998, recommended that the Smithfield Scheme be taken to a detailed feasibility-level investigation as its transfer conveyances would be independent of the existing Mgeni System, thus reducing the risk of limited or non-supply to eThekwini and some areas of Pietermaritzburg, and providing a back-up to the Mgeni System.

The ***Mkomazi-Mgeni Transfer Pre-feasibility Study*** concluded that the first phase of the uMWP would comprise a new dam at Smithfield on the uMkhomazi River near Richmond, a multi-level intake tower and pump station, a water transfer pipeline/tunnel to a balancing dam at Baynesfield Dam or a similar in-stream dam, a water treatment works at Baynesfield in the uMlaza River valley and a gravity pipeline to the Umgeni bulk distribution reservoir system, below the reservoir at Umlaas Road. From here, water will be distributed under gravity to eThekwini and possibly low-lying areas of Pietermaritzburg. Phase two of the uMWP may be implemented when needed, and could comprise the construction of a large dam at Impendle further upstream on the uMkhomazi River to release water to the downstream Smithfield Dam. Together, these developments have been identified as having a 99% assured stochastic yield of about 388 million m^3/year.

The DWA aims to have this scheme commissioned and supplying water by 2023.

1.2 OBJECTIVE OF THE STUDY

According to the Terms of Reference (November 2010), the objective of the study project is to undertake a feasibility study to finalise the planning of the proposed uMkhomazi Water Project (uMWP) at a very detailed level for the scheme to be accurately compared with other possible alternatives and be ready for implementation (detailed design and construction) on completion of the study.

The feasibility study has been divided into the following modules, which will run concurrently:

- Module 1: Technical Feasibility Raw Water (DWA) (*defined below*);
- Module 2: Environmental Impact Assessment (DWA); and
- Module 3: Technical Feasibility Potable Water (Umgeni Water) (*ranging from the Water Treatment Plant to the tie-in point with the eThekwini distribution system*).

The layout as per module is shown in **Figure 1.1**.

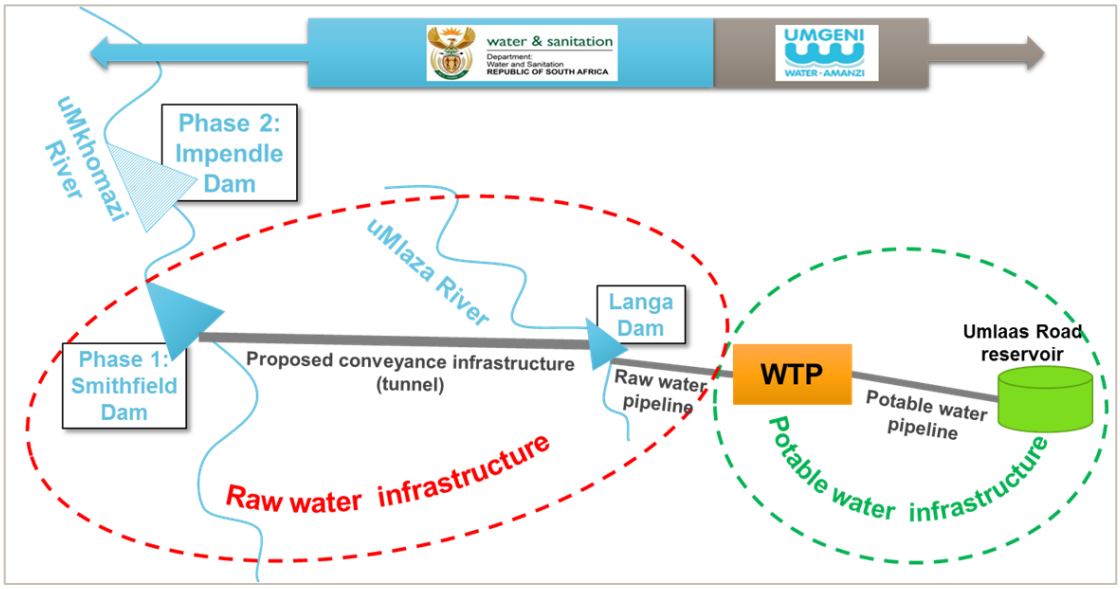

Figure 1.1: Feasibility layout of uMWP components

This module, the raw water technical feasibility study, considers water resources aspects, engineering investigations and project planning and scheduling and implementation tasks, as well as an environmental screening and assessment of socio-economic impacts of the proposed project.

Some specific objectives for this study, recommended in the *Mkomazi-Mgeni Transfer Scheme Pre-feasibility* are listed below:

- Smithfield Dam (Phase 1) to be investigated to a detailed feasibility level;
- Investigate the availability of water from Impendle Dam (Phase 2) as a future resource to release to Smithfield Dam, and refine the phasing of the selected schemes;
- Optimise the conveyance system between Smithfield Dam and the proposed Baynesfield Water Treatment Plant;

- Undertake a water resources assessment of the uMkhomazi River Catchment, including water availability to the lower uMkhomazi;
- Evaluate the use of Baynesfield dam as a balancing dam; and
- Investigate the social and economic impact of the uMWP.

This one of three studies, was undertaken in close collaboration with the DWA, Umgeni and the Professional Services Providers (PSPs) of the other modules.

1.3 GOVERNANCE AND ORGANISATION OF THE STUDY

As the main objective of the project is to augment water supply to the Mgeni system, an area that is managed by Umgeni Water with users mainly from eThekwini Municipality, the study required the participation from the three spheres of government. Liaison with the Client, key stakeholders, interested and affected parties and team members are managed through various committees, as shown in the diagram below.

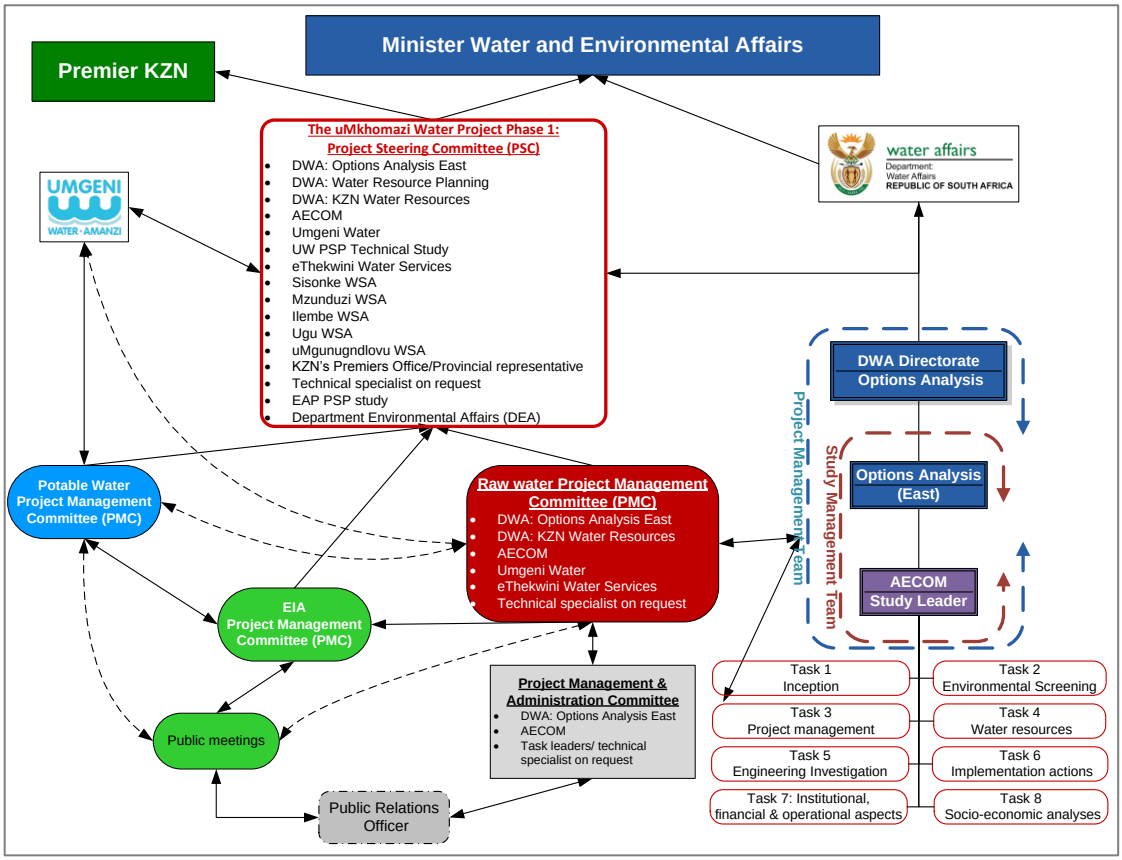

Figure 1.2: uMWP governance structure

The ***Project Steering Committee's*** (PSC) main function was to assist the DWA with strategic matters and to coordinate the contributions of other authorities.

This committee oversees the total project, including the Raw Water, Treated Water and Environmental Impact Assessment project modules. The PSC members are shown in **Figure 1.2**.

The ***Project Management Committee*** (PMC) is responsible for governing and driving the feasibility study, comprising the DWA Project Manager, Umgeni Water, the PSP Study Leader (supported by technical specialists) and representatives of any DWA Directorate wishing to participate at any stage of the project. eThekwini Municipality is an *ad hoc* member, to ensure that the local considerations and situation of interested and affected parties are also accounted for at the appropriate level.

1.4 STUDY AREA

The main study focus and key objective is related to the feasibility investigation of the Smithfield Dam and related raw water conveyance infrastructure to augment water supply to the Mgeni WSS. However, this is also a multi-disciplinary project covering various other tasks with the full study area being defined as the uMkhomazi River catchment, stretching to the north to include the uMngeni River catchment, refer to **Figure 1.3**. The various tasks under the study have specific focus area, defined as:

- Water Resources: uMkhomazi and Mgeni River catchments;
- Water requirements: water users in the Mgeni System and the uMkhomazi River catchment;
- Engineering Investigations: proposed dams at Impendle (only for costing purposes) and Smithfield, and the raw water conveyance infrastructure corridor between Smithfield Dam and the Water Treatment Plant of Umgeni Water;
- Environmental screening as input for the Environmental Impact Assessment; and
- Socio-economic impact assessment: regional, provincial (KwaZulu-Natal (KZN)) and national.

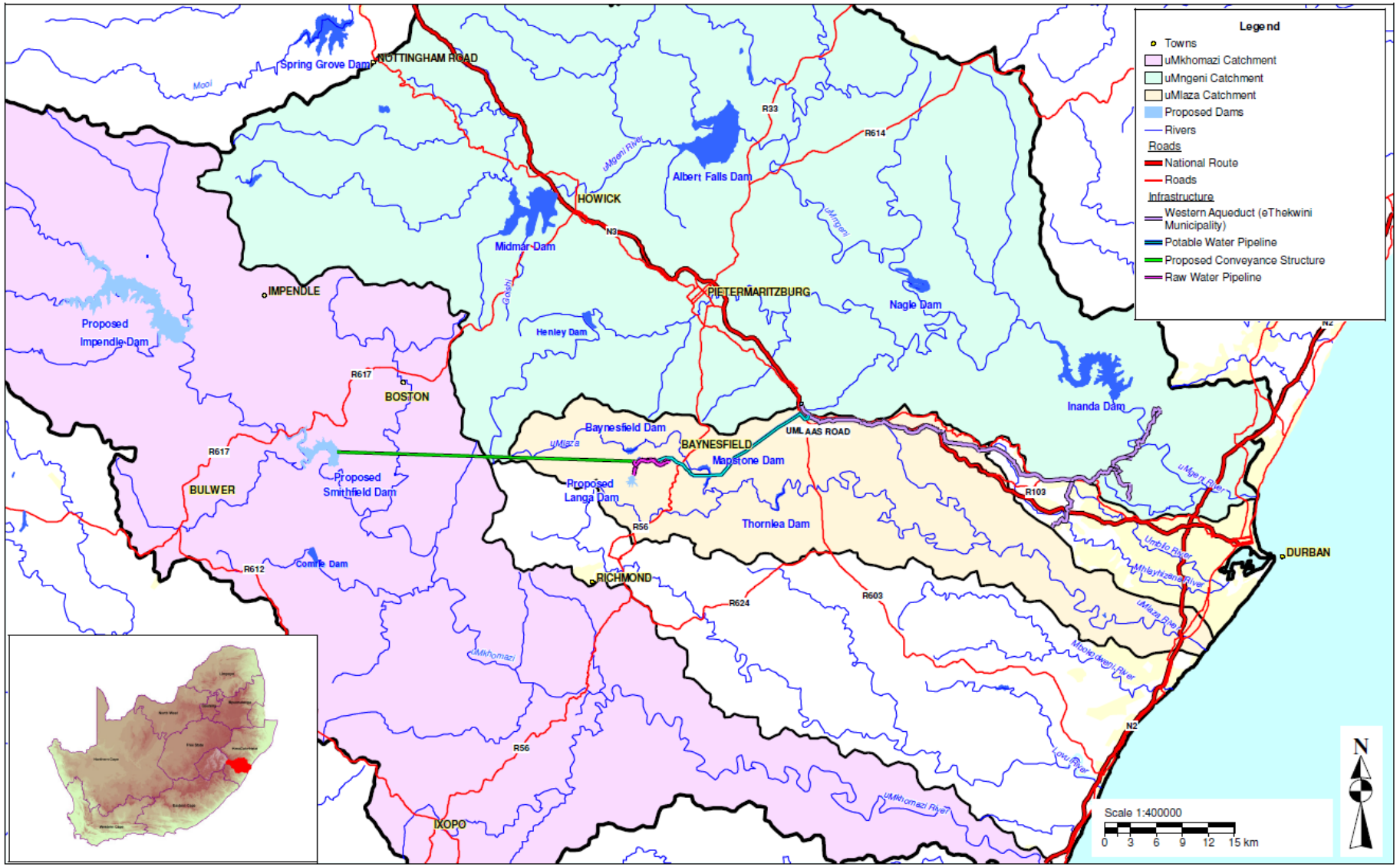

Figure 1.3: Locality map of uMWP study area

1.5 SUMMARY OF THE UMWP

The Mgeni WSS comprises the Midmar, Albert Falls, Nagle and Inanda dams and a water transfer scheme from the Mooi River, the Mearns Weir and the new Spring Grove Dam. The water resources and bulk supply are managed by UW.

The water requirements projection shown in **Figure 1.4** shows that Mgeni WSS is likely to experience a deficit from **2016**, therefore the imminent need for new water resources.

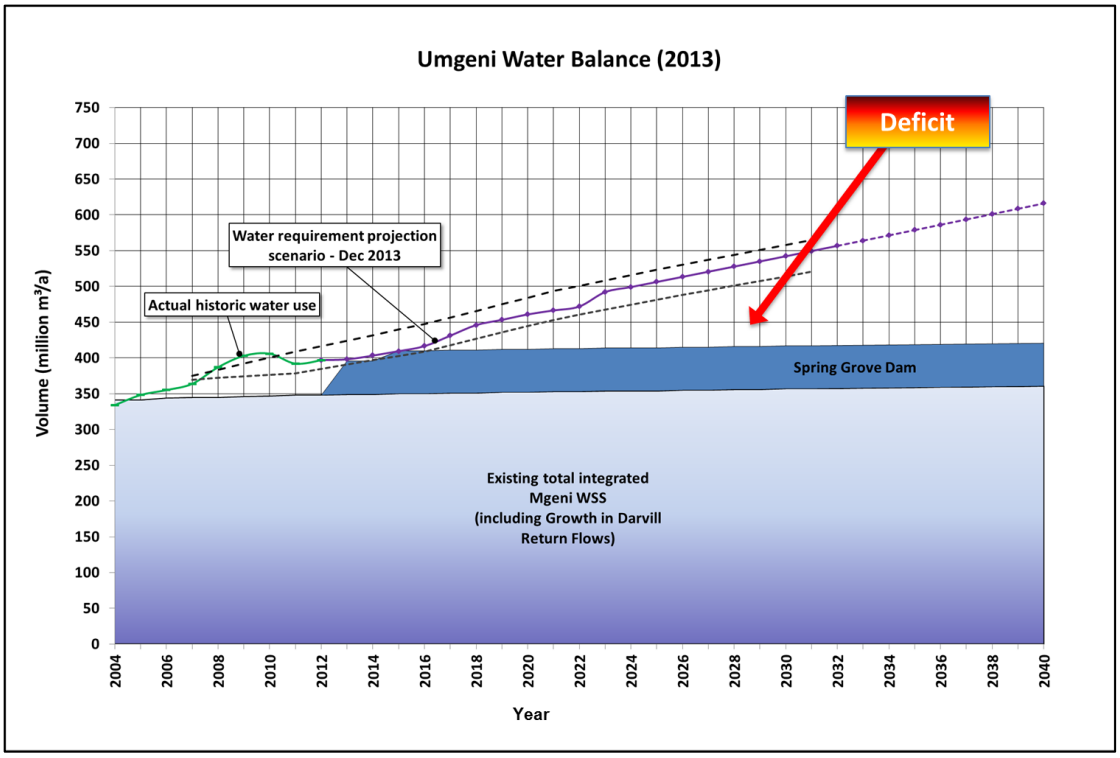

Figure 1.4: Water balance for the integrated Mgeni System

Pre-feasibility investigations, undertaken by the DWA a few years ago and confirmed with the *KwaZulu-Natal Coastal Metropolitan Areas Reconciliation Strategy*, indicated that the uMWP-1, which entails the transfer of water from the uMkhomazi River (a combination of dams at Smithfield and Impendle) to the Mgeni WSS, is the scheme most likely to fulfil this requirement.

The **uMkhomazi Water Project Phase 1** (uMWP-1) comprises the following large infrastructure components, as shown in **Figure 1.5**:

- A new dam at Smithfield on the uMkhomazi River.
- Raw water conveyance infrastructure (tunnel and pipeline) to the uMlaza River valley, including a balancing dam.

- A water treatment works in the uMlaza River valley, followed by a gravity pipeline to the Umgeni Water bulk distribution system, connecting in the area of the Umlaas Road reservoir (Umgeni Water, 2013). From Umlaas Road, water will be distributed under gravity through existing infrastructure to most of the users of the eThekwini Municipality.

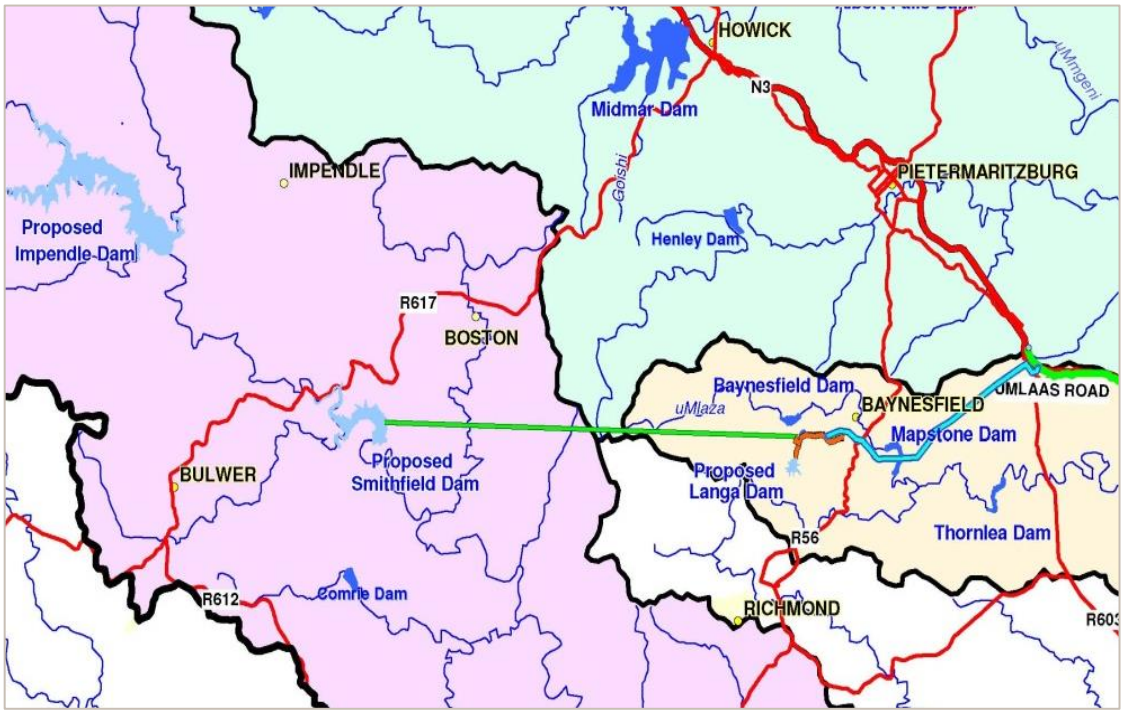

Figure 1.5: Layout of the proposed uMWP scheme

During Phase 2, a second dam will be constructed upstream of Smithfield at Impendle, also in the uMkhomazi River, as well as a second set of conveyance infrastructure, defined as uMkhomazi Water Project Phase 2 (uMWP-2).

The uMWP-1 will cost in the order of R 16.4 billion in 2014 Rands (excl. VAT), of which R 12.8 billion will be required for the raw water (DWA) infrastructure and R 3.6 billion for the WTW and other bulk potable water (UW) infrastructure, as shown in **Table 1.1**.

Table 1.1: Capital cost of uMWP-1 *(all costs 2014 Rands excl. VAT)*

Component	Capital cost in 2014 Rands R (million)
1. Raw water system activities (incl. miscellaneous)	
Smithfield Dam	2 018
uMkhomazi-uMlaza tunnel	3 901
Langa Dam	439
Raw Water Pipeline	365

Component	Capital cost in 2014 Rands R (million)
Transmission lines	5
Smithfield Dam and Baynesfield hydropower plants	Nil*
Waste disposal sites	15
Flow gauging stations	30
Roads and bridges	232
Sub-total of activities	**7 005**
Ps & Gs (25% of activity cost)	1 751
Professional fees (12% of activity cost)	841
Environmental, landscaping and social costs (lump sum)	450
Land acquisition (lump sum)	37
Sub-total of activities and value-related costs	**10 084**
Contingencies (25% of above sub-total)	2 521
Implementing agent - TCTA (lump sum)	200
Total: Raw water system	**12 805**
2. Potable water system activities (incl. miscellaneous)	
Baynesfield WTW-Umlaas Road Pipeline	1 143
Baynesfield WTW and potable water reservoirs	795
Sub-total of activities	**1 938**
Ps & Gs (25% of activity cost)	485
Professional fees (12% of activity cost)	233
Environmental, landscaping and social costs (5% of activity cost)	97
Land acquisition (lump sum)	10
Sub-total of activities and value-related costs	**2 762**
Contingencies (25% of above sub-total)	691
Implementing agent - Umgeni Water (5% of sub-total)	138
Total: Potable water system	**3 591**
3. Grand total: uMkhomazi Water Project Phase 1	**16 396**

* *Hydropower is not included as it does not form part of raw water system. However, the cost of hydropower is R 83 million.*

The administration costs include raising funds, procurement, project management and administration of the project. Design and engineering supervision costs are included as professional fees. **Funding costs (interest) are excluded but are incorporated in the financial modelling**.

Table 1.2: Annual operating costs for the uMWP-1 *(2014 Rands excl. VAT)*

Component	Annual operating cost (R million)
1. Raw water system activities (incl. miscellaneous)	
Smithfield Dam	5.0
uMkhomazi-uMlaza tunnel	4.9
Langa Dam	1.1
Raw Water Pipeline	0.9
Transmission lines	0.0
Smithfield Dam and Baynesfield hydropower plants	-
Waste disposal sites	0.0
Flow gauging stations	0.1
Roads and bridges	0.5
Sub-total of activities	**12.6**
Ps & Gs (25% of activity cost)	3.2
Professional fees (12% of activity cost)	1.5
Environmental, landscaping and social costs (lump sum)	1.8
Land acquisition (lump sum)	
Sub-total of activities and value-related costs	**19.1**
Contingencies (25% of above sub-total)	4.8
Implementing agent - TCTA (lump sum)	8.0
Total: Raw water system	**31.8**
2. Potable water system activities (incl. miscellaneous)	
Baynesfield WTW-Umlaas Road Pipeline	4.6
Baynesfield WTW and potable water reservoirs (costs in R/m^3)	
- WTW chemicals	R 0.15
- WTW energy	R 0.25
- WTW maintenance	R 0.33
- WTW staff costs	R 0.30
- Total operation cost	**R 1.03**
Sub-total of activities	**4.6**
Ps & Gs (25% of activity cost)	1.1
Professional fees (12% of activity cost)	0.5
Environmental, landscaping and social costs (5% of activity cost)	1.0
Land acquisition (lump sum)	
Sub-total of activities and value-related costs	**7.3**
Contingencies (25% of above sub-total)	1.8
Implementing agent - Umgeni Water (5% of sub-total)	1.0
Total: Potable water system	**10.1**

1.6 SCOPE OF THIS REPORT

The scope of this report is to highlight institutional and financial aspects impacting on the project so as to assess options available for addressing the issues raised and to make recommendations for sustainable implementation of the project. Due consideration of alternative water supply augmentation options is also given so as to ensure best proposals are developed.

