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Department:
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REPUBLIC OF SOUTH AFRICA

Directorate: Water Resource Development Planning
Department of Water & Sanitation
Private Bag X313
Pretoria
0001
South Africa

Greater Mangaung Water Augmentation Project

Socio-Economic Impact Assessment & Legal, Institutional and Financing Arrangements Report

Xhariep Pipeline Feasibility Study

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Directorate Water Resource Development Planning

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APPROVAL

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CONSULTANT: ZUTARI (PTY) LTD
Approved for the Consultant:

Stephan Kleynhans
Signed by Stephan Kleynhans, stephan.kleynhans@zutari.com

S KLEYNHANS
Design Director | Study Leader

DEPARTMENT OF WATER & SANITATION
Directorate: Water Resource Development Planning
Approved for Department of Water & Sanitation:

M MUGUMO
Chief Engineer: Water Resource Development Planning

C FOURIE
Director: Water Resource Development Planning

Document control record

Document prepared by:

Zutari (Pty) Ltd

Reg No 1977/003711/07
1 Century City Drive
Waterford Precinct
Century City
Cape Town

South Africa

PO Box 494
Cape Town
8000
Docex: DX 204

T +27 21 526 9400

E capetown@zutari.com

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Author signature	Signed by: Frankie A'Bear, frankie.abear@zutari.com 10/03/2025 13:48:40 UTC+02:00	Approver signature	Signed by: Stephan Kleynhans, stephan.kleynhans@zutari.com
Name	Frankie A'Bear	Name	Stephan Kleynhans
Title	Principal Engineer	Title	Design Director

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Report Structure

This report forms part of the following suite for the study:

REPORT INDEX	REPORT NAME	DWS NUMBER
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3	Stakeholder Management Report	P WMA 06/D00/00/3423/3
4	Data Analysis and Collection Report	P WMA 06/D00/00/3423/4
5	Pre-feasibility Study Report	P WMA 06/D00/00/3423/5
6	Main Feasibility Study Report	P WMA 06/D00/00/3423/6
7	Geological and Materials Investigations Report	P WMA 06/D00/00/3423/7
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10	**Socio-Economic Impact Assessment & Legal, Institutional and Financing Arrangement Report**	**P WMA 06/D00/00/3423/10**
11	Feasibility Design Report - Water Treatment Works	P WMA 06/D00/00/3423/11
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17	Water Use License Application Summary Report	P WMA 06/D00/00/3423/17
18	Integrated Water and Waste Management Plan	P WMA 06/D00/00/3423/18
19	Water Resource Analysis Report	P WMA 06/D00/00/3423/19

Reference

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DWS Report Number: P WMA 06/D00/00/3423/10

Prepared by Zutari (Pty) Ltd

Executive Summary

The conclusions and recommendations contain a detail description of the work undertaken as part of this Socio-Economic Impact Assessment & Legal, Institution and Financing Report and are as such repeated below as the Executive Summary.

Socio-Economic Assessment

The socio-economic assessment reiterated that the implementation of the Xhariep Pipeline is essential to ensure long-term water security and economic stability in the Greater Bloemfontein Water Supply System (GBWSS) region.

From the socio-economic impact assessment, the following are key takeaways:

- The implementation of the Xhariep Pipeline Project would allow economic activities to continue at both the 2035 and 2050 horizons.
- The projected socio-economic impacts by 2050 (in 2023 prices) of the Xhariep Pipeline are:
  - Total Gross Domestic Product (GDP) = R416,665 million,
  - Capital generated = R892,574 million,
  - Employment Opportunities Maintained = 948,040,
  - Annual Household Income Generated = R158,013 million, with
    - R23,892 million to low-income households, and,
  - Additional taxes paid to the different authorities = R107,236 million.
- The Xhariep Pipeline Scheme 1B was found to be economically viable as it would contribute to the socio-economic circumstances in the GBWSS and would improve security of supply of water of the system.
- The affordability analysis concluded that the total capital and interest repayment over a 30-year periods is not affordable for the paying households or the business and industrial sectors.
  - The paying households cannot afford the additional R28/m^3.
- If alternative funding options are considered, the option of a 75% capital grant and a loan for the balance of the capital costs at a low interest rate is probably the first of the different funding options that will ensure that the project is affordable to households.
- A concern raised through the socio-economic impact assessment was the financial management of Mangaung Metropolitan Municipality (MMM).

Financing Arrangements

The financing of the Xhariep Pipeline project is critical to its long-term success and sustainability. The financing model must balance the capital expenditure, operational costs and the affordability for the end-users. As there is limited opportunity for implementation phasing, the project requires substantial upfront investment, which will require a mix of public funding, concessional loans and potential private sector involvement.

The key takeaways from the financing arrangements assessment are:

- Various implementation scenarios were analysed. The project was split into three components and several implementation combinations were explored – with each entity implement one, two or all three components. The components were namely:
  - Component A (encompassing the infrastructure from the Gariep Dam to the 2nd Command Reservoir),
  - Component B (encompassing the infrastructure from the 2nd Command Reservoir to Longridge Reservoir) and,
  - Component C (encompassing the infrastructure from the 2nd Command Reservoir to Rustfontein water treatment works).

- The financial information required to accurately assess the implementation capacity of the entities was not available, however, financial information about previous projects implemented in the past 10 years by the entities was assessed as a proxy indicator.
- Five sources of financing are available for a public infrastructure project of this nature, i.e., (a) grants from central government, (b) the public delivery agency's own resources, (c) equity, (d) commercial debt, and (e) concessionary debt. The share of the financing sources **assumed** to be available to the implementation entities were presented in the report.
- The cost of capital from each financing source was assessed for each implementing entity. It should be noted that MMM and Vaal Central Water Board (VCWB) are expected to have to pay a premium above market rate for loans, given their vulnerable financial positions.
- For each implementation scenario considered, the projected bulk tariff was calculated taking into account the direct costs, long-term operational expenses and debt repayment obligations.
- Options 1C (where the project is implemented entirely by a DWS entity) and Option 3B (where components A and B are implemented by DWS and component C by VCWB) were found to have similar bulk tariff implications, R16.57/kl and R16.44/kl, respectively.
- Introducing a public-private partnership (PPP) in Option 3B did not result in any savings, as the private sector efficiencies were not sufficient to overcome the public entities' access to lower financing cost.
- An affordable tariff structure, particularly for the lower income households is crucial to ensuring that the socio-economic benefits of the project are shared across the population.
- The project can achieve financial sustainability, provided that cost recovery is effectively implemented thorugh a carefully structured bulk water tariff system.

Legal and Institutional Arrangements

The legal and institutional arrangements analysis explained that the chosen institutional arrangement should be based on a cooperative framework that involves all relevant institutions with a mandate and responsibility to provide water.

Key takeaways from the legal and institutional arrangements include:

- The same implementation scenarios were assessed from a legal and institutional mandate perspective as were assessed from a financing perspective.
- The analysis described the mandates of the three spheres of government involved in the Xhariep Pipeline Project implementation process, the national (DWS), water board (VCWB) and the water service authority (MMM and the local municipalities), highlighting that neither sphere has hierarchy over another but that there is interdependency and interrelation between them.
- From the Constitution, the Municipal Systems Act, the Municipal Structures Act and the Water Services Act, the following has been deduced:
    - There is a duty on all spheres of government to ensure that water supply services are provided in a manner that is efficient, equitable and sustainable.
    - The water service authorities, i.e., MMM and the local municipalities, have the mandate to ensure provision of water supply services within their area of jurisdiction.
- Therefore, the municipalities can decide how best to fulfill their consitutional mandate of providing access to water supply services and should decide on who should be the implementing entity for the Xhariep Pipeline. In doing so, these municipalities must take into account, among others:
    - Alternative ways of providing access to the services,
    - The need for regional efficiency,
    - The need to achieve benefit of scale,
    - The need for low costs,
    - The requirements of equity,
    - The availability of resources from neighbouring authorities,
    - Institutional capacity,
    - Financial capacity,

  - Technical competency,
  - Manpower, etc.

- If necessary, the municipalities may request VCWB to be the implementing entity of the scheme and VCWB may only refuse the request if, for sound technical and financial reasons, they would not be able to provide those services.
- If the municipalities fail to take up their responsibilities, the organs of State in the provincial and national sphere of Government may intervene to resolve the matter.
- It should be noted that there is potentially an inability by MMM to take up this responsibility. Their current administration and infrastructure management are poor, but they are also constrained by inadequate support from the other spheres of government and a critical shortage of funds. The other local municipalities may face similar challenges though these were not specifically examined as they would use about 3% of the water produced by the scheme with MMM using 97%.

This assessment highlights that, while various institutional options exist, the financial sustainability of the pipeline project will be dependent on the chosen implementing entity's capacity to manage operations and maintenance effectively. The report findings underscores that the project's success hinges on collaboration between national, provincial and local governments, and a clear delineation of responsibilities among entities.

From an economic perspective, the project is expected to generate substantial socio-economic benefits through direct, indirect, and induced impacts. This includes job creation during the construction and operational phases and an improvement in water security, which is critical for supporting regional economic activities, particularly in the agriculture and manufacturing sectors. The financial viability of the project is achievable if tariff structures are well managed, ensuring affordability for households while maintaining financial sustainability.

Recommendations

Based on the finding of the assessments the following recommendations are made:

- The findings should be presented and discussed at a Working Group Committee meeting to all the relevant stakeholders, which should be initiated by DWS and attendees must include MMM, Kopanong Local Municipality, Mantsopa Local Municipality and VCWB;
- The project success hinges on collaboration and cooperation between national, provincial and local governments. DWS should initiate the establishment of and lead a **Working Group** that involves all the relevant stakeholders, with representation at an executive and strategic level, so that agreement can be reached on:

  - Responsibilities with respect to the implementation, operation and maintenance of the scheme, e.g. MMM (as they should take a leading role) can request VCWB (legally) or DWS (administratively) (including TCTA or the NWRIA) to implement the project on their behalf,
  - Financing options, taking consideration that at least a 75% capital grant and a loan for the balance of the capital costs at a low interest rate would be required to result in affordable bulk water tariff increases. The creditworthiness of each institution must be considered as part of the financing options to minimise the cost impact on the end-users, and,
  - Development of an implementation timeframe.

Contents

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Abbreviations

Acronyms

Acronym	Description
DWS	Department of Water & Sanitation
EIA	Environmental Impact Assessment
GBWSS	Greater Bloemfontein Water Supply System
MMM	Mangaung Metropolitan Municipality
NWA	National Water Act
NWRIA	National Water Resource Infrastructure Agency
PPP	Private Public Partnerships
TCTA	Trans-Caledon Tunnel Authority
UAW	Unaccounted for Water
VCWB	Vaal Central Water Board
WC/WDM	Water Conservation and Water Demand Management
WMA	Water Management Area
WSA	Water Service Authority
WSAct	Water Services Act
WSDP	Water Service Development Plan
WSP	Water Service Provider
WTW	Water Treatment Works

Measurement Units

Symbol	Description
km	Kilometres
m	Meters
m^3/a	Cubic meters per annum
m^3/s	Cubic meters per second
million m^3	Million cubic meters
million m^3/a	Million cubic meters per annum
Mℓ/d	Megalitres per day

1 Introduction

1.1 Background

The Water Reconciliation Strategy Study for the Larger Bulk Water Supply Systems: Greater Bloemfontein Area (DWS, 2012) (henceforth referred to as the "2012 Reconciliation Strategy") identified that the Greater Bloemfontein Water Supply System (GBWSS) would need to secure a sustainable water supply for the future water demands in the area. The 2012 Reconciliation Strategy recommended that the development of a major surface water augmentation scheme should be given consideration as a possible option in conjunction with the implementation of various other interventions.

Following the 2012 Reconciliation Strategy, the area experienced water shortages and the major surface water augmentation scheme option, now called the Greater Mangaung Water Augmentation Project – Xhariep Pipeline, was accelerated. Vaal Central Water Board (VCWB), previously known as Bloem Water, and Mangaung Metropolitan Municipality (MMM) independently investigated the same three route options from Gariep Dam to tie-in points within the GBWSS area (see Figure 1-1). Each institution reached a different conclusion as to which of the three was the best route/scheme.

The Xhariep Pipeline project was and remains of critical importance to address growing water demands on a regional basis; thus, the Department of Water and Sanitation (DWS, the Client) appointed Zutari to complete the detailed feasibility study, which builds on the pre-feasibility study which reviewed all previous studies and recommended an optimal scheme from a national and regional perspective. The pre-feasibility study included determining routing and sizing which has been taken forward to this detailed feasibility stage. The water use license application and the environmental authorisation process was initiated in the pre-feasibility study phase of this project and documentation will be handed over for submission by the agreed implementing entity in the next phase of the project.

1.2 Study Objectives

The optimal Scheme approved by DWS was determined to be Scheme 1B, which is a hybrid between the potable water scheme previously assessed by MMM and VCWB, and a new raw water scheme. This selection concluded the pre-feasibility stage, and the study continued to the detailed feasibility stage where the objectives were to:

- Assess the technical, financial, economic, and environmental aspects at detailed feasibility level,
- Assess the risks and redundancy of the proposed bulk infrastructure system when operated in conjunction with the existing bulk infrastructure,
- Assess the impact of the project on existing systems including the Orange River System (ORS),
- Integration and utilisation of the available capacities in the existing infrastructure, and,
- Conduct stakeholder engagement workshops.

As this study is complex in nature, the detailed feasibility stage also considered:

- Institutional arrangements for implementation, ownership and operation,
- Financing options,
- Affordability and bankability in line with the National Treasury guidelines,
- Opportunities for phased implementation, and,
- Stakeholder preferences.

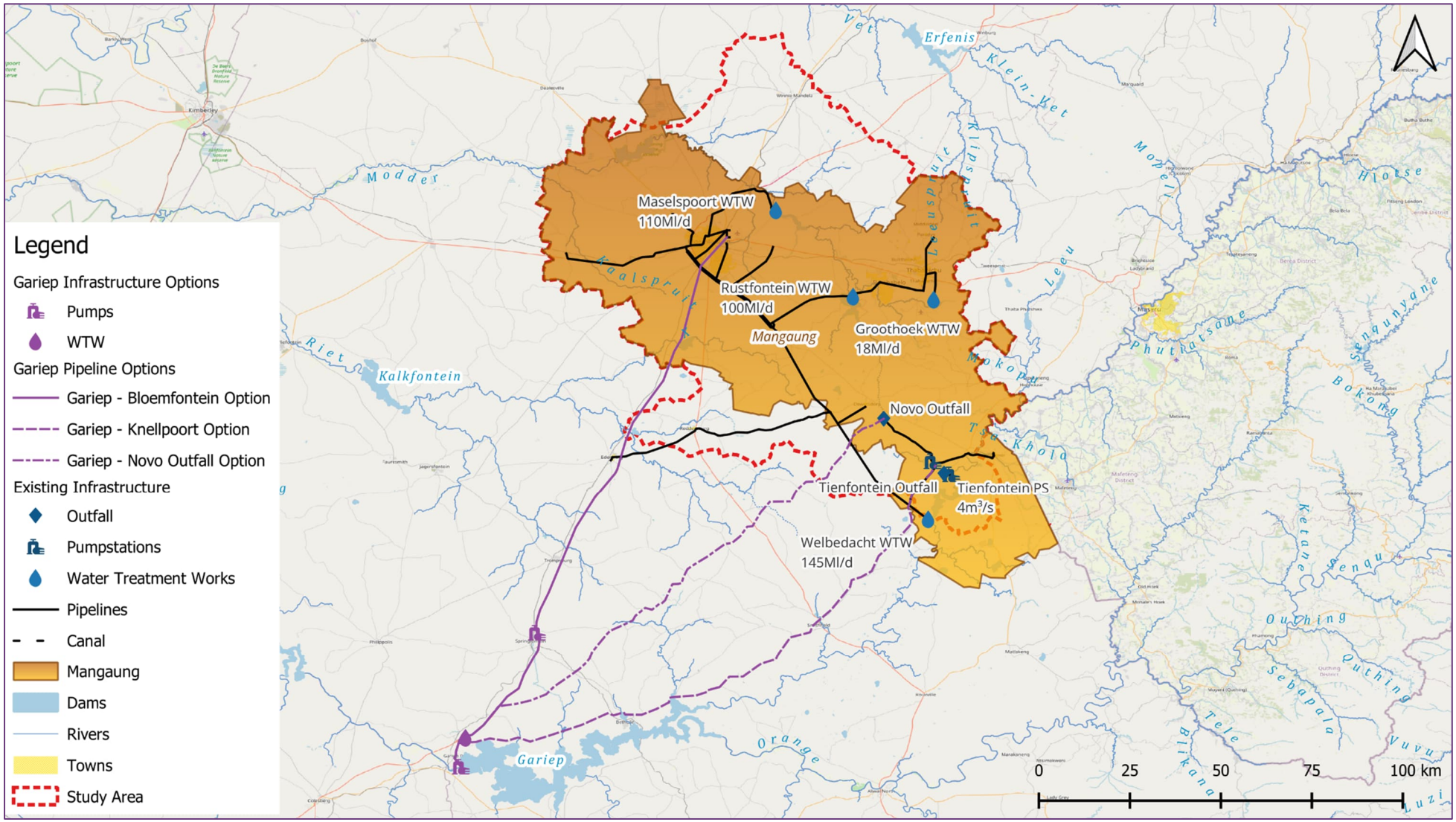


Figure 1-1: Previously studied route options from Gariep Dam to the GBWSS

1.3 Report Structure

This report aims to address the socio-economic, legal and institutional, and financing requirements of the Xhariep Pipeline project. The three aspects are closely intertwined and therefore are addressed in a single report to present a holistic view of the socio-economic impact and practical implementation options for the implementing and owning agent, and financing mechanisms available.

The report is structured as follows:

- Chapter 1 presents the background and objectives of the study.
- Chapter 2 provides a description of the Scheme 1B as well as the institutional scenarios assessed.
- Chapter 3 describes the socio-economic impact assessment, including the study area demographics, the economic impact, the socio-economic impact, and affordability.
- Chapter 4 discusses the financing arrangements, starting with the financing considerations and then calculating the projected bulk tariff.
- Chapter 5 presents the legal and institutional arrangements and describes the powers and functions of the possible implementing agents and provides recommendations on how to give effect to the constitutional imperatives.
- Chapter 6 summarises the findings and provides recommendations for possible implementation options to be further explored for the Xhariep Pipeline project.

2 Contextual Background

2.1 Greater Bloemfontein Water Supply System

The existing configuration of the GBWSS is shown in Figure 2-1. A detailed description of the GBWSS infrastructure can be found in the Data Collection, Review & Analysis Report (Report No. P WMA 06/D00/00/3423/4), which forms part of the published reports for this study.

The Welbedacht-Bloemfontein scheme (shown in orange) supplies De Hoek, Wepener, De Wetsdorp, Edenburg, Reddersburg, Uitkyk and Bloemfontein. The Rustfontein-Thaba Nchu scheme (light green) supplies Botshabelo and Thaba Nchu as well as smaller towns (e.g. Tabane, Blydskap, Motlatla and Houtnek). This scheme has the capability to supplement the Welbedacht-Bloemfontein pipeline. The smallest supply scheme is from Maselspoort water treatment works (WTW) to Bloemfontein (dark green). The Rustfontein and Mockes Dams can be supplemented by the Tienfontein-Knellpoort-Novo transfer (dashed blue).

The total storage capacity of the system is 181.5 million m³. The installed capacity of Tienfontein Pump Station is 5.7 m³/s however the maximum operational capacity is limited to 3.8 m³/s due to power supply constraints. The Novo Pump Station has an installed capacity of 2.95 m³/s and a maximum operational capacity of 2.2 m³/s. The system has a total treatment capacity of 355 Mℓ/d (excluding the Groothoek WTW), but distribution of potable water is uneven due to WTW location and capacity relative to the demand centres.

Most of the small towns use their own groundwater resources in combination with surface water support from the GBWSS. The small towns currently make up approximately 4% of the water demand of the GBWSS. VCWB is the main supplier of bulk potable water, and MMM supplies the remainder of Bloemfontein's water demands via the Maselspoort Scheme.

2.2 Scheme 1B Description

The pre-feasibility study concluded that Scheme 1B should be taken forward into the detailed feasibility study. Scheme 1B is a hybrid between the potable water scheme previously assessed by MMM and VCWB and a new raw water scheme that was introduced in the pre-feasibility study. A full description of the scheme comparison and analysis is provided in the Xhariep Pipeline Pre-Feasibility Study Report (document reference number: P WMA 06/D00/00/3423/5).

Scheme 1B, shown in Figure 2-2, is a potable water pipeline which abstracts raw water from Gariep Dam, treats the water to potable standard at the Xhariep WTW, which then pumps the water to Command Reservoir No 2, located between Bloemfontein and Rustfontein WTW. The elevation of Command Reservoir No 2 allows water to gravitate in two separate pipelines to Longridge Reservoir in Bloemfontein and Rustfontein WTW to join the existing distribution network at those two locations.

The Scheme 1B configuration can satisfy the following criteria:

- Supply potable water to the towns along the proposed pipeline route,
- Supply water to the major demand centres of Botshabelo, Thaba Nchu and Bloemfontein, and,
- Improve the resilience of the GBWSS by allowing the system to satisfy the majority of the 2050 water demands should any of the WTW's in the system experience downtime.

It must be noted that infrastructure upgrades are required by MMM and VCWB to meet the 2050 demands for the GBWSS. The pre-feasibility study included a calculation of indicative upgrades required by the entities. These upgrades are captured in the schematic for Scheme 1B (Figure 2-3), where red indicates upgrades that were required in each scheme that was compared in the pre-feasibility study, purple indicates the upgrades required by MMM for Scheme 1B and green the upgrades required by VCWB. The red, purple and green upgrades are required to ensure that the proposed Xhariep Pipeline project is a success.

The required upgrades to be implemented by MMM and VCWB do not form part of the assessment of this report, only the proposed Xhariep Pipeline project infrastructure, indicated as blue in Figure 2-3.

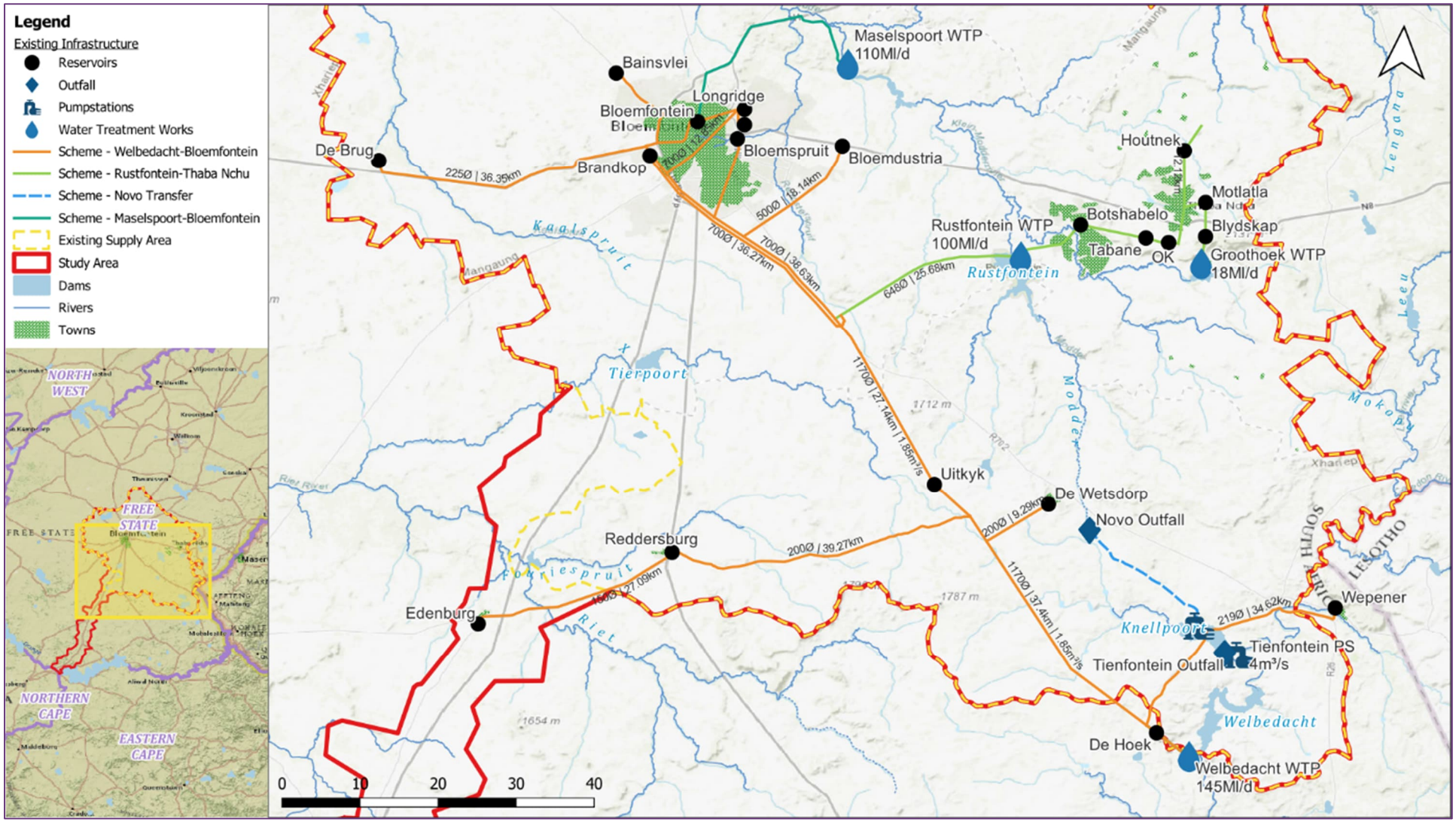


Figure 2-1: Existing GBWSS

2.3 Institutional Scenarios for Assessment

Scheme 1B can logically be divided into three physical components for implementation. The three physical components of the project are:

- **Component A:** from abstraction at Gariep Dam to the Command Reservoir No 2 (this includes the Xhariep WTW),
- **Component B:** from the Command Reservoir No 2 to Longridge Reservoir in Bloemfontein (serving Bloemfontein), and,
- **Component C:** from the Command Reservoir No 2 to Rustfontein WTW (serving Botshabelo and Thaba Nchu)

Dividing the project into three components could allow a different combination of entities to implement each component. It is important to distinguish between the different possible implementation combinations as affordability, institutional capacity, creditworthiness and constitutional mandate together with possible synergies in the project components affect the overall cost of the project.