1.6.1 Institutional aspects

a) Development Phase

Based on good understanding of institutional stakeholders and the roles that they can be expected to play along with current understanding of the funding options available, the most suitable arrangement for the development of the project will be proposed. The most notable issues surrounding funding arrangements, relate to affordability or ability of consumers to pay, the financial standing of Water Boards and Municipalities to cross subsidise water supply and meet offtake agreements, DWA budget available for large capital projects, the ability of National Treasury to provide additional budgets or grant funding and the ability of implementing agents to raise loan financing.

b) Operations

It is recognised that the uMWP Phase 1 (uMWP-1) will be part of the integrated Mgeni WSS (which includes inter alia Midmar Dam and Spring Grove Dam) and therefore the management of the scheme must be seen in a systems context. Consideration must therefore be given to the various institutional arrangements available to implement and manage the scheme. Consultation regarding funding and institutional aspects relating to the scheme is crucial and therefore DWA, UW and the key stakeholders, including eThekwini Metro, Msunduzi, Ilembe, Ugu and Umgungundlovu municipalities were engaged in order to gain insights to their concerns and suggestions.

1.6.2 Financial aspects

a) Funding model

A long term funding model needs to be developed in consultation with DWA, UW, eThekwini, and National Treasury considering best practice and precedent created through the implementation of other large capital water projects in South Africa. Capacity for raising off budget (loan) funding through an Implementing Agent such as TCTA also needs to be considered along with various approaches to funding as mentioned above, including DWA or UW's Balance Sheet, National Treasury contributions, private funding or on another utility's balance sheet.

The following factors were also considered in formulating ideas for the preferred funding model:

- The major portion of customers supplied with potable water by UW (e.g. eThekwini, Msunduzi, uMgungundlovu, Ilembe and Ugu municipalities) are tariff sensitive.
- The uMWP will be developed by DWA/UW during the Spring Grove Dam repayment period.
- UW's Balance Sheet is already highly leveraged and therefore the impact of both schemes on the balance sheet must be carefully considered.
- The National Water Infrastructure Agency has not been implemented yet even though it has been approved in principle by Cabinet, and as it may be some time before it is implemented, it has not been included in the possible institutional arrangements for uMWP.

b) Raw Water Tariff

In assessing the feasibility of the project and the implications for UW and Municipalities relating to offtake agreements, the raw water tariff must be determined. The raw water tariff required to repay the scheme (i.e. capital and interest, operations including energy, and maintenance) was determined in accordance with the latest *National Water Pricing Strategy* prescripts for off budget funded (private loan financing) projects, but also in consultation with DWA, UW and National Treasury.

c) Comparison with other augmentation options

The eThekwini Municipality is currently investigating the possible re-use of water from its large wastewater treatment plants (Northern and Kwa Mashu wastewater treatment plants) and UW is also currently investigating the possibility of desalination of sea water to augment water supply to the region. The financial implications of these potential augmentation options on the UW bulk water tariff are also analysed to give perspective to the feasibility of the augmentation options considering the cost of water supplied.

2 IMPLEMENTATION ROLE PLAYERS

The following institutions play a role in the implementation of the uMWP in relation to aspects including: ownership, financing, development (design and construction), management (operation and maintenance) arrangements and as customer:

- The Department of Water Affairs (DWA),
- Implementing Agents;
- National Treasury,
- Umgeni Water, and
- eThekwini Municipality.

The current and possible roles of these institutions are discussed and challenges are raised regarding their role.

2.1 DWA

Chapter 11 of the National Water Act provides the Minister of DWA with the power to establish and operate government waterworks in the public interest out of funds allocated by Parliament or from other sources. Examples of such waterworks include water storage dams and water transfer schemes.

The proposed uMWP-1 will supplement the Mgeni WSS and as such will form an integral component of this strategically important system that provides water to the greater economic important eThekwini Metropolitan area. The project is therefore of national importance.

The DWA, as custodian of the water resources in South Africa, owns the major dams in the Mgeni WSS as well as some dams in neighbouring catchments, including the recently commissioned Spring Grove Dam. Therefore in line with policy and its mandate, the DWA, will own the raw water components of the uMWP-1. The DWA must then ensure that the project is developed, implemented and operated in an integrated way with the rest of the greater Mgeni WSS.

As the Mgeni WSS is supplying water to a metropolitan area which is economically active and strong, and because the Mgeni WSS is currently operating on a cost recovery and financially self-sustainable basis, there is the

potential to recover costs for the development and operation of the scheme from user charges.

The historic volume of water that UW supplies to each Municipality is shown in **Table 2.1** below:

Table 2.1: Umgeni Water Supply

Municipality	2011 kℓ'000	2012 kℓ'000	2013 kℓ'000	2014	
				kℓ'000	%
eThekwini Municipality	310 994	311 434	316 227	327 011	74.4%
Msunduzi Municipality	63 938	64 909	64 668	66 991	15.2%
uMgungundlovu DM	11 112	11 195	14 772	15 052	3.4%
Ilembe DM	11 569	12 514	13 244	14 810	3.4%
Ugu DM	7 923	8 203	9 012	9 890	2.3%
Siza, Harry Gwala and other	9 340	8 740	5 432	5790	1.3%
Total	**414 876**	**416 995**	**423 386**	**439 544**	100%

The bulk of the water sales (75%) is to eThekwini Municipality, which is the economic hub for the region.

A further possible role for DWA is that of Contractor (in-house construction capacity) should the project be funded on-budget. However, the capacity requirements for constructing a project of this magnitude would need to be very carefully considered in light of previous experiences at De Hoop Dam for example. Analysis of the advantages and disadvantages of using DWA's construction team would need to be carried out to confirm that the project could be constructed competitively with the private sector in terms of cost and time to construct, including procurement processes and resourcing.

2.2 IMPLEMENTING AGENTS

The Minister of Water and Environment Affairs in 2008 introduced a Bill to Parliament for the establishment of a National Water Resource Infrastructure Agency (NWRIA). It is expected that NWRIA will be a Schedule 2 Major Public Entity (similar to TCTA) in accordance with Public Finance Management Act 1 of 1999 (PFMA). The *National Water Resource Strategy* requires that the NWRIA be established with sound financial standing and with adequate capacity to operate and perform in accordance with its mandate. As this is not yet in place, it is not regarded possible that the NWRIA will be established in time to plan, fund and implement the uMWP as urgent progress is required to be made from early 2016.

It is shown in this report that the uMWP-1 could be commissioned to supply water from 2023 at best and this will require that construction commence in 2018, thus requiring urgent progress with the appointment of the Implementing Agent in 2016/17 to secure financing and to procure service providers.

Consequently the Minister could direct TCTA to fund and construct the works. TCTA is familiar with the funding and implementation of mega-projects in South Africa and has recently completed the Berg River Project and the MMTS-2 project is nearing completion. TCTA is well established and capable of carrying out the functions of Implementing Agent on behalf of the DWA.

The Minister may direct TCTA to fund and construct the uMWP-1 along the same lines and with similar contractual arrangements to those already applied for projects implemented by TCTA to date. TCTA is able to implement projects funded on-budget with funds from the National Treasury, off-budget through loan financing or a combination of the two. Should TCTA be required to obtain off-budget funding[2] for the DWA raw water components, the financial viability of the project will need to be confirmed to ensure that users are able to afford the tariff required to repay the loans over a 20-year period. TCTA should also be required to provide a cost breakdown of their project management and administration costs so that these can be approved by the Minister and shared with Umgeni Water and the recipient municipalities up front. The Minister will also be required to approve the TCTA's financial model.

2.3 NATIONAL TREASURY

The National Treasury is responsible for managing South Africa's national government finances and allocates budgets to government departments and allocates grant funding. Supporting efficient and sustainable public financial management is fundamental to the promotion of economic development, good governance, social progress and a rising standard of living for all South Africa's citizens. The National Treasury is therefore a key player in determining whether government funds are available for allocation to the uMWP and overseeing the financial affairs of agents of Government.

In order for an Implementing Agent such as TCTA to raise loan financing, National Treasury would need to approve the funding strategy model and

borrowing limit of TCTA, while TCTA's Board will be required to actually approve the loans.

National Government has strategic reasons for accelerating infrastructure development, including the need to stimulate the economy, create employment and to promote socio-economic development and alleviate poverty. A large capital project such as uMWP will achieve all the strategic objectives of government and under circumstances of global economic stagnation, National Treasury might be approached to allocate funds from the fiscus for on-budget funding of portion of the project. However, the fiscus is under pressure with many competing priorities and the National Treasury does not necessarily have surplus funds to finance large infrastructure projects or even portions thereof and therefore the need to utilise off-budget funding and ensure that there is a significant element of 'the user must pay".

As will be shown in **Section 3,** household income for a large portion of the community in the service area of the Mgeni WSS is low resulting in about 25% of water users being regarded as indigent and unable to pay for services. This raises the possibility of the need for government financing of portion of the capital costs to make the water tariff more affordable. This matter is addressed in later sections of this report.

The availability of possible co-financing from the fiscus is therefore a crucial element in the evaluation of the financial viability of the project and the development of the financial model for the project and therefore the role of the National Treasury is crucial, at least in the initial planning phase and decision making regarding institutional mechanisms and funding models.

2.4 UMGENI WATER

UW is a National Government Business Enterprise according to the Public Finance Management Act (PFMA) Schedule 3B and is instituted as a water board in terms of the Water Services Act. UW was established in 1974 to provide water services to water service institutions (municipalities) in its service area. UW gets its mandate from the Water Services Act of 1997. UW currently operates a number of dams under contract to the DWA and in accordance with system operating rules modelled by the DWA.

UW and its customers (municipalities listed in the supply area of the Mgeni WSS) will be the only beneficiaries of water transfers from the uMWP. The current and future extended supply area of Umgeni Water is shown in **Figure 2.1**.

The proposal is that UW will treat the raw water received from the Smithfield Dam at Baynesfield in the uMlaza valley and transfer the bulk water into the Mgeni WSS to supply the municipalities of eThekwini, Msunduzi and those smaller municipalities along the North and South Coast of KZN.

In the absence of any other option, UW would be contracted by the DWA to implement the potable water supply component of the uMWP-1 as part of the extended Mgeni WSS and to operate the whole uMWP-1 (raw and potable components).

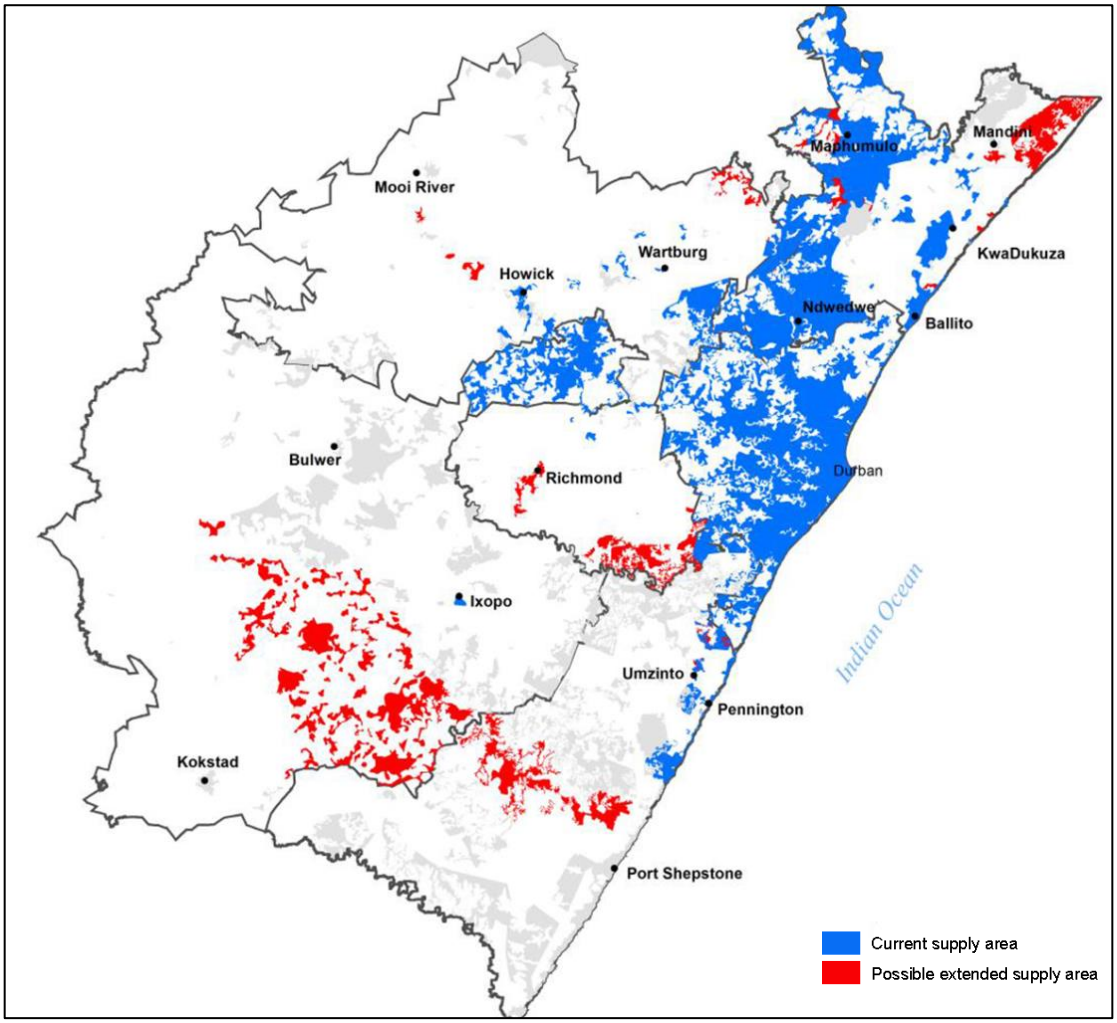

Figure 2.1: Umgeni Water area of jurisdiction

It is the intention of the current Minister of DWA to increase the role of water boards and expand their services into Regional Water Utilities (RWU) as

proposed in the Institutional Reform (IR) policy and adopted in the NWRS-2. This could entail extending their role into financing large water infrastructure projects but the strength of the UW balance sheet is not necessarily adequate for securing major loans.

In essence, it is understood that water boards will remain responsible for regional bulk water supply schemes with an expanded footprint, and that they will be more responsible for supporting underperforming and less-capacitated municipalities, rather than that they develop into an implementing agent such as TCTA.

The capacity and expertise required to implement projects of the size of uMWP-1 (approximately R 16 billion) is considerable and the intention should not be to create capacity in institutions that would duplicate that already existing in an implementing agent such as TCTA. UW will, however, almost certainly remain responsible for owning, funding, implementing and operating the water treatment works and bulk distribution system for water supply to the municipal reservoirs.

The volume of bulk water sold by UW during the 2012 financial year was 417 million m³/a (1 142 Mℓ/day), of which about 400 million m³/a is sourced from the Mgeni WSS.

UW's bulk water tariff for the 2013 financial year was R 3.901/kℓ and the bulk tariff for sales to eThekwini Municipality was R 3.825/kℓ. The capital unit charge for Spring Grove Dam was R 0.408/kℓ.

The summary statement of income for UW and their balance sheet is shown in the tables below

Table 2.2: Umgeni Water: Statement of Comprehensive Income for the year ended 30 June 2012

Components	R'000
Revenue	1 847 151
Cost of sales	856 808
Gross Surplus	**990 343**
Other income	52 109
Other Operating and admin expenses	469 197
Surplus from operations	**573 255**
Net Finance Income	15 546
Profit from associate	2 531
Surplus for the year	**591 332**

** Included in cost of sales is raw water of R 150.6 million*

Table 2.3: Umgeni Water: Statement of Financial Position for the year ended 30 June 2012

	R'000
ASSETS	
Non–current assets	3 143 293
Assets for sale	13 500
Current assets	2 031 854
Total assets	**5 188 647**
EQUITY AND LIABILITIES	
Capital and reserves	3 107 777
Non-current liabilities	1 461 073
Current liabilities	619 797
Total equity and liabilities	**5 188 647**

UW, as owner of the potable water components, will raise funding for its own infrastructure and the financing that they can leverage will depend on the strength of their balance sheet and the level of income that can be generated from the financed components to redeem loans. Thus it is foreseen that the raw water and potable components will be financed separately by TCTA and UW based on their own balance sheets and offtake agreements.

2.5 eTHEKWINI MUNICIPALITY

eThekwini Metropolitan Municipality was created in 2000 and is the largest of the 11 districts of KwaZulu-Natal Province. eThekwini Municipality used 311 million m³ of water out of the total 417 million m³ sold by UW in 2012, which is 75%.

The future economic development of the eThekwini Municipality and by implication the region as a whole, is strongly influenced by access to adequate and reliable water supply. The financial viability of the uMWP-1 is then dependent on the amount of sales of water to eThekwini Municipality as the major water user, which is then a function of the affordability of water (tariffs) and level of cost recovery.

As key customer, eThekwini Municipality will accordingly be a key role player in decision-making relating to the planning and implementation of the uMWP-1, as the funding model is sensitive to end-user tariffs and implications relating to supply and demand.

Due to the increasing cost of water and the impact that rising costs has on the end-users ability to pay, the eThekwini Municipality must consider all its options and be open to alternatives for augmenting water supply. Viable alternatives can help defer the implementation of the uMWP-1 while the lack of alternatives will enhance the need to execute the uMWP-1 as a priority for the region.

Other sources of water include:

(i) continuation of the comprehensive water conservation and demand management (WC/WDM) strategy which is already being implemented and will enhance the efficient use of current water supply and defer the use of costly water supply from new sources,

(ii) the direct potable re-use of waste water from eThekwini's major waste water treatment plants (WwTW),

(iii) the desalination of sea water which could defer the implementation of the uMWP-1 and which is being investigated by UW for the North and South Coast areas and possibly also for eThekwini Municipality.

The options are covered in **Appendix F** and summary cost information is provided in **Section 3.4**. The DWA could consider such augmentation projects to be part of the regional water supply system and incorporate them as government waterworks.

However, the eThekwini Municipality strongly supports the development of the uMWP-1 as long-term augmentation scheme to the municipality, and currently does not pursue direct re-use as an alternative augmentation option (refer to relevant communication in **Appendix G**).

The Municipality is committed to the uMWP and requested that any holdups, as was experience with the signing of off-take agreements for Spring Grove, should be avoided.

eThekwini Municipality also requested grant funding from National Treasury for at least 25 % of the Capital Expenditure *in lieu* of an increase in the Equitable share.

3 FINANCIAL AND INSTITUTIONAL CONSIDERATIONS FOR THE RAW WATER COMPONENT OF THE uMWP-1

3.1 HOUSEHOLD INCOME AND ABILITY TO PAY FOR WATER

The Census 2011 provides data on the household income for the various municipalities that are supplied with water by UW.

Table 3.1: Household income in the supply area (Census 2011)

	Total number of households apportioned to the Mgeni WSS area	Number of households with annual household income below and equal to R 38 400 per annum	Number of households with annual household income above R 38 400 per annum
P5D01: Ugu (DC21)	179 436	132 113	47 323
P5D02: UMgungundlovu (DC22)	272 670	177 583	95 087
P5D09: iLembe (DC29)	157 697	117 957	39 740
P5D11: eThekwini (ETH)	956 710	560 773	395 937
Total	**1 566 513**	**988 426**	**578 087**
	100%	**63%**	**37%**

In recognition of the primary importance of having a clean and adequate water supply for all citizens, DWA introduced the Free Basic Water Policy in 2000, which allows for every household to get 6kℓ of water per month at no cost. This is calculated at 25 ℓ/c/d for a family of eight.

While it is the intention of the DWA Policy to ensure that only indigents (defined as the impoverished experienced extreme poverty) are actually provided with free basic water, households with an income of less than R 38 400 per annum or an equivalent R 3 200 per month are for the benefits of this study, regarded as low income and unlikely to be able to pay for the full cost of water. In some instance portions of communities are able to make contributions to only O&M costs while others can afford to pay the full cost of water. Thus there is a need for support from government to pay for basic levels of water supply through the Equitable Share Fund and then for cross-subsidisation by users that can pay.

As the Mgeni WSS must be seen as an integrated system, there needs to be appreciation for the total cost of providing water throughout the greater Mgeni WSS and which will increase due to the cost of developing the uMWP-1, and the need for a system tariff.

While there is a current system tariff for water which is paid for by those consumers that can pay and is subsidised by Government through the ***Equitable Share*** (paid by National Treasury to Municipalities in accordance with the level of indigent in the Municipality), this system tariff will increase due to the uMWP-1 but the amount of consumers that can pay will not necessarily increase and there will also not be an increase in ***Equitable Share*** contribution from National Treasury. Therefore there is an expected cost burden which will be experienced initially until the percentage of consumers that can pay grows significantly and this initial burden needs to be carried or absorbed without impacting too significantly on current consumers. The impact of 'water demand price elasticity' also needs to be considered in that as the price of water increases so the per capita demand for water will reduce until consumers habits return or their affordability status changes.

For the purposes of this study, a scenario that has been assumed is that a low income household uses 60 ℓ/c/d and that there are 5 persons per household resulting in a household use 9 kℓ/month. This is the same monthly volume of water that the City of eThekwini provides free (reference to text box below) to households registered at a property value of less than R 250 000. The 988 426 households earning less than R3 200 per month are then determined to use 106 million m^3/annum water, which is 25.6% of the total Mgeni WSS demand of 414 million m^3/annum in 2011.

eThekwini Municipality Free Basic Water

The policy in respect of free water was amended by Council resolution applicable from 1 July 2012.

a. No charge for the supply of water is raised for domestic residential customers for the first 9 kl of water per month for those customers:

i. With a full pressure connection where the property value is less than or equal to R 250 000 or

ii. With a water supply via a low pressure roof tank

All other domestic residential customers will be charged for the volume of water supplied at the tariff rate.

b. All water supplied via a standpipe is free of charge (standpipes are installed subject to the conditions in section 4.6.5 of the resolution).

It can then be argued that about 25% of the total supply from the Mgeni WSS should be regarded as “social water supply” and that the equivalent portion of the cost of supplying water (system cost) should then be subsidised by government to accommodate the low income households in the Mgeni WSS. The mechanism for funding this amount then needs to be determined based on the funds available from the fiscus and could be either through additional budget allocation to DWA for capital expenditure or through special grant allocation to the project. A change in the ***Equitable Share Fund*** allocation to these affected municipalities (eThekwini, Msunduzi and uMgungundlovu, iLembe and Ugu DMs) could be counter argued as then being inequitable distribution compared to all other municipalities in the country.

3.2 GOVERNMENT POLICY CONSIDERATIONS

As DWA is custodian of the country’s water resources, Government Policy has a direct impact on the implementation of water resource development and raw bulk water supply projects. While policy clearly guides institutional arrangements for large water projects, financial arrangements are not so clear cut and are influenced by a combination of policy, availability of government budgets and political imperatives at the time of implementing the projects.

There are a few matters related to policy and government practice that must be considered when addressing the financial arrangements for the implementation of the uMWP-1.

Firstly there is the matter of the National Water Act (NWA) of 1988. The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors: promoting equitable access to water; redressing the results of past racial and gender discrimination; promoting the efficient, sustainable and beneficial use of water in the public interest; facilitating social and economic development; protecting aquatic and associated ecosystems and their biological diversity; meeting international obligations.

Secondly, there is the DWA Raw Water Pricing Strategy which was gazetted by the Minister of DWA on 16 March 2007 to govern water use charges. The document sets the strategy for implementing practices based on the principle of ‘the user must pay’ but at the same time addressing efficiencies and imbalances of the past relating to access to water supply.

Section 7.1 of the *Pricing Strategy* provides that "State funding will in the future be confined mostly to social water resource development or betterment projects, which conform to the purpose, set out in Section 2 of the NWA of 1998 and where the demand is not driven by specific commercial water users or sectors". It goes further to say that "New infrastructure development or betterment may have a social as well as a commercial component in which case State funding and related charges will apply on the social component, while loan funding and related charges will apply on the commercial component." ***This strategy thus explicitly supports the concept of allocating State Funding to the social component of the water supply.***

The Raw Pricing Strategy and its reference to the NWA provides directive for the allocation State Funding to the "social component" of the water demand.

Social equity is where water use charges coupled to the granting of financial assistance will contribute to social equity and redress the imbalances of the past with respect to equitable access to water supply services. In order to ensure financial sustainability adequate revenue must be generated to fund the annual cost related to the management of the water resources, the operations, maintenance and refurbishment of existing water schemes and the development of augmentation schemes. The full financial cost of water resource management and supplying water should be recovered from water users, including the cost of capital. Water must be priced at levels consistent with efficient and effective delivery of services. This approach may be phased in by taking account of constraints of various sectors to adapt quickly to price increases.

The pricing of water may include targeted subsidies which will be transparent and put in place to serve specific national objectives such as redress, equity and poverty eradication.

Thirdly, there is the matter of precedent which is established through the previous implementation of other large bulk water supply schemes including LHWP, Berg Water Project, MMTS2, ORWRP and MCWAP etc. With each project decisions are made regarding the status and intention of the project and the levels of social and commercial / economic benefits to be derived from the project.

Institutional and funding arrangements for the LHWP are unique in that it is based upon a treaty between South Africa and Lesotho and therefore cannot be considered as precedent for water supply schemes implemented within South Africa.