The potential implementing entities are MMM, VCWB and DWS. It must be noted that the term “DWS” in this report is used broadly and includes entities such as the Trans-Caledon Tunnel Authority (TCTA) or the National Water Resource Infrastructure Agency (NWRIA), which was recently established.

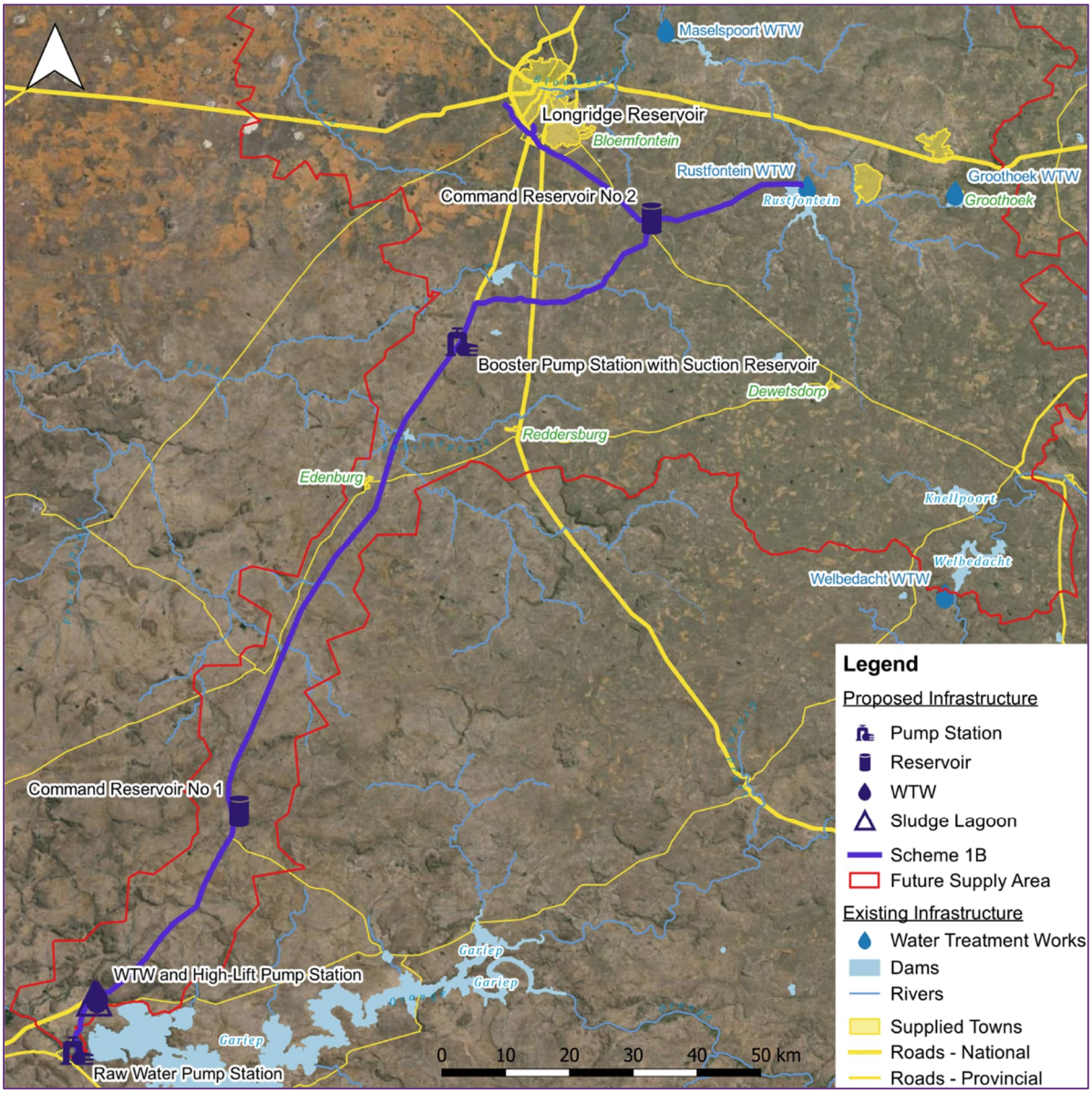


Figure 2-2: Scheme 1B supply to Bloemfontein and Rustfontein WTW

Table **2-1** describes how each physical component of the pipeline can be developed by the entities:

- All three components are implemented by one of the possible entities (Options 1A to 1C),
- The most proximate entity per component implements such component (Option 2)
- One proximate entity implements the related component with the remainder implemented by DWS (Options 3A to 3B)
- The two proximate entities implementing project components without DWS involvement (Options 4A to 4B)

Table 2-1: Xhariep Pipeline Institutional Options

Part Description	Option No	Comp. A Gariep Dam to Command Reservoir	Comp. B Command Reservoir to MMM	Comp. C Command Reservoir to VCWB	Comment
One does all	1A	MMM	MMM	MMM	One supplier proves to be superior
	1B	VCWB	VCWB	VCWB	
	1C	DWS	DWS	DWS	
Each its own	2	DWS	MMM	VCWB	Everyone is competent to do "its" part
DWS support	3A	DWS	MMM	DWS	One of the local suppliers proves to be competent to do "its" part
	3B	DWS	DWS	VCWB	
No DWS	4A	MMM	MMM	VCWB	One local supplier is competent to also do part A
	4B	VCWB	MMM	VCWB	

Table 2-2 shows the project packages that emerge from the above allocation of responsibilities. For example, DWS could be responsible for the whole project (“ABC”), A only, AC or AD, but never components B and C only.

Table 2-2: Physical component/s per entity

Description	Project Components						
	Option No	A, B & C	A	B	C	A & C	A & B
One does all	1A	MMM					
	1B	VCWB					
	1C	DWS					
Each its own	2		DWS	MMM	VCWB		
DWS support	3A			MMM		DWS	
	3B				VCWB		DWS
No DWS	4A				VCWB		MMM
	4B			MMM		VCWB	

Figure 2-3 shows a schematic of the Scheme 1B pre-feasibility design, including GBWSS upgrades.

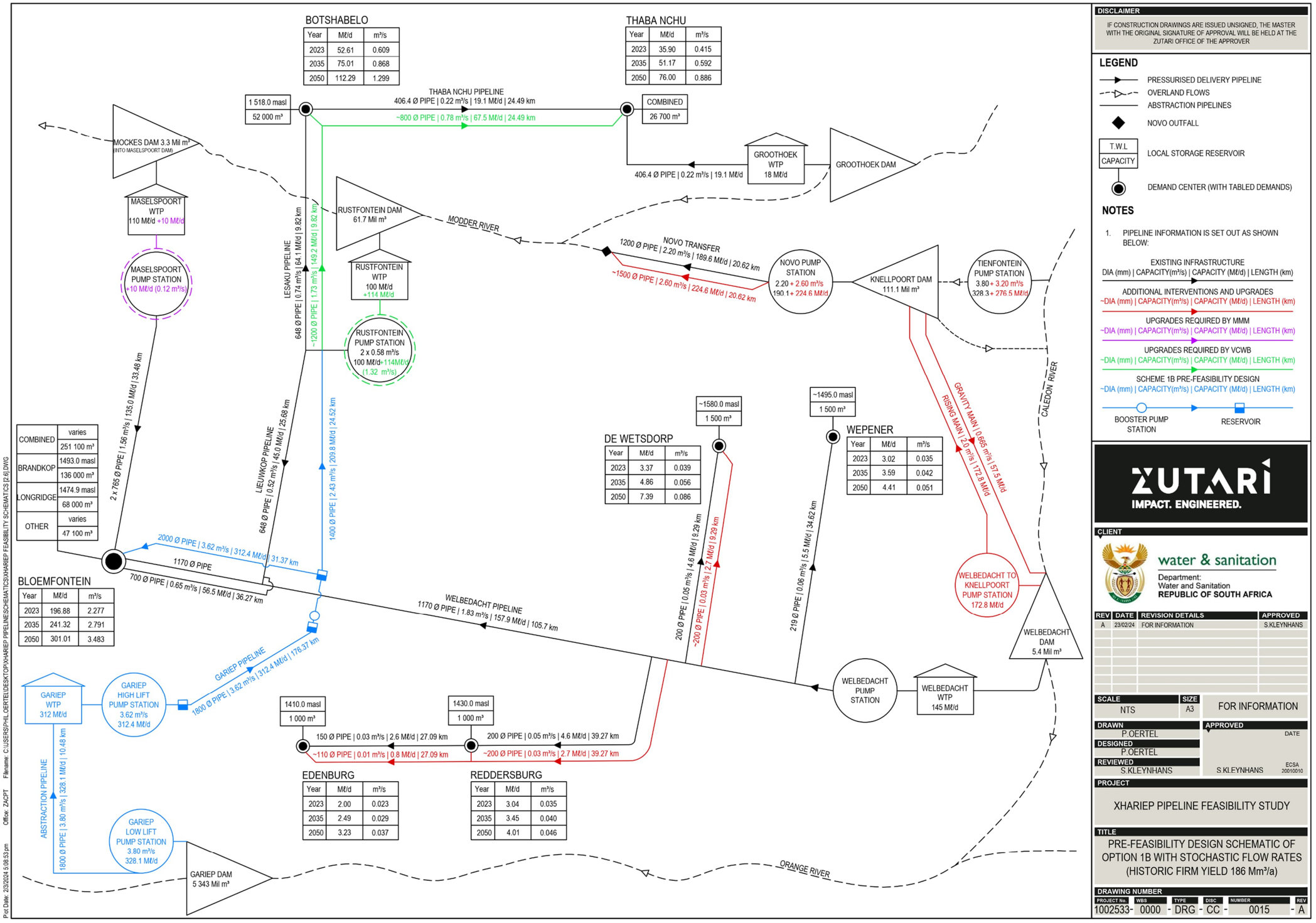


Figure 2-3: Schematic of pre-feasibility design for Scheme 1B including GBWSS upgrades

3 Socio-Economic Impact Assessment

3.1 Introduction

The Socio-Economic Impact Assessment holistically presents the picture of the impacts of the project. It is necessary to describe the current economic situation in the GBWSS, which includes MMM, Reddersburg, and Edenburg in the Kopanong Local Municipality, as well as Excelsior in the Mantsopa Local Municipality and then the estimated future population growth and economic outlook for the area together with the projected future water demand.

The following paragraphs describe the current economic base, and the analysis undertaken before the proposed pipeline is implemented.

3.1.1 Current Demographics in the GBWSS

Mangaung is one of the eight metros in South Africa and is easily accessible via national infrastructure including the N1, N6 and N8 roads, and Bram Fischer International Airport. There are currently 830,724 people living in Mangaung, comprising of 234,897 households, giving an average household size of 3.54 people per household. The Metro's Gini Coefficient, which is an index for the degree of inequality in the distribution between income/wealth where higher values indicate higher inequality, is 0.62, making this municipality the most unequal, ascribed to the large rural area it serves. This is also reflected in the fact that some 63% of all households are regarded as indigent, largely due to high levels of poverty and unemployment in Thaba Nchu and Botshabelo. The unemployment rate in Mangaung is 25.3%, which is lower than the provincial and national average.

The estimated population growth rate of 1.6% per annum is significantly higher than that of the Free State Province. About 66% of all households reside in the Mangaung/Bloemfontein area; 29% in the Botshabelo/Thaba Nchu area, 3% in the other small towns and 2% in the farm areas.

MMM includes 47 informal settlements which are home to an estimated 30,329 households. MMM has adopted a municipal wide approach to the upgrading of the informal settlements wherein all the settlements have access to municipal utility services such as solid waste removal, access to water (individual and communal) and electricity. The roll-out of basic services is underway.

The metro consists of the following seven main administrative regions:

- **Bloemfontein** is highly accessible with well-developed infrastructure and transport networks, including three national roads (N1, N6 and N8), a railway link between Gauteng and the Western Cape, as well as an international airport (Bram Fisher Airport).
- **Botshabelo**, located 55 km to the east of Bloemfontein, is a township that was established in the early 1980s in terms of the then government's decentralisation policy. With an unemployment rate of 32.9%, the town greatly depends on Bloemfontein for employment.
- **Thaba Nchu**, located 12 km to the east of Botshabelo, comprises of the main town surrounded by about 37 rural villages located on trust land under traditional leadership.
- **Dewetsdorp** is located 75 km south-east of Bloemfontein on the R702 and comprises two urban settlements (Dewetsdorp and Morojaneng). It is surrounded by agricultural land with a medium to high production potential.
- **Wepener** is situated on the banks of Jammersbergspruit, a tributary of the Caledon River. The town serves as one of the gateways into Lesotho, given its proximity to the Van Rooyen's border post.
- **Van Stadensrus** is located 30 km from Wepener on the R702 and is another frontier town on the border of South Africa and Lesotho.
- **Soutpan** is a small town located 38 km to the north-west of Bloemfontein. The town was established due to the salt mining activities in the area and produces a vast amount of salt. The area is also known for the Florisbad anthropological area and the Soetdoring Nature Reserve.

Other towns in the GBWSS area are:

- **Reddersburg**, a town in the Kopanong Local Municipality, is situated 60 km south of Bloemfontein on the N6. Main agricultural activities include sheep and cattle farming. Reddersburg's population, including that of Matoporong, amounts to 5,132. This comprises only 0.6% of the total population served by the GBWSS. The total number of households in Reddersburg is 1,443, giving an average household size of 3.56 people per household. The main social and economic functions of the town are to serve as a general agricultural service centre to surrounding farming areas, and to provide social functions such as residence, education and medical services.
- **Edenburg**, also part of the Kopanong Local Municipality, has a population of 7,479, accommodated in 2,104 households, giving an average household size of 3.55 people per household. This includes the population of Ha-Rasebei. This comprises 0.88% of the total population served by the GBWSS. Edenburg/Ha-Rasebei serves as a general agricultural service centre and the main social and economic functions such as residence, education and medical services are provided.
- **Excelsior**, located in the Mantsopa Local Municipality, has a population of 6,682, accommodated in 1,882 households, giving an average household size of 3.55 people per household. The town's population makes up 0.78% of the GBWSS area. Similar to Edenburg and Reddersburg, the town serves as a service area for the surrounding agricultural communities.

The population, household size and total households are summarised in Table 3-1 and were applied in the different economic analysis models.

Table 3-1: Population and Household Numbers in the Greater Bloemfontein Water Supply Area

City and Towns	Population	Total Households	Average Household Size
Bloemfontein	563,259	159,563	3.53
Thaba Nchu	55,969	15,547	3.60
Botshabelo	190,494	53,812	3.54
Wepener	9,553	2,734	3.49
Dewetsdorp	9,498	2,714	3.50
Soutpan and Van Stadensrus	1,951	527	3.70
Reddersburg	5,132	1,443	3.56
Edenburg	7,479	2,104	3.56
Excelsior	6,682	1,882	3.55
Total	**850,017**	**240,326**	

Source: Stats SA 2022 Census

3.1.2 Current Economic Base and Activities

The main economic sector in Mangaung is the tertiary sector with a share of 76.9% of the economy. The sector is mainly driven by community services (33%). The community services sector is comprised of the provincial government headquarters, three tertiary institutions, healthcare and other facilities. Bloemfontein is the judicial capital of South Africa. The tertiary sector is the largest employer in MMM with community services being the highest (32.4%), followed by trade at 16.2% and finance at 15.1%.

In 2019, there were 280,389 employed people which represents 35.21% of the total employment in the Free State Province (779,000), and 1.67% of the total employment in South Africa (16.4 million). Employment within Mangaung increased annually at an average rate of 1.78% between 2009 and 2019.

3.1.2.1 Economic sectors

3.1.2.1.1 Primary sector

Mining contributes 0.8% to the MMM's gross domestic product (GDP). Main mining activities include sand, gravel, clay and salt. Mining also includes minerals value addition. Value added in salt production includes salt repackaging and the production of salt bars.

Agriculture contributes 1.1% to the MMM's GDP: Livestock (dairy) and poultry production (the latter mainly in Botshabelo and Thaba Nchu) form the backbone of the agricultural sector.

3.1.2.1.2 Secondary sector

Manufacturing contributes 12.2% to the GDP and focuses mainly on light industrial manufacturing. Main industrial areas are Botshabelo Industrial Park, East End, Bloemdustria and Hamilton. Manufacturing in MMM is largely geared towards local needs, with growing dominance of food, beverages, and tobacco products.

The Botshabelo Industrial Park has undergone upgrading of almost R50 million by the Department of Trade, Industry and Competition under its Revitalisation of Industrial Parks Programme. The digital hub in Botshabelo is part of the Digital Hubs Programme that the government will be rolling out in revitalised industrial parks across the country. Since the completion of phase one of the revitalisation, 25 new industries, investing a total amount of R201 million, were established. The total number of jobs created was 1,360. A further six investors, one of them being Hangda Trading that will be investing R300 million in a steel smelter construction and employing 2,000 people, were identified. The occupancy of the park has increased to 75.5% as a result of the upgrading programme.

The revitalisation programme is envisaged to eventually create more than 5,000 direct job opportunities as well as other indirect job opportunities in related areas such as transport, food and beverages, manufacturing, and the construction industry. Out of the 144 factories in the park, 108 of them are occupied and operational.

The Thaba Nchu Agri-Hub creates potential linkages between agriculture and manufacturing through agri-processing in the agro-industrial sector. The Thaba Nchu Agri-Hub is one of the most important catalytic projects that will impact positively on the Greater Mangaung Area and beyond. A Master Agri-Park Business Plan for Thaba Nchu was prepared in 2016, and some components of the Agri-Hub are already functioning.

Another industrial development initiative in Thaba Nchu is the Rui Star Iron-Steel Plant, a steel manufacturing factory. Over R300 million had been invested in the smelting plant. The company has the capacity to employ over 500 people. The factory sources scrap metal from across the country to process it into steel and iron for the domestic and export market.

3.1.2.1.3 Tertiary sector

This sector contributes 76.9% to the MMM's GDP. Finance, insurance, real estate and business services is the main contributing sector with 21.9%, while the second largest contributor to the tertiary sector is wholesale & retail trade, catering and accommodation at 17.3%. Government services (the Free State provincial Government's administration, health and educational services, and the National Judicial services) contributes 14.6%.

The N8 Corridor concept covers Bloemfontein, Botshabelo and Thaba Nchu and encompasses projects such as the **ICC Precinct** (hotel and convention centre in Bloemfontein), **Bio-Medical Park**, **Airport Node** (logistics and supply chain, warehouses, residential apartments, hospitals, schools, hotels and new shopping malls), and **tourism infrastructure** for the Naval Hill Development.

3.1.3 Current Infrastructure and Services

VCWB is the main supplier of bulk potable water to urban centres in the Modder / Riet River sub-catchment. To meet current water requirements, water is transferred from the Orange and Caledon River Systems. The main transfer water supply schemes, as introduced in Section 2.1, are:

(a) The Caledon-Bloemfontein transfer which supplies Bloemfontein, Botshabelo, Thaba Nchu, Dewetsdorp, Reddersburg, and Edenburg and small users from Welbedacht Dam.
(b) The Maselspoort Scheme, which supplies Bloemfontein from the Maselspoort Dam.
(c) Caledon-Modder (also known as the Tienfontein Scheme) which supplies water via the Rustfontein Treatment Works to Bloemfontein, Botshabelo, and Thaba Nchu. Due to siltation, the yield of the Welbedacht Dam was reduced significantly. To be able to supply the increasing demand on the Caledon-Bloemfontein Regional Water Supply Scheme, the DWS constructed the Knellpoort off-channel storage dam on the Rietspruit, a tributary of the Caledon River. Knellpoort Dam is supplied with water from the Caledon River by the Tienfontein Pump Station. Water diverted from the Caledon River into Knellpoort Dam is then released back into the Caledon River to allow abstraction at Welbedacht Dam by VCWB all year round.
(d) The Novo Transfer Pump Station is located at the Knellpoort Dam and can transfer water into the Modder River, which supplies the Rustfontein and Mockes Dams.
(e) Situated just downstream of Welbedacht Dam is the Welbedacht Water Treatment Works (WTW) with a capacity of 145 Ml/d. This water is pumped after purification via a 6.5 km pressure pipeline and a 106 km gravity pipeline to Bloemfontein. The average capacity of the pipeline is 1.7 m^3/s and the maximum capacity 1.85 m^3/s. This infrastructure is owned and operated by Vaal Central Water Board.

The irrigators downstream of Welbedacht Dam have no claim to the stored water in the dam. Only the inflow is released for irrigation purposes, as they do have a claim to that water.

Tienfontein Pump Station is seen as the most critical component of the water supply infrastructure, supplying VCWB with raw water, as it receives approximately 70% of its water supply from Welbedacht Dam (via Tienfontein Pump Station and Knellpoort Dam).

A description of the rivers and dams in MMM is provided in Table 3-2.

Mockes Dam on the Modder River supplies water to Bloemfontein via the Maselspoort WTW. Groothoek Dam is located on the Kgabanyane River, a tributary of the Modder River, and supplies water to Thaba Nchu when functional.

Rustfontein Dam is located on the Modder River and forms the major storage reservoir in the Modder River. Water is released from Rustfontein Dam to supplement the abstraction from Mockes Dam and provides the major portion of water supplied to northern parts of Bloemfontein from Maselspoort WTW.

Table 3-2: List of Rivers and Dams in Mangaung

Dams	Capacity (Million m^3)	River	Support Area
Mockes	70	Leeu	Bloemfontein
Maselspoort	0.8	Modder	Bloemfontein
Rustfontein	72.2	Modder	Botshabelo, Thaba Nchu, Bloemfontein
Welbedacht	5.5	Riet	Bloemfontein, Dewetsdorp, Wepener
Knellpoort	130	Off-channel storage dam on the Rietspruit (Caledon)	Off channel storage for the Modder River system
Egmont	9.1	Witspruit	
Groothoek	12	Kgabanyane	Thaba Nchu

Source Mangaung Integrated Development Plan (IDP)

Small towns and communities in the vicinity of Bloemfontein, such as Dewetsdorp, Reddersburg, Edenburg and Excelsior, are solely or partially depended on groundwater for drinking and domestic purposes. Groundwater is therefore considered as an essential resource, specifically for the smaller towns. An estimate of the groundwater yields for the small towns in the vicinity of Bloemfontein is provided in Table 3-3.

Table 3-3: Estimated Groundwater Yields

Town	Estimated Average Yield of Existing Boreholes (million m³)	Number of Boreholes
Wepener	0.071	4
Dewetsdorp	0.080	4
Reddersburg	0.160	9
Edenburg	0.213	12

Source: Department of Water Affairs; 2012. Interim Reconciliation Strategy Report for the Large Bulk Water Supply Systems of the Greater Bloemfontein Area.

Raw water sources for Excelsior consist of bulk water provided by VCWB and groundwater from 10 boreholes.

Apart from using water from boreholes, the provisioning of water in all these towns is supplemented from VCWB's Welbedacht WTW–Bloemfontein Pipeline. These towns have no large commercial or industrial sectors and water users consist mainly of domestic type users and the services sector.

The bulk water supply for MMM is currently dependent on 31% being supplied by Maselspoort WTW and 69% being supplied by VCWB. As part of the MMM Bulk Water Augmentation Programme (Mangaung Bulk Water Programme (MBWaP) Water Services Development Plan (WSDP) – March 2019), a study was completed which revealed that the current yield of the system is 187 Ml/d, pointing to a current supply deficit of more than 60 Ml/d. This resulted in the introduction of water restriction measures since 2014. However, the yield can be increased to 218 Ml/d when the efficiency is improved, reducing the deficit to around 25 Ml/d. The MMM Updated Status Quo Assessment (August 2023) proposed the following interventions:

- Improving the operation and management of the system by implementing the loss reduction strategies proposed in the Water Masterplan to bring the reported non-revenue water levels of 46% down to a more acceptable level of less than 30%,
- Introduction of strict water conservation and demand management measures,
- Implementation of water re-use projects, specifically referring to the optimisation of the Maselspoort system,
- Replacement of 159km of asbestos pipelines, identified in a study by SMEC in 2019 to address the health risk associated with asbestos and reduce water distribution losses, and
- The introduction of the Xhariep Pipeline project.

The breakdown of the water losses in the previous four financial years for MMM is shown in Table 3-4. Water losses are grouped into two types of loss; Real losses, which are the physical losses (or leakage) and Apparent losses, which are caused by revenue meter under-registration, water theft and billing errors.

Table 3-4: Breakdown of water losses (Mangaung Metropolitan Municipality)

Year	Supply input volume (Ml/d)	Water losses (Ml/d)	Real losses (Ml/d)	Apparent losses (Ml/d)
2018/19	207.71	80.64	29.97	50.68
2019/20	208.18	87.56	48.26	39.30
2020/21	215.32	96.70	35.60	61.09
2021/22	221.41	100.49	54.93	45.56

Source: MMM Final IDP 2023/2024

According to the Mangaung Metropolitan Municipality Updated Status Quo Assessment, (National Treasury & Free State Province, 2023), the main issues listed for the high levels of water losses are poorly maintained infrastructure and unmetered consumption. The implication is therefore that the potential income on 100.49 Ml/d (45% of water supplied) is forfeited due to water distribution and unmetered losses.

The city has completed a revised 10-year Water Conservation and Demand Management Strategy, and the following activities are to be implemented:

- Replacement of fire hydrants and water meters;
- Metering of unmetered sites;
- Refurbishment of the water supply system; and
- Implementing a pressure management system.

3.2 Economic Impact Assessment

The Economic Impact Assessment comprises of an economic cost benefit analysis (Economic CBA) and a socio-economic impact assessment.

The Economic CBA is performed to determine the economic feasibility of the identified option in terms of the projected benefits and costs involved in the project. The socio-economic impact assessment is performed to estimate the social impacts during the operational and construction periods on the local community and economy.

3.2.1 Economic Cost Benefit Analysis

An Economic CBA is considered to be the most acceptable tool for ascertaining the economic viability of public sector and public/private sector infrastructure development projects. The cost-benefit assessment (CBA) method provides a logical framework for evaluating developmental projects; thus, serving as an aid in the project approval decision-making process. The core principle of CBA can be described as the comparison of economic costs and benefits. The only factor that complicates this technique is the discounting of future costs and benefits to present values.

The official Manual for Cost Benefit Analysis in South Africa (WRC Report Number TT598/14) forms the basis of this analysis. This manual is widely used by the public sector, especially by departments involved in infrastructure investments. It is also used by development finance institutions, such as the African Development Bank and the Development Bank of Southern Africa.

The following standard CBA criteria will be used in the evaluation:

- Net present value (NPV).
- Internal rate of return (IRR); and
- Benefit cost ratio (BCR).

The detailed definition of these standard evaluation criteria is discussed in the following sections.

3.2.1.1 Net Present Value

According to this method, the difference between the benefits and costs (the net benefit) in a specified future year is discounted to the present value, using the social discount rate. The discounted sum of all these net benefits over the economic life of a project is defined as the net present value (NPV).

The criterion for the acceptance of a project is that the NPV must be positive; in other words, funds will be voted for a project only if the analysis produces a positive net present value. Where a choice has to be made between mutually exclusive projects, the project with the highest net present value will be chosen since it maximises the net economic benefit to the community.

3.2.1.2 Internal Rate of Return

Only projects with an internal rate of return (IRR) higher than the social discount rate, which forms a lower limit, will be considered for funding. IRR must be handled carefully because there are situations in which the mathematical solution is not unique. This happens when the stream of net benefits over the assessment period changes its sign (positive or negative) more than once over the period of analysis.

3.2.1.3 Benefit Cost Ratio

The discounted BCR is the ratio of the present value of the benefits relative to the present value of the costs.

A project is potentially worthwhile if the BCR is greater than 1. This means that the present value (PV) of benefits exceeds the PV of costs. Under this decision rule, if alternatives are mutually exclusive, the alternative with the highest BCR would be chosen.

The NPV, IRR and BCR criteria are not the only discounting measures used in CBA. There is also the net discounted end value, the net benefit-investment ratio, and the yearly value method. The first three are, however, theoretically well founded and are the ones most commonly used in practice. Therefore, the three criteria were applied in this project analysis.

3.2.1.4 Difference between Financial and Economic CBA

The Economic CBA is an extension of the Financial CBA and forms an important aspect in the economic analysis. Table 3-5 below describes the various elements of CBA. From this table, it is evident that the Economic CBA focuses on the broader community and not only on the entity (Greater Mangaung Water Augmentation project) that drives the project.

The CBA model was multipurposed to accommodate the MMM area as well as the rest of the water supply area for specific differences that might occur and contain the estimated economic benefits.

Table 3-5: Difference between Financial and Economic CBA

		Economic Analysis	Financial Analysis
1.	**From the point of view of**	Community	Shareholders
2.	**Goal**	Apply scarce resources effectively and efficiently	Maximise net value of firm
3.	**Discount rate**	Social time-preference rate. This rate reflects the view on how future social benefits and costs should be valued when compared with present ones.	Market rate or weighted marginal cost of capital plus uncertainty and risk premium
4.	**Value unit**	Opportunity cost (Shadow Prices)	Market Price. Limited to aspects of decision-making that may affect profits
5.	**Dimensions**	All aspects necessary for a rational decision	Money Income
6.	**“Advantages”**	Additional goods, services, products, income and/or cost savings	Money payments and depreciation calculated according to accounting principles (GAAP)
7.	**“Disadvantages”**	Opportunity costs in terms of goods and services foregone	

Source: A Manual for Cost Benefit Analysis in South Africa with Specific Reference to Water Resource Development, Fourth Edition, 2022.

The following are of importance regarding the Economic CBA Analysis, namely:

(a) The Manual prepared for use by the Water Research Commission of South Africa.

(b) This study followed the prescripts of the Manual and used the data and shadow prices that are contained in the Manual. An important aspect of the shadow price is the value of water provided in the Manual, specifically for households.
(c) The CBA Manual fourth edition has been updated (2022) by Conningarth, who undertook the CBA for this study.

3.2.1.5 Water Demand

Currently the water supply is from two sources namely the Caledon and the Modder rivers. As the purpose of this report is not to discuss the detail of the project, but the economic feasibility and the socio-economic impact, only the relevant detail as applied is mentioned. According to current planning projections, the current volume of water available from the Caledon River will, by 2035, be reduced by 14 million m³/a when the implementation of Phase 1 of the development of increased water provision to Lesotho from the Caledon River is completed and taking into account the increased demands of other upstream users. Phase 2 of the development in Lesotho is planned to be completed by 2050, with further increases in the demands of upstream users, implying a further loss of 9 million m³/a to Mangaung. Therefore, by 2050 a total of 97.5 million m³/a will be required to be pumped from the Gariep Dam, additional to what is to be provided for the annual growth in water demand as a result of the projected growth of the population and the economy.

The total water demand volumes and annual growth as documented in the Xhariep Pipeline Feasibility Study: Pre-feasibility Study Report (2023) were used. It was only changed to make provision for estimated growth per economic sector over time. In the growth rates provision was made for the possibility that the water delivery and accounting system will over time be improved to reduce the unaccounted-for water (UAW), which is the difference between the volume of water delivered in a network and legitimate consumption, both metered and unmetered.

To eventually calculate the benefits and the value of the water, it was necessary to divide the total volume into the two sections of Bloemfontein and the remainder of the Mangaung area.

3.2.1.5.1 Total Water Demand

Table 3-6 presents the total water demand for the GBWSS plus the estimated annual Growth Rates.

Table 3-6: Total Mangaung Water Demand per Sector and Annual Growth Rates

Sector	Usage Percentage	Annual Growth Rate	2035 million m³	2045 million m³	2050 million m³
Household	39.83%	2.32%	58.22	73.26	82.18
Manufacturing & Commercial	4.17%	2.51%	6.23	7.98	9.04
Services	8.96%	2.50%	13.37	17.12	19.36
Mining	0.05%	1.00%	0.06	0.07	0.07
Unaccounted Water - Municipal Use	25.00%	1.25%	32.20	36.46	38.79
Unaccounted Water - Losses	21.99%	1.00%	27.49	30.37	31.92
Total	**100.00%**		**137.58**	**165.25**	**181.36**

Source: Conningarth Economists based percentage division on an estimation for Water Research Commission (WRC) and then based on supplied water volumes.

The present demand for the GBWSS in 2023 is 111.32 million m³/a which increases to 137.77 million m³/a in 2035, 165.25 million m³/a in 2045, 181.36 million m³/a in 2050.

Lesotho is planning to build two dams in the Caledon River upstream from the Knellpoort Dam with the intention to increase irrigation and urban water security in Lesotho. The result will be that the volume of water available from the Caledon River for the GBWSS will decline in two phases.

A number of possible options have been investigated to augment the GBWSS, with the preferred proposal involving abstracting raw water from Gariep Dam, a pipeline conveying potable water from a WTW near Gariep Dam to a command reservoir outside of Bloemfontein, with the water gravitating to Bloemfontein and Botshabelo/Thaba Nchu.

It is important to note that, due to the long distance between Gariep Dam and the point of delivery in Mangaung, it is not practical to consider a phased increase in conveyance capacity to meet the projected phased increase in demand. The result is that the investment in the capacity of the infrastructure will initially result in an oversupply of capacity. Another factor to be considered is that the projected population growth is based on the current statistics as provided by Stats SA and could in future be affected by factors such as changing demographic profiles, migration between provinces and urbanisation. Population growth should therefore be monitored on an ongoing basis.

3.2.1.5.2 Bloemfontein Water Demand

In Table 3-7 the projected demand for Bloemfontein is presented.

Table 3-7: Water Demand in Bloemfontein

Sector	Usage Percentage	Growth Rate	2035 million m³/a	2045 million m³/a	2050 million m³/a
Households	39,83%	2,09%	45,69	56,19	62,31
Manufacturing & Commercial	4,17%	1,81%	5,43	6,50	7,11
Services	8,96%	2,50%	10,31	13,20	14,94
Mining	0,05%	1,81%	0,05	0,06	0,07
Unaccounted Water - Municipal Use	25,00%	1,90%	26,82	32,37	35,57
Unaccounted Water - Losses	21,99%	0,65%	20,86	22,26	22,99
Total	100,00%		**109,16**	**130,58**	**142,98**

Source: Conningarth Economists based on supplied water volumes for 2035, escalated based on growth rates obtained from WRC report. The 2050 water demand determined in the Pre-feasibility study report is 147.31 million m³/a, which corresponds reasonably well.

The projected demand in Bloemfontein for 2035 is 109.16 million m³/a. As previously indicated, the supply is expected to be reduced by 14 million m³/a, which will then have to be delivered by the Xhariep pipeline based on recommendations that such shortfalls be augmented from Gariep Dam. Any further increase in demand will also have to be delivered by the Xhariep pipeline.

Table 3-8 presents the projected water sources supplying Bloemfontein.

Table 3-8: Water Volume Supplied by Xhariep pipeline.

Supply Source	2035 million m³/a	2045 million m³/a	2050 million m³/a
Bloemfontein Demand from Current Sources	66.90	66.90	51.90
Bloemfontein Demand by Xhariep Pipeline	39.00	59.98	87.13
Projected Total Bloemfontein Demand	105.90	126.88	139.03

Source: Conningarth Economists based on data supplied.

It is assumed that the volume of water delivered by the Xhariep pipeline, would to a large extent maintain the economic activities in Bloemfontein, as well as improve and maintain the security of supply of the GBWSS.

3.2.1.5.3 Assurance of supply

The current economic activities in the GBWSS uses a certain volume of water at a given level of "assurance of supply" for the specific area and activity. This forms the basis to provide and support the current specific social and economic baseline. The potential impact on a specific activity should also be considered if the assurance of supply cannot be maintained and becomes lower. It could be a temporary situation, or a permanent situation brought about by population and economic growth or a drought situation.

3.2.1.5.4 Balance of the Water Supply Area

In Table 3-9, the volume of water supplied to the rest of the GBWSS is provided. This includes the communities of Thaba Nchu and Botshabelo and the towns of Wepener, Dewetsdorp, Edenburg and Reddersburg.

Table 3-9: Water Demand per Sector in the GBWSS excluding Bloemfontein.

Sector	Usage Percentage	Growth Rate	2035 million m^3/a	2045 million m^3/a	2050 million m^3/a
Household	53.25%	1.17%	14.53	19.53	22.59
Manufacturing & Commercial	2.33%	2.76%	1.80	2.69	3.24
Services	13.21%	1.01%	3.06	3.91	4.43
Mining	0.20%	0.40%	0.01	0.01	0.00
Unaccounted Water - Municipal Use	20.26%	-1.07%	5.38	4.09	3.23
Unaccounted Water - Losses	10.75%	1.08%	7.15	8.67	9.50
Total	100%		**31.94**	**38.89**	**42.99**

Source: Conningarth Economists based on data supplied.

3.2.2 Benefits - Value of Water

Water is a critically important component of social life and economic development, and the availability of water to meet the demand by the users is important. The water therefore has a specific value for the user, which is then applied in the Economic CBA. However, it is important to keep in mind that the availability of water is not the only component to stimulate economic development, but the sustainable supply of water is essential for economic growth and the well-being of the community.

The approach to estimate the benefits is by applying the available data of Greater Mangaung as published in the different documents and to link it to the volume of water used in the GBWSS plus the smaller towns dependent on the same water sources.

It is necessary that the Value of the Water be determined to be weighted in the Economic CBA model against the cost elements to determine the Economic feasibility of the project. The value of the water was determined for the following sectors:

(a) Households in two fee categories, namely the households receiving free services and those that pay for the water,
(b) Mining,
(c) Manufacturing and Commercial,
(d) Unaccounted Water - Municipal Use, and,
(e) Unaccounted Water - Physical Losses in Distribution.

3.2.2.1 Value of Household Water

In the determination of the value of household water, it was necessary to divide households into two groups, namely households that cannot afford to pay for services (equitable share households) and those that pay for the services.

3.2.2.1.1 Equitable Share Households

Equitable share households are defined as those households which are, due to their level of poverty, eligible for free basic services. The basis for determining eligibility for free basic services is deemed to be less or equal to the amount received by two state pensioners as determined annually by the Minister of Finance. These households need to be registered as indigent households in terms of the Municipality's indigent policy.

The following section is quoted from the Division of Revenue Act (DORA), 2023, about the definition of the households and municipalities qualifying for the Equitable Share allocation:

"*The formula is based on the demographic data for each municipality and makes provision for the funding of basic services (water, sanitation, electricity and refuse removal), the basic administrative and governance capacity in the case of municipalities with limited resources and a stabilisation factor which ensures that all of the formula's guarantees can be met. Households with a gross income equal to or less than two times the old age grant payable to pensioners are eligible for support in terms of free basic services*". This old age grant amounted to R4 216 per household per month as the basis for calculation of equitable share in the Division of Revenue Act (DORA), 2023.

In DORA 2023, the following amounts were allocated per household below the affordability threshold: (Rand per month):

- Water - Operations R162.71 and Maintenance R18.08 for a total of R180.79, and,
- Sanitation - Operations R109.71 and Maintenance R12.19 for a total of R121.90.

This adds up to R302.89 per month for water and sanitation services per qualifying household. A qualifying household is eligible for 6kl water per month in terms of the Free Basic Services policy.

In terms of the latest available statistics, 153,817 (64%) out of a total of 240,326 households in the GBWSS are eligible for free basic services in 2023, which is less than the 68% of the 823,285 households in the Free State that are classified as indigent.

The total 153,817 indigent households are then divided between Bloemfontein and the rest of the area as follows:

- The total number of indigent households = 153,817,
- The number of indigent households in Bloemfontein = 79,440, and,
- The number of indigent households in the rest of GBWSS = 74,377.

An analysis of the census statistics indicates that a larger number of households are non-paying households, compared to the number of paying households (see Table 3-10).

Table 3-10: Household Division in Affordability of Water Payments

Households in GBWSS	Paying Households	Equitable Share Households	Total Households
Households Bloemfontein	80,123	79,440	159,563
Rest of the GBWSS	6,386	74,377	80,763
Total	**86,509**	**153,817**	**240,326**

Source: Conningarth Economists based on Stats SA numbers

Table 3-10 indicates that it is only in Bloemfontein that the number of households in the two groups are close to being equal, but in the rest of the GBWSS the indigent group is about twelve times larger than the paying group.

In determining the value of water, the point of departure for the cost of water was the equitable share per household, calculated as R302.89 per month. Although the National norm for free basic water is 6kl per household per month, statistics in Greater Mangaung suggest that actual consumption per poor household is between 10 and 12 kl/month. This is also in line with the water demand per household in the Thaba Nchu and Botshabelo townships. However, any household eligible for free basic water, using more than 6kl/month, should be billed for the amount of water used above the free basic services level. Therefore, the calculation of the value of water is based on 6kl/month, resulting in a value of R50.45. (R302.89 divided by 6).

The calculation of the Economic CBA is therefore based on R50.45 per kl as the value of the water.

3.2.2.1.2 Paying Households

The value of the water for these households depends on what they are prepared to pay and what they can afford to pay. The socio-economic impact of the available water is presented in Section 3.3. Households are currently paying the potable water and sanitation tariff as provided by the Tariff Book of the MMM.

Each household pays a monthly fixed fee of R 69.50 and then further costs are added by applying the different tariffs. Table 3-11 presents the 2023 tariffs.

Table 3-11: The MMM water consumption tariffs (2023 prices)

Tariff Structure	Tariff R/kl (2023/24)
0 - 6 kl/month	11.40
7 - 15 kl/month	28.14
16 - 30 kl/month	32.32
31 - 60 kl/month	39.69
61 or more kl/month	48.37

Source: (MMM, 2023)The water use for the average paying household is estimated at 22 kl per month.

According to MMM's tariff rates, the following approach is applied for sanitation and wastewater: "*Charges will be levied for the financial year 1 July 2023 to 30 June 2024, on the market value of property or on the market value of a right in property within the area of jurisdiction of the Council as appearing in the valuation roll, in respect of the various categories of properties set out below*".

The tariffs for sanitation and wastewater shown in Table 3-12 are applicable for the 2023/24 financial year.

Table 3-12: MMM Sanitation Tariffs

Category	Rate in the Rand (2023/24) x market value of property	Minimum Monthly Charges (Rand)
Non-residential	0.6216	185.24
Residential	0.4213	140.60

Source: Mangaung Tariff publication

The residential minimum monthly charge of R140.60 converts to the market value of a property valued at R400,000. The monthly sanitation tariff for a residential property with a value of R1,000,000 converts to a monthly tariff of R350.08.

Based on available information on the value of properties in Bloemfontein, a representative value of R1.1 million per household property is used for households in the paying group.

The value of the water is then estimated as follows:

- Fixed monthly fee of R69.50 divided by 22kl = R3.16 per kl.
- Potable water - R32.32 kl
- Sanitation and wastewater - R1,100,000.00*(0.4213/100)/12 divided by 22kl = R17.55 per kl.

- The total value of the average household water is then: R3.16+R32.32+R17.55 =R53.03 per kl.

The amount of R53.03 is used in the Economic CBA model as the value of water for the paying households.

3.2.2.2 Commercial and Industry

The available water demand provides only a combined water demand figure for the two tariff-category sectors. The tariff structure presents a single tariff for the two sectors and is presented in the table below. The monthly fixed rate is stated as R1,046.97.

The following assumptions have been used to calculate the value of the water:

- Average market value of the sector units = R5 million.
- Average water used per month = 120kl.

Table 3-13: MMM Commercial and Industrial Potable Water Tariffs (2023 prices)

Tariff Structure	Tariff R/kl (2023/24)
0 – 60 kl/month	29.37
61 - 100 kl/month	40.50
101 or more kl/month	50.11

The value of the water is calculated as follows:

(a) Fixed monthly fee of R1,046.97 divided by 120kl = R8.73 per kl.
(b) Potable Water = R50.11 per kl.
(c) Sanitation and Wastewater = (R5,000,000.00 *(0.666/100)/12/120 = R21.58.
(d) Total Value of Water for the sector = R8.73+R50.11+R21.58 = R80.42 per kl.

The amount of R80.42 per kl is used as the value of the water for the commercial and industrial sector.

3.2.2.3 Value of Services Water

According to the Tariff Book the commercial and business tariffs also apply to schools, sport clubs, private hospitals, and clinics as well as the rest of the government sector. In line of this statement, it was decided to use the same value as estimated for the commercial and industrial sector, namely R80.42 per kl.

3.2.2.4 Value of Water Used by the Municipality

This refers to water used by the municipality on an interdepartmental basis for different applications such as office consumption, the maintenance of parks, etc. According to the Tariff Book, the applicable tariff used to record the cost of water in interdepartmental transfers is R72.33 per kl. This reflects the financial value forfeited due to the water not being sold for external consumption. As these interdepartmental transfers carry no monetary transactions, it will not have any impact on the financial CBA analysis.

For purposes of the Economic CBA, the value of R72.33 per kl is used in the model.

3.2.2.5 Unaccounted Water

The volume of water bought and paid for by the MMM from VCWB but lost in the distribution system, either through infrastructure failure (e.g. leaking pipes), illegal connections or overall management failure, is referred to as "unaccounted for water" (UAW). The bulk water tariff paid by the MMM is R11.40 per kl in 2023 prices, with the consequence that the expenditure by MMM on UAW represents funds not generating any income. The bulk tariff is used to reflect the economic cost of UAW in the Economic CBA model.

The volume of UAW is estimated to be 16.48 million kl/annum with the cost implication of a total financial loss of R11.40 x 16.48 million kl/annum = R187.87 million per annum. As an example, this amount could have financed the construction of about 400 low cost housing units, including the required supporting services infrastructure, per annum.

An efficient Water Conservation and Water Demand Management (WC/WDM) policy is obviously very necessary to reduce the annual losses. The benefit of an effective WC/WDM policy is not only limited to the potential positive financial impact, but also in terms of the saving of valuable natural resources.

3.2.2.6 Benefits Supported by the Xhariep Pipeline

The purpose of determining the value of the water delivered by the Xhariep Pipeline is to estimate the total value of the water delivered to Bloemfontein and the maintenance of the economic activities and supporting population and economic growth over time.

The primary focus of the Xhariep Pipeline is to secure the provision of water over the long term to Bloemfontein. The dependency of the balance of the GBWSS on the Caledon River system will not be directly influenced by developments in Lesotho, however, the development of the Xhariep Pipeline would improve the security of supply position of the balance of the GBWSS. In calculating the value of the water for these areas, the same cost values were used and applied to the projected volumes of water. It was also assumed that the Xhariep Pipeline will improve the security of supply by an estimated 20%, based on the assumption that the current Caledon water supply will remain the same and that the Xhariep Pipeline will be available to supply additional volume as needed. Therefore, only 20% of the total benefit is added in the Economic CBA model.

In Table 3-14, the total benefits for Bloemfontein and the rest of the area are provided.

Table 3-14: Benefits Maintained and Supported by the Xhariep Pipeline (2023 prices)

Area Benefitting	2035 R mil	2040 R mil	2045 R mil	2050 R mil
Bloemfontein Benefits	R2,051.22	R2,695.12	R3,174.63	R4,649.02
Rest of GBWSA benefits	R350.04	R383.44	R421.01	R463.32
Total Benefits	**R2,401.26**	**R3,078.56**	**R3,595.64**	**R5,112.34**

Source: Conningarth Economists

Table 3-14 shows the positive impact of the water delivered by the pipeline on the GBWSS economy as a total.