For the Berg River and MMTS2 projects, it was deemed that the customer / end user has the economic and financial capacity to pay the tariff for full funding of the scheme through off-budget financing and that Municipalities are able to cross-subsidise water tariffs with the support of the Equitable Share Fund. Additional project specific grant funding from National Treasury to support the financing of the projects was therefore not provided for these projects. The projects are fully funded by TCTA by raising capital on the bond market and TCTA then recovers its capital disbursements, finance costs and administrative overheads by applying a surcharge on the respective system tariffs. These costs are then passed on to the end user who pays after being processed through the Water Board and Municipality. (See document in **Appendix E**: Request for approval that implementation of Phase-2 of the Mooi-Mgeni Transfer Scheme (MMTS-2) be funded off-budget.)

For other projects, if grant funding has been allocated then it has been on the merits of the project decided at the time of implementation by the DWA Minister.

3.3 FINANCIAL IMPLICATIONS OF THE UMKHOMAZI SCHEME PHASE 1

The uMWP-1 will cost in the order of R16.4 billion (2014 Rand), of which R 12.8 billion will be required for the raw water infrastructure and R 3.6 billion for the bulk potable water infrastructure (refer **Table 1.1)**.

If the uMWP-1 is to be fully funded by private sector debt funding, and

- If the capital debt is to be redeemed over a 20 year period at a real interest rate of 3.83% from first water delivery in 2023, and
- If the debt and operating costs of both the raw and potable water component were to be recovered across all of Umgeni Water's bulk potable sales, and
- if the benefits of power generation are to be ignored;

Then UW's bulk potable tariff will need to be increased by a constant real surcharge of R 2.70/kℓ (2014 Rand) or R 4.57/kℓ (2023 Rand), of which R 1.88/kℓ (2014 Rand) would be for the raw water component.

The possible tariff increase of R 2.70/kℓ (2014 Rand) should then be compared to UW's current 2013/2014 financial year bulk potable tariff of R 4.55/kℓ which includes a charge for Spring Grove Dam of R 0.408/kℓ. This will equate to a 59,3% increase.

The impact of the uMWP-1 on the UW bulk potable tariff and the municipal tariffs should then be compared with that of other large water boards and metropolitan areas.

Table 3.2: Comparison of the tariffs in large Metropolitan Areas (2013/14)

Raw Water Source	Bulk Water Supplier	Municipality	Raw Water Use Charge R/kℓ	Average Water Board Charge R/kℓ	Retail Metro Tariffs# R/kℓ	Retail Sanitation Tariff# R/kℓ
Upper Vaal	Rand Water	City of Tshwane	2.66	5.50	15.35	R 4.17
		Johannesburg Water	2.66	5.50	16.86	R 7.03
Welbedacht, Knellpoort etc.	Bloem Water	City of Mangaung	0.17	4.37		
Berg River	None	City of Cape Town	0.48	None	17.20	R 10.89
Kouga Dam	None	Nelson Mandela Bay	0.90	None	10.56	R 6.01
Mgeni WSS + Spring Grove Surcharge	**Umgeni Water**	**City of eThekwini**	**0.76**	**4.55**	**18.66**	**R 5.03**
uMWP$	Umgeni Water	City of eThekwini	1.88*	2.70*	2.70*	
Mgeni WSS + uMWP	**Umgeni Water**	**City of eThekwini**	**2.64**	**7.25**	**21.36**	**R 5.03**

* *Allows 6% inflation from base date of 2013 to financial year 2013/14.*

\# *Band of users between 25 kℓ - 30 kℓ*

$ *No subsidy*

From the **Table 3.2** it can be seen that the current 2013/14 UW bulk potable water tariff of R 4.55 /kℓ is just below the Rand Water tariff of R 5.50/kℓ. However the eThekwini retail tariff for the 25 kℓ to 30 kℓ tariff block of R 18.66 is already more expensive than the tariff charged by the City of Tshwane, City of Johannesburg and City of Cape Town.

If the full cost of the uMWP-1 is to be passed on to the consumer then the 2013/14 UW Tariff would increase from R 4.55/kℓ to R 7.25/kℓ and the eThekwini retail tariff for the 25 kℓ to 30 kℓ tariff block would increase from R 18.66 to R 21.36, resulting in the most expensive large water board bulk potable tariff and Metropolitan retail tariff in the country.

Note that this financial analysis is based on the feasibility design. The appointed Implementing Agent (e.g. TCTA), will propose its own funding strategy and this will have an impact on the model and resultant tariffs.

3.4 BULK POTABLE TARIFF IMPLICATIONS OF THE RE-USE, DESALINATION AND UMWP COMBINED SCENARIOS

The uMWP-1 is proposed to be commissioned for the supply of water in 2023, which means that the region could be at high risk of water shortages until then. Alternative augmentation options including sea water desalination and re-use have therefore been identified through studies such as the *KwaZulu-Natal Coastal Metropolitan Areas Reconciliation Strategy*. The desalination and re-use options are being investigated at feasibility level UW and eThekwini Municipality respectively and details pertaining to these options are provided in **Appendix F.**

Assuming that the identified alternative augmentation options of desalination and re-use of water are to be fully funded off budget through private sector debt funding by UW and/or eThekwini and:

- if the capital debt is to be redeemed over a 20 year period at a real interest rate of 3.83% from first water delivery of the first phase and until 20 years beyond the first delivery of the last phase, and
- if the debt and operating costs of both the raw water component and the treatment plants were to be recovered over all of UW's bulk potable sales,
- and if there are no subsidies and if the benefits of power generation are to be ignored,
- then UW's bulk potable tariff would need to be increased as shown in the table below:

Table 3.3: UW's bulk potable tariff increases for the various development scenarios

Scenarios*	Increase in UW Tariff	
	2014 Rands R/kℓ	2023 Rands R/kℓ
Scenario 1: • uMWP delivering 2023; **Cost Recovery and Repayment 2023 to 2042**	R 2.70	R 4.57
Scenario 2: • Desalination delivering 2019 • uMWP delivering 2023 **Cost Recovery and Repayment 2019 to 2042**	R 3.27	R 5.52

Scenarios*	Increase in UW Tariff	
	2014 Rands R/kℓ	2023 Rands R/kℓ
Scenario 3: • Re-use delivering in 2019 • Desalination delivering in 2023 • uMWP delivering 2027 **Cost Recovery and Repayment 2019 to 2046**	R 3.26	R 5.51

* *Cost recovery is determined by the dates that the various phases first deliver water*

While the above are realistic and practical funding and repayment scenarios, the results do not give a fair comparison of the burden on UW or of the consumers, because the repayment periods commence on first water delivery of the first phase and end 20 years after the first water delivery of the last phase.

A relative cost comparison should assume that all repayment periods are equal. The comparison below assumes that all costs are repaid over the period 2023 to 2042, regardless of how early the first phase is or how late the last phase can be postponed to.

Table 3.4: Bulk Potable Water tariff implications of the various augmentation scenarios

Scenarios	Increase in Umgeni Tariff	
	2014 Rands R/kℓ	2023 Rands R/kℓ
Scenario 1: • uMWP delivering 2023; **Cost recovery 2023 to 2042**	R 2.70	R 4.57
Scenario 2: • Desalination delivering 2019 • uMWP delivering 2023 **Cost recovery 2023 to 2042**	R 4.11	R 6.94
Scenario 3: • Re-use delivering in 2019 • Desalination delivering in 2023 • uMWP delivering 2027 **Cost recovery 2023 to 2042**	R 4.40	R 7.43

* *Cost recovery occurs between 2023 and 2042 regardless of date of the implementation of each phase.*

From **Table 3.4** it can be seen that the implementation of sea water desalination and waste water reclamation and re-use have a substantial impact on the Umgeni Water tariff.

However, the implementation of either of these alternative augmentation options has the advantage of addressing the risk of a shortfall of water supply during the period 2019 to 2023, should the UW and/or eThekwini be able to implement the projects in time.

3.5 POSSIBLE FUNDING OPTIONS

The following possible funding options are considered:

- Option 1: On-budget funding for the raw water component
- Option 2: Off-budget funding by Implementing Agent (e.g. TCTA)
- Option 3: Off-budget funding by Umgeni Water

3.5.1 Option 1: On-budget funding for the raw water component

On-budget funding may be an option to fully or partially fund the raw water works. It is assumed that the potable water component will not have any on-budget financing. However, precedent and policy shows that it will not be fully funded.

Section 7.1 of the Pricing Strategy for Raw Water Use Charges gazetted by the Minister on 16 March 2007 provides that State funding will in the future be confined mostly to social water resource development or betterment projects, which conform to the purpose, set out in section 2 of the NWA, 1998 and where the demand is not driven by specific commercial water users or sectors.

It is acknowledged that the availability of funding from National Treasury is likely to be even more restricted at the time of the implementation of the uMWP (currently scheduled for year 2018 to year 2022) with the many competing demands for infrastructure funding, including those from the energy sector, and private sector involvement in the funding and implementation might be viewed more favourably at that time.

If only the “social component” of the works (refer to **Section 3.1**) is funded on-budget (say 25% of the capital cost), then the remainder of the funding requirement (75% of the capital cost) would need to be raised off-budget, and would then be the same as in Options 2, 3 and 4 below.

National Treasury would then be partially funding the works as a government water works and the works could be constructed by either the DWA or TCTA (or the NWIA if it has been established in time. The UW or the DWA could operate the government works.

The DWA would then charge UW a raw water tariff based on the National Water Pricing Strategy stipulations for a Government Funded works. The UW would then treat, distribute and sell the water together with other Mgeni WSS's water at a weighted average systems bulk potable tariff, and recover the raw water tariff through the bulk water tariff to the relevant municipalities.

The DWA could potentially implement the project through their in-house construction team. However, the capacity requirements for managing a project of this magnitude would need to be considered, and care would need to be taken that the in-house option does not cost more than a competitively tendered option, or is delayed due to onerous internal supply chain processes.

If 25% of the capital costs of the scheme were to be subsidised through a capital grant and if the balance of 75% of the capital costs were to be funded by private sector debt funding, then UW's bulk potable tariff would need to be increased by a constant real amount of R 2.12/kℓ in 2014 Rand (shown in line 2 in **Table 3.5**).

If, however, National Treasury subsidised 25% of the capital costs of the scheme and the tariff was phased in from 2018, that is at the commencement of construction, and if the project is repaid over 25 years from first water delivery, i.e. until 2047, then Umgeni Water's bulk potable tariff would need to be increased by a constant real amount of 1.60/kl in 2014 Rand (shown in line 4 in **Table 3.5**). This option may not be acceptable to financial institutions as TCTA has confirmed that the norm accepted by the financial institutions is that capital loans or bonds of this type are repaid over a 20 year period and that any change to this norm will need to be very well motivated.

The impact of the various subsidy and phasing arrangements on the Mgeni WSS bulk potable tariff are shown in the table below:

Table 3.5: Bulk Potable Water tariff implications of the various subsidy and phasing scenarios

Funding arrangements	Increase in Umgeni Tariff	
	2014 Rands R/kℓ	2023 Rands R/kℓ
1. uMWP-1 redeemed over 20 years from 2023; No subsidy.	R 2.70	R 4.57
2. uMWP-1 redeemed over 20 years from 2023; 25% Capital grant subsidy.	R 2.12	R 3.58

Funding arrangements	Increase in Umgeni Tariff	
	2014 Rands R/kℓ	2023 Rands R/kℓ
3. uMWP-1 redeemed over 25 years from 2023; 25% Capital grant subsidy.	R 1.86	R 3.15
4. uMWP-1 redeemed over 25 years from 2023; but phased in over the prior 5 years from 2018; 25% Capital grant subsidy.	R 1.60	R 2.71
5. uMWP-1 (raw water component only) redeemed over 20 years from 2023; No subsidy.	R 1.88	R 3.18

The impact of the tariff increase can be mitigated by accessing capital grant funding, lengthening the capital repayment period, and by phasing in the tariff increase before the project is commissioned.

Phasing in the tariff increase prior to commissioning is not too problematic as long as the project construction has commenced and there are loans to be redeemed. However, phasing in the tariff increase prior to the raising of any funding requires a secure arrangement whereby the surplus funds can be earmarked for loan repayment, otherwise there is a risk that the surplus funds or pre-financing will be used for other purposes.

3.5.2 Option 2: Off-budget funding by an Implementing Agent

Two implementing agent options are available for off-budget funding and are TCTA or UW but the finances of UW would be stressed.

The required funding would be raised against the security of the off-take agreements from the Mgeni WSS users to secure a revenue stream to repay the loans. It has been accepted as reasonable practice if 85% of the off-take agreements for the water requirements for the IA to proceed with financing.

The following reflects the off-budget approach considering precedent of the MMTS2 and Berg Water Project and with the TCTA as IA (a similar approach would be adopted if the IA were to be UW):

- The Minister directs the TCTA to fund and develop the uMWP raw water components as a government water works and as part of the Mgeni WSS;
- The DWA signs an off-take agreement with UW and simultaneously signs a back-to-back Implementation Agreement with TCTA committing tariffs receivable from the off-takers to TCTA to service the loans. Ideally such

agreements would be signed regardless of the source of funding, but in the past off-take agreements have only been entered into where TCTA is the funder;

- TCTA raises funds in the bond market against the security of the committed revenue stream,
- TCTA facilitates and oversees the design and implementation of the works;
- The DWA charges UW which in turn charges their off-takers a raw water tariff which is used to redeem the TCTA allocated debt over a period of 20 years;
- UW is mandated to operate and maintain the works under systems analysis based operating rules prepared by the DWA; and
- UW treats, distributes and sells the water together with the other Mgeni Water Supply Schemes with a weighted average systems bulk potable tariff.

3.5.3 Option 3: Alternative service delivery mechanisms

While the previous sections have covered some options for off-budget through Implementing Agents, it is appropriate to consider other options available for service delivery. More and more infrastructure projects in Africa are being developed through alternative service delivery mechanisms.

One of the most important reasons for considering alternative forms of service delivery is *fiscal stress* (limited government budgets and competing priorities) combined with the need to continue to deliver essential services in an efficient manner. Public services and public utilities are capital intensive and so Government is faced with the lack of sources to finance capital projects. Typically capital and operational costs can be recovered for the life time of the project and therefore private financing could be government projects.

Use of the private sector provides opportunity to improve the efficiency of service delivery, through alternative mechanisms for providing financing and capacity to implement.

There are four main role players in service delivery; including the (i) Client who is responsible for the service (ii) the financing organization (iii) the service provider and (iv) the consumer or customer. The Client has the legal responsibility to ensure the appropriate level of services within its jurisdiction and this is not necessarily the financier or the provider.

The Client is accountable for the service and creates the required regulatory environment for the service and defining standards and procedures. The service provider is responsible for delivering the service to the consumer for the Client.

Alternative service delivery mechanisms provide for various roles and combinations of these four players. There are many techniques and forms for how the service can be provided to the customer. Private Public Partnerships carry many forms and go under various names including Build, Operate and Transfer (BOT), DBOM (Design, Build, Operate and Maintain) and FDBOM which includes financing etc. (Note that acronyms differ depending on terminology eg FDCO is Finance, Design, Construct and Operate).

Typically these mechanisms are used to implement infrastructure projects because of the revenues they generate through user charges. The finance is then procured through a special purpose private sector entity.

A possible contractual and institutional arrangement for a typical mechanism is shown in **Figure 3.1**.

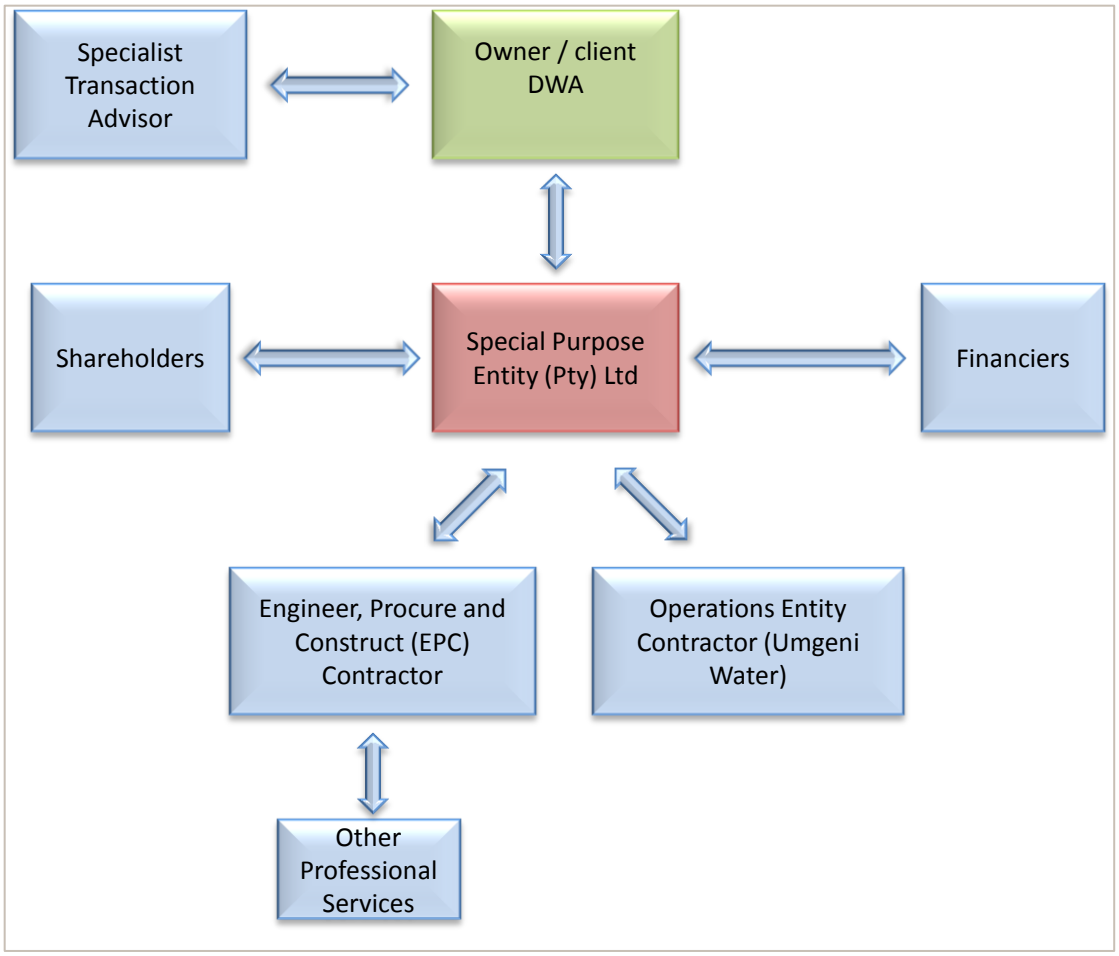

Figure 3.1: Alternative delivery mechanism

In this model, the DWA is Owner or Project Sponsor and DWA could be assisted by a Specialist Transaction Advisor. A Special Purpose Entity (a separate company) would be established for the securing of finance and to implement the design and construction of the project. The DWA, would provide the requirements for the implementation of the project and this would be managed by the Transaction Advisor as support to the DWA.

Advantages and disadvantages

An alternative delivery model was initially considered for the Berg Water Project and the procurement of a transaction advisor was initiated. However, the DWA decided at that time that the private sector ownership of national water infrastructure, even for only the stipulated period of say 20 years, was not compatible with its national water policy and decided to appoint TCTA as the implementing agent instead.

During the recent formulation of the National Water Resource Strategy, this approach was confirmed and policy has been adopted that no component of the national water resource infrastructure will be owned by the private sector.

Revisiting this to allow for possible private sector involvement would require a shift in policy to one that is more aligned with the National Development Plan and one that is more prepared to make full use of the funding and skills capacity of the private sector, much in the same way that the energy sector is now providing space for independent power producers.

The DWA also does not have experience in implementing projects through such mechanisms and therefore there could be protracted delays during procurement and negotiation stages.

The possible advantages are:

- Funding arranged by a private sector entity through a competitive process in order to obtain competitive rates.
- The design and construction risks are vested in a contractor.
- Efficient project implementation due to private sector profit motive.
- The possibility of shorter lead times.

The overriding criterion is that an alternative private sector mechanism is currently not DWA policy, nor is the DWA geared for this process at this time.

There is however potential for the involvement of the private sector in the possible generation of hydropower under the project and is briefly introduced in the next section.

3.5.4 Independent Power Producers for hydropower development

There is potential for the development of hydropower at Smithfield Dam and Impendle Dam, and possibly also in the transfer tunnels. The study recommends that provision be made to develop the hydropower potential of the dams and tunnel and that this hydropower potential be made available to an Independent Power Producer in accordance with Eskom policy.

DWA does not see hydropower generation as part of their mandate and currently, neither the policy on hydropower nor the use of DWA infrastructure for hydropower generation, have been approved. However, with current focus in South Africa on the need to develop renewable energy, the policy will be under scrutiny and may change. It is, however, possible for DWA to allow UW or TCTA to grant permission to an Independent Power Producer (IPP) to access the infrastructure in order to develop the hydropower potential. Alternatively, DWA could lease the hydropower potential of its dams to Independent Power Producers (IPPs). This is similar to the approach currently being adopted by Eskom with its IPP's.

It is therefore recommended that the uMWP-1 be designed to accommodate the possible inclusion of hydropower plants.

4 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations regarding the institutional arrangements and funding aspects are provided.

4.1 INSTITUTIONAL ARRANGEMENTS

Based on consultations that have been held with officials at UW, TCTA, eThekwini MM, Ilembe DM, Msunduzi LM, Ugu DM, Ingwe LM, National Treasury, and with senior DWA officials during the course of this feasibility study, and accepting that the NWIA will not be established in time to implement the uMWP, it is recommended that the TCTA would be appointed as IA for the Raw water component of the uMWP. It is further recommended that the UW should be the IA for the Potable water component.

TCTA as implementing agent is an attractive option as it is well established, has a good track record of implementing large projects and can secure financing at competitive rates. Financiers may perceived there to be 'an implied government guarantee' for the projects, as TCTA is a Public Entity with DWA being its only shareholder. TCTA is accordingly able to borrow money at more competitive rates than a similarly leveraged private sector entity, which National Treasury carrying contingent liability.

The recommended institutional arrangement is then shown in **Figure 5.1**.

Key further steps in the process towards implementation of the uMWP include:

- Further consultations with the Implementing Agents; TCTA for Raw water and UW for Potable water to get agreement on the way forward.
- TCTA should be requested to develop a funding and cost recovery plan for approval by the Minister. This plan should reflect all costs, including a breakdown of their project management and administration costs, and the costs of raising and managing the private sector debt funding, as well as a tariff model to be used as a basis for further consultation.
- As the responsible water board having jurisdiction in the area, UW should be responsible for implementing the bulk potable water component, through private sector loans on its balance sheet.

4.2 FUNDING ASPECTS

It has been shown that what differentiates the uMWP-1 from other projects is that the additional supply to be provided by uMWP-1 is in the order of 50% of the current demand and the resulting short term increase to the UW Bulk Potable Tariff will increase by approximately 50%, which is substantial and raises affordability concerns.

The raw water component of the uMWP-1 could be funded off-budget and in total using private sector debt funding. This results in the highest cost scenario for the end user. The costs of the full uMWP-1 will then be recovered out of the Umgeni Water bulk water sales. Consideration could be given to phasing in the tariff before the date of first water delivery (2023), as doing so would substantially reduce the tariff in real terms. However, the tariffs remain high.

In order to reduce the cost burden and help subsidise the supply of water to indigent, the raw water component of Phase 1 could be partly funded on-budget by National Treasury which would reduce the impact on UW's tariff and would give recognition to the social water supplied to the low income households.

There is strong motivation based on household income and the cost of the project, that 25% of the water supplied from the uMWP should be declared "social water". Accordingly, the raw water component of uMWP-1 could be funded partially on-budget (approximately 25%) by National Treasury with the balance of 75% being funded through private sector debt funding. The grant funding would reduce the impact on Umgeni Water's tariff.

National Treasury has indicated that they may find it difficult to provide a capital grant of this size in the current economic climate. National Treasury did raise the possibility of providing an increased Equitable Share to at least some of the municipalities being supplied out of the uMWP-1 in order to subsidize the tariff increase rather than funding portion of the capital expenditure. This option is however not preferred by the recipient municipalities who perceive a once off capital grant to be a cleaner option. There is also the possibility that concerns would be raised that the "equitable share fund' is no longer equitable as some municipalities would get greater funding for improved infrastructure.

As DWA has confirmed that the uMWP needs to be implemented as a priority project, the crucial next steps towards implementation of the uMWP are as follows:

i. Appointment of TCTA as the Implementing Agent by the Minister for DWA for the uMWP Raw water component,

ii. Determination of the availability of funds for National Treasury for subsidisation of the costs of the project through grant funding,

iii. Development of the financial models for the raw water and potable water components by TCTA and UW respectively,

iv. Finalise off-take agreements with Water Service Authorities that constitute 85% of the current water users, by September 2017,

v. Formulation of a procurement strategy and programme for the implementation of the uMWP-1 by TCTA and UW to ensure an integrated approach towards timeous completion of the project in 2023, and

vi. Appointment of UW as operator for the whole uMWP (raw and potable water components).