3.2.3 Construction and Operational Costs

The construction capital with the impact of the "market or shadow" price together with the operational costs are presented in the following two sections.

The construction Phase 1 data was applied for the period 2028 to 2032 and the data for Phase 2 for the period 2046 to 2049. Phase 1 comprises the construction of the pipelines, pump stations, reservoirs and the first phase of the water treatment works infrastructure to deliver a flow of 208 Ml/d. Phase 2 entails the construction of the next water treatment works module, with a capacity of 104 Ml/d, to increase the scheme's overall capacity to 312 Ml/d. The timing of Phase 2 will be influenced by the actual increase in water demand over time but for the sake of evaluating the "market or shadow" prices, was chosen to be implemented towards the end of the planning horizon. Phase 2 is, however, a small capital contribution relative to the overall project's capital costs, meaning that the implementation date for Phase 2 will not materially impact the analysis.

3.2.3.1 Capital Construction Data

In calculating the Economic CBA, construction data expressed in nominal 2023 was used. The influence of inflation and fluctuations in exchange rates were not taken into consideration. In the case of

calculating the financial cost-benefit analysis, the prices are adapted to make provision for inflation and other cost changes that could take place.

The term: "Shadow Price" and the reason why it is used in calculating the Economic CBA, is briefly described as follows:

"A shadow price is an estimated price for something that is not normally priced or sold in the market. Shadow pricing can provide businesses with a better understanding of the costs and benefits associated with a project. However, shadow pricing is inexact as it relies on subjective assumptions and often lacks reliable data to fall back on.

It is often used in cost-benefit accounting to value intangible assets but can also be used to reveal the true price of a money market share, or by economists to put a price tag on externalities. Shadow pricing is also frequently used by economists to determine the value of public infrastructure projects like public parks, water and sanitation projects and transportation".

Table 3-15 provides the estimated amounts to be spent over the 5-year construction period.

Table 3-15: Projected Construction Capital over the 5-year Phase 1 Period (Shadow 2023 prices)

Construction Item	Total Nominal Prices	Phase 1 Annual Construction Capital (R mil)					Shadow Prices
Year	(R mil)	2028	2029	2030	2031	2032	(R mil)
Pipeline Construction	9,214.00	1,225.1	3,675.4	3,675.4	306.3	0.0	8,882.30
WTW - Phase 1	1,273.90	158.9	317.7	317.7	317.7	105.9	1,217.85
Pump stations (x3)	917.00	203.4	406.7	271.1	0.0	0.0	881.24
Command Reservoirs	360.00	93.9	187.7	62.6	0.0	0.0	344.16
Business and Contingency	3,905.27	543.5	1,630.5	1,630.5	135.9	0.0	3,940.42
Total	**15,670.17**	**2,224.72**	**6,218.10**	**5,957.38**	**759.86**	**105.90**	**15,265.96**

Source: Data Zutari, period allocation Conningarth Economists

The table above shows that with the application of the shadow prices, the total estimated capital is reduced by about R404 million.

The 5-year Phase 1 construction period is assumed to start in 2028 so that the system would be ready to deliver water in 2033, which will be well in advance of the timeframe when the first Lesotho Dam is scheduled to become operational.

The proposed second phase provides for an increase in capacity of the WTW (Table 3-16). The construction period is scheduled to be from 2046 to 2049 to coincide with the completion of the second Lesotho Dam.

Table 3-16: Phase 2 Water Treatment Works Capital Spending (Shadow prices - 2023 values)

Construction Item	Total Nominal Prices (R mil)	Phase 2 Annual Construction Capital (R mil)				Shadow Price (R mil)
Year		2046	2047	2048	2049	
WTW – Phase 2	918.48	52.15	312.87	312.87	208.58	886.47

Source: Data Zutari, period allocation Conningarth Economists

From Table 3-16, it is clear that the total shadow price (R 886.49 million) is nearly R 32 million less than the nominal price (R 918.48 million), both expressed in 2023 values.

3.2.3.2 Operational and Maintenance Cost

The operational, maintenance and staffing costs are presented in Table 3-17.

Table 3-17: Projected Operation, Maintenance and Staffing Costs (2023 prices)

Year		2035	2040	2045	2050
Item		**Million m³/a**	**Million m³/a**	**Million m³/a**	**Million m³/a**
Estimated Pumped Volume		31.80	46.20	67.11	97.50
Operational Costs	**R/mil m³**	**R Mil**	**R Mil**	**R Mil**	**R Mil**
Energy Cost	0.02	0.78	0.97	1.18	1.72
Chemical Cost	0.61	23.84	29.70	36.16	52.47
Sludge Disposal	0.04	1.67	2.08	2.54	3.68
Sub-Total Annual Cost	0.67	26.29	32.75	39.88	57.87
Maintenance Annual Costs	0.47	18.49	23.04	28.05	40.70
Staffing Costs		15.66	15.66	15.66	24.43
Total		**60.44**	**71.45**	**83.59**	**123.00**

Source: Data Zutari, period allocation Conningarth Economists

Table 3-17 shows that the operational and maintenance costs increase from R60.4 million in 2035 to R123.00 million in 2050.

3.2.4 Results of the Economic Cost Benefit Analysis

Table 3-18 presents the results of the Economic CBA analysis for a 10% discount rate.

Table 3-18: Economic CBA baseline results with four sensitivity sets

Discount Rate	10%	10%	10%	10%	10%
	Baseline	**Capital Cost Increase 10%**	**Benefits decrease 10%**	**Both simultaneously 10%**	**Both simultaneously 5%**
Net Present Value (NPV)	R2,378	R1,039	R759	-R579	R899
Benefit Cost Ratio (BCR)	1.17	1.07	1.05	0.96	1.06
Internal Rate of Return (IRR)	11.38%	10.57%	10.46%	9.67%	10.52%

The results of the baseline and sensitivity changes are discussed below.

(a) Baseline:
- Net Present Value positive.
- Benefit Cost Ratio > 1.
- Internal rate of return> discount rate.
- The result is positive.

(b) Capital Costs Increase by 10%.
- Net Present Value positive.
- Benefit Cost Ratio > 1.
- Internal rate of return> discount rate.
- The result is positive.

(c) Total Benefits 10% reduced.
- Net Present Value positive.
- Benefit Cost Ratio > 1.
- Internal rate of return> discount rate.
- The result is positive.

(d) Capital increased by 10% and benefits decreased by 10%.
- Net Present Value negative.
- Benefit Cost Ratio < 1.
- Internal rate of return< discount rate.

- The result is negative.

(e) Capital increased by 5% and benefits decreased by 5%.
- Net Present Value positive.
- Benefit Cost Ratio > 1.
- Internal rate of return> discount rate.
- The result is positive.

It can therefore be concluded that the Baseline results are very positive. This outcome also applies for the impact of the capital cost increase of 10% as well as a 10% decrease in benefits. However, in the case of both a capital cost increase of 10% and a 10% decrease in benefits occurring simultaneously, the outcome becomes negative. If the same scenario is projected, based on a capital cost increase of 5% and a decrease of 5% in benefits, the results are positive.

The Economic CBA base line results, including the majority of sensitivity scenarios, are positive and it can be concluded that the proposed project should be implemented.

3.3 Socio-Economic Impact of the Xhariep Pipeline Scheme

3.3.1 Economic Modelling

A Social Accounting Matrix (SAM) is a comprehensive, economy-wide database that contains information about the flow of resources that takes place between the different economic agents that exist within an economy (i.e., business enterprises, households, government, etc.) during a given period of time – usually one calendar year.

The development of the ideas that underpin the SAM is largely attributable to Sir Richard Stone and the work undertaken by the Cambridge Growth Project in the 1950s and 60s. This group started out by integrating disaggregated production accounts in the form of Input-Output Tables into the System of National Accounts (SNA). A SAM is a presentation of the SNA in a matrix format which incorporates an analysis of the interrelationships that exist between the various economic agents in the economy, including the distribution of income and expenditure amongst household groups, thereby, providing the national accounts with a social dimension.

A SAM is very similar to the traditional Input-Output Table in the sense that it reflects all of the inter-sectoral linkages that are present in an economy. However, in addition to these inter-sectoral linkages, a SAM also reflects the activities of households, which are the basic units where significant decisions regarding important economic variables such as expenditure and saving are taken. By combining households into meaningful groups, the SAM makes it possible to clearly distinguish between these household groups, and to study the economic welfare of each household group separately.

The data requirements for all economic models can always be expressed in the form of a SAM. If it is not possible to express the data in this particular manner, the model will invariably be flawed, making its application in the model-building arena impossible. It is this particular characteristic of the SAM that has made it popular as the database of preference for multi-sector economic models that are used to assess the economic implications of policy changes (or shocks) that will have effects not only on macroeconomic aggregates such as the Gross Domestic Product (GDP), job opportunities, the balance of payments, etc., but also upon the structure of the economy. As such, these models must have access to information about production, consumption, labour markets, and the functional distribution of income and the composition of trade.

3.3.2 Application of the SAM in econometric modelling

The SAM is the core component for the macro-economic analysis embedded in the econometric model. The partial general econometric model used to calculate the socio-economic impacts of the construction and operational phases are based on the multipliers obtained from the recently updated Free State

Provincial SAM and adjusted for the Greater Mangaung Area. The development of a SAM is very significant as it provides a framework in which the activities of all economic agents are accentuated and prominently distinguished. By combining these agents into meaningful groups, the SAM makes it possible to distinguish clearly between groups, to research the effects of interaction between groups, and to measure the economic welfare of each group.

There are two key reasons for compiling a SAM:

- Firstly, a SAM provides a framework for organizing information about the economic and social structure of a particular geographical entity (i.e., a country, region, or province) for a particular time period (usually one calendar year); and
- Secondly, it provides a database that can be used by any one of a number of different macro-economic modelling tools for evaluating the impact of different economic decisions and/or economic development programmes.

Since a SAM is a comprehensive, disaggregated, consistent, and complete data system of economic entities that captures the interdependence that exists within a socio-economic system, it can be used as a conceptual framework for exploring the impact of exogenous changes such as in certain categories of government expenditure and investment on the entire interdependent socio-economic system.

The SAM, because of its fine disaggregation of private household expenditure into relatively homogenous socio-economic categories that are recognisable for policy purposes, has been used to explore issues related to income distribution. The next section contains a more thorough discussion of SAMs and elaborates on the use of SAMs as analytical tools for specific applications in general economic equilibrium analysis.

The following section will explain the concept of economic multipliers. This is the connection between the ‘kick’ and the economic impacts.

3.3.3 Economic Multipliers

The economic multipliers are presented in a group of three: Direct, Indirect and Induced Multipliers and are discussed in the following sections.

3.3.3.1 Direct Multipliers

The direct multiplier measures the direct impact emanating from a particular sector on itself. For instance, the direct multiplier will measure how an increase in the production of a particular sector will affect employment within the same sector. These direct impacts are most closely related to the sector and, as such, are probably the most important impacts from a strategic planning point of view.

3.3.3.2 Indirect Multipliers

Indirect multipliers reflect the impacts that a particular sector will have on all other industries that supply inputs (materials and services) for the operations taking place in the sector. These ‘backward linkages’ are important as they measure the broader impact that changes in the direct sector will have on the economy. Frequently, these indirect impacts are very significant and may even exceed the direct impacts themselves.

3.3.3.3 Induced Multipliers

Economic impacts will result from the paying out of salaries and wages to people who are employed in a particular sector, as well as the salaries and wages paid by businesses operating in the sectors indirectly linked to this sector due to the supply of inputs. These additional salaries and wages lead to an increased demand for various consumable goods that need to be supplied by various economic sectors throughout the broader economy. Clearly, these induced impacts can be considerable and are measured by using induced multipliers.

The section below will be a theoretical introduction of the economic impacts emanating from water system development.

3.3.4 Economic Impacts

During both the construction and production phases, the investment of capital will have an impact on the economy. In the case of the construction phase, the socio-economic impact will be for a limited period as the proposed construction period is relatively short. For the proposed investment project, capital spending during the construction phase has two elements, the spending by the municipality on the water system development, and perhaps the spending of the provincial government and private sector on the housing development resulting from additional water supply that will be made available.

The economic benefits of the water development on the operational and maintenance phase will be expressed in economic indicators. The economic stimulus of, especially what the medium/high-cost housing will bring, will be discussed.

Figure **3**-**1** schematically demonstrates the structure of the economic multipliers of the three economic impacts and how it contributes to the total economic impact of the proposed development.

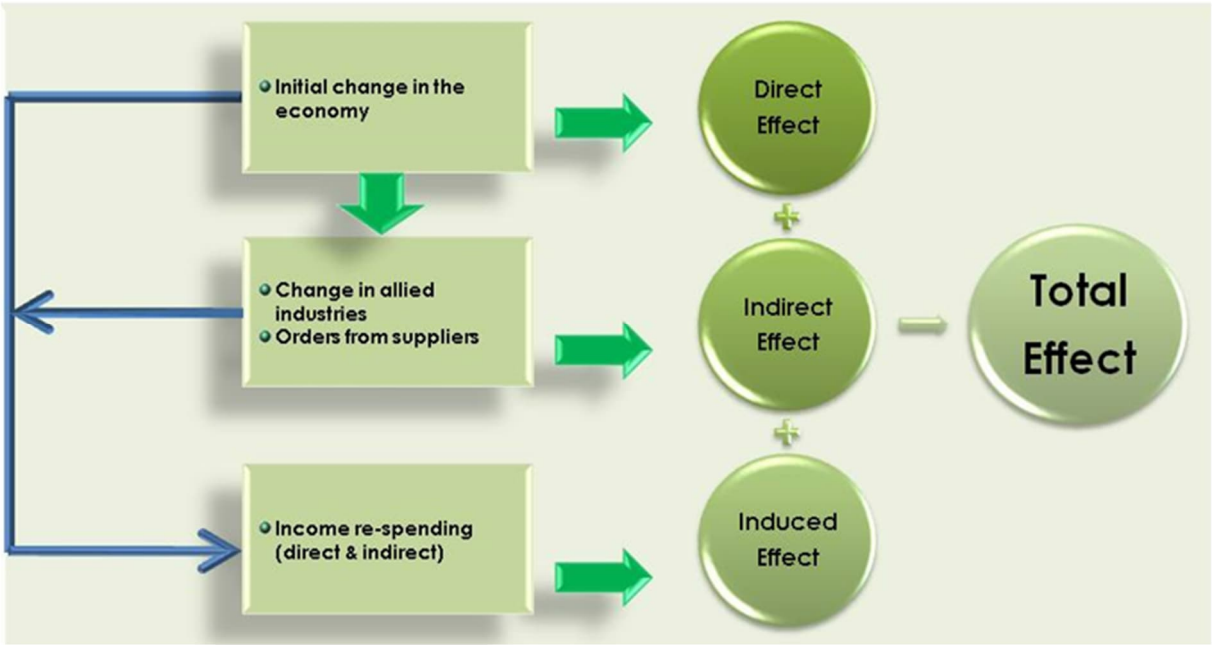


Figure 3-1: Schematic representation of Direct, Indirect, and Induced Impacts

3.3.4.1 Direct Impacts

The direct impacts refer to the economic impacts that are realized from the improvement in the availability of water, and "security of supply", that will benefit the current purification and distribution system that will lead to an economic stimulus with the projected growth.

3.3.4.2 Indirect Impacts

Indirect impacts refer to the effects of the project on all other industries that supply inputs during the construction and operational phases of the project. In terms of the construction phase, such inputs include cement, bricks, steel, electrical and mechanical components, etc. With regards to the operational phase, inputs include products such as electricity and fuel. It is important to note that indirect impacts also include the materials, which other firms would have to supply to the industries that supply products and services directly to the project.

3.3.4.3 Induced Impacts

The induced impacts are the effects of paying salaries and wages to people who are employed in the first instance by the company responsible for the construction of the project; and, secondly, the salaries and wages paid by the input suppliers. These additional salaries and wages create a multiplier effect through their increase in the demand for consumable goods that need to be supplied by various economic sectors throughout the economy.

3.3.5 Social and Macro-economic Indicators

This section presents information regarding the standard indicators used to measure the macro-economic and social impacts of the various aspects of the construction of the water infrastructure development and future housing development. These indicators include:

- GDP - value added to the national economy.
- Capital utilization (procurement of machinery, transport equipment, buildings and other social and economic infrastructure).
- Fiscal Impact (contribution to Local Government Revenue).

The following socio-economic indicators are also measured:

- Employment creation (creation of new jobs for skilled, semi-skilled, and unskilled workers).
- Income generated for low-, medium-, and high-income households where incremental income available to low-income households is used as a specific measure of poverty alleviation.

By taking all the diverse economic linkages and tools into account, it will be used as background for interpretation of the economic results.

3.3.6 Economic Results

The construction period is projected from 2028 to 2033 with different socio-economic impacts depending on the projected capital expenditure per annum. As these amounts might differ from year to year, it was necessary to calculate the positive impacts on an average amount to provide a realistic number per year for the five-year construction period.

The provincial Free State SAM is converted to an electronic model that is used in the calculations. The capital numbers used are all expressed in 2023 prices resulting in the answers also in 2023 values.

As explained in the theorical portion of the socio-economic analysis, the results of the evaluation of Xhariep Pipeline and infrastructure development and its economic spin-offs are discussed below:

- Phase 1: The impact of the investment in the construction of the Xhariep pipeline and the associated upgrade of water infrastructure.
- Flowing from additional water resources that would be available and the maintenance and enhancement of the economic growth in the MMM, the Operational Phase.
- Phase 2: The construction impact of the expansion of the WTW.
- The socio-economic impacts of the new volume of water which would be added to the GBWSS.

3.3.6.1 Phase 1 - Construction of the Pipeline, Pump Stations and the first section of the WTW

The construction of Phase 1 of the project includes the pump stations, pipeline and the first phase of the WTW. The projected capital spending is presented in Table 3-19. Applying that data to the Free State SAM the following results were obtained.

Table 3-19: Socio-Economic Impact of the Phase1 Construction. (2023 prices)

Socio-Economic Impacts	Direct impact	Indirect impact	Induced impact	Total impact
Impact on GDP (R Million)	5,617.5	1,745.2	966.8	8,329.5
Impact on capital formation (R Million)	5,366.8	6,104.4	3,868.0	15,339.3
Impact on employment (person years)	22,026	6,657	3,521	32,204
Impact on skilled employment (person years)	3,526	1,387	721	5,634
Impact on semi-skilled employment (person years)	12,527	3,401	1,816	17,744
Impact on unskilled employment (person years)	5,973	1,869	984	8,826
Total Impact on Household Income (R Million)				3,348.0
a) Low Income Households (R Million)				602.1
b) Medium Income Households (R Million)				994.8
c) High Income Households (R Million)				1,751.1
Total Fiscal Impact (R Million)				1,722.1
a) National Government (R Million)				1,668.0
b) Provincial Government (R Million)				54.1
c) Local Government (R Million)				0.0
Impact on the Balance of Payments (R Million)				-2,705.0

Source: Conningarth Economists

Discussion of Results

- Impact on GDP: The total impact is estimated at R8,329.5 million consisting of the estimated Direct impact of R5,617.5, the estimated Indirect impact of R1,745.2 million and the estimated Induced impact of R988.6 million. In evaluating these results, it is important to keep in mind that this very positive impact is only during the construction period.
- The Impact on Capital Formation, which is a very important component of future development, consists of:
  - The Direct capital formation: R5,366.8 million.
  - Indirect formation: R6,104.40 million.
  - Induced formation: R3,868.00 million.
  - The total capital formation amounts to R15,339.3 million.
- The construction period will also have a very positive impact on job creation with a total of 32,204 person years over the construction period, comprising of an estimated 5,634 skilled person year opportunities, 17,744 semiskilled and 8,826 unskilled opportunities.
- Household Income present the social impact on households with Low Income Households receiving an estimated R602.1 million, medium income households receiving R994.8 million and the high-income group R1,751.1 million.
- Additional taxes paid to the provincial government is estimate at R54.1 million.
- The only negative impact is projected to be on the Balance of Payments where the possibility exist that a negative amount of R-2,705.4 million can be generated.

The overall result of the Phase 1 construction will have a very positive impact in the construction region.

3.3.6.2 The Socio-Economic Impact of the water supply maintained in 2035

It is estimated that by 2035, the first dam to be constructed by Lesotho in the Caledon River together with other upstream developments will be restricting the water supply volume. Water supply from the Gariep Dam will be required to provide in this shortfall (refer to Table 3-17). The potential positive socio-economic impact of replacing the projected loss from the Caledon system by water from the Gariep Dam is presented in Table 3-20.

The approach was to first apply the GDP values presented in the Integrated Development Plan (IDP) Report, updated with 2023 prices and then convert them to an estimated annual turnover in 2023 prices and then calculate the dependency on the volume that would be delivered by the Xhariep pipeline.

Table 3-20: Socio-Economic Impacts dependent on the volume delivered from the Xhariep pipeline. (2023 prices)

Socio Economic Impacts	Direct impact	Indirect impact	Induced impact	Total impact
Impact on GDP (R Million)	64,502.4	61,124	15,328	140,954.4
Impact on capital formation (R Million)	19,082	240,142	61,509	320,733
Impact on employment (Numbers)	104,389	187,482	55,506	347,377
Impact on skilled employment (Numbers)	34,037	43,046	11,376	88,459
Impact on semi-skilled employment (Numbers)	52,824	96,926	28,644	178,394
Impact on unskilled employment (Numbers)	17,529	47,509	15,485	80,523
Total Impact on Household Income (R Million)				53,454.7
a) Low Income Households (R Million)				8,061.3
b) Medium Income Households (R Million)				17,578.6
c) High Income Households (R Million)				27,814.8
Total Fiscal Impact (R Million)				36,277.2
a) National Government (R Million)				34,415.7
b) Provincial Government (R Million)				336.5
c) Local Government (R Million)				1,525.0

Source: Conningarth Economists

Discussion of Results

- Impact on GDP. The total impact is estimated at R140,954.4 million comprising of the Direct impact estimated at R64,502.4 million, the Indirect impact estimated at R61,124 million and the Induced impact at R15,328 million. In the evaluation process, it is important to keep in mind that this very positive impact is ongoing, and that further water demand will add to these values.
- Impact on Capital Formation, which is a very important component of future development:
  - The Direct capital formation dependent on the volume delivered is R19,082.46 million.
  - The Indirect formation is R240,142.32 million.
  - The Induced formation is R61,508.85 million.
  - The total capital formation is R320,733.62 million.
- The production activities have a positive impact on job creation with a total of 347,377 person years over the construction period - an estimated 88,459 skilled person year opportunities, 178,394 semiskilled and 80,524 unskilled opportunities.

- Household Income present the social impact on households with Low Income Households receiving an estimated R8,061.30 million, medium income households receiving R17,578.6 million and the high-income group R27,814 million.
- Additional taxes paid to the national and provincial government is estimate at R36,277.2 million.
- No Impact on the Balance of Payment could be calculated as no detail of the different products produced is available.

3.3.6.3 Phase 2 - Completion of the WTW in 2050

The Phase 2 construction impact (Table 3-21) represents the impact of the completion of the WTW construction during the period up to 2050.

Table 3-21: Socio-Economic Impact of the Phase 2 Construction

Socio-Economic Impact	Direct impact	Indirect impact	Induced impact	Total impact
Impact on GDP (R Million)	261.0	81.1	44.9	387.0
Impact on capital formation (R Million)	249.3	283.6	179.7	712.6
Impact on employment (person years)	1,023	309	164	1,496
Impact on skilled employment (person years)	164	64	34	262
Impact on semi-skilled employment (person years)	582	158	84	824
Impact on unskilled employment (person years)	277	87	46	410
Total Impact on Household Income (R Million)				155.5
a) Low Income Households (R Million)				28.0
b) Medium Income Households (R Million)				46.2
c) High Income Households (R Million)				81.3
Total Fiscal Impact (R Million)				80.0
a) National Government (R Million)				77.5
b) Provincial Government (R Million)				2.5
c) Local Government (R Million)				-

Source: Conningarth Economists

Discussion of Results

- Impact on GDP: The total impact is estimated at R386.9 million comprising of the Direct impact estimated at R261.0 million, the Indirect impact estimated at R81.1 million and the Induced impact at R44.9 million. In evaluating these results, it is important to keep in mind that this very positive impact is ongoing, and that any further water demand will add to these values.
- Impact on Capital Formation which is a very important component of future development.
    - The Direct capital formation dependent on the 44 million m³/a is R249.3 million.
    - The Indirect formation is R283.6 million.
    - The Induced formation is R179.7 million.
    - The total capital formation is R712.6 million.
- The production activities have a positive impact on job creation with a total of 1,496 person years over the construction period, consisting of an estimated 1,023 skilled person year opportunities, 309 semiskilled opportunities and 164 unskilled opportunities.
- Household Income present the social impact on households with Low Income Households receiving an estimated R28.0 million, medium income households receiving R46.2 million and the high-income group R81.3 million.
- Additional taxes paid to the national and provincial government is estimated at R80 million.