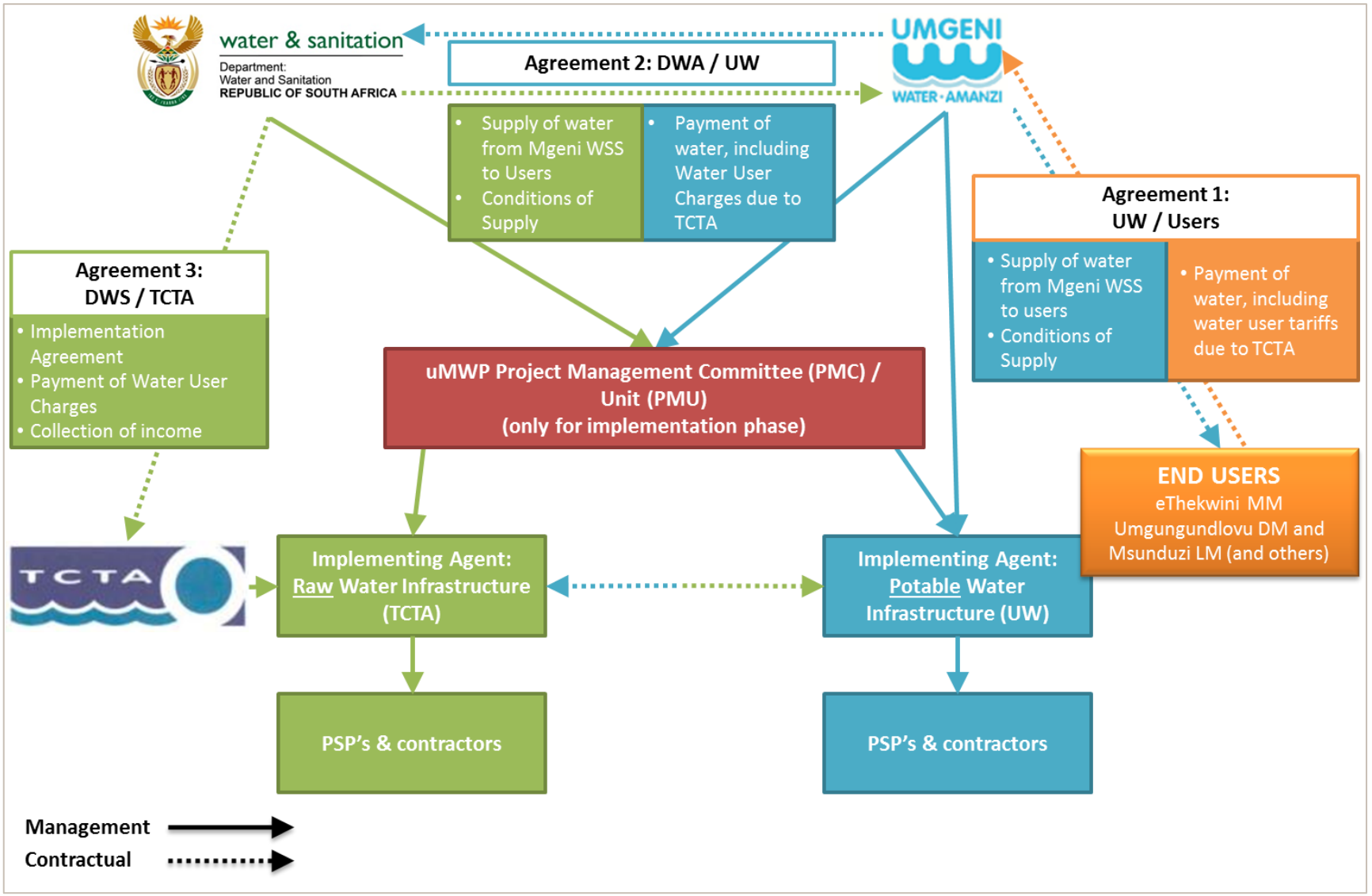

Figure 4.1: Recommended institutional arrangements

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Appendix A

Calculations: Capital and Operating Costs of Augmentation Options

Table A.1: Capital and operating costs of uMWP-1

Component	Capital cost (R million)	Annual operating percent (%)	Annual operating cost (R million)	Refurbishment percent (%)	Refurbishment cost after 25 years (R million)
Raw water system activities (incl. miscellaneous)					
Smithfield Dam	2 018	0.25%	5.0	7%	141.246
uMkhomazi-uMlazi tunnel	3 901	0.125%	4.9	7%	273.084
Langa Dam	439	0.25%	1.1	7%	30.716
Tunnel-Langa Dam-Baynesfield Pipeline	365	0.25%	0.9	30%	109.56
Transmission lines	5	0.40%	0.0	25%	1.325
Smithfield Dam and Baynesfield hydropower plants	Nil*	Nil*	-		
Waste disposal sites	15	0.25%	0.0	0%	0
Flow gauging stations	30	0.25%	0.1	10%	3.02
Roads and bridges	232	0.25%	0.6	7%	16.24
Sub-total of activities	**7 005**		**12.6**		**575.2**
Ps & Gs (25% of activity cost)	1 751		3.2		143.8
Professional fees (12% of activity cost)	841		1.5		69.0
Environmental, landscaping and social costs (lump sum)	450	0.40%	1.8		0.0
Land acquisition (lump sum)	37				
Sub-total of activities and value-related costs	**10 084**		**19.1**		**788.0**
Contingencies (25% of above sub-total)	2 521		4.8		197.0
Implementing agent - TCTA (lump sum)	200		8.0		8.0
Total: Raw water system	**12 805**		**31.9**		**993.0**
Potable water system activities (incl. miscellaneous)					
Baynesfield WTW-Umlaas Road Pipeline	1 143	0.40%	4.6	30%	343.0
Baynesfield WTW and potable water reservoirs	795			7%	55.6
- WTW chemicals		R 0.15	R/m3		
- WTW energy		R 0.25	R/m3		
- WTW maintenance		R 0.33	R/m3		
- WTW staff costs		R 0.30	R/m3		
- Total operation cost		**R 1.03**	**R/m3**		
Sub-total of activities	**1 938**		**4.6**		**398.6**
Ps & Gs (25% of activity cost)	485		1.1		99.7
Professional fees (12% of activity cost)	233		0.5		47.8
Environmental/social costs (5% of activity cost)	97		1.0		
Land acquisition (lump sum)	10				
Sub-total of activities and value-related costs	**2 762**		**7.3**		**546.1**
Contingencies (25% of above sub-total)	691		1.8		136.5
Implementing agent - Umgeni Water (5% of sub-total)	138		1.0		1.0
Total: Potable water system	**3 591**	**R 1.03**	**10.1**		**683.6**
Grand total: uMkhomazi Water Project Phase 1	**16 396**				**1 677**

*Not included as does not form part of raw water system. However, activity cost is R 83 million

Table A.2: Capital and operating costs of sea water desalination at Lovu

Summary

Capital Costs	Cost (R million)
Phase 1: 75 Ml/day	3 785
Phase 2: 75 Ml/day	566
Total (excl VAT)	4 350

Operating Costs	Cost
Fixed Annual	**R million/annum**
Fixed Annual	45
Operating Costs	**R/m³**
Chemicals, Filters, Membranes etc	0.83
Electricity Cost Based on R1.00/kWh	4.09
Total (excl VAT)	4.92

Capital cost

Item	EPC Price (R'000)
Construction/Procurement/Installation	
Intake Structure with Two Inlet Towers	108 120
Intake Pipeline from Intake Tower to Pump Station	222 600
Discharge Outfall with Diffusers	29 680
Discharge Pipe from Plant to Outfall	103 880
Intake Pump Station	44 520
Intake Pipeline from Pump Station to Desalination Plant	66 780
DAF System	63 600
Gravity Media Filters	127 200
Desalination System (Single Pass/Includes En. Recovery)	720 800
Product Water Re-mineralization System	33 920
Product Water Disinfection System	14 840
Waste Disposal System	7 738
Site Preparation	4 982
Product Water Storage Tank	94 340
Product Water Transfer Pump Station	26 500
High Voltage Plant Power Substation	124 020
Electrical and Instrumentation System	233 200
Other Construction/Procurement/Installation Costs	29 680
Sub-Total: Construction	**2 056 400**
Professional Services & Fees	
Engineering	52 470
Project Licensing	1 378
Project Management and Administration	10 494
Geotechnical and Surveying Services	3 710
Construction Management and Inspection	84 800
Insurance & Bonds	95 400
Contractor Overhead & Profit	307 400
Start-up, Commissioning and Acceptance Testing	110 240
Operator Training	848
Sub-Total: Professional services and fees	**666 740**
Sub-Total: Project EPC Costs	**2 723 140**
Ps&Gs (25% of construction cost)	514 100
Environmental, landscaping and social costs (5% of construction cost)	102 820
Land acquisition (lump sum)	6 360
Sub-Total of activities and value related costs	**3 346 420**
Contingencies (25% of above sub-total)	836 605
Implementing agent - Umgeni Water (5% of above sub-total)	167 321
Total (excl. VAT)	**4 350 346**

Phase 1: 75 Ml/d Desal System + Other Costs	3 784 801
Phase 2: 75 Ml/d Desal System	565 545
Total	**4 350 346**

(**Table A.2 – continued**)

Operation and maintenance cost

Item	Annual O&M Costs	
	(R'000/year)	(R/m³)
Fixed annual costs		
Labour	17 683	0.32
Maintenance	16 547	0.30
O & M Contingency	8 830	0.16
Insurance	1 060	0.02
Operator Training	451	0.01
Sub-total: Fixed annual costs	**44 570**	**0.81**
Operating costs (excluding power)		
Chemicals	31 229	0.57
Cartridge Filters	4 070	0.07
Membrane Replacement	9 461	0.17
Other Miscellaneous Costs	848	0.02
Sub-total: Operating costs (excluding power)	**45 608**	**0.83**
Power	224 015	4.09
Total: Operation and maintenance cost	**314 192**	**5.73**

Power requirements

Unit	Number of Duty Units	Number of Standby Units	Avg Power Use (Hp)	Average Power Use			Maximum Power Use (Hp)	Maximum Power Use		
				Total (Hp)	% of Total	(kWh/m³)		Total (Hp)	% of Total	(kWh/m³)
Desalination Plant Intake Pump Station										
Seawater Intake Pumps	4	1	860	3,440	10.63	0.411	1,200	4,800	11.63	0.521
DAF Clarifiers										
DAF Compressors	2	1	200	400	1.24	0.048	200	400	0.97	0.043
DAF Circulation Pumps	5	1	110	550	1.70	0.066	150	750	1.82	0.081
Clarified Water Pumps	4	1	180	720	2.22	0.086	240	960	2.33	0.104
Pretreatment Facilities										
Gravity Filters - Blowers	2	1	200	160	0.49	0.019	200	160	0.39	0.017
Gravity Filters - Backwash Pumps	2	1	400	320	0.99	0.038	400	320	0.78	0.035
Other Pre-filtration Pretreatment Equipment	4	4	10	40	0.12	0.005	10	40	0.10	0.004
Reverse Osmosis System (Single Pass)										
Filtered Water Pumps	10	1	215	2,150	6.64	0.257	300	3,000	7.27	0.326
High Pressure RO Feed Pumps	10	0	1920	19,200	59.32	2.292	2400	24,000	58.14	2.604
ERI Booster Pumps	10	0	158	1,580	4.88	0.189	180	1,800	4.36	0.195
Product Water Delivery Pumps										
Product Water Delivery Pumps	4	1	670	2,680	8.28	0.320	920	3,520	8.53	0.382
Solids Handling Facilities										
Waste Discharge Pumps	4	1	23	92	0.28	0.011	25	100	0.24	0.011
Retention Tank Discharge Mixers	6	0	20	120	0.37	0.014	20	120	0.29	0.013
Membrane Cleaning System										
Membrane Cleaning Pumps	2	1	5	10	0.03	0.001	5	10	0.02	0.001
Flush Pumps	2	1	7.5	15	0.05	0.002	7.5	15	0.04	0.002
Mechanical Mixers for Chemical Batch Tank	2	0	0.75	2	0.00	0.000	0.75	2	0.00	0.000
Chemical Cleaning System	2	0	10	20	0.06	0.002	10	20	0.05	0.002
Chemical Feed Equipment										
Coagulant Feed System	2	1	10	20	0.06	0.002	40	20	0.05	0.002
Polymer Feed System	2	1	2	4	0.01	0.000	2	4	0.01	0.000
Sulfuric Acid Feed System	2	1	0.1	0.20	0.00	0.000	0.8	1.6	0.004	0.000
Sodium Hypochlorite Feed System	1	1	0.1	0.1	0.00	0.000	0.8	0.10	0.00	0.000
Sodium Bisulfide Feed System	1	1	4.5	5	0.01	0.001	4.5	5	0.01	0.000
Sodium Hydroxide Feed System	2	1	8	16	0.05	0.002	8	16	0.04	0.002
Ammonia Feed System	1	1	6	6	0.02	0.001	6	6	0.01	0.001
Antiscalant Feed System	2	1	4	8	0.02	0.001	8	8	0.02	0.001
Chlorine Gas/Lime/CO2 Feed System	6	3	4	24	0.07	0.003	8	24	0.06	0.003
Service Facilities										
HVAC	1	0	120	60	0.19	0.007	120	150	0.36	0.016
Lightning	1	0	100	80	0.25	0.010	100	120	0.29	0.013
Controls and Automation	1	0	50	20	0.06	0.002	50	60	0.15	0.007
Service Air Compressors	5	5	5	25	0.08	0.003	5	50	0.12	0.005
Other Miscellaneous/Contingency			600	600	1.85	0.072	800	800	1.94	0.087
				32,366	**100.00**	**3.86**		**41,281**	**hp - 100%**	
Total Desalination Plant Power Demand				**24.15**	**MW**			**30.80**	**MW**	
TOTAL DESALINATION PLANT ELECTRICITY USE				**3.86**	**kWh/m³**			**4.48**	**kWh/m³**	

Table A.3: Capital and operating costs of re-use (Kwamashu and Northern options)

Capital cost

Description	Cost (R'000)		
	KwaMashu only	Northern only	KwaMashu and Northern
Distribution Infrastructure			
Pipelines	8 870	13 264	22 134
Pump Stations & Outlet Works	1 704	2 549	4 253
Pressure Break Tanks & Storage Reservoirs	211	315	526
Mechanical	13 744	20 552	34 296
Electrical & Instrumentation	14 189	21 217	35 406
Sub-Total Distribution Infrastructure	**38 718**	**57 897**	**96 615**
Reclamation Treatment Plants			
Civil works	91 897	72 104	164 001
Piping	26 900	21 106	48 006
Mechanical	465 479	365 222	830 701
Electrical & Instrumentation	36 895	28 949	65 844
Sub-Total Treatment Plants	**621 171**	**487 380**	**1 108 552**
Sub-Total excl. VAT & Contingencies (activity cost)	**659 889**	**545 278**	**1 205 167**
Ps&Gs (25% of activity cost)	164 972	136 319	301 292
Professional fees (12% of activity cost)	79 187	65 433	144 620
Environmental, landscaping and social costs (5% of activity cost)	32 994	27 264	60 258
Land acquisition (lump sum)	0	0	0
Sub-Total of activities and value related costs	**937 043**	**774 294**	**1 711 337**
Contingencies (25% of above sub-total)	234 261	193 574	427 834
Implementing agent - Umgeni Water (5% of above sub-total)	46 852	38 715	85 567
Total cost	**1 218 155**	**1 006 583**	**2 224 738**

Operating cost

Description	Cost (R'000, unless specified otherwise)		
	KwaMashu only	Northern only	KwaMashu and Northern
Distribution Infrastructure (annual)			
Fixed cost (personnel, etc)	353	529	882
Electricity costs	10 598	15 847	26 445
Pipeline maintenance	335	501	836
Pump station maintenance	68	102	170
Sub-Total Distribution Infrastructure OPEX	**11 354**	**16 979**	**28 333**
Reclamation Treatment Plants (annual)			
Fixed costs (personnel, etc)	19 625	15 398	35 024
Chemicals	100 356	78 741	179 097
Electricity costs	12 184	9 560	21 744
Sub-Total Treatment Plants OPEX	**132 166**	**103 699**	**235 865**
Total annual OPEX excl. VAT (R'000/year)	**143 520**	**120 678**	**264 198**
Total daily OPEX excl. VAT (R/day)	393 205	330 624	723 829
Total daily water production (Ml/day)	65	51	116
Total OPEX/m³ of water distribution infrastructure (R/m³)	0.48	0.91	0.67
Total OPEX/m³ of water treatment plants (R/m³)	5.57	5.57	5.57
Total OPEX/m³ of water (R/m³)	**6.05**	**6.48**	**6.24**

Appendix B

Calculations: Tariffs – For all Augmentation Option Scenarios (Cost Recovery and Repayment Periods Dependent on Phasing of the Various Options)

Table B.1: Water demand scenarios

Year	Total Mgeni Demands (incl. old South Coast)	New total Mgeni system water requirements	Total availability (excl. Spring Grove)	Spring Grove yields	Total availability (Incl. Spring Grove)	Short fall/deficit addressed	Scenario 1			Scenario 2			Scenario 3			Treated at uMkhomazi WTW		
							Treated Desal	Treated Re-Use	Mkomazi - transferred	Treated Desal	Treated Re-Use	Mkomazi - transferred	Treated Desal	Treated Re-Use	Mkomazi - transferred	Scenario 1	Scenario 2	Scenario 3
	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)
2012	390.5	393.2	348		348													
2013	393.7	393.8	349	46.8	395.8	-2.0												
2014	396.3	399.1	349	60	409	-9.9			0.0			0.0			0.0	0.0	0.0	0.0
2015	400.1	405.2	350	60	410	-4.8			0.0			0.0			0.0	0.0	0.0	0.0
2016	405.1	412.2	350	60	410	2.2			0.0			0.0			0.0	0.0	0.0	0.0
2017	411.2	426.9	351	60	411	15.9			0.0			0.0			0.0	0.0	0.0	0.0
2018	417.3	441.7	351	60	411	30.7			0.0			0.0			0.0	0.0	0.0	0.0
2019	423.6	449.0	352	60	412	37.0			0.0	**54.7**		0.0		**41.975**	0.0	0.0	0.0	0.0
2020	429.9	456.6	352	60	412	44.6			0.0	54.7		0.0		41.975	0.0	0.0	0.0	0.0
2021	436.4	462.2	353	60	413	49.2			0.0	54.7		0.0		41.975	0.0	0.0	0.0	0.0
2022	442.9	467.7	353	60	413	54.7			0.0	54.7		0.0		41.975	0.0	0.0	0.0	0.0
2023	449.6	487.8	354	60	414	73.8			73.8	54.7		19.1	**54.7**	41.975	0.0	**136.9**	**136.9**	0.0
2024	456.3	494.8	354	60	414	80.8			80.8	54.7		26.1	54.7	41.975	0.0	136.9	136.9	0.0
2025	463.2	502.0	354	60	414	88.0			88.0	54.7		33.3	54.7	41.975	0.0	136.9	136.9	0.0
2026	470.1	509.1	355	60	415	94.1			94.1	54.7		39.4	54.7	41.975	0.0	136.9	136.9	0.0
2027	477.2	516.3	355	60	415	101.3			101.3	54.7		46.6	54.7	41.975	4.6	136.9	136.9	**136.9**
2028	484.3	523.4	356	60	416	107.4			107.4	54.7		52.7	54.7	41.975	10.8	136.9	136.9	136.9
2029	491.6	530.7	356	60	416	114.7			114.7	54.7		60.0	54.7	41.975	18.0	136.9	136.9	136.9
2030	499.0	537.9	357	60	417	120.9			120.9	54.7		66.2	54.7	41.975	24.2	136.9	136.9	136.9
2031	506.5	545.2	357	60	417	128.2			128.2	54.7		73.5	54.7	41.975	31.5	136.9	136.9	136.9
2032	513.5	552.5	357.4	60	417.4	135.1			135.1	54.7		80.4	54.7	41.975	38.4	136.9	136.9	136.9
2033	520.7	559.8	357.8	60	417.8	142.0			142.0	54.7		87.3	54.7	41.975	45.3	**182.5**	136.9	136.9
2034	528.0	567.1	358.2	60	418.2	148.9			148.9	54.7		94.2	54.7	41.975	52.2	182.5	136.9	136.9
2035	535.4	574.5	358.6	60	418.6	155.9			155.9	54.7		101.2	54.7	41.975	59.2	182.5	136.9	136.9
2036	542.9	581.9	359	60	419	162.9			162.9	54.7		108.2	54.7	41.975	66.2	182.5	136.9	136.9
2037	550.5	589.3	359.4	60	419.4	169.9			169.9	54.7		115.2	54.7	41.975	73.2	182.5	136.9	136.9
2038	558.2	596.8	359.8	60	419.8	177.0			177.0	54.7		122.3	54.7	41.975	80.3	182.5	136.9	136.9
2039	566.0	604.2	360.2	60	420.2	184.0			184.0	54.7		129.3	54.7	41.975	87.4	**228.1**	136.9	136.9
2040	574.0	611.8	360.6	60	420.6	191.2			191.2	54.7		136.5	54.7	41.975	94.5	228.1	136.9	136.9
2041	582.0	619.3	361	60	421	198.3			198.3	54.7		143.6	54.7	41.975	101.6	228.1	**182.5**	136.9
2042	590.1	626.8	361.4	60	421.4	205.4			205.4	54.7		150.7	54.7	41.975	108.8	228.1	182.5	136.9
2043	598.4	634.4	361.8	60	421.8	212.6			212.6	54.7		157.9	54.7	41.975	115.9	228.1	182.5	136.9
2044	606.8	641.9	362.2	60	422.2	219.7			219.7	54.7		165.0	54.7	41.975	123.0	228.1	182.5	136.9
2045	615.3	649.5	362.6	60	422.6	226.9			220.0	54.7		172.2	54.7	41.975	130.2	228.1	182.5	136.9
2046	623.9	657.0	363	60	423	234.0			220.0	54.7		179.3	54.7	41.975	137.3	228.1	182.5	**182.5**

Table B.2: Tariff calculation – augmentation scenario 1

uMkhomazi Raw Water and WTW delivering in 2023
20 year loan redemption from 2023, 0% Grant

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Disbursements (R'000)				Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
			uMWP-1: Raw water component	uMWP-1: Potable water component	Grant as a percentage of Capital Cost	Total							
			Nominal end of year	Nominal end of year	0%	Nominal	6%	R 2.70		Inflated		10.06%	
2014		0	0	0	0	0	1.00	2.70	0	0	0	0	0
2015		0	0	0	0	0	1.06	2.86	0	0	0	0	0
2016		0	0	0	0	0	1.12	3.04	0	0	0	0	0
2017		0	0	0	0	0	1.19	3.22	0	0	0	0	0
2018		0	2 556 459	0	0	2 556 459	1.26	3.41	0	3 227 470	0	0	3 227 470
2019		0	2 556 459	0	0	2 556 459	1.34	3.62	0	3 421 118	3 227 470	324 677	6 973 265
2020		0	2 556 459	1 196 911	0	3 753 369	1.42	3.83	0	5 324 226	6 973 265	701 497	12 998 988
2021		0	2 556 459	1 196 911	0	3 753 369	1.50	4.06	0	5 643 680	12 998 988	1 307 672	19 950 341
2022		0	2 556 459	1 196 911	0	3 753 369	1.59	4.31	0	5 982 301	19 950 341	2 006 964	27 939 606
2023	1	487 756	31 846	151 062		182 909	1.69	**4.57**	2 226 646	309 020	27 939 606	2 810 668	28 832 648
2024	2	494 847	31 846	151 062		182 909	1.79	4.84	2 394 556	327 562	28 832 648	2 900 507	29 666 160
2025	3	501 961	31 846	151 062		182 909	1.90	5.13	2 574 720	347 215	29 666 160	2 984 356	30 423 011
2026	4	509 099	31 846	151 062		182 909	2.01	5.44	2 768 014	368 048	30 423 011	3 060 494	31 083 540
2027	5	516 262	31 846	151 062		182 909	2.13	5.76	2 975 373	390 131	31 083 540	3 126 942	31 625 239
2028	6	523 449	31 846	151 062		182 909	2.26	6.11	3 197 802	413 539	31 625 239	3 181 436	32 022 412
2029	7	530 661	31 846	151 062		182 909	2.40	6.48	3 436 372	438 351	32 022 412	3 221 391	32 245 782
2030	8	537 898	31 846	151 062		182 909	2.54	6.86	3 692 233	464 652	32 245 782	3 243 861	32 262 062
2031	9	545 161	31 846	151 062		182 909	2.69	7.28	3 966 615	492 531	32 262 062	3 245 499	32 033 477
2032	10	552 450	31 846	151 062		182 909	2.85	7.71	4 260 831	522 083	32 033 477	3 222 504	31 517 233
2033	11	559 766	31 846	198 056		229 902	3.03	8.18	4 576 290	695 593	31 517 233	3 170 571	30 807 106
2034	12	567 109	31 846	198 056		229 902	3.21	8.67	4 914 499	737 328	30 807 106	3 099 133	29 729 068
2035	13	574 479	31 846	198 056		229 902	3.40	9.19	5 277 070	781 568	29 729 068	2 990 685	28 224 251
2036	14	581 877	31 846	198 056		229 902	3.60	9.74	5 665 727	828 462	28 224 251	2 839 303	26 226 290
2037	15	589 303	31 846	198 056		229 902	3.82	10.32	6 082 315	878 170	26 226 290	2 638 312	23 660 456
2038	16	596 757	31 846	198 056		229 902	4.05	10.94	6 528 810	930 860	23 660 456	2 380 195	20 442 700
2039	17	604 241	31 846	245 050		276 896	4.29	11.60	7 007 325	1 188 402	20 442 700	2 056 495	16 680 272
2040	18	611 754	31 846	245 050		276 896	4.55	12.29	7 520 119	1 259 707	16 680 272	1 678 002	12 097 862
2041	19	619 297	31 846	245 050		276 896	4.82	13.03	8 069 611	1 335 289	12 097 862	1 217 021	6 580 560
2042	20	626 839	31 846	245 050		276 896	5.11	13.81	8 657 958	1 415 406	6 580 560	661 991	0