- No Impact on the Balance of Payment could be calculated as no detail of the different products produced is available.

3.3.6.4 The Socio-Economic Impact of the water maintained in 2050

In 2035, Phase 1 of the development will start to deliver 32 million m³/a via the Xhariep pipeline. On completion of the construction of the second dam by Lesotho in the Caledon River in 2050, additional water to be delivered through the Xhariep pipeline will be required. The total estimated required volume by then will be an average flow of 97.5 million m³/a, or a peak flow of 101 million m³/a, with a further growth in demand until the full capacity of the pipeline is reached.

It is important to note that the socio-economic impact of the additional water in 2050 is not "new" but only represents the level of dependency on the Xhariep water. Further increases in delivery beyond 2050 will produce new impacts.

Table 3-22: Socio-Economic Impacts dependent on the 97.5 million m³/a from the Xhariep pipeline. (2023 prices)

Socio-Economic Impact	Direct impact	Indirect impact	Induced impact	Total impact
Impact on GDP (R Million)	190,670.5	180,684.0	45,310.0	416,664.5
Impact on capital formation (R Million)	886.5	709,866.0	181,821.5	892,574.0
Impact on employment (Numbers)	229,764	554,200	164,076	948,040
Impact on skilled employment (Numbers)	74,917	127,245	33,627	235,789
Impact on semi-skilled employment (Numbers)	116,266	286,516	84,673	487,455
Impact on unskilled employment (Numbers)	38,581	140,439	45,775	224,795
Total Impact on Household Income (R Million)				158,013.4
a) Low Income Households (R Million)				23,829.5
b) Medium Income Households (R Million)				51,962.6
c) High Income Households (R Million)				82,221.2
Total Fiscal Impact (R Million)				107,236.3
a) National Government (R Million)				101,733.5
b) Provincial Government (R Million)				994.7
c) Local Government (R Million)				4,508.1

Source: Conningarth Economists

Discussion of Results

- Impact on GDP: The total impact is estimated at R416.7 million with the Direct impact estimated at R190.6 million, the Indirect impact estimated at R180.6 million and the Induced impact at R45.3 million. When evaluating these figures, it is important to keep in mind that this very positive impact is ongoing, and that further water demand will add to these values.
- Impact on Capital Formation, which is a very important component of future development:
  - The Direct capital formation dependent on the 97.5 million m³/a is R886.5 million.
  - Indirect capital formation is R709.9 million.
  - Induced capital formation is R181.8 million.
  - The total capital formation, resulting from this development is calculated at R892.6 million.
- The production activities have a positive impact on job creation with a total of 948,040 person years depending on the water from the Xhariep pipeline. An estimated 235,789 skilled person

year opportunities, 487,456 semiskilled and 224,795 unskilled person year opportunities is calculated.

- Household Income present the social impact on households with Low Income Households receiving an estimated R23,829.5 million, medium income households receiving R51,926.6 million and the high-income group R82,221.2 million.
- Additional taxes paid to the national, provincial, and local government is estimated at R107.2 million.
- No Impact on the Balance of Payments could be calculated as no detail of the different products produced are available.

3.4 Affordability Assessment

In the previous sections, the economic viability of the Xhariep Pipeline and accompanying additional infrastructure have been established by applying an Economic CBA, and the estimated socio-economic impacts on the Greater Mangaung economic activities determined if the additional water is not available over time. The last outstanding issue is then the question of whether the users can pay the additional cost associated with the construction and operation of the system.

The link between affordability and the realisation of the right to water and sanitation services is widely acknowledged by the international community. Water and sanitation services are essential not only to health, but also to poverty reduction, food security, peace and human rights, ecosystems and education. Access to water, sanitation and hygiene is therefore regarded as a human right. The World Health Organisation (WHO) argues that affordability issues represent one of the three key dimensions in the concept of equitable access to water and sanitation services, together with geographical disparities and specific barriers faced by vulnerable groups.

Water and sanitation affordability is a central element to access to these services and can be defined as a household's capacity to cover water costs for essential uses such as drinking, cooking, and sanitation without neglecting other essential expenditures. The volume of water required to meet these needs varies across households due to differences in household occupancy, water-using appliances and plumbing efficiency. When costs of services make it unaffordable, it can pose a health and safety issue and a range of administrative and political problems. Water affordability is typically measured by the cost of water as a percentage of median household income. Internationally, the norm for affordability for the poor is the so-called "Five Percent Rule" for improved water services: spending on water by poor households should not be more than 5% of their income or expenditure if income is difficult to calculate.

The calculation of the clean (potable) water tariff consists of the following:

- The bulk raw water provider, in this case DWS, has a cost element.
- Then the organisation treating/cleaning the water and deliver it to the local municipality. In this case, it is assumed that VCWB maintains the system, the pump stations and water treatment plants and then deliver water to MMM at their bulk storage reservoirs. VCWB has certain cost elements that are added to the total costs.
- MMM then does the distribution of the water and have a cost element. MMM is responsible for the collection of the tariffs and for paying the VCWB.
- In the case of the Xhariep Pipeline, the repayment of the capital and construction costs is the responsibility of the "receiver" of the water, which is in this case the Greater Mangaung water users.

In this specific case the complication is that the Xhariep Pipeline will not be fully utilised for a long period of time, mainly as the Xhariep infrastructure needs to supply the growth in demand over time and needs to augment the gradual decrease in yield from the Caledon River. However, the capital cost must be repaid by all the users, except if some form of grant is provided.

Ability-to-pay, or residential affordability of services, refers to the capacity of customers to pay rates that reflect the full costs of providing water and sanitation services. At the same time, the widening

infrastructure investment gap has translated into an increased focus on the issue of defining, measuring, and addressing water and sanitation affordability.

Water and sanitation affordability is intimately related to tariffs charged for the services. In the South African local government environment, specific provision is made to supplement the tariff income stream by intergovernmental transfers through the equitable share allocation to local government to make water and sanitation services more affordable for particularly poor communities.

There are two main approaches to measuring affordability: the affordability ratios and the residual income approach. The former calculates the water and sanitation bill as a proportion of income and compares it to a threshold while the latter compares the difference between income and the bill to a poverty line. The affordability ratio (AR) is a common measure of household water cost burden and is used amongst others, by both the U.S. Environmental Protection Agency (EPA) and American Water Works Association, as well as the European Union. A literature review on water services and sanitation affordability revealed that 90% of the studies adopted a threshold of between 2% and 5% for the water bill as percentage of household income.

To ensure that the infrastructure investment is accessible, affordable (to both end users and the water authorities) and financially viable, a detailed analysis of the costs and benefits is required. In the case where infrastructure is created to provide for additional future capacity to meet the needs of growing communities, such as the Xhariep Pipeline, such an analysis of the capital cost requires particular scrutiny. The phasing in of additional treatment capacity should be planned and structured to be in accordance with the population growth. On the other hand, the conveyance infrastructure (the pipeline) can, in this instance, not be phased in due to the overall distance to be covered. An "over-capacity" will therefore be created from the outset.

When pricing is set to meet criteria, such as cost recovery and return on investment, there is a risk that low-income segments of society will likely be excluded from a given service, unless the funding of such developments are subsidised by intergovernmental transfers. Such transfers are also justified from the broader socio-economic benefits to society, such as broader job creation, decreased pollution and better health outcomes.

The concepts of ability to pay (determined by affordability to the end user) and willingness to pay (the amount the end user is prepared to pay for a service) also need to be considered in tariff setting. Quality and reliability of a service are two important factors that will impact on the willingness to pay.

The ability of vulnerable groups to pay, their preferences and expectations, as well as the benefits they derive from the infrastructure service, must be carefully considered. Financial assistance can take the form of government subsidies for the provider (typically the municipality) and/or the end users of the services, with the aim of promoting the government’s economic and social policy objectives.

Infrastructure needs to be financially viable, in that the funding received, whether through end user tariffs or from intergovernmental transfers, must be adequate to meet the cost of operating and maintaining the infrastructure assets, as well as meeting any obligations to repay the financing for its initial construction.

In addition to being affordable to end users, and financially sustainable in terms of having adequate funding and operational revenue, infrastructure is a substantial investment and must also be affordable from the government’s fiscal perspective – which means that the financial commitments of the government to the project (in the form of direct funding or subsidies) must be accommodated within the government’s current and future budget constraints. Governments also need to be conscious of the contingent liabilities which the state is assuming in respect of infrastructure projects, in the form of payments or assumptions of liability that may arise if particular risks allocated to the government under a private public partnership materialise.

The latest water use in the Mangaung area is presented in Table 3-9 which show that households use approximately 53.25% of the water, services 13.2% and the municipality 20.3%, as the main users.

In the section regarding the "Value of Water" the households were divided into two groups namely:

- "Equitable Share" Households.
- "Paying" Households.

According to the latest available statistics 153,817 (64%) out of a total of 240,326 households in the GBWSS were eligible for free basic services in 2023. The total of 153,817 poor households are then divided between Bloemfontein and the rest of the area, which according to the interpretation of census statistics, comprises a larger number of non-paying households compared to the number of paying households.

- The total number of non-paying households in Greater Mangaung = 153,817,
- The number of non-paying households in Bloemfontein = 79,440, and
- The number of non-paying households in the rest of the GBWSS = 74,377.

The result is that the balance of the households, 86,509, will be evaluated as if they could afford the higher tariffs, while the non-paying (equitable share) households depend on the annual allocation from the national treasury. The evaluation will be done between the 2% and 5% values of the monthly income. Table 3-23 provides an indication of the household groups, monthly income and affordability levels of monthly payment for water and sanitation. The Division of Revenue Bill 2024 show the level of household income per month to be R4,418 to qualify for the Indigent assistance.

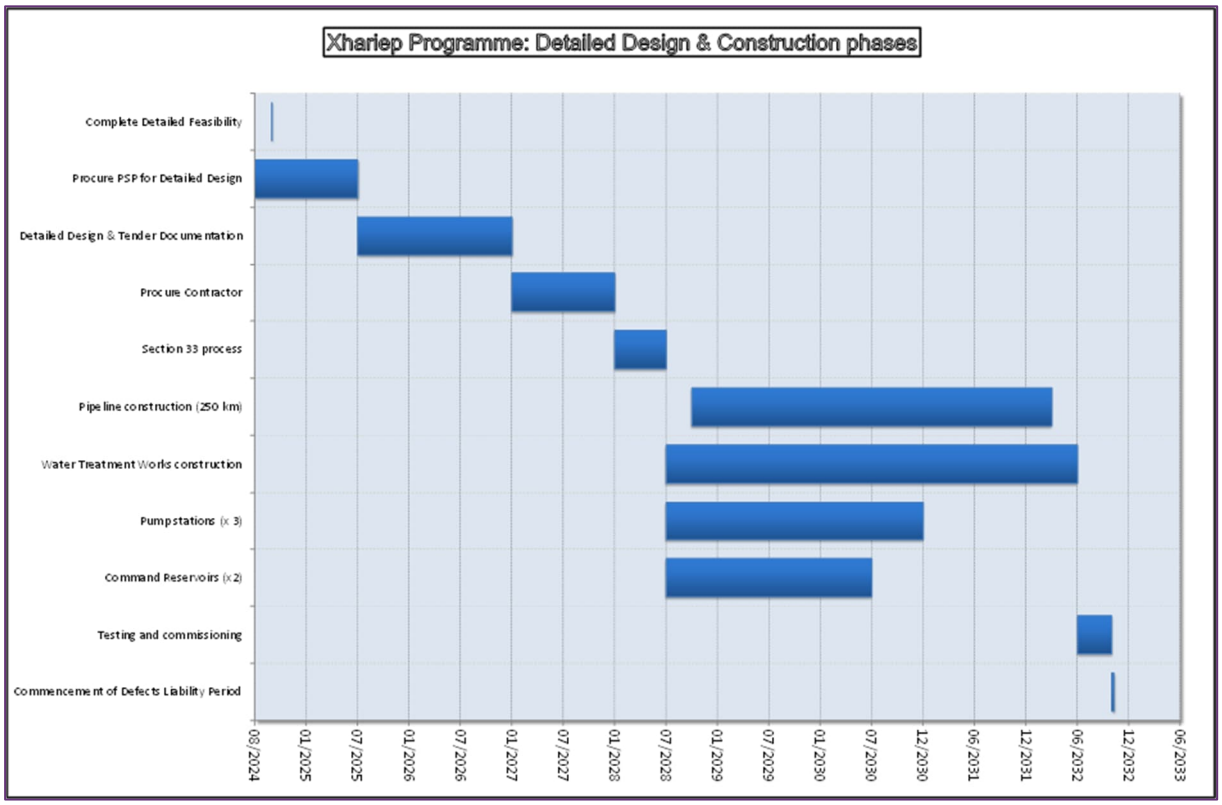
Table 3-23: MMM Household Income and projected water and sanitation tariffs (2023/24 prices)

Monthly Household Income	Number of HH's	Percentage	Government Contribution	2% of Monthly Income	5% of Monthly Income
R1 - R560	30,826	12.83%	R302.69		
R561 - R1 120	19,105	7.95%	R302.69		
R1 121 - R2 240	49,274	20.50%	R302.69		
R2 241 - R4 480	54,612	22.72%	R302.69		
R4 481 - R8 960	31,515	13.11%		R134.41	R336.03
R8 961 - R17 920	21,819	9.08%		R268.81	R672.03
R17 921 - R35 840	17,654	7.35%		R537.61	R1,344.03
R35 841 - R71 680	10,173	4.23%		R1,075.21	R2,688.03
R71 681- R143 360	3,428	1.43%		R2,150.41	R5,376.03
R143 361- R286 720	1,046	0.44%		R4,300.81	R10,752.03
R286 721+	874	0.36%		R5,734.42	R14,336.05
Total	**240,326**	**100.00%**			

Source: IDP and Census 2022 Data adapted by Conningarth Economists

A number of options has been identified and analysed to determine the affordability of the proposed Xhariep Pipeline for the current and future household of the MMM.

The following diagram from the Zutari documentation was used to estimate the percentage capital spending from 2025 to 2032 with the assumption that the construction of the pipeline, pump stations and WTWs will be completed and that the first delivery from the pipeline will take place in 2033.



Source: Zutari

Figure 3-2: Xhariep Programme - Detailed Design & Construction Phases

Table 3-24 presents the estimated projected capital spending per year as used in the analysis based on Figure 3-2 above, with the assumption that no actual repayment of capital and interest will take place before completion of the project. The second assumption used was that the pumping activities will start the year after the completion of Phase 1 to continue throughout the pipeline lifetime. In the following table the projected capital per annum is listed together with a 7% per annum interest added for the number of years before pumping starts. The interest is added as this will impact on the total capital cost of the project.

Table 3-24: Projected Annual Capital Spending

Estimated Spending per Annum	2023 Prices	Interest Added at 7% per annum
Year	**R million**	**R million**
2028	R1 561.99	R2 190.78
2029	R3 450.47	R4 522.86
2030	R3 360.47	R4 116.72
2031	R2 903.67	R3 324.41
2032	R2 801.68	R2 997.80
Total	R14 078.29	R17 152.58

Source: Interpretation by Conningarth Economists

It was further assumed that repayment will commence once the project is fully implemented and became operational. The amount of R14,078.29 million, expressed in 2023 prices, with added interest at 7% per annum is applied as the final amount of R17,152 million that must be repaid from 2033 onwards. The total that will be applied and repaid together with an interest rate of 9% applied over a 30-year period from 2033 onwards.

It is important to keep in mind that the capital repayment, operational and maintenance amounts will be added to the current water tariff, which is discussion in more detail under Chapter 4. The calculation provided here is only to determine the impact of the Phase 1 capital construction costs on tariffs

expressed in 2023 prices. A similar calculation will be required when Phase 2 is eventually completed, but the impact on tariffs will be less than that of Phase 1 since the repayment of the pipelines, reservoirs and pump stations is already accounted for in Phase 1.

Four scenarios are discussed in the following sections from the angle of affordability for the repayment of the costs.

Scenario 1

The additional tariff is an estimated additional amount of R28,73 per kl, presented in 2023 prices, that will be billed to the paying group. This converts to an additional amount of over R630 per month to the average water account. Based on the household income analysis, the income groups that will be able to afford this is from the R17,921 - R35,840 group and upwards, which constitute only 13,81% of all households.

The conclusion is that this Option is not affordable for the Greater Mangaung population.

Scenario 2

Another option is that only the capital costs are repaid and that no interest is charged. This converts to an increase of R12.45 per kl, an increase of R272 per month if the same methodology is applied. Based on the household income analysis, the group between R8,961 – R17,920 should be able to afford to pay the additional R227 per month, adding another 9.08% of households. However, this is still not enough paying households to cover the repayment of the capital.

Scenario 3

A 75% construction cost grant with interest only charged on the 25% which convert to an increase of R12.60 per kl in 2023 prices, converting to an increase of R215 per month. Based on the household income analysis, all the income groups not dependant on equitable share should be able to afford this amount.

Scenario 4

A complete grant to fund the construction investment with only the operational and management costs payable by consumers, will amount to less than R20 per month, which would be affordable, also to indigent households.

From the four scenarios it can be deducted that the majority of rate payers of the MMM will not be able to afford the full repayment of the capital and even in a case where there is no interest charged, they will still not be able to afford the impact on the water tariffs. In the case of a 75% capital grant, it appears as if they would be able to afford it.

3.5 Summary and Conclusion

The purpose of this section of the study is to determine the Economic viability of the proposed pipeline and the socio-economic impact of maintaining the volume of water as well as providing for projected growth in water demand over time.

The Economic CBA shows the economic viability of the pipeline by projecting the future water supply and the "Value of the Water" for the Bloemfontein area. The proposed system provides the water that might be lost if the two Lesotho dams located upstream of the Tienfontein abstraction works are completed and also makes provision for economic growth and possible water demand increase.

The recommended structure makes provision for most of the water to be channelled to Bloemfontein; however, it is also planned to meet any water shortages that might develop in the Thaba Nchu and Botshabelo areas.

Table 3-25 provides the results of the baseline analysis as well as a sensitivity analysis if the costs are higher than anticipated or the benefits lower than expected.

Table 3-25: Economic CBA Results (2023 prices)

Discount Rate	10%	10%	10%	10%	10%
Measuring Unit	**Baseline**	**Capital Cost Increase 10%**	**Benefits decrease 10%**	**Both simultaneously 10%**	**Both simultaneously 5%**
Net Present Value (BPV)	R2,378	R1,039	R759	-R579	R899
Benefit Cost Ratio (BCR)	1.17	1.07	1.05	0.96	1.06
Internal Rate of Return (IRR)	11.38%	10.57%	10.46%	9.67%	10.52%

The baseline option shows a very positive set of results, while in the case of an increase of 10% in the construction costs still provides positive results. If the benefits are reduced by 10%, the results are also still positive, however if the construction cost increase by 10% and the benefits are reduced by 10% the results are negative. A simultaneous increase of 5% in costs and decrease of 5% in benefits also provides positive results.

The impact of the water is estimated at two points, namely in 2035 and again in 2050. The socio-economic impacts are measured in terms of GDP values and employment numbers supported by the water originally supplied through the Caledon/Modder River system but would eventually become dependent on the water from the Xhariep pipeline.

The results are presented in terms of the following values:

- GDP - Direct, Indirect, and Induced values.
- Capital Formation - Direct, Indirect, and Induced values.
- Labour numbers supported: Skilled, semi-skilled, and unskilled.
- Household Income: Low-Income Households, Medium-Income Households and High-Income Households.
- Fiscal Impact - Taxes paid to National, Provincial and Local Government.

In both 2035 and 2050 the impacts are very positive by maintaining the economic activities with the water supplied from the alternative source.

The projected socio-economic impacts by 2050 of maintaining water provision to Bloemfontein through the Xhariep pipeline (all expressed in 2023 prices) are:

- Total GDP = R416,665 million.
- Capital generated = R892,574 million.
- Employment Opportunities Maintained = 948,040.
- Annual Household Income Generated = R158,013 million with R23,892 million to low-income households.
- Additional taxes paid to the different authorities = R107,236 million.

It is therefore possible to state that the proposed option is economically viable and that the socio-economic impacts of the available water will not only maintain but also add positively to the socio-economic circumstances of Bloemfontein. It will also contribute to improve the security of supply of water for the rest of the GBWSS.

However, the affordability analysis shows that the total capital and interest repayment over a 30-year period is not affordable for the paying households as well as the business and industrial sectors. Specifically, the current paying households will not be able to afford the projected additional tariff increase of nearly R28 per cubic meter.

A number of other funding options were investigated which shows that, without a large government grant, the project will not be financially affordable. The option of a 75% capital grant and a loan for the balance of the capital costs at a low interest rate is probably the first of the different options that will render the project to be affordable for the households.

Another issue is the apparent dysfunctionality of MMM as highlighted by the Auditor General's negative comments about the standard of the financial management. MMM received a qualified audit opinion due to audit action plans that were not effectively implemented to address prior-year qualifications and poor record keeping.

However, the additional infrastructure, securing the water supply, makes economic sense and is necessary for the future of the inhabitants and the general social and economic wellbeing of the municipality.

4 Financing Arrangements

4.1 Financing Considerations

4.1.1 Project Cost and Synergies

The development cost, i.e., capital expenditure (capex) and the ongoing operating and maintenance (O&M) cost for the project are presented in Chapter 3.2.3 of this report. The costing was done without having a specific delivery agency or combination of components in mind. These costs are highlighted (light blue) in Table 4-1 below.

For the potential delivery packages (Table 2-2), Table 4-1 indicates the adjustments made to the base values:

- A "Design and Procurement" stage is added, priced at 8% of the contract capex value. Where packages are more complex (ABC, AC and AB) the duration of the procurement period is expected to be slightly longer.
- Where project components are joined, they are expected to have some capex synergy, which should be higher if the components are all executed together (ABC) and slightly less costly for packages AC and AB.
- No O&M saving is assumed for more complex packages.
- All packages containing Component A (Xhariep Dam to the Command Reservoir) are assumed to require a reinvestment of mechanical components after 15 years.

Table 4-1: Cost Reference Values

Package			ABC	A	B	C	AC	AB
Design & Procurement		% of Capex	8%	8%	8%	8%	8%	8%
		R mil	1,372	1,289	162	73	1,294	1,379
		months	8	8	6	6	8	8
Capex		Synergy %	90%	100%	100%	100%	95%	95%
		R mil	17,144	16,118	2,023	908	16,175	17,235
		months	36	36	24	24	36	36
O&M	**Fixed**	R mil/yr	345	305	27	12	318	333
	Energy	R mil/yr	479	479	-	-	479	479
	Other	R mil/yr	65	65	-	-	65	65
Reinvestment		R mil	827	827	-	-	827	827
		Every x yr	15	15	15	15	15	15

These adjustments therefore reflect the inherent, engineering and contracting nature of mixing-and-matching the contract packages.

Note that the purpose of this calculation is to determine the entity that would be best suited to implement Phase 1, which accounts for 80% of the total infrastructure cost. It follows that the entity who implements Phase 1 will also implement Phase 2, the outcome therefore, will be the same if Phase 1 or both phases are considered. To be consistent with the tariff analysis, only Phase 1 was considered.

4.1.2 Agency Delivery Capability

A next adjustment relates to the delivery agencies themselves. It would require a detailed assessment of creditworthiness and projects execution to make an accurate finding on the relative capabilities of the three delivery agencies. The conclusions below are somewhat subjective but reflect the consultant's

understanding of the agencies' strengths and weaknesses. It should be noted that while Kopanong and Mantsopa Local Municipalities may be beneficiaries of the Xhariep Pipeline Project, they would use roughly 3% of the water to be produced by the scheme with MMM using 97%, therefore their capacities for implementation were not examined to the same extent as MMM.

Both MMM and VCWB are financially constrained. The MMM Consolidated Annual Report 2022-2023 reports that Water Services makes a substantial operating financial loss. This situation is projected to continue in the medium term (refer the MMM MTREF 2023/24-2025/26). It has also maintained a consistently high ratio of unaccounted for water (UAW) losses. At the time of this assessment, more detailed information was unfortunately not forthcoming from MMM.

In FY23/24, VCWB just about broke even on an accounting basis (and was projected to continue to do so in FY24/25). However, it is one of the water supply agencies that suffers from a low payment ratio by its customers (i.e. local authorities, including MMM) which impedes VCWB's cash flow.