Table B.3: Tariff calculation – augmentation scenario 2

Desalination delivering in 2019
uMkhomazi Raw Water and WTW delivering in 2023
20 year loan redemption from 2023, 0% Grant

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Disbursements (R'000)					Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
			uMWP-1: Raw water component	uMWP-1: Potable water component	Desalination	Grant as a percentage of Capital Cost	Total							
			Nominal end of year	Nominal end of year	Nominal end of year	0%	Nominal	6%	R 3.27		Inflated		10.06%	
2014		0	0	0	0	0	0	1.00	3.27	0	0	0	0	0
2015		0	0	0	0	0	0	1.06	3.46	0	0	0	0	0
2016		0	0	0	1 450 115	0	1 450 115	1.12	3.67	0	1 629 350	0	0	1 629 350
2017		0	0	0	1 450 115	0	1 450 115	1.19	3.89	0	1 727 111	1 629 350	163 909	3 520 369
2018		0	2 556 459	0	1 450 115	0	4 006 574	1.26	4.12	0	5 058 207	3 520 369	354 142	8 932 719
2019		448 961	2 556 459	0	313 780	0	2 870 239	1.34	4.37	1 961 900	3 841 027	8 932 719	898 614	11 710 460
2020		456 576	2 556 459	1 196 911	313 780	0	4 067 150	1.42	4.63	2 114 888	5 769 330	11 710 460	1 178 049	16 542 950
2021		462 167	2 556 459	1 196 911	313 780	0	4 067 150	1.50	4.91	2 269 230	6 115 489	16 542 950	1 664 188	22 053 398
2022		467 656	2 556 459	1 196 911	313 780	0	4 067 150	1.59	5.20	2 433 954	6 482 419	22 053 398	2 218 528	28 320 390
2023	1	487 756	31 846	151 062	313 780		496 689	1.69	**5.52**	2 690 882	839 145	28 320 390	2 848 975	29 317 628
2024	2	494 847	31 846	151 062	313 780		496 689	1.79	5.85	2 893 799	889 494	29 317 628	2 949 295	30 262 618
2025	3	501 961	31 846	151 062	313 780		496 689	1.90	6.20	3 111 526	942 864	30 262 618	3 044 359	31 138 315
2026	4	509 099	31 846	151 062	313 780		496 689	2.01	6.57	3 345 119	999 436	31 138 315	3 132 452	31 925 083
2027	5	516 262	31 846	151 062	313 780		496 689	2.13	6.96	3 595 711	1 059 402	31 925 083	3 211 600	32 600 373
2028	6	523 449	31 846	151 062	313 780		496 689	2.26	7.38	3 864 514	1 122 966	32 600 373	3 279 532	33 138 358
2029	7	530 661	31 846	151 062	313 780		496 689	2.40	7.83	4 152 824	1 190 344	33 138 358	3 333 652	33 509 530
2030	8	537 898	31 846	151 062	313 780		496 689	2.54	8.30	4 462 030	1 261 764	33 509 530	3 370 992	33 680 255
2031	9	545 161	31 846	151 062	313 780		496 689	2.69	8.79	4 793 617	1 337 470	33 680 255	3 388 166	33 612 275
2032	10	552 450	31 846	151 062	313 780		496 689	2.85	9.32	5 149 175	1 417 719	33 612 275	3 381 328	33 262 146
2033	11	559 766	31 846	151 062	313 780		496 689	3.03	9.88	5 530 405	1 502 782	33 262 146	3 346 105	32 580 629
2034	12	567 109	31 846	151 062	313 780		496 689	3.21	10.47	5 939 127	1 592 949	32 580 629	3 277 546	31 511 996
2035	13	574 479	31 846	151 062	313 780		496 689	3.40	11.10	6 377 290	1 688 525	31 511 996	3 170 044	29 993 275
2036	14	581 877	31 846	151 062	313 780		496 689	3.60	11.77	6 846 978	1 789 837	29 993 275	3 017 263	27 953 397
2037	15	589 303	31 846	151 062	313 780		496 689	3.82	12.47	7 350 422	1 897 227	27 953 397	2 812 056	25 312 258
2038	16	596 757	31 846	151 062	313 780		496 689	4.05	13.22	7 890 007	2 011 061	25 312 258	2 546 363	21 979 675
2039	17	604 241	31 846	151 062	313 780		496 689	4.29	14.01	8 468 288	2 131 724	21 979 675	2 211 111	17 854 223
2040	18	611 754	31 846	151 062	313 780		496 689	4.55	14.86	9 087 995	2 259 628	17 854 223	1 796 099	12 821 955
2041	19	619 297	31 846	198 056	313 780		543 683	4.82	15.75	9 752 051	2 621 826	12 821 955	1 289 863	6 981 592
2042	20	626 839	31 846	198 056	313 780		543 683	5.11	16.69	10 463 062	2 779 135	6 981 592	702 334	0

Table B.4: Tariff calculation – augmentation scenario 3

Re-use delivering in 2019
Desalination delivering in 2023
uMkhomazi Raw Water and WTW delivering in 2027
20 year loan redemption from 2023, 0% Grant

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Disbursements (R'000)						Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
			uMWP-1: Raw water component	uMWP-1: Potable water component	Desalination	Re-use	Grant as a percentage of Capital Cost	Total							
			Nominal end of year	Nominal end of year	Nominal end of year	Nominal end of year	0%	Nominal	6%	R 3.26		Inflated		10.06%	
2014		0	0	0	0		0	0	1.00	3.26	0	0	0	0	0
2015		0	0	0	0		0	0	1.06	3.45	0	0	0	0	0
2016		0	0	0	0	741 579	0	741 579	1.12	3.66	0	833 239	0	0	833 239
2017		0	0	0	0	741 579	0	741 579	1.19	3.88	0	883 233	833 239	83 822	1 800 294
2018		0	0	0	0	741 579	0	741 579	1.26	4.11	0	936 227	1 800 294	181 106	2 917 626
2019		448 961	0	0	0	264 198	0	264 198	1.34	4.36	1 958 187	353 556	2 917 626	293 507	1 606 502
2020		456 576	0	0	1 450 115	264 198	0	1 714 313	1.42	4.62	2 110 886	2 431 786	1 606 502	161 611	2 089 013
2021		462 167	0	0	1 450 115	264 198	0	1 714 313	1.50	4.90	2 264 936	2 577 693	2 089 013	210 151	2 611 921
2022		467 656	2 556 459	0	1 450 115	264 198	0	4 270 772	1.59	5.19	2 429 349	6 806 961	2 611 921	262 754	7 252 287
2023		487 756	2 556 459	0	313 780	264 198		3 134 437	1.69	**5.51**	2 685 790	5 295 565	7 252 287	729 566	10 591 628
2024		494 847	2 556 459	1 196 911	313 780	264 198		4 331 347	1.79	5.84	2 888 323	7 756 784	10 591 628	1 065 497	16 525 585
2025		501 961	2 556 459	1 196 911	313 780	264 198		4 331 347	1.90	6.19	3 105 638	8 222 191	16 525 585	1 662 441	23 304 578
2026		509 099	2 556 459	1 196 911	313 780	264 198		4 331 347	2.01	6.56	3 338 789	8 715 522	23 304 578	2 344 394	31 025 705
2027	1	516 262	31 846	151 062	313 780	264 198		760 887	2.13	6.95	3 588 907	1 622 916	31 025 705	3 121 124	32 180 838
2028	2	523 449	31 846	151 062	313 780	264 198		760 887	2.26	7.37	3 857 201	1 720 291	32 180 838	3 237 328	33 281 256
2029	3	530 661	31 846	151 062	313 780	264 198		760 887	2.40	7.81	4 144 966	1 823 509	33 281 256	3 348 028	34 307 827
2030	4	537 898	31 846	151 062	313 780	264 198		760 887	2.54	8.28	4 453 587	1 932 919	34 307 827	3 451 299	35 238 459
2031	5	545 161	31 846	151 062	313 780	264 198		760 887	2.69	8.78	4 784 546	2 048 895	35 238 459	3 544 918	36 047 726
2032	6	552 450	31 846	151 062	313 780	264 198		760 887	2.85	9.30	5 139 431	2 171 828	36 047 726	3 626 329	36 706 452
2033	7	559 766	31 846	151 062	313 780	264 198		760 887	3.03	9.86	5 519 940	2 302 138	36 706 452	3 692 596	37 181 246
2034	8	567 109	31 846	151 062	313 780	264 198		760 887	3.21	10.45	5 927 889	2 440 266	37 181 246	3 740 359	37 433 983
2035	9	574 479	31 846	151 062	313 780	264 198		760 887	3.40	11.08	6 365 222	2 586 682	37 433 983	3 765 784	37 421 227
2036	10	581 877	31 846	151 062	313 780	264 198		760 887	3.60	11.74	6 834 022	2 741 883	37 421 227	3 764 501	37 093 589
2037	11	589 303	31 846	151 062	313 780	264 198		760 887	3.82	12.45	7 336 513	2 906 396	37 093 589	3 731 541	36 395 013
2038	12	596 757	31 846	151 062	313 780	264 198		760 887	4.05	13.20	7 875 077	3 080 780	36 395 013	3 661 266	35 261 981
2039	13	604 241	31 846	151 062	313 780	264 198		760 887	4.29	13.99	8 452 263	3 265 627	35 261 981	3 547 285	33 622 630
2040	14	611 754	31 846	151 062	313 780	264 198		760 887	4.55	14.83	9 070 798	3 461 564	33 622 630	3 382 369	31 395 766
2041	15	619 297	31 846	151 062	313 780	264 198		760 887	4.82	15.72	9 733 597	3 669 258	31 395 766	3 158 351	28 489 778
2042	16	626 839	31 846	151 062	313 780	264 198		760 887	5.11	16.66	10 443 263	3 889 414	28 489 778	2 866 015	24 801 944
2043	17	634 380	31 846	151 062	313 780	264 198		760 887	5.42	17.66	11 203 031	4 122 779	24 801 944	2 495 026	20 216 717
2044	18	641 921	31 846	151 062	313 780	264 198		760 887	5.74	18.72	12 016 386	4 370 145	20 216 717	2 033 761	14 604 238
2045	19	649 463	31 846	151 062	313 780	264 198		760 887	6.09	19.84	12 887 011	4 632 354	14 604 238	1 469 157	7 818 738
2046	20	657 004	31 846	198 056	313 780	264 198		807 880	6.45	21.03	13 818 851	5 213 564	7 818 738	786 549	0

Table B.5: Tariff calculation – results

Scenario	Augmentation	Cost recovery and repayment period	Increase in Umgeni Water tariff	
			2014 Rands	2023 Rands
1	uMWP-1 delivering in 2023	2023 to 2042	R 2.70	R 4.57
2	Desalination delivering in 2019 uMWP-1 delivering in 2023	2019 to 2042	R 3.27	R 5.52
3	Re-use delivering in 2019 Desalination delivering in 2023 uMWP-1 delivering in 2027	2019 to 2046	R 3.26	R 5.51

Appendix C

Calculations: Tariffs – For all Augmentation Option Scenarios (Equal Cost Recovery and Repayment Periods)

Table C.1: Water demand scenarios

Year	Total Mgeni Demands (incl. old South Coast)	New total Mgeni system water requirements	Total availability (excl. Spring Grove)	Spring Grove yields	Total availability (Incl. Spring Grove)	Short fall/deficit addressed	Scenario 1			Scenario 2			Scenario 3			Treated at uMkhomazi WTW		
							Treated Desal	Treated Re-Use	Mkomazi - transferred	Treated Desal	Treated Re-Use	Mkomazi - transferred	Treated Desal	Treated Re-Use	Mkomazi - transferred	Scenario 1	Scenario 2	Scenario 3
	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)
2012	390.5	393.2	348		348													
2013	393.7	393.8	349	46.8	395.8	-2.0												
2014	396.3	399.1	349	60	409	-9.9			0.0			0.0			0.0	0.0	0.0	0.0
2015	400.1	405.2	350	60	410	-4.8			0.0			0.0			0.0	0.0	0.0	0.0
2016	405.1	412.2	350	60	410	2.2			0.0			0.0			0.0	0.0	0.0	0.0
2017	411.2	426.9	351	60	411	15.9			0.0			0.0			0.0	0.0	0.0	0.0
2018	417.3	441.7	351	60	411	30.7			0.0			0.0			0.0	0.0	0.0	0.0
2019	423.6	449.0	352	60	412	37.0			0.0	**54.7**		0.0		**41.975**	0.0	0.0	0.0	0.0
2020	429.9	456.6	352	60	412	44.6			0.0	54.7		0.0		41.975	0.0	0.0	0.0	0.0
2021	436.4	462.2	353	60	413	49.2			0.0	54.7		0.0		41.975	0.0	0.0	0.0	0.0
2022	442.9	467.7	353	60	413	54.7			0.0	54.7		0.0		41.975	0.0	0.0	0.0	0.0
2023	449.6	487.8	354	60	414	73.8			73.8	54.7		19.1	**54.7**	41.975	0.0	**136.9**	**136.9**	0.0
2024	456.3	494.8	354	60	414	80.8			80.8	54.7		26.1	54.7	41.975	0.0	136.9	136.9	0.0
2025	463.2	502.0	354	60	414	88.0			88.0	54.7		33.3	54.7	41.975	0.0	136.9	136.9	0.0
2026	470.1	509.1	355	60	415	94.1			94.1	54.7		39.4	54.7	41.975	0.0	136.9	136.9	0.0
2027	477.2	516.3	355	60	415	101.3			101.3	54.7		46.6	54.7	41.975	4.6	136.9	136.9	**136.9**
2028	484.3	523.4	356	60	416	107.4			107.4	54.7		52.7	54.7	41.975	10.8	136.9	136.9	136.9
2029	491.6	530.7	356	60	416	114.7			114.7	54.7		60.0	54.7	41.975	18.0	136.9	136.9	136.9
2030	499.0	537.9	357	60	417	120.9			120.9	54.7		66.2	54.7	41.975	24.2	136.9	136.9	136.9
2031	506.5	545.2	357	60	417	128.2			128.2	54.7		73.5	54.7	41.975	31.5	136.9	136.9	136.9
2032	513.5	552.5	357.4	60	417.4	135.1			135.1	54.7		80.4	54.7	41.975	38.4	136.9	136.9	136.9
2033	520.7	559.8	357.8	60	417.8	142.0			142.0	54.7		87.3	54.7	41.975	45.3	**182.5**	136.9	136.9
2034	528.0	567.1	358.2	60	418.2	148.9			148.9	54.7		94.2	54.7	41.975	52.2	182.5	136.9	136.9
2035	535.4	574.5	358.6	60	418.6	155.9			155.9	54.7		101.2	54.7	41.975	59.2	182.5	136.9	136.9
2036	542.9	581.9	359	60	419	162.9			162.9	54.7		108.2	54.7	41.975	66.2	182.5	136.9	136.9
2037	550.5	589.3	359.4	60	419.4	169.9			169.9	54.7		115.2	54.7	41.975	73.2	182.5	136.9	136.9
2038	558.2	596.8	359.8	60	419.8	177.0			177.0	54.7		122.3	54.7	41.975	80.3	182.5	136.9	136.9
2039	566.0	604.2	360.2	60	420.2	184.0			184.0	54.7		129.3	54.7	41.975	87.4	**228.1**	136.9	136.9
2040	574.0	611.8	360.6	60	420.6	191.2			191.2	54.7		136.5	54.7	41.975	94.5	228.1	136.9	136.9
2041	582.0	619.3	361	60	421	198.3			198.3	54.7		143.6	54.7	41.975	101.6	228.1	**182.5**	136.9
2042	590.1	626.8	361.4	60	421.4	205.4			205.4	54.7		150.7	54.7	41.975	108.8	228.1	182.5	136.9

Table C.2: Tariff calculation – augmentation scenario 1

uMkhomazi Raw Water and WTW delivering 2023
20 year loan redemption from 2023, 0% Grant
Cost recovery 2023 to 2042

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Disbursements (R'000)				Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
			uMWP-1: Raw water component	uMWP-1: Potable water component	Grant as a percentage of Capital Cost	Total							
			Nominal end of year	Nominal end of year	0%	Nominal	6%	R 2.70		Inflated		10.06%	
2014		0	0	0	0	0	1.00	2.70	0	0	0	0	0
2015		0	0	0	0	0	1.06	2.86	0	0	0	0	0
2016		0	0	0	0	0	1.12	3.04	0	0	0	0	0
2017		0	0	0	0	0	1.19	3.22	0	0	0	0	0
2018		0	2 556 459	0	0	2 556 459	1.26	3.41	0	3 227 470	0	0	3 227 470
2019		0	2 556 459	0	0	2 556 459	1.34	3.62	0	3 421 118	3 227 470	324 677	6 973 265
2020		0	2 556 459	1 196 911	0	3 753 369	1.42	3.83	0	5 324 226	6 973 265	701 497	12 998 988
2021		0	2 556 459	1 196 911	0	3 753 369	1.50	4.06	0	5 643 680	12 998 988	1 307 672	19 950 341
2022		0	2 556 459	1 196 911	0	3 753 369	1.59	4.31	0	5 982 301	19 950 341	2 006 964	27 939 606
2023	1	487 756	31 846	151 062		182 909	1.69	**4.57**	2 226 646	309 020	27 939 606	2 810 668	28 832 648
2024	2	494 847	31 846	151 062		182 909	1.79	4.84	2 394 556	327 562	28 832 648	2 900 507	29 666 160
2025	3	501 961	31 846	151 062		182 909	1.90	5.13	2 574 720	347 215	29 666 160	2 984 356	30 423 011
2026	4	509 099	31 846	151 062		182 909	2.01	5.44	2 768 014	368 048	30 423 011	3 060 494	31 083 540
2027	5	516 262	31 846	151 062		182 909	2.13	5.76	2 975 373	390 131	31 083 540	3 126 942	31 625 239
2028	6	523 449	31 846	151 062		182 909	2.26	6.11	3 197 802	413 539	31 625 239	3 181 436	32 022 412
2029	7	530 661	31 846	151 062		182 909	2.40	6.48	3 436 372	438 351	32 022 412	3 221 391	32 245 782
2030	8	537 898	31 846	151 062		182 909	2.54	6.86	3 692 233	464 652	32 245 782	3 243 861	32 262 062
2031	9	545 161	31 846	151 062		182 909	2.69	7.28	3 966 615	492 531	32 262 062	3 245 499	32 033 477
2032	10	552 450	31 846	151 062		182 909	2.85	7.71	4 260 831	522 083	32 033 477	3 222 504	31 517 233
2033	11	559 766	31 846	198 056		229 902	3.03	8.18	4 576 290	695 593	31 517 233	3 170 571	30 807 106
2034	12	567 109	31 846	198 056		229 902	3.21	8.67	4 914 499	737 328	30 807 106	3 099 133	29 729 068
2035	13	574 479	31 846	198 056		229 902	3.40	9.19	5 277 070	781 568	29 729 068	2 990 685	28 224 251
2036	14	581 877	31 846	198 056		229 902	3.60	9.74	5 665 727	828 462	28 224 251	2 839 303	26 226 290
2037	15	589 303	31 846	198 056		229 902	3.82	10.32	6 082 315	878 170	26 226 290	2 638 312	23 660 456
2038	16	596 757	31 846	198 056		229 902	4.05	10.94	6 528 810	930 860	23 660 456	2 380 195	20 442 700
2039	17	604 241	31 846	245 050		276 896	4.29	11.60	7 007 325	1 188 402	20 442 700	2 056 495	16 680 272
2040	18	611 754	31 846	245 050		276 896	4.55	12.29	7 520 119	1 259 707	16 680 272	1 678 002	12 097 862
2041	19	619 297	31 846	245 050		276 896	4.82	13.03	8 069 611	1 335 289	12 097 862	1 217 021	6 580 560
2042	20	626 839	31 846	245 050		276 896	5.11	13.81	8 657 958	1 415 406	6 580 560	661 991	0

Table C.3: Tariff calculation – augmentation scenario 2

Desalination delivering in 2019
uMkhomazi Raw Water and WTW delivering in 2023
20 year loan redemption from 2023, 0% Grant
Cost recovery 2023 to 2042

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Disbursements (R'000)					Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
			uMWP-1: Raw water component	uMWP-1: Potable water component	Desalination	Grant as a percentage of Capital Cost	Total							
			Nominal end of year	Nominal end of year		0%	Nominal	6%	R 4.11		Inflated		10.06%	
2014		0	0	0	0	0	0	1.00	4.11	0	0	0	0	0
2015		0	0	0	0	0	0	1.06	4.35	0	0	0	0	0
2016		0	0	0	1 450 115	0	1 450 115	1.12	4.61	0	1 629 350	0	0	1 629 350
2017		0	0	0	1 450 115	0	1 450 115	1.19	4.89	0	1 727 111	1 629 350	163 909	3 520 369
2018		0	2 556 459	0	1 450 115	0	4 006 574	1.26	5.18	0	5 058 207	3 520 369	354 142	8 932 719
2019		0	2 556 459	0	313 780	0	2 870 239	1.34	5.49	0	3 841 027	8 932 719	898 614	13 672 360
2020		0	2 556 459	1 196 911	313 780	0	4 067 150	1.42	5.82	0	5 769 330	13 672 360	1 375 412	20 817 101
2021		0	2 556 459	1 196 911	313 780	0	4 067 150	1.50	6.17	0	6 115 489	20 817 101	2 094 159	29 026 749
2022		0	2 556 459	1 196 911	313 780	0	4 067 150	1.59	6.54	0	6 482 419	29 026 749	2 920 033	38 429 201
2023	1	487 756	31 846	151 062	313 780		496 689	1.69	**6.94**	3 382 772	839 145	38 429 201	3 865 901	39 751 475
2024	2	494 847	31 846	151 062	313 780		496 689	1.79	7.35	3 637 865	889 494	39 751 475	3 998 919	41 002 023
2025	3	501 961	31 846	151 062	313 780		496 689	1.90	7.79	3 911 574	942 864	41 002 023	4 124 722	42 158 034
2026	4	509 099	31 846	151 062	313 780		496 689	2.01	8.26	4 205 230	999 436	42 158 034	4 241 014	43 193 254
2027	5	516 262	31 846	151 062	313 780		496 689	2.13	8.76	4 520 255	1 059 402	43 193 254	4 345 155	44 077 555
2028	6	523 449	31 846	151 062	313 780		496 689	2.26	9.28	4 858 174	1 122 966	44 077 555	4 434 114	44 776 461
2029	7	530 661	31 846	151 062	313 780		496 689	2.40	9.84	5 220 616	1 190 344	44 776 461	4 504 422	45 250 612
2030	8	537 898	31 846	151 062	313 780		496 689	2.54	10.43	5 609 326	1 261 764	45 250 612	4 552 121	45 455 172
2031	9	545 161	31 846	151 062	313 780		496 689	2.69	11.05	6 026 172	1 337 470	45 455 172	4 572 699	45 339 170
2032	10	552 450	31 846	151 062	313 780		496 689	2.85	11.72	6 473 152	1 417 719	45 339 170	4 561 030	44 844 766
2033	11	559 766	31 846	151 062	313 780		496 689	3.03	12.42	6 952 405	1 502 782	44 844 766	4 511 294	43 906 436
2034	12	567 109	31 846	151 062	313 780		496 689	3.21	13.17	7 466 220	1 592 949	43 906 436	4 416 900	42 450 064
2035	13	574 479	31 846	151 062	313 780		496 689	3.40	13.96	8 017 045	1 688 525	42 450 064	4 270 392	40 391 936
2036	14	581 877	31 846	151 062	313 780		496 689	3.60	14.79	8 607 502	1 789 837	40 391 936	4 063 348	37 637 619
2037	15	589 303	31 846	151 062	313 780		496 689	3.82	15.68	9 240 393	1 897 227	37 637 619	3 786 269	34 080 722
2038	16	596 757	31 846	151 062	313 780		496 689	4.05	16.62	9 918 719	2 011 061	34 080 722	3 428 453	29 601 517
2039	17	604 241	31 846	151 062	313 780		496 689	4.29	17.62	10 645 689	2 131 724	29 601 517	2 977 853	24 065 406
2040	18	611 754	31 846	151 062	313 780		496 689	4.55	18.68	11 424 738	2 259 628	24 065 406	2 420 932	17 321 228
2041	19	619 297	31 846	198 056	313 780		543 683	4.82	19.80	12 259 539	2 621 826	17 321 228	1 742 481	9 425 996
2042	20	626 839	31 846	198 056	313 780		543 683	5.11	20.98	13 153 368	2 779 135	9 425 996	948 236	0

Table C.4: Tariff calculation – augmentation scenario 3

Re-use delivering in 2019
Desalination delivering in 2023
Mkomazi Raw Water and WTW delivering 2027
20 year loan redemption from 2023, 0% Grant
Cost recovery 2023 to 2042