The financial situations of DWS, including TCTA and NWRIA entities, are not directly comparable to MMM and VCWB, as DWS is funded from the national budget while TCTA's operating and capital costs are effectively funded by DWS which maintains it in an operational break-even position. TCTA also earns net financing income of more than R1 billion (TCTA Annual Report 2022-23. p.147). TCTA obtains nearly all its financing for projects from commercial banks (98-99%) and the development finance institutions.

A fundamental difference between the three agencies is their experience of delivering especially large capital projects. The MMM 22/23 Annual Report (p.42-55) reported that the majority of water and sanitation projects have experienced delays, mostly at the procurement (supply chain management) stage already. A cursory review of recent capex programmes reveals that VCWB has executed somewhat more capital expenditure than MMM. However, both these entities' programmes (which run into some hundreds of millions of Rand) pale into insignificance against DWS/TCTA (with projects in the billions of Rands). The TCTA Annual Report provides a comprehensive description of projects under preparation, in implementation, and in the close-out phase, although it does not report project execution against planned timelines. However, it is the consultant's opinion that, although some individual projects have been delayed, the TCTA generally delivers projects on schedule and within budget.

When it comes to project delivery by the private sector, under public-private-partnerships (PPP) it is expected that projects will come in on-time and in-budget, amongst others because of the oversight of the financiers and shareholders (who will have to absorb overruns).

Table 4-2 crystalises the above discussion in specific performance factors and ratios per agency. The left-hand column are the stages of the project. The column headings show the agencies. Throughout, there are expected time and cost overruns per agency against their expected performance. For capex and reinvestments, there is also upfront provision (in the form of a "factor") for a longer or more expensive delivery by an agency. For example, from the outset it is expected that MMM will take 20% longer to deliver a project (capex "Time Factor"), and furthermore it will eventually overspend by another 20% (capex "Time Overrun"). All agencies are compared relative to the DWS' performance, i.e., relative to others, DWS has no overruns. Throughout, MMM is expected to deliver later and more expensively than VCWB, and VCWB likewise compared with DWS, but PPP delivery is expected to be superior to DWS (except for PPP procurement, which takes longer than conventional procurement by a public agency).

Table 4-2: Agency Efficiencies & Risks

Agency Comparator		Unit	MMM	VCWB	DWS	PPP	Comment
Procurement	Time	%	20%	10%	-	50%	Procurement duration can be longer
	Cost	%	20%	10%	-	-	Procurement can be higher
Capex	Time Factor	%	20%	10%	-	-10%	Up-front adjustment for project duration

Agency Comparator		Unit	MMM	VCWB	DWS	PPP	Comment
	Time Overrun	%	20%	10%	-	-	Provision for overrun of adjusted project duration
	Cost Factor	%	20%	10%	-	-10%	Up-front adjustment for capex
	Cost Overrun	%	20%	10%	-	-	Provision for overrun of adjusted capex
Ops & Maintenance	Factor	%	-	-	-	-10%	Up-front adjustment for O&M cost
	Overspend	%	10%	10%	-	-	Provision for overrun of adjusted O&M
Reinvestment	Factor	%	-	-	-	-10%	Up-front adjustment for reinvestment value
	Overrun	%	20%	10%	-	-	Provision for overrun of adjusted reinvestment
	Accelerated	%	10%	10%	-	-	Provision for earlier than expected reinvestment

4.1.3 Project Financing

Excluding more exotic permutations, there are essentially five sources of financing for a public infrastructure project. “Grants” are allocations by government which are not required to earn a return and which therefore “buy down” the overall project cost of capital. Grants can be from Central Government (from Treasury directly or via DWS) or from capital set aside by a public delivery agency itself. If a private investor, “equity” is the allocation of its own capital, which would indeed demand a return and since it is last in line to be paid, equity is the most expensive source of capital. If there is sufficient grant and/or equity committed, the project may leverage “debt” (loan) financing. Most debt would usually be “commercial” on market-related terms, but sometimes “concessionary” debt may be available at more lenient terms to help a project “get over the line”. Debt (loan) financing is described as the act of raising capital by borrowing money from a lender or a bank, to be repaid at a future date. Concessionary debt involves transactions where a loan is granted, bearing an interest payable below normal market rates as a matter of policy, such that it contains a grant/transfer element from the creditor to the debtor.

4.1.3.1 Grant Funding

There is a menu of possible conditional grants available for water infrastructure projects. However, grants such as the Municipal Infrastructure Grant (MIG), Water Services Infrastructure Grant (WSIG), and Urban Settlements Development Grant (USDG) all target access to water and basic service delivery, sometimes restricted to urban areas. The Regional Bulk Infrastructure Grant (RBIG) is aimed at supporting regional bulk water and sanitation infrastructure that services multiple municipalities. All the delivery agencies, including a private developer, would qualify to receive funding under the RBIG. Judging by historic allocation levels, typical annual amounts per project range roughly between R300-500 million (i.e. about 5% of the Xhariep project capital value).

4.1.3.2 Private Shareholder’s Equity

For a PPP, lenders would require the shareholder to have sufficient equity “skin in the game”. The equity contribution could be up to 20% or 30%, but for a public benefit project like the Xhariep pipeline which will have strong (written and unwritten) government support the required share of equity is expected to be quite limited.

4.1.3.3 Debt Financing

For the same reason as the expected modest equity requirement, the project should be in a position to access a sizable share (compared to e.g. the typical TCTA use) of concessionary debt. The remainder of the project (after grant, equity and concessionary debt) would then be required to be financed from commercial debt.

The shares of funding and financing sources assumed to be available to the different delivery agencies is as presented in Table 4-3. It should be noted, however, that these shares need to shift quite significantly for the required project tariff to be affected noticeably.

Table 4-3: Capex Gearing

Share	Unit	MMM	VCWB	DWS	PPP
Grant from Central Govt	%	5%	5%	5%	5%
Agency Own Sources	%			5%	
Equity	%				10%
Debt Concessionary	%	20%	20%	20%	20%
Debt Commercial	%	75%	75%	70%	65%
Total	**%**	**100%**	**100%**	**100%**	**100%**

4.1.4 Cost of Capital

The different sources of project capital come at different cost and terms, with no direct cost for grant funding, lower cost and extended tenor for concessionary debt, higher-cost commercial debt and equity being the most expensive. Typical recent costs and terms for each funding source are presented in Table 4-4 below.

Table 4-4: Cost of Capital

Source	Unit	MMM	VCWB	DWS	PPP
Govt Own Sources	%/yr	10.0%	10.0%	10.0%	
Equity	%/yr				20.0%
Corp. Income Tax	%				28.0%
Debt Concessionary					
Fees upfront	%	1.0%	1.0%	1.0%	1.0%
Fees commitment	%	0.3%	0.3%	0.3%	0.3%
Repayment Period	years	20	20	20	20
Repayment Grace	years	2	2		
Reference Rate	%/yr	8.3%	8.3%	8.3%	8.3%
Interest premium	%/yr	1.0%	1.0%		
Interest total	%/yr	9.3%	9.3%	8.3%	8.3%
Interest construction	%/yr	9.3%	9.3%	8.3%	8.3%
Debt Commercial					
Fees upfront	%	1.5%	1.5%	1.5%	1.5%
Fees commitment	%	0.5%	0.5%	0.5%	0.5%
Repayment Period	years	12	12	12	12
Reference Rate	%/yr	11.8%	11.8%	11.8%	11.8%
Interest premium	%/yr	1.0%	2.0%		

Source	Unit	MMM	VCWB	DWS	PPP
Interest total	%/yr	12.8%	13.8%	11.8%	11.8%
Interest construction	%/yr	12.8%	13.8%	11.8%	11.8%

Note: A higher interest premium is applied to VCWB to reflect the constrained financial position of water boards in general, related to non-payment by client local authorities

It should be noted that although grants are “free”, such contributions will be financed in the background by government itself. When the project is assessed for its financial performance, it would be expected that it recovers all its direct costs as well as the indirect background cost of financing grants. Currently, the South African 10-year government bond earns 9.3% and the 20-year bond 11.4%.

Shareholder equity typically requires a return in a range of 15% to 20% for infrastructure projects in South Africa, but probably higher in the case of technically complex projects and/or projects with uncertain offtake.

The debt terms for commercial loans are somewhat tighter than for concessionary debt, with shorter repayment term, higher interest rates, and no repayment grace period as sometimes offered by development finance institutions. Concessionary loans are expected to be priced around the Reserve Bank Repo rate (currently 8.25%) while commercial pricing should be around the prime overdraft rate (currently 11.75%). Both MMM and VCWB are expected to have to pay a premium above market rate given their vulnerable financial positions.

4.2 Projected Bulk Tariff

4.2.1 Revenue Requirement

The cost of delivering and operating the Xhariep project is essentially made up of standing (fixed) cost, with a negligible component of variable cost. The “revenue requirement” – i.e. the amount that the project must earn every year to cover all its costs – can therefore be thought of as a fixed annual payment. In that payment, the capital portion (financing and debt service cost) is constant, while the other / O&M costs would increase by about inflation. It should be noted that, given the large share of capital costs (about two thirds of total cost over the project life), the overall increase in the annual payment is lower than inflation.

The revenue requirement is calculated for each option (refer to Table 4-5) based on the costs and agency efficiencies and financing cost as set out in the preceding tables above. The calculation is made per participating agency per option and then aggregated.

4.2.2 Bulk Tariff

Although the project payment will probably be in the form of a fixed period payment (an “availability payment”), that payment can also be expressed as a tariff per volume of water delivered. This is done by considering the throughput volumes. It should be recalled that the annual throughput volumes increase steadily, implying that when the annual payment is converted into a rate per volume, then over time that rate decreases in real (non-inflated) terms.

Table 4-5 shows the present-day semi-annual (twice-a-year) revenue requirement and the implied bulk tariff per option. Option 3B results are slightly more competitive than Option 1C, because the DWS efficiencies slightly exceed the synergy benefits of delivering all components together. Option 3A is slightly more costly because of the assumed higher inefficiencies of MMM. At the extremes (Options 1A and 4A) the revenue requirement is nearly one third higher than the lowest-cost options.

Table 4-5: Revenue Requirement and Bulk Tariff (real 2024 values)

Description	No	Rev. Req. million	Components/Packages						Total bulk tariff (R/kl)
			ABC	A	B	C	AC	AB	
One does all	1A	1,384	20.66	-	-	-	-	-	20.66
	1B	1,264	19.28	-	-	-	-	-	19.28
	1C	1,063	16.57	-	-	-	-	-	16.57
Each its own	2	1,153	-	31.00	6.75	2.97	-	-	17.98
DWS support	3A	1,085	-	-	6.75	-	20.42	-	16.91
	3B	1,054	-	-	-	2.97	-	20.52	16.44
No DWS	4A	1,323	-	-	-	2.97	-	24.91	19.75
	4B	1,242	-	-	6.75	-	23.26	-	18.95

4.2.3 Introducing Private Sector Participation

As shown in Table 4-2, the private sector is assumed to be more efficient in project delivery than DWS. However, with reference to Table 4-4, the private sector would have a higher cost of capital, including the obligation to pay corporate income tax.

Delivering Option 3B as a PPP (i.e. replacing DWS with a private partner but retaining VCWB to deliver Component C), increases the semi-annual payment to R1,419 million (an increase of one third). The implication is that the private efficiencies are not sufficient to overcome the public agencies' lower financing cost.

4.3 Estimated Impact in Household Distribution Tariffs

The project cost, after considering the available capital subsidies, must ultimately be recovered from the water users. The project bulk tariff is blended into the total bulk supply cost, and the end-user tariffs need to be adjusted accordingly. Of particular interest is how tariffs applicable to households will be affected, and whether such effects will be affordable.

4.3.1 Household/Residential Tariffs

MMM applies a two-part residential water tariff. The availability charge is a standing cost per household per month. This component is typically aimed at recovering the system fixed costs related to the provision, maintenance and operation of the water reticulation infrastructure and business.

The consumption charge is payable according to the amount of water consumed. This is structured as a rising block charge, with each subsequent consumption block paying an increasing rate per kilolitre.

Some residential customers are categorised as indigent in terms of the MMM Council's indigent policy. Indigent customers are absolved from paying the availability charge as well as the consumption charge for the first block – a monthly consumption of less than 6kl.

The Xhariep Pipeline bulk tariff, as developed in the previous sections, affects the blended cost of water supplied to MMM. It does not have an impact per se on the standing cost of the distribution/reticulation system. The approach followed is therefore to keep the monthly availability charge as-is and only increase it by the rate of inflation. The impact of the project bulk water charge plays out only in terms of the consumption charge.

4.3.2 Calculation of Required Tariff Increase

The project bulk tariff is essentially the revenue requirement divided by the water volume delivered. The delivered volume can be sub-divided into household and non-household consumption, and the

household consumption in turn by category (indigent and non-indigent) and consumption blocks. The revenue requirement is allocated across all blocks with the exception of the lowest indigent block to which no revenue requirement is allocated. Since succeeding blocks pay a higher rate, the revenue requirement is scaled up for those blocks in proportion to the applicable rates. The result is that all blocks' tariffs increase at the same rate.

However, two other effects play out. Firstly, as consumption per household increases, more and more consumption takes place in higher, pricier consumption blocks. The average effective rate (R/kl) for a household therefore increases even though every block's tariff increases at the same rate. This block-creep effect is more prevalent amongst indigent consumers where initial consumption rates are quite low. It will be recalled that one of the drivers of the demand projection is precisely improving the level of household service, and this impetus is therefore expected to impact indigent households more.

Secondly, it should be recalled that the whole bulk tariff is recovered from the consumption charges only, and not from the availability charge. The availability charge is linked to an inflationary increase only. The Xhariep Pipeline will supply just more than half of the MMM water requirement and will, for some years, require a higher tariff than the non-project bulk supplies, resulting in the blended (total) bulk water charge increasing by more than inflation initially. The effect is therefore that indigent customers experience a higher total increase in their water charge whereas the effect on non-indigents is slightly diluted by the slower-increasing availability charge.

4.3.3 Projected Effect on Tariffs

Figure 4-1 shows the projected increases related to the Xhariep project. These are based on the project tariff under case 1A (refer to Table 4-5). For comparison, the increases are shown as index values with 2025 as base year. The "Blended Bulk" supply increase reflects the combination of the project "Xhariep Bulk" tariff and the tariffs of "Other Bulk" sources. The "Consumption Tariff" is the pure tariff effect on the consumption tariff components. The "Non-Indigent Spend" is the increase in the total monthly charge to non-indigent households, including the mitigating effect of the availability charge. The "Indigent Spend" is the increase in the monthly charge for indigent households.

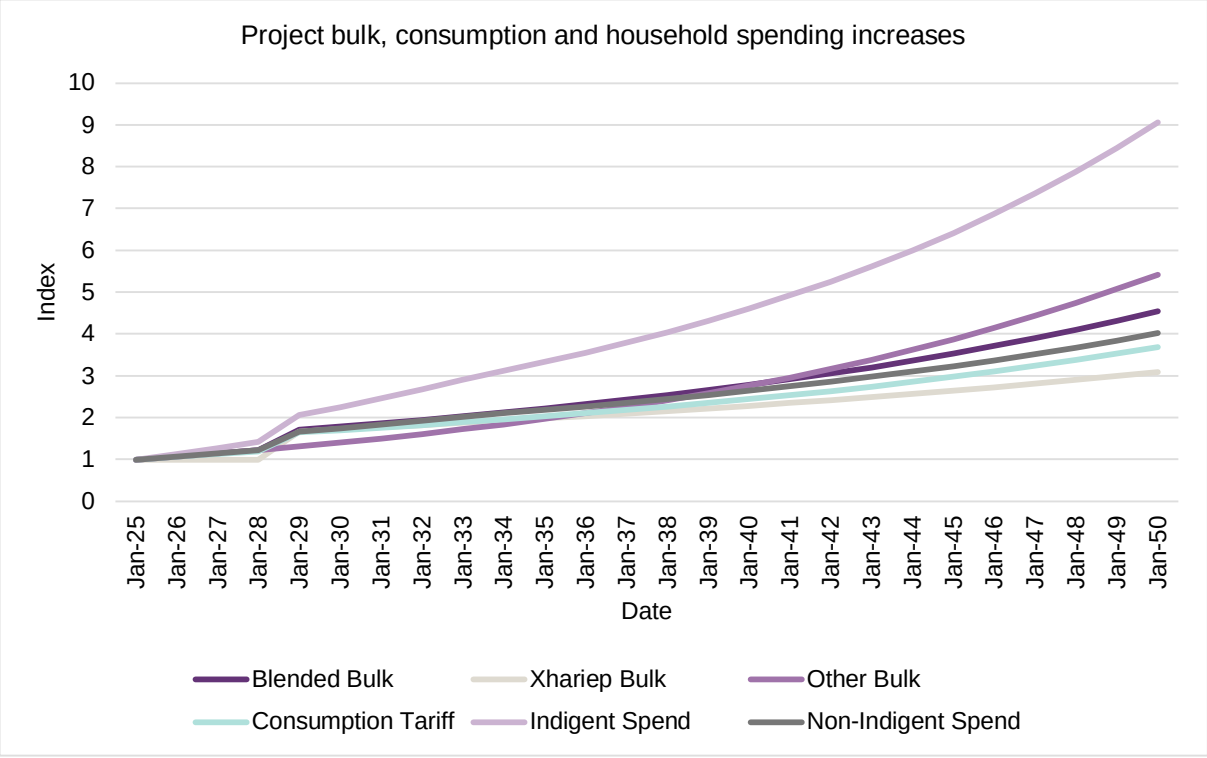


Figure 4-1: Project bulk, consumption and household spending increases (2025 = 1)

In the figure above the relative increase in the indigent monthly water spend is conspicuous. It is of course in this category that the two effects discussed in Section 4.3.2 above play out, i.e. more consumption and no availability charge attenuation. In absolute terms, the consequence of the increased projected non-indigent spending is much less striking. Whereas the ratio of indigent vs. non-indigent monthly spending is initially 8% (R39/month vs. R513/month), it is projected to increase to 13% by 2050. This increase is largely the result of improved living conditions and water service levels, with a concomitant increase in water consumption.

5 Legal and Institutional Arrangements

5.1 Introduction

An important component of this study is to make recommendations on the appropriate legal and institutional arrangements best suited for the proposed pipeline based on the current structure (scheme and arrangements) and proposed institutional scenarios that should be considered.

These arrangements should be based on a co-operative framework involving all the relevant institutions with a mandate and responsibility in this regard.

This report contains principles and scenarios for such arrangements instead of a final model. It would allow the stakeholders involved to discuss the matter and decide on the appropriate way forward.

In developing these arrangements and drafting the report, no input was obtained, and no consultation was done with MMM, VCWB and the Local Municipalities regarding the legal and institutional arrangements.

5.2 Institutional scenarios considered

5.2.1 Scenarios

The technical options analysed during the pre-feasibility study and in this study serve the same market at approximately the same service level (reliability) at the same cost. The social versus commercial characteristics of the options should be the same. Therefore, one option could not be “social” and another “commercial,” but the different potential implementing entities of the scheme might have different creditworthiness.

An implementing entity must be capable of repaying the loans, determining the tariffs, collecting the accounts, and maintaining and operating the infrastructure to secure financing. Although the scheme itself will not differentiate the financing plan, it is possible that the choice of institution may cause the financing terms to be adjusted somewhat. Therefore, the appropriate institutional arrangements should not be driven by the different options and schemes, but rather by who the institution should be. The different options and schemes may impact the identification of who should and could be the best institution for a specific option or scheme, e.g.:

- For a scheme that provides water directly to MMM with take-offs to the other users, MMM could be the better institution.
- For a scheme that branches off to MMM and other Municipalities and users (a Municipal entity between MMM and the other Municipalities might be necessary for this), VCWB could be a better institution.
- For a scheme for which affordability and non-payment issues are critical, the DWS (through the NWRIA and/or TCTA) could be the better institution.
- For a scheme that is economically viable, a Private Public Partnership (PPP) entity could be the better institution.

In this study the actual implementing entity is not identified, but rather recommendations on the appropriate legal and institutional arrangements best suited for implementing, owning and operating the proposed pipeline from Gariep Dam are made. It identifies who is responsible to take the lead for this, i.e. who is accountable and responsible for ensuring access to the water to the consumers.

This entity will be responsible for the design, construction, operation and maintenance of the scheme and take control thereof, although some of these activities may be handed over to others. The entity would be accountable for establishing the scheme and should take full responsibility for the initial works.

As mentioned in Chapter 2.3 there are three implementing entities that were considered:

- The DWS, which includes TCTA or NWRIA (note, the newly established National Water Resources Infrastructure Agency will include TCTA once operational),
- The VCWB,
- The MMM, which may include municipal entities established under Chapter 8A of the System Act, with or without (some of) the other smaller municipalities, and these entities may be a private company, services utility or a multi-jurisdictional service utility.

There are several institutional arrangements that could be considered but cannot be analysed in the financing arrangements. These hypothetical institutional arrangements were therefore excluded from the study scope. The first excluded arrangement is the possibility to include further models such as establishing entities to do the services, appoint and or conclude services delivery/implementation agreements with other institutions (staying accountable but the other institution becomes responsible), and involving other institutions for support, assistance and/or advice.

The second excluded arrangement is a caretaker model, where the identified institution construct, operate and maintain the pipeline. Later, the pipeline could be transferred to another or a new institution. This also allows the possibility to place all the infrastructure providing water to MMM (and the other municipalities receiving water from these works) under one institution.

Legally any of the different scenarios are possible, as, among others, the Constitution of the Republic of South Africa (Act 108 of 1996) (Constitution), the Water Services Act (WSAct) (Act 108 of 1997) and the Local Government Municipal Systems Act (Systems Act) (Act 32 of 2000) allow for this. A decision therefore must be taken on the most suitable arrangement as required by these legislations. However, due to the various role players involved and the history, the decision is complex.

The decision could be driven by analysing the existing arrangements applicable in other areas, such as the Municipalities in Gauteng where Rand Water provides the water, Cape Town which relies mainly on its own arrangements, Buffalo City, Gqeberha, eThekwini, etc., with a combination of a water board and own arrangements. Each of them has a unique structure, developed and changed over years. But the basis of all of them is driven by the Constitution and the applicable legislation, but the outcome is driven by the reality and influenced by the available institutional capacity, financial capabilities, technical competency and the manpower of the concerned institutions. This arrangement was also excluded from the scope.

So, in the case of this study, there remains a challenge to identify what factors will drive the decision making. It is strongly influenced by the political power and will, not only at National but also at Local level. However, this is beyond the scope of this study.

Rather, this study focused on the requirements of the Constitution, the WSAct and the Systems Act as whose responsibility it is to take control of developing and implementing these arrangements. The institutional scenarios described in **Table 2-1** are considered for the different parts of the proposed scheme.

The identification and allocation of responsibilities should be considered in terms of the Constitutional mandate,[1] as well as the institutional capacity (or rather financial capabilities and not only technical competency and manpower) of the different institutions.

Most of the role-players involved, have certain positions they want to protect, but these are not necessarily in the best interest of the consumers. It would be necessary to change these positions to put the interest of the consumers first.

[1] See Section 5.4.2.1 of this Report for detail regarding this mandate.

5.2.2 Mandates of Institutions to Provide Water Services

5.2.2.1 The Minister and the DWS

5.2.2.1.1 The Minister and the DWS as Sector Leader

The National Government is the public trustee of the nation's water resources and acts through the Minister of Water and Sanitation (Minister) to ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable manner, for the benefit of all and in accordance with its Constitutional mandate as required by the National Water Act (NWA) (Act 36 of 1998).[2]

The Minister is ultimately responsible to ensure that water is allocated equitably and used beneficially in the public interest, while promoting environmental values. The Minister has the power to regulate the use, flow and control of all water in the Republic.[3] DWS, an organ of state in the National sphere of Government, assists the Minister to fulfil this role. This is done by setting goals and monitoring and assessing the water resources and by maintaining general oversight over water resources management[4] and water provision institutions'[5] activities and performances.

The Minister and the DWS' eventual role will mainly be as sectoral leader to provide the overall policy and regulatory framework within which the other organisations will take part in water management. The Minister and the DWS will be responsible for sector policy, planning, support and regulation and form the first tier of the water management structure.

5.2.2.1.2 The National Water Resource Infrastructure Agency (NWRIA)

The National Water Policy of 1997 (NWP) makes provision for the establishment of a national public water utility.[6] On 3 August 2005 Cabinet already approved the establishment of a NWRIA to ensure long-term water security for South Africa. This agency will take responsibility for developing and operating South Africa's major national dams and water transfer schemes which are managed directly by DWS. However, the Agency will not be responsible for domestic water supplies, which remain the responsibility of the water services providers.