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Disbursements (R'000)						Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
			uMWP-1: Raw water component	uMWP-1: Potable water component	Desalination	Re-use	Grant as a percentage of Capital Cost	Total							
			Nominal end of year	Nominal end of year			0%	Nominal	6%	R 4.38		Inflated		10.06%	
2014		0	0	0	0		0	0	1.00	4.38	0	0	0	0	0
2015		0	0	0	0		0	0	1.06	4.64	0	0	0	0	0
2016		0	0	0	0	741 579	0	741 579	1.12	4.92	0	833 239	0	0	833 239
2017		0	0	0	0	741 579	0	741 579	1.19	5.22	0	883 233	833 239	83 822	1 800 294
2018		0	0	0	0	741 579	0	741 579	1.26	5.53	0	936 227	1 800 294	181 106	2 917 626
2019		0	0	0	0	264 198	0	264 198	1.34	5.86	0	353 556	2 917 626	293 507	3 564 690
2020		0	0	0	1 450 115	264 198	0	1 714 313	1.42	6.22	0	2 431 786	3 564 690	358 601	6 355 076
2021		0	0	0	1 450 115	264 198	0	1 714 313	1.50	6.59	0	2 577 693	6 355 076	639 308	9 572 077
2022		0	2 527 295	0	1 450 115	264 198	0	4 241 608	1.59	6.98	0	6 760 478	9 572 077	962 932	17 295 487
2023		487 756	2 527 295	0	313 780	264 198		3 105 273	1.69	**7.40**	3 610 793	5 246 293	17 295 487	1 739 891	20 670 878
2024		494 847	2 527 295	1 196 911	313 780	264 198		4 302 184	1.79	7.85	3 883 081	7 704 555	20 670 878	2 079 449	26 571 802
2025		501 961	2 527 295	1 196 911	313 780	264 198		4 302 184	1.90	8.32	4 175 240	8 166 829	26 571 802	2 673 070	33 236 461
2026		509 099	2 527 295	1 196 911	313 780	264 198		4 302 184	2.01	8.82	4 488 690	8 656 839	33 236 461	3 343 521	40 748 131
2027	1	516 262	31 482	151 062	313 780	264 198		760 522	2.13	9.35	4 824 950	1 622 139	40 748 131	4 099 180	41 644 500
2028	2	523 449	31 482	151 062	313 780	264 198		760 522	2.26	9.91	5 185 647	1 719 467	41 644 500	4 189 353	42 367 674
2029	3	530 661	31 482	151 062	313 780	264 198		760 522	2.40	10.50	5 572 519	1 822 635	42 367 674	4 262 103	42 879 893
2030	4	537 898	31 482	151 062	313 780	264 198		760 522	2.54	11.13	5 987 431	1 931 993	42 879 893	4 313 631	43 138 087
2031	5	545 161	31 482	151 062	313 780	264 198		760 522	2.69	11.80	6 432 375	2 047 913	43 138 087	4 339 605	43 093 230
2032	6	552 450	31 482	151 062	313 780	264 198		760 522	2.85	12.51	6 909 485	2 170 788	43 093 230	4 335 093	42 689 625
2033	7	559 766	31 482	151 062	313 780	264 198		760 522	3.03	13.26	7 421 043	2 301 035	42 689 625	4 294 491	41 864 108
2034	8	567 109	31 482	151 062	313 780	264 198		760 522	3.21	14.05	7 969 492	2 439 097	41 864 108	4 211 446	40 545 159
2035	9	574 479	31 482	151 062	313 780	264 198		760 522	3.40	14.90	8 557 447	2 585 443	40 545 159	4 078 762	38 651 917
2036	10	581 877	31 482	151 062	313 780	264 198		760 522	3.60	15.79	9 187 704	2 740 570	38 651 917	3 888 306	36 093 088
2037	11	589 303	31 482	151 062	313 780	264 198		760 522	3.82	16.74	9 863 256	2 905 004	36 093 088	3 630 892	32 765 728
2038	12	596 757	31 482	151 062	313 780	264 198		760 522	4.05	17.74	10 587 305	3 079 304	32 765 728	3 296 167	28 553 894
2039	13	604 241	31 482	151 062	313 780	264 198		760 522	4.29	18.81	11 363 278	3 264 062	28 553 894	2 872 465	23 327 142
2040	14	611 754	31 482	151 062	313 780	264 198		760 522	4.55	19.93	12 194 840	3 459 906	23 327 142	2 346 664	16 938 872
2041	15	619 297	31 482	151 062	313 780	264 198		760 522	4.82	21.13	13 085 912	3 667 500	16 938 872	1 704 017	9 224 477
2042	16	626 839	31 482	151 062	313 780	264 198		760 522	5.11	22.40	14 039 991	3 887 550	9 224 477	927 964	0

Table C.5: Tariff calculation – results

Scenario	Augmentation	Cost recovery and repayment period	2014 Rands	2023 Rands
1	uMWP-1 delivering in 2023	2023 to 2042	R 2.70	R 4.57
2	Desalination delivering in 2019 uMWP-1 delivering in 2023	2023 to 2042	R 4.11	R 6.94
3	Re-use delivering in 2019 Desalination delivering in 2023 uMWP-1 delivering in 2027	2023 to 2042	R 4.40	R 7.43

Appendix D

Calculations: Tariffs – For uMWP-1 only, with Different Grant and Phasing Options

Table D.1: Water demand scenarios

Year	Total Mgeni Demands (incl. old South Coast)	New total Mgeni system water requirements	Total availability (excl. Spring Grove)	Spring Grove yields	Total availability (Incl. Spring Grove)	Total New south coast demand (minus existing local sources)	Old South Coast Demands (included in old total Mgeni)	New South Coast demands additional to Total Mgeni	New North Coast demands additional to Total Mgeni	New total Mgeni (incl. additional North coast)	Short fall/deficit	Treated at uMkhomazi WTW
	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)	(million m³/a)
2012	390.5	393.2	348		348		12					
2013	393.7	393.8	349	46.8	395.8	12.26	12.18	0.08	3.90	397.58	-2.0	
2014	396.3	399.1	349	60	409	12.77	12.36	0.41	5.10	401.45	-9.9	0.0
2015	400.1	405.2	350	60	410	14.08	12.55	1.53	6.68	406.76	-4.8	0.0
2016	405.1	412.2	350	60	410	16.10	12.74	3.37	8.41	413.50	2.2	0.0
2017	411.2	426.9	351	60	411	18.44	12.93	5.51	10.30	421.47	15.9	0.0
2018	417.3	441.7	351	60	411	23.26	13.12	10.14	12.27	429.60	30.7	0.0
2019	423.6	449.0	352	60	412	25.82	13.32	12.50	14.02	437.61	37.0	0.0
2020	429.9	456.6	352	60	412	28.74	13.52	15.22	15.35	445.30	44.6	0.0
2021	436.4	462.2	353	60	413	30.97	13.72	17.25	16.56	452.95	49.2	0.0
2022	442.9	467.7	353	60	413	33.56	13.93	19.63	18.16	461.10	54.7	0.0
2023	449.6	487.8	354	60	414	36.03	14.14	21.90	19.77	469.35	73.8	**136.9**
2024	456.3	494.8	354	60	414	38.30	14.35	23.96	21.37	477.70	80.8	136.9
2025	463.2	502.0	354	60	414	40.79	14.56	26.23	22.98	486.15	88.0	136.9
2026	470.1	509.1	355	60	415	41.66	14.78	26.88	24.59	494.71	94.1	136.9
2027	477.2	516.3	355	60	415	42.76	15.00	27.76	26.19	503.37	101.3	136.9
2028	484.3	523.4	356	60	416	43.66	15.23	28.43	27.80	512.13	107.4	136.9
2029	491.6	530.7	356	60	416	44.80	15.46	29.34	29.40	521.00	114.7	136.9
2030	499.0	537.9	357	60	417	45.74	15.69	30.05	31.01	529.98	120.9	136.9
2031	506.5	545.2	357	60	417	46.91	15.92	30.99	32.62	539.07	128.2	136.9
2032	513.5	552.5	357.4	60	417.4	47.89	16.16	31.73	34.22	547.77	135.1	136.9
2033	520.7	559.8	357.8	60	417.8	49.10	16.40	32.70	35.83	556.56	142.0	**182.5**
2034	528.0	567.1	358.2	60	418.2	50.12	16.65	33.47	37.43	565.46	148.9	182.5
2035	535.4	574.5	358.6	60	418.6	51.16	16.90	34.26	39.04	574.46	155.9	182.5
2036	542.9	581.9	359	60	419	52.21	17.15	35.06	40.64	583.56	162.9	182.5
2037	550.5	589.3	359.4	60	419.4	53.29	17.41	35.88	42.25	592.76	169.9	182.5
2038	558.2	596.8	359.8	60	419.8	54.37	17.67	36.70	43.86	602.08	177.0	182.5
2039	566.0	604.2	360.2	60	420.2	55.44	17.94	37.51	45.46	611.50	184.0	**228.1**
2040	574.0	611.8	360.6	60	420.6	56.52	18.21	38.31	47.07	621.03	191.2	228.1
2041	582.0	619.3	361	60	421	57.60	18.48	39.12	48.67	630.67	198.3	228.1
2042	590.1	626.8	361.4	60	421.4	58.68	18.76	39.92	50.28	640.42	205.4	228.1
2043	598.4	634.4	361.8	60	421.8	59.75	19.04	40.71	50.75	649.16	212.6	228.1
2044	606.8	641.9	362.2	60	422.2	60.83	19.32	41.50	51.22	658.01	219.7	228.1
2045	615.3	649.5	362.6	60	422.6	61.91	19.61	42.29	51.70	666.98	226.9	228.1
2046	623.9	657.0	363	60	423	62.98	19.91	43.07	52.17	676.07	234.0	228.1
2047	632.6	664.5	363.4	60	423.4	64.06	20.21	43.85	52.65	685.28	241.1	228.1
2048	641.5	672.1	363.8	60	423.8	65.14	20.51	44.63	53.13	694.61	248.3	228.1
2049	650.5	679.6	364.2	60	424.2	66.21	20.82	45.40	53.60	704.07	255.4	228.1
2050	659.6	687.2	364.6	60	424.6	67.29	21.13	46.16	54.08	713.65	262.6	228.1
2051	668.8	694.7	365	60	425	68.37	21.45	46.92	54.56	723.37	269.7	
2052	678.2	702.3	365.4	60	425.4	69.44	21.77	47.67	55.04	733.21	276.9	
2053	687.7	709.8	365.8	60	425.8	70.52	22.09	48.43	55.53	743.19	284.0	
2054	697.3	717.3	366.2	60	426.2	71.60	22.43	49.17	56.01	753.30	291.1	
2055	707.1	724.9	366.6	60	426.6	72.67	22.76	49.91	56.49	763.54	298.3	
2056	717.0	732.4	367	60	427	73.75	23.10	50.65	56.97	773.92	305.4	
2057	727.0	740.0	367.4	60	427.4	74.83	23.45	51.38	57.45	784.44	312.6	
2058	737.2	747.5	367.8	60	427.8	75.90	23.80	52.10	57.93	795.10	319.7	
2059	747.5	755.0	368.2	60	428.2	76.98	24.16	52.82	58.42	805.90	326.8	
2060	758.0	762.6	368.6	60	428.6	78.06	24.52	53.54	58.90	816.85	334.0	

Table D.2: Tariff calculation – grant and phasing scenario 1

Raw and potable water
Tariff distributed over Umgeni Water Sales from 2023
20 year loan redemption from 2023, 0% Grant
First order financial calculation. Actual tariff to be calculated by DWA and TCTA once costs have been finalised and funding has been arranged.

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Volume treated WTW	Disbursements (R'000)				Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
				uMWP-1: Raw water component	uMWP-1: Potable water component	Grant as a percentage of Capital Cost	Total							
				Nominal end of year	Nominal end of year	0%	Nominal	6%	R 2.70		Inflated		10.06%	
2014		0	0	0	0	0	0	1.00	2.70	0	0	0	0	0
2015		0	0	0	0	0	0	1.06	2.86	0	0	0	0	0
2016		0	0	0	0	0	0	1.12	3.04	0	0	0	0	0
2017		0	0	0	0	0	0	1.19	3.22	0	0	0	0	0
2018		0	0	2 556 459	0	0	2 556 459	1.26	3.41	0	3 227 470	0	0	3 227 470
2019		0	0	2 556 459	0	0	2 556 459	1.34	3.62	0	3 421 118	3 227 470	324 677	6 973 265
2020		0	0	2 556 459	1 196 911	0	3 753 369	1.42	3.83	0	5 324 226	6 973 265	701 497	12 998 988
2021		0	0	2 556 459	1 196 911	0	3 753 369	1.50	4.06	0	5 643 680	12 998 988	1 307 672	19 950 341
2022		0	0	2 556 459	1 196 911	0	3 753 369	1.59	4.31	0	5 982 301	19 950 341	2 006 964	27 939 606
2023	1	487 756	136 875	31 846	151 062		182 909	1.69	**4.57**	2 226 646	309 020	27 939 606	2 810 668	28 832 648
2024	2	494 847	136 875	31 846	151 062		182 909	1.79	4.84	2 394 556	327 562	28 832 648	2 900 507	29 666 160
2025	3	501 961	136 875	31 846	151 062		182 909	1.90	5.13	2 574 720	347 215	29 666 160	2 984 356	30 423 011
2026	4	509 099	136 875	31 846	151 062		182 909	2.01	5.44	2 768 014	368 048	30 423 011	3 060 494	31 083 540
2027	5	516 262	136 875	31 846	151 062		182 909	2.13	5.76	2 975 373	390 131	31 083 540	3 126 942	31 625 239
2028	6	523 449	136 875	31 846	151 062		182 909	2.26	6.11	3 197 802	413 539	31 625 239	3 181 436	32 022 412
2029	7	530 661	136 875	31 846	151 062		182 909	2.40	6.48	3 436 372	438 351	32 022 412	3 221 391	32 245 782
2030	8	537 898	136 875	31 846	151 062		182 909	2.54	6.86	3 692 233	464 652	32 245 782	3 243 861	32 262 062
2031	9	545 161	136 875	31 846	151 062		182 909	2.69	7.28	3 966 615	492 531	32 262 062	3 245 499	32 033 477
2032	10	552 450	136 875	31 846	151 062		182 909	2.85	7.71	4 260 831	522 083	32 033 477	3 222 504	31 517 233
2033	11	559 766	182 500	31 846	198 056		229 902	3.03	8.18	4 576 290	695 593	31 517 233	3 170 571	30 807 106
2034	12	567 109	182 500	31 846	198 056		229 902	3.21	8.67	4 914 499	737 328	30 807 106	3 099 133	29 729 068
2035	13	574 479	182 500	31 846	198 056		229 902	3.40	9.19	5 277 070	781 568	29 729 068	2 990 685	28 224 251
2036	14	581 877	182 500	31 846	198 056		229 902	3.60	9.74	5 665 727	828 462	28 224 251	2 839 303	26 226 290
2037	15	589 303	182 500	31 846	198 056		229 902	3.82	10.32	6 082 315	878 170	26 226 290	2 638 312	23 660 456
2038	16	596 757	182 500	31 846	198 056		229 902	4.05	10.94	6 528 810	930 860	23 660 456	2 380 195	20 442 700
2039	17	604 241	228 125	31 846	245 050		276 896	4.29	11.60	7 007 325	1 188 402	20 442 700	2 056 495	16 680 272
2040	18	611 754	228 125	31 846	245 050		276 896	4.55	12.29	7 520 119	1 259 707	16 680 272	1 678 002	12 097 862
2041	19	619 297	228 125	31 846	245 050		276 896	4.82	13.03	8 069 611	1 335 289	12 097 862	1 217 021	6 580 560
2042	20	626 839	228 125	31 846	245 050		276 896	5.11	13.81	8 657 958	1 415 406	6 580 560	661 991	0

Table D.3: Tariff calculation – grant and phasing scenario 2

Raw and potable water
Tariff distributed over Umgeni Water Sales from 2023
20 year loan redemption from 2023, 25% Grant
First order financial calculation. Actual tariff to be calculated by DWA and TCTA once costs have been finalised and funding has been arranged.

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Volume treated WTW	Disbursements (R'000)				Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
				uMWP-1: Raw water component	uMWP-1: Potable water component	Grant as a percentage of Capital Cost	Total							
				Nominal end of year	Nominal end of year	25%	Nominal	6%	R 2.12		Inflated		10.06%	
2014		0	0	0	0	0	0	1.00	2.12	0	0	0	0	0
2015		0	0	0	0	0	0	1.06	2.25	0	0	0	0	0
2016		0	0	0	0	0	0	1.12	2.38	0	0	0	0	0
2017		0	0	0	0	0	0	1.19	2.53	0	0	0	0	0
2018		0	0	2 556 459	0	639 115	1 917 344	1.26	2.68	0	2 420 603	0	0	2 420 603
2019		0	0	2 556 459	0	639 115	1 917 344	1.34	2.84	0	2 565 839	2 420 603	243 508	5 229 949
2020		0	0	2 556 459	1 196 911	938 342	2 815 027	1.42	3.01	0	3 993 170	5 229 949	526 122	9 749 241
2021		0	0	2 556 459	1 196 911	938 342	2 815 027	1.50	3.19	0	4 232 760	9 749 241	980 754	14 962 755
2022		0	0	2 556 459	1 196 911	938 342	2 815 027	1.59	3.38	0	4 486 726	14 962 755	1 505 223	20 954 704
2023	1	487 756	136 875	31 846	151 062		182 909	1.69	**3.58**	1 748 570	309 020	20 954 704	2 108 001	21 623 156
2024	2	494 847	136 875	31 846	151 062		182 909	1.79	3.80	1 880 428	327 562	21 623 156	2 175 246	22 245 536
2025	3	501 961	136 875	31 846	151 062		182 909	1.90	4.03	2 021 910	347 215	22 245 536	2 237 856	22 808 698
2026	4	509 099	136 875	31 846	151 062		182 909	2.01	4.27	2 173 702	368 048	22 808 698	2 294 509	23 297 554
2027	5	516 262	136 875	31 846	151 062		182 909	2.13	4.53	2 336 540	390 131	23 297 554	2 343 687	23 694 833
2028	6	523 449	136 875	31 846	151 062		182 909	2.26	4.80	2 511 211	413 539	23 694 833	2 383 653	23 980 813
2029	7	530 661	136 875	31 846	151 062		182 909	2.40	5.09	2 698 559	438 351	23 980 813	2 412 422	24 133 027
2030	8	537 898	136 875	31 846	151 062		182 909	2.54	5.39	2 899 485	464 652	24 133 027	2 427 734	24 125 929
2031	9	545 161	136 875	31 846	151 062		182 909	2.69	5.71	3 114 954	492 531	24 125 929	2 427 020	23 930 526
2032	10	552 450	136 875	31 846	151 062		182 909	2.85	6.06	3 346 000	522 083	23 930 526	2 407 363	23 513 972
2033	11	559 766	182 500	31 846	198 056		229 902	3.03	6.42	3 593 728	695 593	23 513 972	2 365 459	22 981 295
2034	12	567 109	182 500	31 846	198 056		229 902	3.21	6.81	3 859 321	737 328	22 981 295	2 311 872	22 171 174
2035	13	574 479	182 500	31 846	198 056		229 902	3.40	7.21	4 144 045	781 568	22 171 174	2 230 376	21 039 072
2036	14	581 877	182 500	31 846	198 056		229 902	3.60	7.65	4 449 255	828 462	21 039 072	2 116 489	19 534 768
2037	15	589 303	182 500	31 846	198 056		229 902	3.82	8.11	4 776 399	878 170	19 534 768	1 965 159	17 601 697
2038	16	596 757	182 500	31 846	198 056		229 902	4.05	8.59	5 127 029	930 860	17 601 697	1 770 696	15 176 224
2039	17	604 241	228 125	31 846	245 050		276 896	4.29	9.11	5 502 803	1 188 402	15 176 224	1 526 698	12 388 521
2040	18	611 754	228 125	31 846	245 050		276 896	4.55	9.65	5 905 496	1 259 707	12 388 521	1 246 260	8 988 992
2041	19	619 297	228 125	31 846	245 050		276 896	4.82	10.23	6 337 009	1 335 289	8 988 992	904 275	4 891 547
2042	20	626 839	228 125	31 846	245 050		276 896	5.11	10.85	6 799 033	1 415 406	4 891 547	492 080	0

Table D.4: Tariff calculation – grant and phasing scenario 3

Raw and potable water
Tariff distributed over Umgeni Water Sales from 2023
25 year loan redemption from 2023, 25% Grant
First order financial calculation. Actual tariff to be calculated by DWA and TCTA once costs have been finalised and funding has been arranged.

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Volume treated WTW	Disbursements (R'000)				Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
				uMWP-1: Raw water component	uMWP-1: Potable water component	Grant as a percentage of Capital Cost	Total							
				Nominal end of year	Nominal end of year	25%	Nominal	6%	R 1.86		Inflated		10.06%	
2014		0	0	0	0	0	0	1.00	1.86	0	0	0	0	0
2015		0	0	0	0	0	0	1.06	1.97	0	0	0	0	0
2016		0	0	0	0	0	0	1.12	2.09	0	0	0	0	0
2017		0	0	0	0	0	0	1.19	2.22	0	0	0	0	0
2018		0	0	2 556 459	0	639 115	1 917 344	1.26	2.35	0	2 420 603	0	0	2 420 603
2019		0	0	2 556 459	0	639 115	1 917 344	1.34	2.49	0	2 565 839	2 420 603	243 508	5 229 949
2020		0	0	2 556 459	1 196 911	938 342	2 815 027	1.42	2.64	0	3 993 170	5 229 949	526 122	9 749 241
2021		0	0	2 556 459	1 196 911	938 342	2 815 027	1.50	2.80	0	4 232 760	9 749 241	980 754	14 962 755
2022		0	0	2 556 459	1 196 911	938 342	2 815 027	1.59	2.97	0	4 486 726	14 962 755	1 505 223	20 954 704
2023	1	487 756	136 875	31 846	151 062		182 909	1.69	**3.15**	1 534 275	309 020	20 954 704	2 108 001	21 837 451
2024	2	494 847	136 875	31 846	151 062		182 909	1.79	3.33	1 649 973	327 562	21 837 451	2 196 804	22 711 843
2025	3	501 961	136 875	31 846	151 062		182 909	1.90	3.53	1 774 116	347 215	22 711 843	2 284 766	23 569 709
2026	4	509 099	136 875	31 846	151 062		182 909	2.01	3.75	1 907 305	368 048	23 569 709	2 371 066	24 401 518
2027	5	516 262	136 875	31 846	151 062		182 909	2.13	3.97	2 050 186	390 131	24 401 518	2 454 744	25 196 207
2028	6	523 449	136 875	31 846	151 062		182 909	2.26	4.21	2 203 451	413 539	25 196 207	2 534 688	25 940 983
2029	7	530 661	136 875	31 846	151 062		182 909	2.40	4.46	2 367 838	438 351	25 940 983	2 609 611	26 621 106
2030	8	537 898	136 875	31 846	151 062		182 909	2.54	4.73	2 544 140	464 652	26 621 106	2 678 030	27 219 649
2031	9	545 161	136 875	31 846	151 062		182 909	2.69	5.01	2 733 203	492 531	27 219 649	2 738 242	27 717 220
2032	10	552 450	136 875	31 846	151 062		182 909	2.85	5.31	2 935 933	522 083	27 717 220	2 788 297	28 091 667
2033	11	559 766	182 500	31 846	198 056		229 902	3.03	5.63	3 153 301	695 593	28 091 667	2 825 965	28 459 924
2034	12	567 109	182 500	31 846	198 056		229 902	3.21	5.97	3 386 344	737 328	28 459 924	2 863 011	28 673 919
2035	13	574 479	182 500	31 846	198 056		229 902	3.40	6.33	3 636 174	781 568	28 673 919	2 884 539	28 703 851
2036	14	581 877	182 500	31 846	198 056		229 902	3.60	6.71	3 903 979	828 462	28 703 851	2 887 550	28 515 885
2037	15	589 303	182 500	31 846	198 056		229 902	3.82	7.11	4 191 030	878 170	28 515 885	2 868 641	28 071 665
2038	16	596 757	182 500	31 846	198 056		229 902	4.05	7.54	4 498 688	930 860	28 071 665	2 823 953	27 327 790
2039	17	604 241	228 125	31 846	245 050		276 896	4.29	7.99	4 828 410	1 188 402	27 327 790	2 749 121	26 436 904
2040	18	611 754	228 125	31 846	245 050		276 896	4.55	8.47	5 181 751	1 259 707	26 436 904	2 659 500	25 174 358
2041	19	619 297	228 125	31 846	245 050		276 896	4.82	8.98	5 560 380	1 335 289	25 174 358	2 532 490	23 481 758
2042	20	626 839	228 125	31 846	245 050		276 896	5.11	9.52	5 965 781	1 415 406	23 481 758	2 362 218	21 293 601
2043	21	634 380	228 125	31 846	245 050		276 896	5.42	10.09	6 399 803	1 500 331	21 293 601	2 142 094	18 536 222
2044	22	641 921	228 125	31 846	245 050		276 896	5.74	10.69	6 864 438	1 590 351	18 536 222	1 864 707	15 126 841
2045	23	649 463	228 125	31 846	245 050		276 896	6.09	11.34	7 361 788	1 685 772	15 126 841	1 521 730	10 972 555
2046	24	657 004	228 125	31 846	245 050		276 896	6.45	12.02	7 894 108	1 786 918	10 972 555	1 103 817	5 969 183
2047	25	664 545	228 125	31 846	245 050		276 896	6.84	12.74	8 463 803	1 894 133	5 969 183	600 488	0

Table D.5: Tariff calculation – grant and phasing scenario 4

Raw and potable water
Tariff distributed over Umgeni Water Sales from 2023
25 year loan redemption from 2023, phase in from 2018, 25% Grant
First order financial calculation. Actual tariff to be calculated by DWA and TCTA once costs have been finalised and funding has been arranged.

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Volume treated WTW	Disbursements (R'000)				Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
				uMWP-1: Raw water component	uMWP-1: Potable water component	Grant as a percentage of Capital Cost	Total							
				Nominal end of year	Nominal end of year	25%	Nominal	6%	R 1.60		Inflated		10.06%	
2014		0	0	0	0	0	0	1.00	1.60	0	0	0	0	0
2015		0	0	0	0	0	0	1.06	1.70	0	0	0	0	0
2016		0	0	0	0	0	0	1.12	1.80	0	0	0	0	0
2017		0	0	0	0	0	0	1.19	1.91	0	0	0	0	0
2018	0.20	88 337	0	2 556 459	0	639 115	1 917 344	1.26	2.02	178 605	2 420 603	0	0	2 241 997
2019	0.40	179 584	0	2 556 459	0	639 115	1 917 344	1.34	2.14	384 880	2 565 839	2 241 997	225 540	4 648 496
2020	0.60	273 946	0	2 556 459	1 196 911	938 342	2 815 027	1.42	2.27	622 340	3 993 170	4 648 496	467 629	8 486 956
2021	0.80	369 733	0	2 556 459	1 196 911	938 342	2 815 027	1.50	2.41	890 343	4 232 760	8 486 956	853 771	12 683 143
2022	1.00	467 656	0	2 556 459	1 196 911	938 342	2 815 027	1.59	2.55	1 193 717	4 486 726	12 683 143	1 275 899	17 252 050
2023	1	487 756	136 875	31 846	151 062		182 909	1.69	**2.71**	1 319 726	309 020	17 252 050	1 735 522	17 976 866
2024	2	494 847	136 875	31 846	151 062		182 909	1.79	2.87	1 419 245	327 562	17 976 866	1 808 437	18 693 620
2025	3	501 961	136 875	31 846	151 062		182 909	1.90	3.04	1 526 028	347 215	18 693 620	1 880 541	19 395 348
2026	4	509 099	136 875	31 846	151 062		182 909	2.01	3.22	1 640 592	368 048	19 395 348	1 951 133	20 073 937
2027	5	516 262	136 875	31 846	151 062		182 909	2.13	3.42	1 763 493	390 131	20 073 937	2 019 398	20 719 973
2028	6	523 449	136 875	31 846	151 062		182 909	2.26	3.62	1 895 326	413 539	20 719 973	2 084 388	21 322 573
2029	7	530 661	136 875	31 846	151 062		182 909	2.40	3.84	2 036 726	438 351	21 322 573	2 145 008	21 869 207
2030	8	537 898	136 875	31 846	151 062		182 909	2.54	4.07	2 188 374	464 652	21 869 207	2 199 998	22 345 483
2031	9	545 161	136 875	31 846	151 062		182 909	2.69	4.31	2 350 999	492 531	22 345 483	2 247 911	22 734 927
2032	10	552 450	136 875	31 846	151 062		182 909	2.85	4.57	2 525 380	522 083	22 734 927	2 287 088	23 018 719
2033	11	559 766	182 500	31 846	198 056		229 902	3.03	4.85	2 712 351	695 593	23 018 719	2 315 637	23 317 597
2034	12	567 109	182 500	31 846	198 056		229 902	3.21	5.14	2 912 807	737 328	23 317 597	2 345 704	23 487 822
2035	13	574 479	182 500	31 846	198 056		229 902	3.40	5.44	3 127 701	781 568	23 487 822	2 362 828	23 504 517
2036	14	581 877	182 500	31 846	198 056		229 902	3.60	5.77	3 358 056	828 462	23 504 517	2 364 507	23 339 430
2037	15	589 303	182 500	31 846	198 056		229 902	3.82	6.12	3 604 967	878 170	23 339 430	2 347 900	22 960 533
2038	16	596 757	182 500	31 846	198 056		229 902	4.05	6.48	3 869 603	930 860	22 960 533	2 309 784	22 331 573
2039	17	604 241	228 125	31 846	245 050		276 896	4.29	6.87	4 153 217	1 188 402	22 331 573	2 246 512	21 613 270
2040	18	611 754	228 125	31 846	245 050		276 896	4.55	7.29	4 457 148	1 259 707	21 613 270	2 174 252	20 590 079
2041	19	619 297	228 125	31 846	245 050		276 896	4.82	7.72	4 782 831	1 335 289	20 590 079	2 071 321	19 213 858
2042	20	626 839	228 125	31 846	245 050		276 896	5.11	8.19	5 131 541	1 415 406	19 213 858	1 932 876	17 430 599
2043	21	634 380	228 125	31 846	245 050		276 896	5.42	8.68	5 504 871	1 500 331	17 430 599	1 753 483	15 179 542
2044	22	641 921	228 125	31 846	245 050		276 896	5.74	9.20	5 904 532	1 590 351	15 179 542	1 527 032	12 392 392
2045	23	649 463	228 125	31 846	245 050		276 896	6.09	9.75	6 332 334	1 685 772	12 392 392	1 246 650	8 992 479
2046	24	657 004	228 125	31 846	245 050		276 896	6.45	10.34	6 790 216	1 786 918	8 992 479	904 625	4 893 807
2047	25	664 545	228 125	31 846	245 050		276 896	6.84	10.96	7 280 247	1 894 133	4 893 807	492 307	0

Table D.6: Tariff calculation – grant and phasing scenario 5

Raw water only
Tariff distributed over Umgeni Water Sales from 2023
20 year loan redemption from 2023, 0% Grant
First order financial calculation. Actual tariff to be calculated by DWA and TCTA once costs have been finalised and funding has been arranged.

Real interest rate 3.83%

Year	Years operational	Umgeni water sales (kl'000)	Volume treated WTW	Disbursements (R'000)				Inflation	Tariff	Revenue (R'000)	Disbursements (R'000)	Beginning Year Debt (R'000)	Interest (R'000)	End Year Debt (R'000)
				uMWP-1: Raw water component	uMWP-1: Potable water component	Grant as a percentage of Capital Cost	Total							
				Nominal end of year	Nominal end of year	0%	Nominal	6%	R 1.88		Inflated		10.06%	
2014		0	0	0	0	0	0	1.00	1.88	0	0	0	0	0
2015		0	0	0	0	0	0	1.06	2.00	0	0	0	0	0
2016		0	0	0	0	0	0	1.12	2.12	0	0	0	0	0
2017		0	0	0	0	0	0	1.19	2.25	0	0	0	0	0
2018		0	0	2 556 459	0	0	2 556 459	1.26	2.38	0	3 227 470	0	0	3 227 470
2019		0	0	2 556 459	0	0	2 556 459	1.34	2.52	0	3 421 118	3 227 470	324 677	6 973 265
2020		0	0	2 556 459	0	0	2 556 459	1.42	2.67	0	3 626 385	6 973 265	701 497	11 301 147
2021		0	0	2 556 459	0	0	2 556 459	1.50	2.83	0	3 843 969	11 301 147	1 136 873	16 281 989
2022		0	0	2 556 459	0	0	2 556 459	1.59	3.00	0	4 074 607	16 281 989	1 637 936	21 994 531
2023	1	487 756	137	31 846	0		31 846	1.69	**3.18**	1 553 334	53 804	21 994 531	2 212 606	22 707 607
2024	2	494 847	137	31 846	0		31 846	1.79	3.38	1 670 470	57 032	22 707 607	2 284 340	23 378 509
2025	3	501 961	137	31 846	0		31 846	1.90	3.58	1 796 154	60 454	23 378 509	2 351 831	23 994 641
2026	4	509 099	137	31 846	0		31 846	2.01	3.79	1 930 998	64 081	23 994 641	2 413 813	24 541 537
2027	5	516 262	137	31 846	0		31 846	2.13	4.02	2 075 654	67 926	24 541 537	2 468 830	25 002 639
2028	6	523 449	137	31 846	0		31 846	2.26	4.26	2 230 823	72 002	25 002 639	2 515 215	25 359 033
2029	7	530 661	137	31 846	0		31 846	2.40	4.52	2 397 252	76 322	25 359 033	2 551 068	25 589 171
2030	8	537 898	183	31 846	0		31 846	2.54	4.79	2 575 744	80 901	25 589 171	2 574 219	25 668 548
2031	9	545 161	183	31 846	0		31 846	2.69	5.08	2 767 155	85 755	25 668 548	2 582 205	25 569 352
2032	10	552 450	183	31 846	0		31 846	2.85	5.38	2 972 404	90 901	25 569 352	2 572 226	25 260 074
2033	11	559 766	183	31 846	0		31 846	3.03	5.70	3 192 472	96 355	25 260 074	2 541 113	24 705 070
2034	12	567 109	183	31 846	0		31 846	3.21	6.05	3 428 410	102 136	24 705 070	2 485 281	23 864 076
2035	13	574 479	183	31 846	0		31 846	3.40	6.41	3 681 344	108 264	23 864 076	2 400 678	22 691 675
2036	14	581 877	183	31 846	0		31 846	3.60	6.79	3 952 475	114 760	22 691 675	2 282 737	21 136 697
2037	15	589 303	183	31 846	0		31 846	3.82	7.20	4 243 092	121 646	21 136 697	2 126 309	19 141 560
2038	16	596 757	228	31 846	0		31 846	4.05	7.63	4 554 572	128 944	19 141 560	1 925 603	16 641 534
2039	17	604 241	228	31 846	0		31 846	4.29	8.09	4 888 389	136 681	16 641 534	1 674 105	13 563 931
2040	18	611 754	228	31 846	0		31 846	4.55	8.58	5 246 120	144 882	13 563 931	1 364 504	9 827 197
2041	19	619 297	228	31 846	0		31 846	4.82	9.09	5 629 452	153 575	9 827 197	988 596	5 339 915
2042	20	626 839	228	31 846	0		31 846	5.11	9.64	6 039 889	162 789	5 339 915	537 185	0

Table D.7: Tariff calculation – results

Scenario	Funding arrangements			Increase in Umgeni Water tariff	
	Infrastructure	Loan redemption period	Grant	2014 Rands	2023 Rands
1	Raw and potable water	20 years, from 2023	0%	R 2.70	R 4.57
2	Raw and potable water	20 years, from 2023	25%	R 2.12	R 3.58
3	Raw and potable water	25 years, from 2023	25%	R 1.86	R 3.15
4	Raw and potable water	25 years, from 2023, phased in from 2018	25%	R 1.60	R 2.71
5	Raw water only	20 years, from 2023	None	R 1.88	R 3.18

Appendix E

Request for Approval that Implementation of Phase-2 of the Mooi-Mgeni Transfer Scheme (MMTS-2) be Funded Off-Budget

MINISTRY OF WATER AFFAIRS AND FORESTRY

2007 -05- 24

10:05 PRIVATE BAG X313
PRETORIA 0001

water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

ENQUIRIES: L.S. Mabuda
TELEPHONE: 012-336-8477
REFERENCE: 14/2/V200/10/1/2

MINISTER OF WATER AFFAIRS AND FORESTRY

REQUEST FOR APPROVAL THAT THE IMPLEMENTATION OF PHASE-2 OF THE MOOI-MGENI TRANSFER SCHEME (MMTS-2) BE FUNDED OFF-BUDGET

Purpose of this submission

The purpose of this submission is twofold:

1. To obtain approval in terms of section 111 of the National Water Act, 1998 (Act No. 36 of 1998) to finance the implementation of the proposed Phase-2 of the Mooi-Mgeni Transfer Scheme (Spring Grove Dam and Transfer Infrastructure) (MMTS-2) with off-budget funds.
2. To obtain approval that, in general, all new water resource augmentation schemes for Metros be funded off-budget unless there are specific grounds to fund the schemes from the fiscus.

Background

The existing Mgeni water supply system, generally referred to as the Mgeni System, comprise four large dams on the Mgeni River and a transfer scheme from the Mooi River known as Phase-1 of the Mooi-Mgeni Transfer Scheme (MMTS-1). The MMTS-1 and three of the dams, viz. Midmar, Albert Falls, and Inanda belongs to the State while Nagle Dam (a much smaller dam) belongs to Umgeni Water, the regional water board. Umgeni Water purchases raw water from our Department, treats it to potable standards, and then sells it on to its municipal clients in the Durban-Pietermaritzburg region utilising its own distribution infrastructure. As an entity that operates on a commercial basis, Umgeni Water enjoys a high credit rating that enables it to fund its own projects from finance obtained from the financial markets. In this way Umgeni Water funded the MMTS-1 project..

Since the start of the planning investigations into the MMTS-2 in 1999, all stakeholders were informed of the intention that the proposed scheme will be funded off-budget. My predecessor, Mr Mike Muller, reiterated this position during a meeting held with Umgeni Water and its three municipal clients with regards to the urgent need to implement the MMTS-2 on 19 November 2004 in Durban. At the time no objections were raised to the method of funding proposed by our Department.

Our Department's position regarding funding and institutional arrangements was repeated during subsequent individual presentations to each of the municipalities and the board of Umgeni Water. All four major stakeholders agreed to the urgent need for the project to proceed as the analyses showed that the risk of shortages to the present system was already unacceptably high. The three municipalities individually confirmed their acceptance of the funding and institutional arrangements proposed by our Department in writing. However, the board of Umgeni Water did not concur but argued that the project should be funded from the fiscus. The argument raised by Umgeni Water

Act DDG: NR
2) CD: NWRP

was that off-budget financing will be more expensive to its consumers and that it expects that funding from the fiscus will be favourable, especially, to the poor in their supply area. (Please see copy of their letter attached as Annexure A.)

The position taken by Umgeni Water meant that the whole progress toward augmentation was brought to a halt since it makes it impossible to secure the necessary off-take agreements to secure off-budget funding. Although Umgeni Water agrees that the project should be urgently implemented, its position regarding the method of funding has not changed, despite two formal letters and discussions with high-level officials of our Department.

Legal situation

In accordance with section 111 of the National Water Act, 1998, the Minister of Water Affairs and Forestry may finance the construction of a government waterworks from funds appropriated by Parliament or obtained from any other source (e.g. off-budget funding). This is also reflected in section 5.3.2.2 of the National Water Pricing Strategy.

The main advantage of off-budget funding is that projects can be implemented without the need to fit into the capital budget cycle and that the loans can be structured such that government guarantees are not required. There is therefore no additional load on government debt.

Both types of funding result in full cost recovery. If funded from the fiscus the user has to pay for water in accordance to the National Water Pricing Strategy. In the case of off-budget financing the payments cover the interest and redemption of the loans (with smoothing to spread the load on the consumer over time).

In cases where users cannot afford to pay for water, such as poor rural communities, the responsible municipalities are expected to provide relief by utilising the monies received through local government's Equitable Share. This aspect is dealt with in our Department's Strategic Framework for Water Services (September 2003), especially in sections 4.4.1, 4.5.1 and 4.5.2. The implication is, that in the end, all such water is basically supplied free of charge to this user group.

Existing precedents for off-budget funding

A precedent has already been set in that two major projects currently being implemented by our Department, through the Trans-Caledon Tunnel Authority (TCTA), are fully (100%) financed with off-budget funding, viz. the Berg Water Project (BWP) and the Vaal River Eastern Sub-system Augmentation Project (VRESAP). The BWP is being developed to essentially supply the Cape Metropolitan area with water while the VRESAP is being developed essentially for the industrial sector on the Eastern Highveld (Eskom and Sasol). Although not a water board, the City of Cape Town is in a very similar position as Umgeni Water and its municipal clients. Both of these water users have sustainable sources of income and can afford to pay for water.

A similar financing model applies to the users of the Vaal River System (E.g. Rand Water) that is being supplemented from the Lesotho Highlands Water Scheme.

Affordability of water by users of the Mgeni System

The Mgeni System water users comprise largely the eThekwini Metropolitan Municipality (using 82,3% of the water) and the Msunduzi Local Municipality (Pietermaritzburg) (using 13,9% of the water). Together these two major municipalities use 96,2% of the Mgeni System's water. The remaining 3,8% of the system's water is mostly used by the uMgungungdlovu District Municipality while only a small portion is used by irrigation.

Due to their greater and sustainable sources of revenue both the eThekwini MM and Msunduzi LM can structure their water tariff structure such that the basic human needs component of water can

be supplied through cross-subsidisation free of charge to those who cannot afford to pay for water. On the other hand the uMgungundlovu LM receive monies to cover the cost of water through local government's Equitable Share.

As mentioned earlier these municipalities were approached by our Department and informed of the Department's intention to implement and finance the proposed MMTS-2 with off-budget funding. The implications of this funding method on the raw water tariff were also thoroughly discussed with them. At the end of the process all three the municipalities agreed in writing with the funding arrangements proposed by our Department.

Concluding remarks

The method of funding new schemes is not only crucial for our Department's planning investigations where the impact of the water tariff has to be discussed with the water users but also for establishing our Department's capital projects budget programmes. It is critical for the implementation phase of any project that the water users have already accepted the proposed funding method during the extensive public participation process of the planning investigations in order to ensure smooth transition into the implementation phase. Without a proper policy in this regard, serious delays can be experienced with the potential of leading to embarrassing consequences for our Department.

It is my opinion that the current deadlock with Umgeni Water can only be resolved through a Ministerial decision on the method of funding to be used for implementing the very urgently needed MMTS-2 and that the off-budget funding method is the appropriate way to go in this situation.

Recommendation

We recommend that you approve:

1. That Phase-2 of the Mooi-Mgeni Transfer Scheme be funded off-budget in terms of section 111 of the National Water Act, 1998, and

2. That the general position be taken, in cases of water resource augmentation schemes for Metropolitan areas, that these will be funded off-budget unless there are specific grounds for funding from the fiscus, in whole or in part.

mdane

DIRECTOR-GENERAL
DATE: 22/05/07

RECOMMENDATION NO. 1
APPROVED/

RECOMMENDATION NO. 2
APPROVED/

MRS L B HENDRICKS MP
MINISTER OF WATER AFFAIRS AND FORESTRY
DATE: 27/06/07

RECOMMENDATION NO. 1
NOT APPROVED

RECOMMENDATION NO. 2
NOT APPROVED

MRS L B HENDRICKS MP
MINISTER OF WATER AFFAIRS AND FORESTRY
DATE:

UMGENI WATER

Managing Water for Life

M Msiwa

3 October 2006

Director-General
Department of Water Affairs and Forestry
Private Bag X313
PRETORIA
0001

5.10.2006

Attention: P H van Niekerk

FACSIMILE: 012 323 4472

MNGENI SYSTEM AUGMENTATION: IMPLEMENTATION OF THE PROPOSED MMTS-2

Reference is made to your letter dated 13 July in respect the proposed implementation of the Mgeni System Augmentation MMTS-2, and regret the delay in responding to your correspondence.

I wish to confirm once more that the Board of Umgeni water fully accepts and supports the technical reasons and need for the implementation of the proposed MMTS-2. It also appreciates the technical aspects of the proposal.

However the Board is concerned about the possible adverse impacts of the proposal with regard to the **Financial, Institutional, Economic** and **Social** aspects.

The Board is concerned that the user-pay principle (i.e. paying only for the volume of abstracted water used) will not apply in this project. The end-users will be paying for the availability/or assurance of supply rather than water consumed or used.

The impacts of the establishment of the National Infrastructure Agency and the Catchment Management Agency are likely to add further undisclosed and unquantified costs to the future raw water prices.

It is the Boards view that the **eThekwini-Msunduzi** economic growth corridor, contributes significantly to the GDP of the country, and that additional water demands are partly due to the rapid economic growth of the area, which benefits the National Revenue Fund, and hence it is a fair request

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D:OA
See next page pse.
5/10.

to have the project funded from the National Revenue Fund. The Raw Water Pricing Strategy also reinforces this request.

Lastly, the Living Conditions Survey in our area of supply indicates that out of the:
(824 371) households of eThekwini Metropolitan Municipality **35.5%** are living in poverty
(130 016) households of Ilembe District Municipality **61.1%** are living in poverty
(76 344) households of Sisonke District Municipality **69.1%** are living in poverty
(158 443) households of Ugu District Municipality **62.5%** are living in poverty
(234 781) households of Mgungundlovu District Municipality **47.96%** are living in poverty

It therefore follows that Spring Grove Dam cannot be regarded as a purely economic infrastructure project as it has to support socio-economic goals and the constitutional imperatives in relation to "water rights".

Given the above institutional, economic, financial and social aspects the Board strongly appeals to the Minister to finance/fund the proposed MMTS-2 through the National Revenue Fund.

Yours sincerely

M MSIWA
CHIEF EXECUTIVE
UMGENI WATER

cc General Manager: Engineering and Scientific Services – Mr Pumezo Jonas

D: OA
Please prepare a memo to the DG, providing the background to the situation, as well as a draft letter to UW, which can serve as basis for discussion for our appropriate response.

CD: IWRP 5.10.2006.

cc DDG: P&R
DDG: NWRI (Att. Mr. W. Craeamp)

Appendix F

Alternative augmentation options

ALTERNATIVE AUGMENTATION OPTIONS

Alternative augmentation options including sea water desalination and re-use have been identified through studies such as the *KwaZulu-Natal Coastal Metropolitan Areas Reconciliation Strategy*. The desalination and re-use options are being investigated at feasibility level UW and eThekwini Municipality respectively.

All information on the sea water desalination and the reclamation and re-use option in this report is based on preliminary information provided by the consultants working for UW and eThekwini.

While there are social hurdles to overcome before the direct re-use of effluent can be implemented, it is possible that either one or both of these options could be implemented before the much larger uMWP could first deliver water.

F.1 DESCRIPTION OF ALTERNATIVE AUGMENTATION OPTIONS

F.1.1 Desalination

The desalination investigating focus on two plants; the first is at Lovu to supply the South Coast and the other is at Tongaat to supply the North Coast. **Figure F.1** shows the locality and supply areas of these proposed plants. The *KwaZulu-Natal Coastal Metropolitan Areas Reconciliation Strategy* indicated that a desalination plant at Tongaat would be replaced by the uMWP, and is not viable in the long-term.

However, regardless of whether the uMWP is implemented or not, an intervention on the South Coast is much needed, and either the South Coast desalination plant or a dam at Ngwadini will be required as there are supply constraints between the main Mgeni WSS and the South Coast. The decision on which of the options – South Coast desalination plant and/or Ngwadini Dam – will be implemented will be taken during the *KwaZulu-Natal Coastal Metropolitan Areas Reconciliation Strategy*.

UW is currently investigating the feasibility of a 54.7 million m³/a (150 Mℓ/day) sea water desalination plant on the South Coast in the vicinity of Lovu.

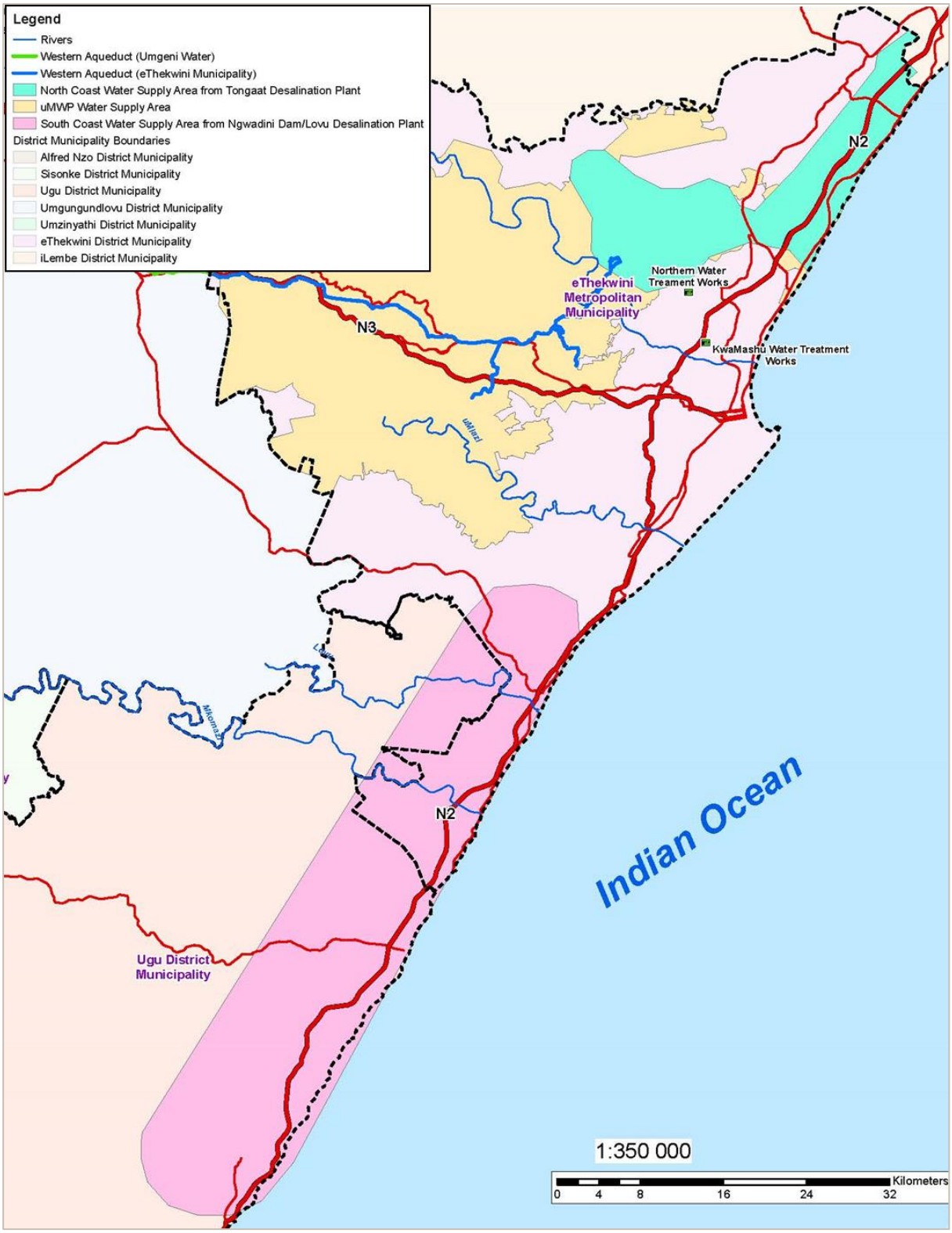

Figure F.1: Map showing the relative positions (and supply areas) of the uMWP, the desalination and re-use options

F.1.2 Re-use of treated water

The eThekwini Municipality is currently investigating the feasibility of re-using effluent from its KwaMashu and Northern waste water treatment works (shown on **Figure F.1**) with a combined output of 42.4 million m³/a (116 Mℓ/day), which is

detailed in the report titled *Feasibility Study of Project Options for Reclamation and Re-use of Treated Sewage Effluents* by Golder Associates (2010).