The Agency will be responsible for the provision of bulk raw water and not potable water. The Agency should ensure a sustainable, equitable and reliable supply of water from the national water resources infrastructure while meeting Constitutional obligations, including the national and regional social and economic objectives of national policy. They will provide mainly bulk raw water to the other water services institutions. This will form part of the third tier of the water management structure.

in June 2023, Cabinet approved the NWRIA Bill for introduction to Parliament.

5.2.2.2 Water Boards

5.2.2.2.1 The legal framework dealing with water boards

Water boards are part of the third tier of the water management structure and provide water services to other water services institutions (like municipalities) and consumers (and a water service may include

[2] Section 3(1) of the NWA.

[3] Section 3(3) of the NWA.

[4] See Section 5.6.1.2 of this Report.

[5] See Sections 5.2.2.2, 5.2.2.3, 5.5 and 5.6.2 of this Report.

[6] Item 7.2.3 of the NWP at 29.

provision of water and sanitation related services (like the treatment of wastewater)). They operate within a services area demarcated by the Minister. A water board is a legal entity with its own identity.

Water boards assume the full responsibility for providing the services, including and not limited to, the planning, construction, operation and maintenance of the infrastructure for these services as per the provisions of the WSAct.

A water board is a regional service provider who operates regional infrastructure traversing the boundaries of water services authorities (municipalities responsible for water services) and provides water services to, or on behalf of, more than one water services authority to ensure that the water services Constitutional mandate is achieved, namely, to ensure that everyone has access to sufficient water and that their dignity is respected and protected.

The Minister establishes water boards and determine the area of jurisdiction.[7] Water boards are organs of state, but do not belong to a sphere of government.

Water boards provide water services within their services areas. They operate water resource infrastructure, bulk potable water supply schemes (selling water to municipalities and industries), some retail water infrastructure and some wastewater systems. The primary activity of a water board is to provide water services, mainly potable water, to water services institutions within its service area.

A water board must develop sound financial and technical capacity to manage bulk water and water services adequately.[8] One of the objects of a water board is to support water service authorities (WSA) by providing water services on their behalf to water users or by providing water services directly to WSA, as may be requested by the WSA or as may be directed by the Minister.[9] One of the main functions of a water board is to provide bulk water to WSA, water services providers (WSPs) and bulk water consumers within its area as may be directed by the Minister.[10] The primary activity of a water board is to provide water supply services to other water services institutions within its service area.[11] A water board must give priority to its primary activity and enter into written contracts when performing its primary or any other activity.[12] A water board must consider every request by a water services institution (like the WSA) for the provision of water supply services within its service area and may only refuse such request if, for sound technical and financial reasons it would not be viable to provide those services.[13]

These provisions state only what the primary activity of a water board is and does not place a duty or responsibility on the board to provide water to the WSAct.

It is therefore in the discretion of the WSA to decide whether a water board should provide water to it, and if so, then by entering into an agreement with the water board.

There is no legal duty under the Water Services Act on a water board to implement a WSA's water projects. It is for the WSA to decide whether it wants to use a water board as external mechanism as envisaged by the Systems Act.[14]

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[7] Section 28(1)(a) and (c) of the WSAct.

[8] Section 28A(1) of the WSAct (only a provision in the draft WSAct amendment Bill (see chapter 5.3 regarding the draft amendment Bill)).

[9] Section 28A(2)(b) of the WSAct (only a provision in the draft WSAct amendment Bill).

[10] Section 28A(3)(b) of the WSAct (only a provision in the draft WSAct amendment Bill).

[11] Section 29 of the WSAct.

[12] Section 32(a) and (b) of the WSAct.

[13] Section 32(c).

[14] Section 76(b) of the Systems Act.

5.2.2.2.2 Vaal Central Water as a Water Board

VCWB is a water board in terms of the WSAct. VCWB is a State-owned Entity, categorized as a Schedule 3B National Government Enterprise in terms of the Public Finance Management Act (Act 1 of 1999). Since establishment, the VCWB has grown to service the Free State and Northern Cape areas previously serviced by the former Sedibeng Water, after incorporation with Bloem Water from August 2022.

VCWB's mission (according to the board's website) is to create a leading, value-driven, effective and responsive water services institution, adapting best practice methods in anticipating tomorrow's challenges today. The board's strategic goals and objectives are to: plan, develop, operate and maintain infrastructure to ensure sustainable water services delivery; manage and optimise financial affairs to meet current and future obligations; secure the supply and quality of raw resources; achieve an aligned, effective and efficient institution through optimisation of all business processes and systems; and engage and strengthen strategic partnerships with all relevant stakeholders.

The board's footprint has been extended to cover most of the areas of the Northern Cape and Free State, previously serviced by Sedibeng Water. This resulted in the integration process undertaken, informed by the strategic direction and leadership of the VCWB. The entity is therefore going through major changes while ensuring continued and uninterrupted water supply. VCWB is committed to improve water service delivery through infrastructure development and financial viability to ensure sustainability.

VCWB supplies water to a wide array of regions, utilising various sources and infrastructure. The service area includes communities dependent on the Orange River, such as Philippolis, Gariep, and Bethulie, where water is pumped from locations like Raft, Tolhuis, and Hennie Steyn pump stations. Further north, towns like Jagersfontein and Fauresmith are served by sources like Kalkfontein Dam and boreholes. In the Free State, Bloemfontein benefits from the Welbedacht Dam and multiple reservoirs, while Thaba Nchu and surrounding villages rely on Groothoek and Rustfontein dams. Additionally, the Northern Free State, Northern Cape, and parts of the Vaal River and Sand River regions receive water from facilities like Balkfontein and Virginia, ensuring a broad coverage of essential water supply across these diverse areas. Further, a total of twenty-six mines in both the Free State and Northern Cape Provinces, six solar generation plants in the Northern Cape, Kalahari East Water Users Association in the Northern Cape and other stakeholders that cannot be serviced by Municipalities within the area of service of VCWB also receive water from the board.

Their customer base therefore includes MMM, Mantsopa Local Municipality and Kopanong Local Municipality and the areas serviced by these municipalities.

5.2.2.3 The Municipalities in the Study Area, including MMM

5.2.2.3.1 Legal Framework

The Constitution sets out the structure, power, duties and functions for the local sphere of government.

The local sphere of government consists of municipalities, which must be established for the whole of the territory of the Republic.[15]

The Local Government: Municipal Structures Act (Act 117 of 1998) (Structures Act) defines the different types of municipalities, establishes the necessary criteria and makes provision for division of powers and functions as follows:

- Metropolitan municipalities which have exclusive executive and legislative authority in their areas of jurisdiction,
- Local municipalities which share municipal executive and legislative authority in their areas of jurisdiction with the district municipality within whose area of jurisdiction they fall, and,

[15] Section 151 of the Constitution.

- District municipalities that have executive and legislative authority in their area of jurisdiction that include more than one local municipality.[16]

The executive and legislative authority of a municipality is vested in the Municipal Council of the municipality.[17]

The initial demarcation of the boundaries for the different municipalities was done during 2000 and the boundaries were published in the different Provincial Gazettes.[18]

A municipality has the right to govern, on its own initiative, the local government affairs of its community, subject to national and provincial legislation, as provided for in the Constitution. The national or a provincial government may not compromise or impede a municipality's ability or right to exercise its powers or perform its functions.

The objectives of local government are, among others, to:

- Provide democratic and accountable government for local communities,
- Ensure the provision of services to communities in a sustainable manner, and,
- Promote social and economic development; in a safe and healthy environment.[19]

A municipality must, within its financial and administrative capacity, strive to achieve these objectives.[20]

A municipality must structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community.[21]

A municipality has the executive authority in respect of and has the right to administer the local government matters listed in Part B of Schedule 4.[22] These includes “water and sanitation services limited to potable water supply systems.”

Further, a municipality has the right to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions.[23] Therefore, if it is necessary for a municipality to obtain bulk water from a water resource (outside its area of jurisdiction) to provide potable water to the consumers, the municipality may do so.

Municipalities are organs of state.[24] The principles of co-operative government and intergovernmental relations[25] are applicable to municipalities.

The national and provincial governments, by legislative and other measures, must support and strengthen the capacity of municipalities to manage their own affairs, to exercise their powers and to

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[16] Section 1 ‘category’, ‘district municipality’, ‘local municipality’ and ‘metropolitan municipality’ of the Local Government: Municipal Structures Act 117 of 1998. This gives effect to the provisions of s 155 of the Constitution.

[17] Section 151(2) of the Constitution.

[18] The Local Government: Municipal Demarcation Act 27 of 1998 and the Local Government: Cross-Boundary Municipalities Act 29 of 2000 provide the criteria and procedures for the determination by an independent authority.

[19] Section 152(1).

[20] Section 152(2).

[21] Section 153.

[22] Section 156(1)(a).

[23] Section 156(5)

[24] Paragraph (a) of section 239 "organ of state".

[25] Section 41 of the Constitution, see item 5.4.1.3 of this Report.

perform their functions.[26] These governments further have the legislative and executive authority to see to the effective performance by municipalities of their functions in respect of matters listed in Schedules 4 and 5 to the Constitution, by regulating the exercise by municipalities of their executive authority.[27]

5.2.2.3.2 The Municipalities in the Study Area

As far as this study is concerned, the following applies:

- MMM is a Metropolitan Municipality and includes Bloemfontein, Botshabelo, Thaba Nchu, Wepener and De Wetsdorp.
- Kopanong is a Local Municipality and includes Reddersburg and Edenburg. This local municipality falls within the Xhariep District Municipality.
- Mantsopa is a Local Municipality and includes Excelsior. This local municipality falls within the Thabo Mofutsanyana District Municipality.

5.3 Context

The necessary legal and institutional arrangements for the proposed scheme should be in place so that effect is given to the constitutional mandate dealing with water in compliance with the applicable legislative framework.

The Constitution guides these arrangements which lays the foundations for a democratic and open society on which the government should be based and thereby improving the quality of life of all and also building a united and democratic country.

Further, the government places a strong focus on fundamental human rights for all, which takes effect within a framework of co-operative government and respecting environmental values.

Various policies have been published since the Constitution came into operation, such as the National Water Policy (NWP), the Strategic Framework for Water Services of 1994, the Local Government Policy of 2000 and environmental policies redressing the results of past social, racial and gender discrimination, while promoting environmental sustainability. Various pieces of legislation and other legislative instruments have also been promulgated to implement these policies.

From a water resource management perspective regarding the Constitutional mandate, these instruments include the NWA, the National Water Resource Strategy (Third Edition) (NWRS), the Reconciliation Strategies for Metros and large water supply systems and the All-Towns Reconciliation Strategies.[28] A Policy review process is underway with the intention of making the necessary amendments to the NWA.

From a water supply services provision perspective regarding the Constitutional mandate, these instruments include the Structures Act, the Systems Act and the WSAct.

A Policy review process is also underway with intention of making the necessary amendments to the NWA and WSAct. The 2 draft Bills for that were published in the Government Gazette on 17 November 2023 for public comment. The Policy review and amendments to the Acts should not impact on this study but are important and necessary for the Minister to firstly under the NWA, fill the custodian role of the Minster, and secondly under the WSAct, give effect to the Minister's role ensuring compliance to the

[26] Section 154.

[27] Section 155(7).

[28] Although these strategies do not have a real legal basis, they do provide valuable guidance in allocating water from our scarce water resources. These could actually be seen as forerunners for the water allocation plans which form a crucial component of the catchment management strategies contemplated in section 8 of the NWA.

constitutional mandate dealing with water. In this report, the wording of the draft WSAct Bill is used and not the WSAct as it provides a complete and broader picture on the matter.

Allocation of water for poverty eradication is a high priority.[29] Further, a primary focus of water allocation processes is to address past racial and gender imbalances in water use and to support the reduction of poverty and inequity in the country.[30] The water allocation process should also respond to local and provincial planning initiatives and should be aligned with land reform and local economic development programmes.

Of particular significance is also the fact that a National Development Plan is in place in which a number of socio-economic developmental and other objectives are clearly defined. This should also drive the process.

The country is now governed by the Constitution and in a democratic political dispensation with the Constitution as supreme law.

5.4 Constitutional Imperatives

The Constitutional mandate dealing with water consists of two elements, both based on fundamental human rights,[31] firstly the protection of the water resources while ecologically sustainable development takes place and secondly access to sufficient water and the provision thereof. Although these elements are distinguishable, they should not be separated.

An integrated holistic approach should be followed, involving all three spheres of government and the relevant executive authorities of the organs of state within the principles of co-operative government. An executive authority may only exercise the powers conferred on that authority by the Constitution and relevant legislation.

5.4.1 Structure of Government

South Africa is a democratic state founded on the rule of law.

State actions should be lawful, and it could only be lawful if it is authorised by empowering legislation. “Whenever public power is exercised” it can only be done “if it is clearly sourced in law”.[32]

Any conduct of the government and the different government departments inconsistent with the Constitution is invalid and the obligations imposed by it must be fulfilled.[33]

5.4.1.1 Three Spheres of Government

Government is constituted as national, provincial and local spheres of government. These spheres are distinctive, interdependent and interrelated.[34]As these different ‘components of government’ are called ‘spheres’ and not ‘tiers’ or ‘levels’, there is no hierarchy between the different components.

Each of the spheres contains the different organs of state (constituted for example as departments, administrations and institutions) necessary for the government to fulfil its obligations. The Constitution requires that the three spheres are expected to work as one in delivering services.

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[29] See section 6.1.8 of the NWRS.

[30] Section 6.3.

[31] See Chapter 2, especially sections 7, 8, 24, 27(1)(b) and 2, of the Constitution.

[32] AAA Investments (Pty) Ltd v Micro Finance Regulatory Council 2007(1) SA 343 (CC).

[33] Section 2 of the Constitution.

[34] Section 40.

The respective roles and responsibilities of the different spheres and the organisations involved within each sphere should clearly be defined within the framework of co-operative government and intergovernmental relations.[35]

The government and the different organs should play a role to ensure that effective policy and legislation is in place and that it is enforced to ensure that effect is given to the constitutional mandate regarding water as envisaged in sections 24 and 27(1)(b) and (2) of the Constitution.[36]

5.4.1.2 The Executive Authority

A distinction should be made between the legislative and executive authority of the Government.

Legislative authority is the authority to promulgate legislation. The circumstances when a legislature in a specific sphere of government may promulgate legislation are set out in the Constitution.

Executive authority, on the other hand, is the authority to implement the legislation and to exercise the powers conferred by the legislation. The circumstances in which an executive authority may exercise the powers conferred on it by legislation are determined primarily, not by the Constitution itself, but by the relevant legislation.

The different pieces of legislation promulgated by the Parliament and the nine (9) Provincial legislatures would therefore place certain executive authority and responsibilities on the different organs of state.

Further, a single piece of legislation may vest executive powers in different executive authorities of the different spheres of government and/or organs of state not in any sphere of government, despite the fact that the legislation has been created in terms of the legislative competence of one sphere of government. For example, an Act of Parliament may vest certain executive powers in a Minister in the national sphere of government and other powers in the Members of the Executive Councils of the provincial sphere of government and in the different Municipal Councils. The WSA, the Systems Act, and the Structures Act are examples of this.

5.4.1.3 Co-operative Government

The provisions of the Constitution go a considerable way towards entrenching a co-operative federal type of system and not a competitive form by requiring that all spheres of government and all organs of state within each sphere must follow the principles of co-operative government and intergovernmental relations. However, these principles do not diminish the power of one sphere or organ of state at the expense of another. Rather, they place obligations on all the spheres and the organs of state in each sphere.

They are there to shape the attitudes of government and the organs within each sphere to fit the co-operative form of federalism. These principles are concerned with the way how a power is exercised and not whether a power exists (as determined by legislation).[37] These principles call for effective, transparent, accountable and coherent government in a manner that does not encroach on the geographical, functional and institutional integrity of the other spheres of government or organs of state.

Therefore, the different spheres of government and organs of state in each sphere may only exercise powers and perform functions conferred on them.[38] They should observe and adhere to the principles

[35] See item 5.4.1.3 of this Report.

[36] See item 5.4.2 of this Report what this mandate entails.

[37] Premier, Western Cape v President of the Republic of South Africa 1999 (3) SA 657 (CC); 1999 (4) BCLR 382 (CC) para [57].

[38] Sections 40(2) and 41(1)(f) of the Constitution.

of co-operative government and intergovernmental relationship and must conduct their activities within the parameters thereof. They must:

- Provide effective, transparent, accountable and coherent government,
- Respect the constitutional status, institutions, powers and functions of government in the other spheres,
- Not assume any power or function except those conferred on them in terms of the constitution,
- Exercise their powers and perform their functions in a manner that does not encroach on the geographical, functional or institutional integrity of government in another sphere,
- Co-operate with one another in mutual trust and good faith by:
    - Fostering friendly relations,
    - Assisting and supporting one another,
    - Informing one another of, and consulting one another on, matters of common interest,
    - Co-ordinating their actions and legislation with one another,
    - Adhering to agreed procedures, and,
    - Avoiding legal proceedings against one another.[39]

The Intergovernmental Relations Framework Act (Act 13 of 2005) was promulgated to "establish a framework for the national government, provincial governments and local governments to promote and facilitate intergovernmental relations, to provide for mechanisms and procedures to facilitate the settlement of intergovernmental disputes and to provide for matters connected therewith". The objective of the Act is to provide within the principle of co-operative government a framework for the national government, provincial governments and local governments, and all organs of state within these governments, to facilitate co-ordination in the implementation of policy and legislation, including:

- Coherent government,
- Effective provision of services,
- Monitoring implementation of policy and legislation, and,
- Realisation of national priorities.[40]

5.4.2 Constitutional Mandate Dealing with Water

The constitutional mandate regarding water relates to the protection of the water resources while sustainable development takes place as envisaged in sections 24 of the Constitution and access to sufficient water and the provision thereof as envisaged in section 27(1)(b) and (2).

5.4.2.1 Protection and Development of the Water Resources

The constitutional mandate relating to the protection and development of the water resources requires that "Everyone has the right to have the environment protected, … through reasonable legislative and other measures that … [among other] secure ecologically sustainable development and use of the natural resource [which includes the water resources][41] while promoting justifiable economic and social development."[42]

[39] Section 41(1).

[40] Section 4 of the Intergovernmental Relations Framework Act 13 of 2005.

[41] Although the natural resources form an integral part of the environment, they are a subset of the environmental assets. The natural resources include all the natural biological resources, mineral and energy resources, water resources, soil resources, air, plants, wild animals and marine systems.

[42] Section 24 of the Constitution

There is a commitment from the Nation to bring about equitable access to the water resources.[43] The State may take legislative and other measures to achieve reform in the access to water in order to redress the results of past racial discrimination.[44]

Effect should be given to this mandate in such a manner that the other fundamental rights are respected, protected and fulfilled. These include for example the right to equal benefit of the law,[45] to the free choice of a trade, occupation or profession[46] and to not be deprived or expropriated from entitlements to water (except in the manner as set out in the Constitution).[47]

The state must respect, protect and fulfil these rights.[48] A positive duty is therefore placed on the State, which requires legislative and other measures to ensure sustainable development of the water resources.

Sustainable development should be understood to take place in a way that allows the water resources to stay intact and involves managing the interaction between the need for environmental protection and the need for development, that should be sustainable.

The State has to play a role here to ensure that effective legislation is in place and that it is enforced together with the necessary measures. This has already occurred with the enactment and application of the NWA in order to secure ecologically sustainable development and use of the nation's water resources while promoting justifiable economic and social development.

5.4.2.2 Access to Sufficient Water

The Constitutional mandate relating to the access to sufficient water states that "Everyone has the right to have access to sufficient water. The state must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of each of these rights."[49] Giving effect to this right could also give effect to the constitutional rights that a person has, to respect for his or her dignity[50] and to the right to life.[51]

This right is a component of an adequate standard of living and should also include water of sufficient quality and assurance of supply.

The extent of the State's duties differs according to the economic resources available to the different sectors of the population.

According to the Constitutional Court in Government of the Republic of South Africa and Others v Grootboom and Others[52] (this case dealt with housing,[53] but it could also be applied to access to water, with the necessary changes to detail) "[A]ll levels of government must ensure that the ... programme [to provide water] is reasonably and appropriately implemented. ... [E]very step at every level of government

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[43] Section 25(4)(a).

[44] Section 25(8).

[45] Section 9(1).

[46] Section 22.

[47] Section 25.

[48] Section 7(1).

[49] Section 27(1)(b) and (2).

[50] Section 10.

[51] Section 11.

[52] 2001(1) SA 46(CC) (2000(11) BCLR 1169 par [82].

[53] Section 26 of the Constitution.

must be consistent with the constitutional obligation to take reasonable measures to provide adequate [services] ..."

The Court stayed away from delineating the responsibilities of the various spheres of government and emphasised the principles of co-operative government so that one sphere of government or organ of state does not encroach on the geographical, functional and institutional integrity of another. "Each sphere of government must accept responsibility for the implementation of particular parts of the programme, but the national sphere of government must assume responsibility for ensuring that laws, policies, programmes and strategies are adequate to meet the State's ... obligations. In particular, the national framework, if there is one, must be designed in order for these obligations to be met. It should be emphasised that National Government bears an important responsibility in relation to the allocation of national revenue to the provinces and local government on an equitable basis."

The Court states further that "a reasonable programme therefore must clearly allocate responsibilities and tasks to the different spheres of government and ensure that the appropriate financial and human resources are available". A considerable margin of discretion should be given to the State in deciding how it should go about fulfilling this right. The Constitutional Court stated: "[T]he precise contours and content of the measures to be adopted are primarily a matter for the Legislature and the Executive."

Therefore, a right of access to sufficient water places a distinct responsibility on the National Government (not only the Minister and the DWS, but also on the Minister and Department of Cooperative Governance and Traditional Affairs (COGTA) and Treasury) to ensure that its water delivery programmes and resources enable local governments to deliver potable water services with the necessary support from the provincial government and the organs of state within this sphere and strengthen the capacity of municipalities.

The State has already put in place legislation to achieve the progressive realisation of this right, namely the WSA, Structures Act and Systems Act.

5.5 Powers and Functions of Municipalities Relevant to Access of Water

5.5.1 Local Government: Municipal Structures Act 117 of 1998

A metropolitan municipality has all the powers and functions assigned to a municipality in terms of the Constitution.[54] Municipalities have executive and legislative authority in respect of and the right to administer the local government matters such as water services limited to potable supply systems[55] as well as the matters assigned to it by national and provincial legislation.[56]

A district municipality has the following powers and functions relevant to water:

- Integrated development planning for the district municipality as a whole, including a framework for IDPs of all municipalities in the area of the district municipality, and,
- Potable water supply systems.[57]

A local municipality has the following function and power relevant to water:

- Municipal planning.[58]

[54] Section 83(1) of the Structures Act.

[55] As listed in Part B of Schedule 4 to the Constitution.

[56] Section 156(1) of the Constitution and section 83(1) of the Structures Act.

[57] Section 84(1) of the Structures Act.

[58] Section 84(2).

The Minister for Provincial and Local Government may by notice in the Government Gazette authorise a local municipality to perform a function or exercise a power relating to potable water supply systems in its area. The local municipality may only be authorised after consultation with the Minister of Water and Sanitation and the Member of the Executive Council responsible for local government in the province concerned.[59]

The Member of the Executive Council responsible for local government in the province concerned may within the prescribed policy framework[60] adjust the division of functions and powers between a district and a local municipality. A power or function vested in a local municipality may be allocated to a district municipality.[61]

Some of the Members of the Executive Councils have adjusted the division of functions and powers between certain districts and local municipalities.

The Minister for Provincial and Local Government published various notices authorising local authorities to perform functions and exercise powers relating to potable water supply systems.[62] According to this notice, all the Local Municipalities in the Free State are WSA, which means that they have an obligation to provide water and sanitation services.

As the MMM is a metropolitan municipality, the MMM has all the powers and functions related to water services regarding potable water.

As the Kopanong and Mantsopa are Local Municipalities, they also have all the powers and functions related to water services regarding potable water.

As a municipality (MMM, Kopanong and Mantsopa in this study) has in terms of the Constitution the right to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions, they (or one of them) may obtain bulk water from a water resource, like Gariep Dam, (outside its area of jurisdiction) to provide potable water to the consumers.

5.5.2 Local Government: Municipal Systems Act 32 of 2000

5.5.2.1 Municipal Planning

A municipality must undertake developmentally orientated planning so as to ensure that it:

- Strives to achieve the objects of local government and gives effect to its developmental duties as contemplated in the Constitution, and,
- Together with other organs of state contribute to the progressive realisation of the fundamental rights contained in the Constitution.[63]

This planning must be aligned with and complement the development plans and strategies of other affected municipalities and other organs of state so as to give effect to the principles of co-operative government.[64]

A municipal council must adopt a single, inclusive and strategic plan for the development of the municipality, known as its IDP, which links, integrates and co-ordinates plans of the municipality and

[59] Section 84(3)(a).

[60] See the Policy framework for the adjustment of division of functions and powers between district and local municipalities as published in Notice 2592 in Government Gazette 21370 of 12 July 2000.

[61] Section 85(1)(a) of the Structures Act.

[62] Notices 21 to 69 Government Gazette 24228 dated 3 January 2003.

[63] Section 23(1) of the Systems Act.

[64] Section 24(1).

aligns the resources and capacity of the municipality with the implementation of the plan,[65] which may be amend.[66]

An IDP must reflect, among others:

- The municipal council's vision for the long-term development of the municipality with special emphasis on the municipality's most critical development and internal transformation needs,
- An assessment of the existing level of development in the municipality, which must include an identification of communities which do not have access to basic municipal services,
- The council's development priorities and objectives,
- The council's operational strategies,
- A financial plan, which must include a budget projection for at least the next three years, and,
- The key performance indicators and performance targets.[67]

5.5.2.2 Ensuring access to services

A municipality must give effect to the provisions of the Constitution and give priority to the basic needs of the local community.[68] It must also ensure that all members of the local community have access to at least the minimum level of basic municipal services.[69] These services must be:

- Equitable and accessible,
- Provided in a manner that is conducive to:
  - The prudent, economic, efficient and effective use of available resources, and,
  - The improvement of standards of quality over time.
- Financially sustainable,
- Environmentally sustainable, and,
- Regularly reviewed with a view to upgrading, extension and improvement.[70]

A municipality may provide a municipal service through an internal or external mechanism by entering into a service delivery agreement.[71]

A service is provided through an internal mechanism if the service is provided by:

- A department or administrative unit within the municipality,
- A business unit devised by the municipality, provided it operates within the municipality's administration and under the control of the council in accordance with operational and performance criteria determined by the council, or,
- Another component of the municipality's administration.[72]

If a service is provided through an internal mechanism, the municipality concerned must allocate sufficient human, financial and other resources necessary for the proper provision of the service. The

[65] Section 25(1).

[66] Section 25(2).

[67] Section 26.

[68] Section 73(1)(a).

[69] Section 73(1)(c).

[70] Section 73(2).

[71] Section 76.

[72] Section 76(a).

municipality must also transform the provision of that service in accordance with the requirements of the Systems Act.[73]

A service is provided through an external mechanism if the municipality enters into a service delivery agreement with:

- A municipal entity, which could be:
  - A private company (see section 86B(1)(a)),
  - A service utility (see section 86H),
  - Multi-jurisdictional service utility (established by two or more municipalities) (see section 87),
- Another municipality,
- An organ of state, which could be:
  - A water services committee,[74]
  - A licensed services provider registered or recognised in terms of national legislation[75] and,
  - A traditional authority,
- A community-based organisation (CBO) or other non-governmental organisations (NGO) legally competent to enter into such an agreement, or,
- Another institution, entity or person legally competent to operate a business activity.[76]

Sections 77 to 86 of the Systems Act contain a process to be followed to decide when and how an internal or external mechanism should be followed including the reviewing of existing mechanisms, the detail of which is not discussed here. However, it is for the municipality concerned to decide on the appropriate mechanism and not another organ of state or sphere of government, although they should provide support in making the decision.

The municipality may negotiate and enter into a service delivery agreement with the following services providers without selecting the services provider thorough a selection process:

- A municipal entity,
- Another municipality,
- An organ of state in the national sphere of government, or,
- An organ of state in the provincial sphere of government.[77]

In all other cases the municipality must select the services provider by following a selection process before entering into a service delivery agreement.[78]

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[73] Section 79.

[74] A Water Service Committee may be established by the Minister of Water and Sanitation in terms of section 51(1) of the WSAct by notice in the Government Gazette if the WS authority concerned is not able to provide water services in the service area. These committees are not community-based organisations (which usually act as WSP).

[75] Such provider could be licenced under sections 19, 20 and 22 of the WSAct. See item 5.6.2 of this Report.

[76] Section 76(b).

[77] Section 80(1)(a).

[78] Section 80(1)(b). See section 83(1) for the requirements of the process.

If a municipal service is provided through a service delivery agreement, the municipality remains responsible for ensuring that the service is provided to the local community.[79] The municipality, through a service delivery agreement-

- May assign to the services provider certain responsibilities regarding:
  - The developing and implementing of detailed service delivery plans,
  - The operational planning, management and provision of the services,
  - Undertaking social and economic development that is directly related to the provision of the service,
  - Customer management, and,
  - Financial management and collection of fees.
- May pass on to the services provider funds for the subsidisation of services to the poor,
- May transfer or second any of its staff members to the services provider,
- Must ensure continuity of the service if the services provider is placed under judicial management, becomes insolvent, is liquidated or is for any reason unable to continue performing its functions, and,
- Must take over the municipal service, including all assets, when the service delivery agreement expires or is terminated.[80]

5.5.2.3 Tariff Policy

A municipal council must adopt and implement a tariff policy on the levying of fees for municipal services provided by the municipality itself or by way of service delivery agreements.[81] The policy may differentiate between different categories of users, debtors, services providers, services, service standards, geographical areas and other matters as long as the differentiation does not amount to unfair discrimination.[82] A municipal council must adopt by-laws to give effect to the implementation and enforcement of the policy.[83]

5.5.2.4 Intervention in the Affairs of Local Government

Intervention in the exercising of the executive powers of the local spheres of government may take place in terms of the Constitution,[84] while this power could also be conferred in terms of specific laws. The intervention in terms of specific laws must be distinguished from where national legislation regulates the process for intervention in terms of the Constitution. The WSAct contains an example of both.[85]

When a municipality cannot or does not fulfil an executive obligation in terms of the Constitution or legislation, the relevant provincial executive may in terms of the Constitution intervene by taking appropriate steps to ensure fulfilment of that obligation. The intervention may include:

- issuing a directive to the Municipal Council, describing the extent of the failure to fulfil its obligations and stating the steps required to meet the obligations,

[79] Section 81(1).

[80] Section 81(2).

[81] Section 74(1).

[82] Section 74(3).

[83] Section 75(1).

[84] Section 139 of the Constitution.

[85] Section 63(1) and (9) of the WSAct where national legislation regulates the process for intervention while section 63(2) to (8) of the Act contains the procedure to intervene in the affairs of a municipality.

- assuming responsibility for the relevant obligation to the extent necessary to maintain essential national standards or meet established minimum standards for the rendering of a service, or,
- dissolving the Municipal Council and appointing an administrator, if exceptional circumstances warrant such a step.[86]

National legislation may regulate the implementation of this section, including the processes established.[87]

The Minister of Water and Sanitation may issue a directive and require a water services institution to rectify its conduct or omission if the institution has not effectively performed any function imposed on it under the WSAct.[88] The directive must state among others the nature and extent of the non-compliance, the effect and impact on consumers and any other relevant matter.[89] The directive shall require from the institution to comply with the directive within a reasonable time frame and diligently continue with those measures.[90]

If there is continued non-compliance with the WSA, due to persistent failure to comply with the directive, the Minister may, on behalf of the institution, exercise all the powers and carry out the duties relating to that function, including, but not limited to, operations and maintenance, infrastructure maintenance, refurbishment and expansion, billing and revenue management, procurement and supply chain management and human resources management functions, and any other functions associated with that water services provision function and/or as set out in the directive, with the financial resources available to that institution relating to that function.[91] The Minister may appoint any water services institution to perform the function during the process of rectification.[92] Any expenses incurred or losses suffered by or on behalf of the Minister may be recovered from the governing body of that institution.[93]

5.6 How Effect should be given to the Constitutional Imperatives

All three spheres of government, and the appropriated organs of state within the spheres, should be involved for giving effect to the constitutional mandate dealing with water, but each only within its specific geographical, functional and institutional area of jurisdiction. Together they should put in place the necessary strategies, plans and make funds and other resources available to give effect to the successful implementation of the necessary legal and institutional arrangements within the principles of co-operative government.[94]

Enough water is available at present to give effect to the fundamental right of access to sufficient water, but it is each WSA concerned and the appropriate WSPs' responsibility to take the necessary measures to ensure the appropriate infrastructure and systems are constructed, operated and maintained to distribute and supply the water to the consumers.

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[86] Section 139(1) of the Constitution.

[87] Section 139(8).

[88] Section 62A(1) of the WSAct (only a provision in the draft WSAct amendment Bill).

[89] Section 62A(2)(a), (c) and (d) of the WSAct (only a provision in the draft WSAct amendment Bill).

[90] Section 62A(3) of the WSAct (only a provision in the draft WSAct amendment Bill).

[91] Section 62A(4)(a) and (c) of the WSAct (only a provision in the draft WSAct amendment Bill).

[92] Section 62A(4)(e) of the WSAct (only a provision in the draft WSAct amendment Bill).

[93] Section 62A(6) of the WSAct (only a provision in the draft WSAct amendment Bill).

[94] Section 41 of the Constitution, see item 5.4.1.3 of this Report.

5.6.1 Protection and Development of the Water Resources

The NWA provides the legislative measures of the constitutional mandate dealing with the protection and development of the water resources (known as water resource management).

5.6.1.1 Custodianship of the Water

The NWA contains a comprehensive framework to give effect to this obligation of the Minister. The framework includes putting in place resource directed measures, establishing strategies to manage the water resources and an authorising system to regulate the use of water.[95] This framework should ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in such a manner that the purpose of the Act are achieved, including among others: meeting the basic human needs of present and future generations; 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; and providing for the growing demand for water use.

5.6.1.2 Authorisation of the Use of Water

Catchment Management Agencies (CMAs) provide the second tier of the water management structure. A CMA manages the water resources within a water management area in accordance with, among others the NWA, the NWRS and direction by the Minister. A CMA is a legal entity with its own identity.

A water management area is an area established as a management unit within which the water resources should be protected, used, developed, conserved, managed, and controlled.

The purpose of CMAs is to devolve water resource management functions to a catchment level and to involve local communities and water users on the various water-related matters in the area and seek their co-operation.

A CMA does not provide water services (provision of water) to water services institutions (like water boards and municipalities) or consumers. Rather, they authorise the use of water of these institutions and other water users and take administrative and legal actions against water users contravening the provisions of the NWA.

The Vaal-Orange Catchment Management Agency (VOCMA)[96] was established for the area where the proposed scheme is situated. VOCMA regulates all the water resources in the Vaal and Orange rivers' catchments.

VOCMA cannot be involved as a developer of the proposed scheme, but VOCMA should authorise the abstraction of the water from the Orange River for the scheme by way of a licence.[97]

In analysing the application authorising the abstraction (the water use "taking water from Gariep Dam"),[98] it is not for VOCMA to decide who should be authorised (who should be the developer for the scheme), but rather to analyse and consider the relevant factors to determine whether the taking of the water is in the best public interest.

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[95] The legal framework dealing with water use is set out in sections 21 to 55 of the NWA.

[96] VOCMA was established on 25 November 2022 in terms of Government Notice 2792 in Government Gazette 47559.

[97] See sections 40 and 41 of the NWA for the application for such a licence and the procedure for the application.

[98] The water use as contemplated in section 21(a) of the NWA.

5.6.2 Provision of Access to Sufficient Water

The WSAct, Systems Act and Structures Act are the legislative measures of the constitutional mandate dealing with the access to sufficient water. These Acts also strength local government to ensure the provision of services such as access to water to communities in a sustainable manner and thereby to promote social and economic development as envisaged in the Constitution.[99]

From the Constitution, the Systems Act, the Structures Act and the WSAct (as set out above), it is clear that there is a duty on all spheres of Government to ensure that water supply services are provided in a manner which is efficient, equitable and sustainable. Government must strive to provide the services sufficient for subsistence and sustainable economic activity. In striving to provide these services, all spheres of Government must observe and adhere to the principles of co-operative government. Although municipalities have authority to administer water supply services, all spheres of Government have a duty, within the limits of physical and financial feasibility, to work towards this objective. Further, although the provision of the services is an activity distinct from the overall management of water resources, it should be undertaken in a manner consistent with the broader goals of water resource management.

Therefore, all spheres of government should, as required under the principles of co-operative government and intergovernmental relationship, aim to be efficient, equitable and sustainable in a co-operative manner, respecting the constitutional status, institutions, powers and functions of government in the other spheres and not assuming any power or function, except those conferred on them in terms of the Constitution, but exercise them in a manner that does not encroach on the geographical, functional and institutional integrity of government in another sphere. They should co-operate with one another in mutual trust and good faith by assisting and supporting one another and co-ordinating their actions.

An important component of this framework is fulfilled by the WSA, as these authorities have the power and function to ensure provision of water supply services within its area of jurisdiction in terms of the Constitution, the Systems Act, the Structures Act and the WSAct. A water supply service is the sustainable abstraction from a water resource, conveyance, treatment, storage and distribution of potable water, water intended to be converted to potable water or water for commercial use, for industrial use or other use, to consumers or to other WSPs.

These authorities in the study area are MMM, Kopanong Local Municipality and Mantsopa Local Municipality. The Structures Act, Systems Act and WSAct set out the structure[100] and mechanism[101] for these municipalities to ensure that effect is given to the mandate of access to sufficient water. They have the functions and powers that include “water services limited to potable water supply systems.”[102] Further, they have the right to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions, such as abstracting water from a water resource.

It is therefore for these three (3) municipalities to decide on how best to fulfil their constitutional mandate of providing access to water supply services. They should not be dictated to by other spheres of government, but rather these should support and strengthen their capacity to manage their own affairs, to exercise their powers and to perform their functions with the principles of co-operative government and intergovernmental relations. Support would include facilitating the matter and oversight, but not to take over the matter.

These municipalities have a duty to all consumers or potential consumers in their area of jurisdiction to progressively ensure efficient, affordable, economical and sustainable access to water supply services.

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[99] See the text that n 19 refers to.

[100] See item 5.5.1 of this Report.

[101] See item 5.5.2 of this Report.

[102] Section 83(1) of the Structures Act, read with section 156 and Part B of Schedule 4 of the Constitution.

In ensuring access to these services, these municipalities must take into account, among others, alternative ways of providing access to the services; the need for regional efficiency; the need to achieve benefit of scale; the need for low costs; the requirements of equity; the availability of resources from neighbouring authorities; institutional capacity; financial capacity; technical competency; and manpower, etc. This study does not address these aspects.

Therefore, these three (3) municipalities should decide who should be the implementing entity for the proposed scheme.

However, all three spheres of Government should work towards achieving this in a co-operative manner, without assuming the responsibility to abstract, convey, treat and distribute the water. If necessary, Treasury should assist with the financing of the scheme.

The three (3) municipalities must undertake developmentally oriented planning that must be aligned with, and complement, the development plans and strategies of other affected municipalities and other organs of state so as to give effect to the principles of co-operative government.

If necessary, the municipalities may in terms of the WSAct request VCWB to be the implementing entity of the scheme and VCWB may only refuse such request if, for sound technical and financial reasons, it would not be viable to provide those services.

A municipality cannot in terms of legislation request the DWS, TCTA or NWRIA to be the implementing agency. However, the national (DWS is part of this level of government) and provincial governments, by legislative and other measures, must in terms of the Constitution support and strengthen the capacity of municipalities to manage their own affairs, to exercise their powers and to perform their functions. These governments further have the legislative and executive authority to see to the effective performance by municipalities of their functions by regulating the exercise by municipalities of their executive authority. Therefore, the DWS has to play an oversight role, by assisting the municipalities.

The municipalities may administratively request the DWS to be the implementing agency, but there is no legal obligation on the DWS to deal with that request as for example on a Water Board. Obviously, the DWS will deal with the matter as required in terms of the Constitution (namely support and oversight), If necessary, the DWS may give VCWB, the TCTA or the NWRIA a directive to be the implementing agency (if the discussions and investigation reveal that should be the case). But from a policy perspective the DWS would probably request the municipality to approach VCWB legally first.

If the three (3) municipalities fail to take up the responsibilities, the organs of State in the Provincial and National sphere of Government may intervene to rectify the matter.

The Constitution entrusts service provision to the three (3) municipalities in the study area (MMM, Kopanong Local Municipality and Mantsopa Local Municipality). However, it appears that there is an unwillingness and/or inability on the part of the municipalities to take up this responsibility with much room for improvement. Their current administration and infrastructure management are poor, but they are also constrained by inadequate support from the other spheres of government and a critical shortage of funds (for services rendered and from the fiscus).

The choice of financing arrangement will be determined by the fundamental financial health of the scheme, which will also guide the development of institutional measures.

- If the cost-recovering tariff is affordable to the users, the project is more “commercial” and less “social”. The project will be funded from tariffs and financed from commercial sources, i.e. debt/loans, possibly without further government guarantees. The muncipalities (or one of them) could be the developer of the scheme
- If the project is more “social” (unaffordable, basic needs-oriented) then public funding (operational subsidies) and public financing (grants) will be required. The national government institutions such as the VCWB or NWRIA could be the developer who may assign the ownership to another.

6 Conclusions & Recommendations

6.1 Conclusions

The Xhariep Pipeline Feasibility Study demonstrates the critical need for enhanced water infrastructure to support the growing water demands of the Greater Bloemfontein Water Supply System (GBWSS). Given the expected increase in population and economic activity, the existing water supply infrastructure is insufficient to meet future demand.

This report addresses the socio-economic, legal and institutional, and financing requirements of the Xhariep Pipeline project. The three aspects are closely intertwined and therefore are addressed in a single report to present a holistic view of the socio-economic impact and practical implementation options for the implementing and owning agent, and financing mechanisms available.

6.1.1 Socio-Economic Assessment

The socio-economic assessment reiterated that the implementation of the Xhariep Pipeline is essential to ensure long-term water security and economic stability in the region.

From the socio-economic impact assessment, the following are key takeaways:

- The implementation of the Xhariep Pipeline Project would allow economic activities to continue at both the 2035 and 2050 horizons.
- The projected socio-economic impacts by 2050 (in 2023 prices) of the Xhariep Pipeline are:
  - Total Gross Domestic Product (GDP) = R416,665 million,
  - Capital generated = R892,574 million,
  - Employment Opportunities Maintained = 948,040,
  - Annual Household Income Generated = R158,013 million, with
    - R23,892 million to low-income households, and,
  - Additional taxes paid to the different authorities = R107,236 million.
- The Xhariep Pipeline Scheme 1B was found to be economically viable as it would contribute to the socio-economic circumstances in the GBWSS and would improve security of supply of water of the system.
- The affordability analysis concluded that the total capital and interest repayment over a 30-year periods is not affordable for the paying households or the business and industrial sectors.
  - The paying households cannot afford the additional R28/m³.
- If alternative funding options are considered, the option of a 75% capital grant and a loan for the balance of the capital costs at a low interest rate is probably the first of the different funding options that will ensure that the project is affordable to households.
- A concern raised through the socio-economic impact assessment is the financial management of MMM.

6.1.2 Financing Arrangements

The financing of the Xhariep Pipeline project is critical to its long-term success and sustainability. The financing model must balance the capital expenditure, operational costs and the affordability for the end-users. As there is limited opportunity for implementation phasing, the project requires substantial upfront investment, which will require a mix of public funding, concessional loans and potential private sector involvement.

The key takeaways from the financing arrangements assessment are:

- Various implementation scenarios were analysed. The project was split into three components, namely A (Gariep Dam to the 2nd Command Reservoir), B (2nd Command Reservoir to Longridge Reservoir) and C (2nd Command Reservoir to Rustfontein water treatment works), and different combinations for the implementing entity was explored.
- The financial information required to accurately assess the implementation capacity of the entities was not available, however, financial information about previous projects implemented in the past 10 years by the entities was assessed as a proxy indicator.
- Five sources of financing are available for a public infrastructure project of this nature, i.e., (a) grants from central government, (b) the public delivery agency's own resources, (c) equity, (d) commercial debt, and (e) concessionary debt. The share of the financing sources assumed to be available to the implementation entities were presented in the report.
- The cost of capital from each financing source was assessed for each implementing entity. It should be noted that MMM and VCWB are expected to have to pay a premium above market rate for loans, given their vulnerable financial positions.
- For each implementation scenario considered, the projected bulk tariff was calculated taking into account the direct costs, long-term operational expenses and debt repayment obligations.
- Options 1C (where the project is implemented entirely by a DWS entity) and Option 3B (where components A and B are implemented by DWS and component C by VCWB) were found to have similar bulk tariff implications, R16.57/kl and R16.44/kl, respectively.
- Introducing a public-private partnership (PPP) in Option 3B did not result in any savings, as the private sector efficiencies were not sufficient to overcome the public entities' access to lower financing cost.
- An affordable tariff structure, particularly for the lower income households is crucial to ensuring that the socio-economic benefits of the project are shared across the population.
- The project can achieve financial sustainability, provided that cost recovery is effectively implemented thorugh a carefully structured bulk water tariff system.

6.1.3 Legal and Institutional Arrangements

The legal and institutional arrangements analysis explained that the chosen institutional arrangement should be based on a cooperative framework that involves all relevant institutions with a mandate and responsibility to provide water.

Key takeaways from the legal and institutional arrangements include:

- The same implementation scenarios were assessed from a legal and institutional mandate perspective as were assessed from a financing perspective.
- The analysis described the mandates of the three spheres of government involved in the Xhariep Pipeline Project implementation process, the national (DWS), water board (VCWB) and the water service authority (MMM and the local municipalities), highlighting that neither sphere has hierarchy over another but that there is interdependency and interrelation between them.
- From the Constitution, the Municipal Systems Act, the Municipal Structures Act and the Water Services Act, the following has been deduced:
    - There is a duty on all spheres of government to ensure that water supply services are provided in a manner that is efficient, equitable and sustainable. Neither the national, provincial nor municipal government spheres have hierarchy over another but that there is interdependency and interrelation between them.
    - The water service authorities, i.e., MMM and the local municipalities, have the mandate to ensure provision of water supply services within their area of jurisdiction.
- Therefore, the municipalities can decide how best to fulfill their consitutional mandate of providing access to water supply services and should decide on who should be the implementing entity for the Xhariep Pipeline. In doing so, these municipalities must take into account, among others:
    - Alternative ways of providing access to the services,

- The need for regional efficiency,
- The need to achieve benefit of scale,
- The need for low costs,
- The requirements of equity,
- The availability of resources from neighbouring authorities,
- Institutional capacity,
- Financial capacity,
- Technical competency,
- Manpower, etc.

- If necessary, the municipalities may request VCWB to be the implementing entity of the scheme and VCWB may only refuse the request if, for sound technical and financial reasons, they would not be able to provide those services.
- If the municipalities fail to take up their responsibilities, the organs of State in the Provincial and National sphere of Government may intervene to resolve the matter.
- It should be noted that there is potentially an inability by MMM to take up this responsibility. Their current administration and infrastructure management are poor, but they are also constrained by inadequate support from the other spheres of government and a critical shortage of funds. The other local municipalities may face similar challenges though these were not specifically examined as they would use about 3% of the water produced by the scheme with MMM using 97%.

This assessment highlights that, while various institutional options exist, the financial sustainability of the pipeline project will be dependent on the chosen implementing entity's capacity to manage operations and maintenance effectively. The report findings underscores that the project's success hinges on collaboration between national, provincial and local governments, and a clear delineation of responsibilities among entities.

From an economic perspective, the project is expected to generate substantial socio-economic benefits through direct, indirect, and induced impacts. This includes job creation during the construction and operational phases and an improvement in water security, which is critical for supporting regional economic activities, particularly in the agriculture and manufacturing sectors. The financial viability of the project is achievable if tariff structures are well managed, ensuring affordability for households while maintaining financial sustainability.

6.2 Recommendations

Based on the finding of the assessments the following recommendations are made:

- The findings should be presented and discussed at a Working Group Committee meeting to all the relevant stakeholders, which should be initiated by DWS and attendees must include MMM, Kopanong Local Municipality, Mantsopa Local Municipality and VCWB;
- The project success hinges on collaboration and cooperation between national, provincial and local governments. DWS should initiate the establishment of and lead a **Working Group** that involves all the relevant stakeholders, with representation at an executive and strategic level, so that agreement can be reached on:
  - Responsibilities with respect to the implementation, operation and maintenance of the scheme, e.g. MMM and the local municipalities (as they should take a leading role) can request VCWB (legally) or DWS (administratively) (including TCTA or the NWRIA) to implement the project on their behalf,
  - Financing options, taking consideration that at least a 75% capital grant and a loan for the balance of the capital costs at a low interest rate would be required to result in affordable bulk water tariff increases. The creditworthiness of each institution must be considered as part of the financing options to minimise the cost impact on the end-users; and,
  - Development of an implementation timeframe.

7 References

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