The combined output of 42.4 million m³/a (116 Mℓ/day), from the KwaMashu and Northern waste water treatment works can be treated to potable water standards, and discharged directly into eThekwini water distribution system. The financial aspect of this option is attractive as construction can be phased as the water requirements grow. However, the hurdle of public perception and acceptance will have to be addressed.

F.2 Cost of Alternative Augmentation Options

F.2.1 Cost of desalination

The capital cost of the 54.7 mil m³/a (150 Mℓ/day) sea water desalination plant on the South Coast at Lovu is as follows:

Table F.1: Capital cost of Lovu desalination plant

Item	Capital cost (2014 Rands) R'000
Construction/Procurement/Installation	
Intake Structure with Two Inlet Towers	108 120
Intake Pipeline from Intake Tower to Pump Station	222 600
Discharge Outfall with Diffusers	29 680
Discharge Pipe from Plant to Outfall	103 880
Intake Pump Station	44 520
Intake Pipeline from Pump Station to Desalination Plant	66 780
DAF System	63 600
Gravity Media Filters	127 200
Desalination System (Single Pass/Includes En. Recovery)	720 800
Product Water Re-mineralization System	33 920
Product Water Disinfection System	14 840
Waste Disposal System	7 738
Site Preparation	4 982
Product Water Storage Tank	94 340
Product Water Transfer Pump Station	26 500
High Voltage Plant Power Substation	124 020
Electrical and Instrumentation System	233 200
Other Construction/Procurement/Installation Costs	29 680
Sub-Total: Construction	**2 056 400**

Item	Capital cost (2014 Rands) R'000
Professional Services & Fees	
Engineering	52 470
Project Licensing	1 378
Project Management and Administration	10 494
Geotechnical and Surveying Services	3 710
Construction Management and Inspection	84 800
Insurance & Bonds	95 400
Contractor Overhead & Profit	307 400
Start-up, Commissioning and Acceptance Testing	110 240
Operator Training	848
Sub-Total: Professional services and fees	**666 740**
Sub-Total: Project EPC Costs	**2 723 140**
Ps&Gs (25% of construction cost)	514 100
Environmental, landscaping and social costs (5% of activity cost)	102 820
Land acquisition (lump sum)	6 360
Sub-Total of activities and value related costs	**3 346 420**
Contingencies (25% of above sub-total)	836 605
Implementing agent - Umgeni Water (5% of above sub-total)	167 321
Total (excl. VAT)	**4 350 346**

The annual operating and maintenance cost of the Lovu Desalination Plant is as follows:

Table F.2: Operating and maintenance cost of Lovu desalination plant

Item	Annual O&M Costs	
	(R'000/year)	(R/m³)
Fixed annual costs		
Labour	17 683	0.32
Maintenance	16 547	0.30
O & M Contingency	8 830	0.16
Insurance	1 060	0.02
Operator Training	451	0.01
Sub-total: Fixed annual costs	**44 570**	**0.81**
Operating costs (excluding power)		
Chemicals	31 229	0.57
Cartridge Filters	4 070	0.07
Membrane Replacement	9 461	0.17
Other Miscellaneous Costs	848	0.02
Sub-total: Operating costs (excluding power)	**45 608**	**0.83**

Item	Annual O&M Costs	
	(R'000/year)	(R/m³)
Power	224 015	4.09
Total: Operation and maintenance cost	**314 192**	**5.73**

The feasibility investigation into the desalination plant at Lovu is ongoing. The above costs are indicative only and will be revised towards the end of 2014. These costs are also for the delivery of water at sea level and additional costs will be incurred to pump the water up to the consumers.

F.2.2 Cost of the KwaMashu and Northern Re-use Plants

The capital cost of the 42.4 million m³/a (116 Mℓ/day) effluent re-use option is projected to be as follows:

Table F.3: Capital cost of re-use option

Description	Capital cost (2014 Rands), R'000		
	KwaMashu only Membrane	Northern only Membrane	Total KwaMashu and Northern Membrane
Distribution Infrastructure			
Pipelines	8 870	13 264	22 134
Pump Stations & Outlet Works	1 704	2 549	4 253
Pressure Break Tanks & Storage Reservoirs	211	315	526
Mechanical	13 744	20 552	34 296
Electrical & Instrumentation	14 189	21 217	35 406
Sub-Total Distribution Infrastructure	**38 718**	**57 897**	**96 615**
Reclamation Treatment Plants			
Civil works	91 897	72 104	164 001
Piping	26 900	21 106	48 006
Mechanical	465 479	365 222	830 701
Electrical & Instrumentation	36 895	28 949	65 844
Sub-Total Treatment Plants	**621 171**	**487 380**	**1 108 552**
Sub-Total excl. VAT & Contingencies (activity cost)	**659 889**	**545 278**	**1 205 167**

Description	Capital cost (2014 Rands), R'000		
	KwaMashu only Membrane	Northern only Membrane	Total KwaMashu and Northern Membrane
Ps&Gs (25% of activity cost)	164 972	136 319	301 292
Professional fees (12% of activity cost)	79 187	65 433	144 620
Environmental, landscaping and social costs (5% of activity cost)	32 994	27 264	60 258
Land acquisition (lump sum)	0	0	0
Sub-Total of activities and value related costs	**937 043**	**774 294**	**1 711 337**
Contingencies (25% of above sub-total)	234 261	193 574	427 834
Implementing agent - Umgeni Water (5% of above sub-total)	46 852	38 715	85 567
Total excl. VAT	**1 218 155**	**1 006 583**	**2 224 738**

The annual operating cost of the re-use option is projected to be as follows:

Table F.4: Annual operating cost of the combined re-use option

Description	Operating cost (2014 Rands), R'000		
	KwaMashu only Membrane	Northern only Membrane	Total KwaMashu and Northern Membrane
Distribution Infrastructure (annual)			
Fixed cost (personnel, etc)	353	529	882
Electricity costs	10 598	15 847	26 445
Pipeline maintenance	335	501	836
Pump station maintenance	68	102	170
Sub-Total Distribution Infrastructure OPEX	**11 354**	**16 979**	**28 333**

Description	Operating cost (2014 Rands), R'000		
	KwaMashu only Membrane	Northern only Membrane	Total KwaMashu and Northern Membrane
Reclamation Treatment Plants (annual)			
Fixed costs (personnel, etc)	19 625	15 398	35 024
Chemicals	100 356	78 741	179 097
Electricity costs	12 184	9 560	21 744
Sub-Total Treatment Plants OPEX	**132 166**	**103 699**	**235 865**
Total annual OPEX excl. VAT (R'000/year)	**143 520**	**120 678**	**264 198**
Total daily OPEX excl. VAT (R/day)	393 205	330 624	723 830
Total daily water production (Ml/day)	65	51	116
Total OPEX/m³ of water distribution infrastructure (R/m³)	0.48	0.91	0.67
Total OPEX/m³ of water treatment plants (R/m³)	5.57	5.57	5.57
Total OPEX/m³ of water (R/m³)	**6.05**	**6.49**	**6.24**

F.3 Funding of the Combination of the uMWP, Re-use and Desalination Plants

Funding of three augmentation scenarios have been investigated that comprise various possible combinations of the uMWP with the desalination and re-use options:

F.3.1 Scenario 1: uMWP only (refer to Figure F.2)

- uMWP delivers water from 2023; and
- Revenue is generated to repay the project and O&M costs over a 20 year period from 2023 to 2042.

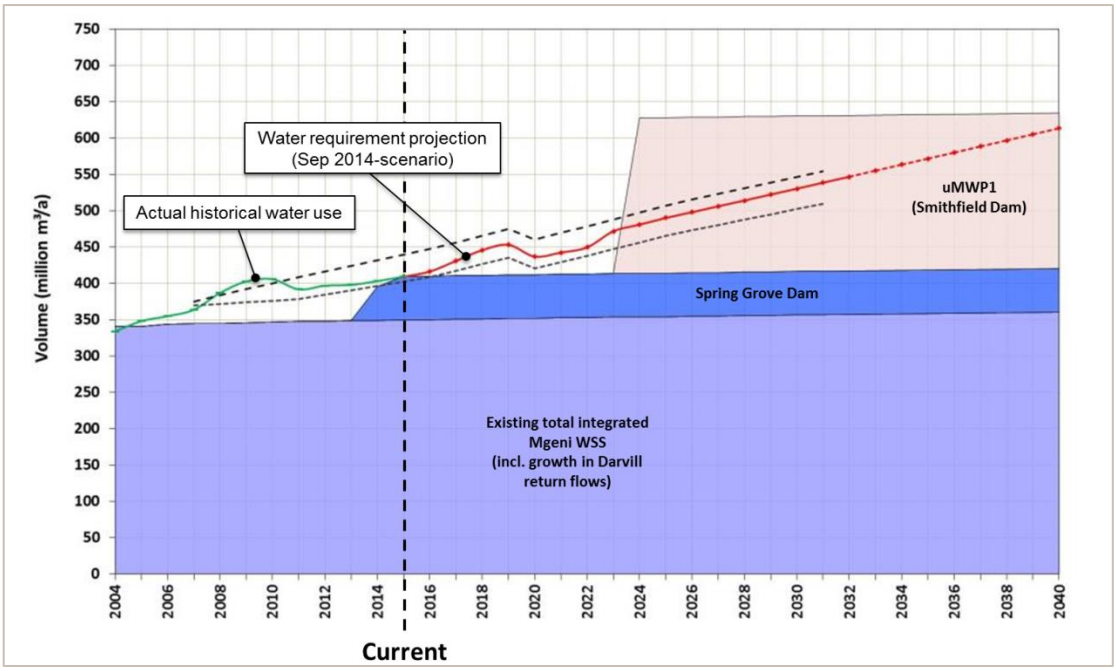

Figure F.2: Scenario 1: only uMWP-1

F.3.2 Scenario 2: 150 Mℓ/day sea water desalination plant followed by uMWP (refer to Figure F.3)

- A 150 Mℓ/day sea water desalination plant is implemented as Phase 1 and delivers water from 2019;
- uMWP is implemented as Phase 2 and delivers water from 2023; and
- Revenue is generated to repay the combined project and O&M costs over a period commencing in 2019 and extending to 20 years beyond 2023, i.e. to 2042.

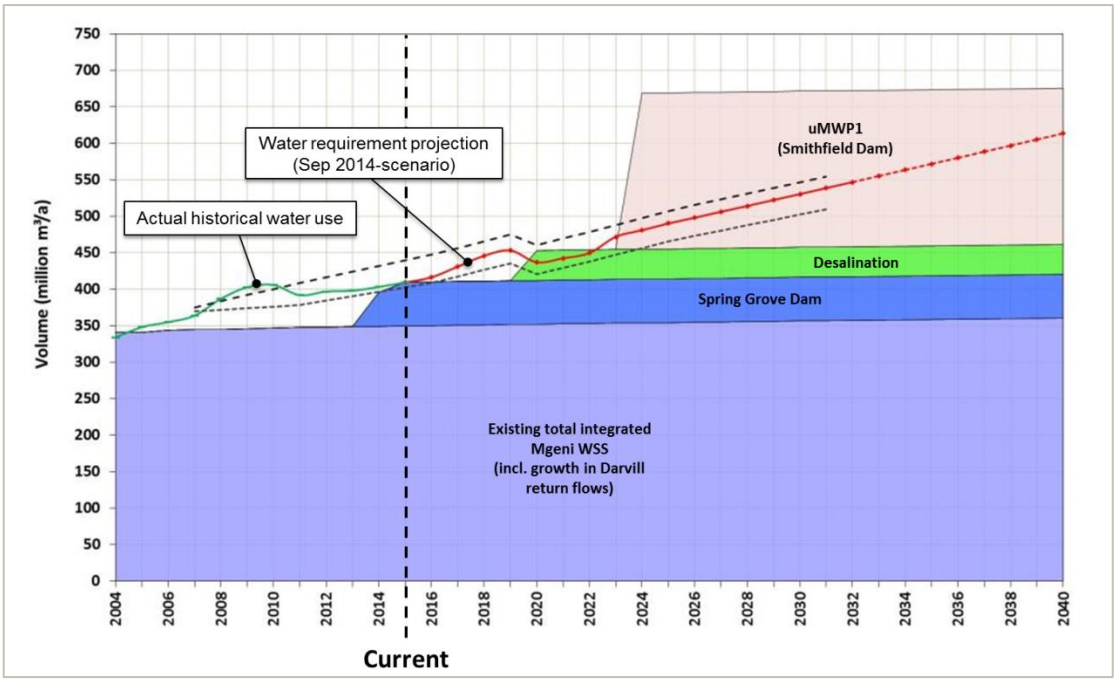

Figure F.3: Scenario 2: 150 Mℓ/day sea water desalination plant and uMWP-1

F.3.3 Scenario 3: 120 Mℓ/day combined Re-use plants, followed by 150 Mℓ/day sea water desalination plant, followed by uMWP (refer to Figure F.4)

- Re-use plants are implemented at the KwaMashu and Northern Waste Water Treatment works with a combined capacity of 120 Mℓ/day as Phase 1 and delivers water from 2019.
- A 150 Mℓ/day desalination plant is implemented as Phase 2 and delivers water from 2023;
- uMWP is implemented as Phase 2 and delivers water from 2027;
- Revenue is generated to repay the combined project and O&M costs over a period commencing in 2019 and extending to 20 years beyond 2027, i.e. to 2046.

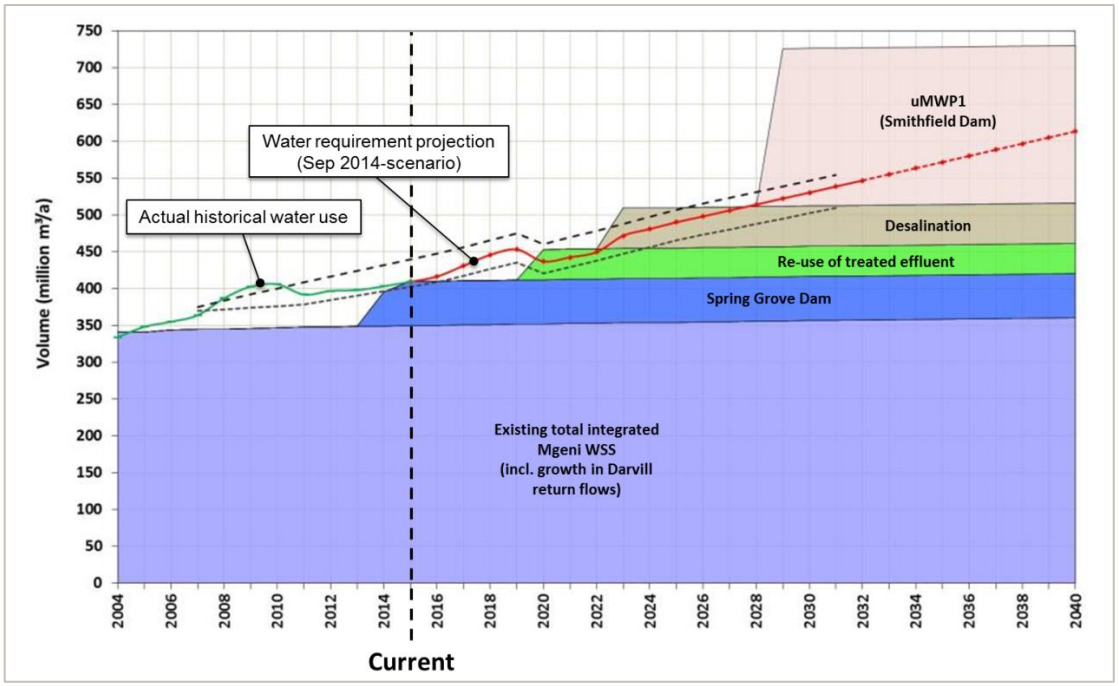

Figure F.4: Scenario 3: re-use, followed by desalination, followed by uMWP-1

Appendix G

Comments from eThekwini Municipality

Pieterse, Hermien

From:	Shinga, Bongi
Sent:	12 December 2015 10:44 PM
To:	Pieterse, Hermien; Bester Kobus (BesterK@dws.gov.za)
Subject:	FW: uMkhomazi Water Project: Technical Feasibility Study - Draft Institutional and Funding Aspects for review
Attachments:	uMWP - Comments on Institutional and Financial Aspects Report (14Dec2015).docx

Dear Hermien and Kobus,

Herewith submission from eThekwini Metro, for your consideration.

I have placed their submission in a table in case we need to provide these comments as an Annexure to the report.

Many thanks,
Bongi

From: Rosh Maharaj [mailto:ROSHANLALL.Maharaj@durban.gov.za]
Sent: 12 December 2015 03:01 PM
To: Shinga, Bongi
Cc: Ednick Msweli; Carron Dove
Subject: FW: uMkhomazi Water Project: Technical Feasibility Study - Draft Institutional and Funding Aspects for review

Hi Bongi
Herewith our comments :

1.
Need for project
The current water projections are showing that demand and supply are roughly balancing out following commissioning of Spring Grove dam .
From now until the implementation of Smithfield dam the gap will however grow and the risk of water restrictions (assessed at a 1 in 100 year occurrence) in the Umgeni supply area will increase. – see fig 1.4
(This is separate from the current situation which , if there is no substantial rainfall in the catchment in Dec to March 2016 , could be the start of a possible 1 in 200 year occurrence) .
The earliest date for Smithfield Dam is 2023 and the engineering studies etc are progressing well towards meeting this date. However the hold up (as experienced at Spring Grove Dam) was the delay in getting the necessary agreements 'signed off' by all parties.
There is no alternative to this scheme and eThekwini must prioritise its commitment to the scheme and prioritise the 'sign-offs'.
2.
Dates for sign –off on Agreements
I can't find any reference in the report of a latest date for these various agreements. This needs to be known and provided to the C M and Councillors.
3.
Grant Funding
It is being recommended that the free basic water supply component be funded by grant funding.
A figure of 25 % is quoted , this being the quoted %age eligible for free basic water in accordance with the eThekwini current water supply policy. (see item 3.1 for details of how this number was determined

) .However you have reflected a percentage of 63% for indigent and 37 % for non-indigent based on income levels.This might be a fairer level due to immense migration since 2011.
The eThekwini free basic water policy is :

Free Basic Water

The policy in respect of free water was amended by Council resolution applicable from 1 July 2012.

a) No charge for the supply of water is raised for domestic residential customers for the first 9 kl of water per month for those customers:
   i) With a full pressure connection where the property value is less than or equal to R 250 000 or
   ii) With a water supply via a low pressure roof tank

All other domestic residential customers will be charged for the volume of water supplied at the tariff rate.

b) All water supplied via a standpipe is free of charge (standpipes are installed subject to the conditions in 4.6.5 below)

The numbers for item a i and ii should be available via the billing system .
All rural connections are now being metered and in the billing system .This project is ongoing. Also the number of households supplied by standpipe – largely informal settlements – is not fully known . The last count was based on 2011 photography.
Again , if the aim is to present an accurate %age, (of indigent vs total households) then the total number of households will also be required.

It needs to be noted that the numbers being provided with free basic water are less than the households regarded as " indigent" and partial subsidisation of this group is provided .

In summary , IF grant funding is to be provided for free basic water (or for 'indigent' households) then it is very important that these numbers (or %ages) are known and the Municipalities should be focussing on providing resources for determining this as a priority.
The receipt of a minimum of 25 % grant funding from National Treasury is critical for this project so as to try and reduce the impact on the poor.

4.

Re-Use

The re-use schemes referred to in the Report – ie direct reuse at both Northern and Kwa Mashu WWTWks - are NOT being pursued . They have been delayed by the Council to the extent that – provided that Smithfield dam does come on line 2023 (or shortly thereafter) – they cannot be justified

5.

Risk of short term supply shortages

Siza Water (the WSP for the Ballito area) has lead the way in actively putting in place a wastewater to potable water project which , if you believe their press statements , will be providing water within the next week.
Some of our Councillors and Officials will be visiting Reuse plants in Singapore.
From the web site Singapore produces 75 Ml/day via 4 separate plants . 6% is used for indirect potable use (this represents 1% of the total potable demand) . The rest is used for non potable uses in plants where the water quality standard is required to be very high.
So they don't skimp on treatment quality at all , but do avoid the emotional side of drinking re-use.
We are not sure as to whether this visit will open up the way for us to implement a re-use scheme (whether direct or indirect) ?? .

We do need to plan for the possibility that Smithfield dam will be delayed and should be putting together a dedicated team now to provide for indirect re-use from Tongaat to Hazelmere dam.

6.Based on current information we are in agreement with the Institutional Arrangements and Funding Aspects under your Conclusions and Recommendations. As stated therein we are adamant that National Treasury fund more than 25 % of the Capital Expenditure . It should also fund part of Umgeni's Portable component .We

definitely do not support the increased Equitable share in lieu of the capital contribution. This will never be guaranteed year on year.

7.We are also of the firm belief that the capital costs and funding by TCTA and Umgeni must be kept separate.

8.We should receive more information on the calculations of the R200m for TCTA for Implementing Agents costs and the costs of 5% to be charged by Umgeni on their project

9.The agreement to the aforementioned must be based on the participation and sharing of costs by all six entities. Otherwise the doors to ring fencing will become a reality.

10. I notice the increase in tariffs as reflected in Table B.5 if Desalination and Reuse are implemented . We really believe that UMWP must be fastracked.

11.We are also of the view that the CUC for Springrove should be increased to pay off that loan maybe ten years earlier instead of early contributions towards UMWP.However some scenarios could be done in this regard.

Thanks
Bill

From: Speedy Moodliar
Sent: 04 December 2015 11:50 AM
To: Rob Dyer; Nithia Naidoo; Hope Joseph; Niren Appalsamy
Cc: Bill Pfaff
Subject: FW: uMkhomazi Water Project: Technical Feasibility Study - Draft Institutional and Funding Aspects for review
Importance: High

Hi,

Please provide your comments to Rosh he is coordinating the response.

Regards,

From: Rosh Maharaj
Sent: 02 December 2015 06:00 PM
To: Bhavna Soni; Speedy Moodliar
Subject: FW: uMkhomazi Water Project: Technical Feasibility Study - Draft Insitutional and Funding Aspects for review
Importance: High

Hi
Please can you check and provide comment as well

Thanks

From: Shinga, Bongi [mailto:Bongi.Shinga@aecom.com]
Sent: 02 December 2015 03:47 PM
To: Carron Dove; Ednick Msweli; Rosh Maharaj
Cc: Bester Kobus (BesterK@dws.gov.za)
Subject: uMkhomazi Water Project: Technical Feasibility Study - Draft Insitutional and Funding Aspects for review
Importance: High

Dear Mr Sibusiso Sithole (Municipal Manager), Mr Rosh Maharaj (Financial Manager) and Mr Ednick Msweli (Head: Water & Sanitation)

The uMkhomazi Water Project Phase 1: Module 1
Technical Feasibility Study: Raw Water

As discussed at the Financial Planning Meeting for uMkhomazi Water Project held on 08 October 2015 in Durban, attached is a **draft Institutional and Funding Aspects Report** for your review and comment.

This report is one of the reports that have been compiled as part of Module 1: Feasibility Study for uMkhomazi Water Project.

Please note that this report has been circulated for comment to all relevant Water Service Authorities and Project Steering Committee members.

You are therefore requested to review the attached report and submit comments in writing to bongi.shinga@aecom.com on or before **Thursday, 10 December 2015.**

On behalf of the study team and the Department of Water & Sanitation, I wish to thank you for your participation and contributions to date.

Many thanks and regards,

Bongi Shinga
Public Participation Manager
Environmental Services, Africa
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bongi.shinga@aecom.com

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