FIPAG
FUNDO DE INVESTIMENTO E PATRIMÓNIO DO ABASTECIMENTO DE ÁGUA

CONCEPT NOTE

Project Title:	**Resilient Infrastructure: Region - Center**
Country:	**Mozambique**
Region:	**Center Region**
Date:	**September 2021**

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ABBREVIATIONS & ACRONYMS

AfdB	African Development Bank
AURA	Water Regulatory Authority (*Autoridade Reguladora de Água)-former CRA*
CPS	Country Partnership Strategy
CRA	Water Regulatory Council *(Conselho de Regulação de Águas) – see AURA*
DA	Designated Accounts
EC	European Commission
EIB	European Investment Bank
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
FAM	Finance & Accounts Manager
FIPAG	Water Supply Investment Fund [Asset Holder & Operator] *(Fundo de Investimento e Património do Abastecimento de Água)*
FMS	Financial Management System
GDP	Gross Domestic Product
IBRD	International Bank for Construction and Development
ICB	International Competitive Bidding
IDA	International Development Association
IFAC	International Federation of Accountants
IFC	International Finance Corporation
IFP	Investment Project Financing
IFR	Interim Financial Reports
IPSAS	International Public Sector Accounting Standard
MDG	Millennium Development Goals
MTA	Ministry of Land and Environment *(Ministério da Terra e Ambiente)*
MEF	Ministry of Economy & Finance
MOPHRH	Ministry of Public Works, Housing and Water Resources
NPV	Net Present Value
NWRDP	National Water Resources Development Project
OBA	Output Based Aid
O&M	Operations & Maintenance
PDO	Project Development Objective
RAP	Resettlement Action Plan
WASIS	Water Services and Institutional Support Project

1. INTRODUCTION

Purpose of the Note & Structure

As an asset holder, FIPAG is responsible for water supply services across all major urban areas in Mozambique. In the Summary of 2019-20 Report & Accounts, customer numbers totalled 3.9m, with 510,000 connections. Across the country water was supplied to approximately 54% of the potential customers in the service area.

Given the scale of the country, which is approx. 780,000km^{2}in land area and around 2,300km in length from north to south, FIPAG has established four regional operational areas for more effective service delivery. These are as follows:

- North;
- Centre;
- South; and
- Maputo

In 2011, the Government of Mozambique approved the National Urban Water Supply & Sanitation Strategy (2011- 2025). The strategy re-affirmed delegated management as the framework for service delivery, whilst promoting commercial sustainability in FIPAG and the principle of private sector involvement in water supply. To deliver those policy objectives, the strategy supports greater efficiency by grouping of water supply assets in secondary and tertiary urban areas into operational regions, with operations on a commercial basis, and gradually transforming municipal operations into public-private companies. The policy demands the professionalization of operations, and technical and financial support to build operator capacity. Finally, the policy envisions service coverage of 80% of the urban population by 2030.

To achieve this objective, substantial investment is required in physical assets, the organisation and the personnel working within the various functions across the organisation. This Concept Note deals with the various investments required for the Central region.

The Note is structured as follows:

- An outline of the regional context, background, issues and challenges
- An outline of the various projects to address these issues and challenges
- A summary of the various projects for the relevant operational region.

Within each of these sections are more detailed discussions of technical, financial, environment/social, resources and organisational issues. Also included are summary cost estimates, expected outcomes, programme/implementation time-lines together with risks and mitigations. The

latter include supporting activities to be delivered by other parties (e.g. the Government of Mozambique) or those already in hand or in place.

2. THE REGIONAL CONTEXT & BACKGROUND

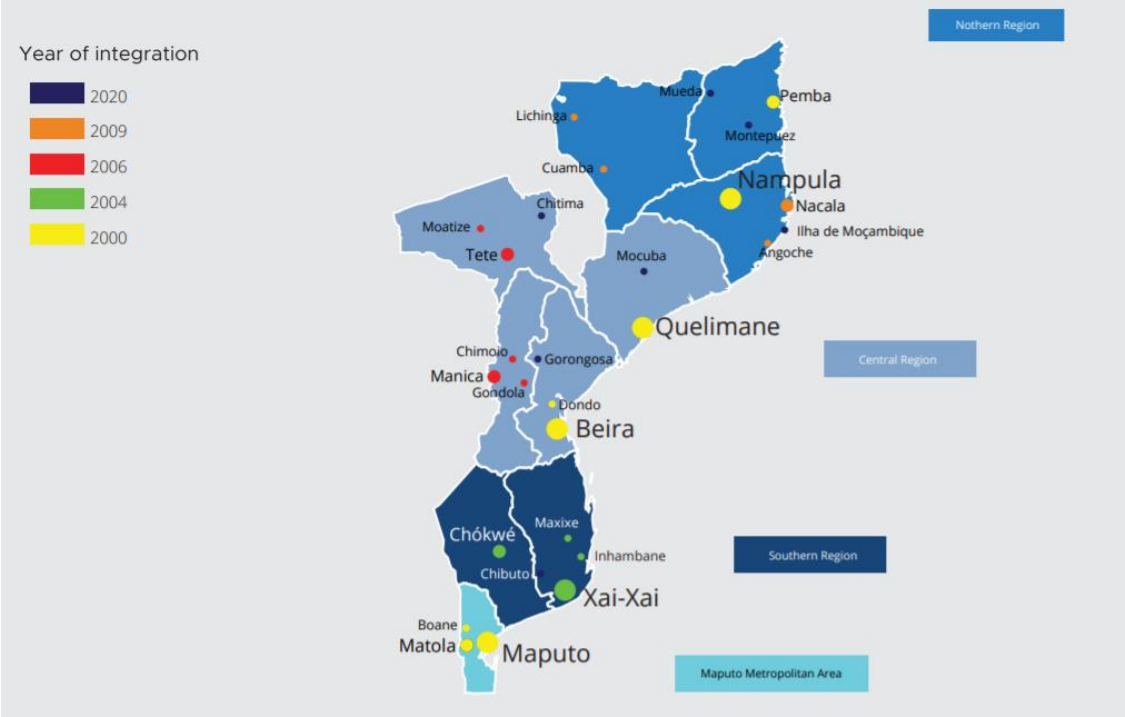
A. Description

1. Regional Characteristics

The Central region is composed by four provinces namely: Sofala, Tete, Manica and Zambézia.

Province	Area in km²	Popn in m (2017)
Sofala	68,018	2,259
Tete	100,724	2,764
Manica	61,661	1,946
Zambézia	105,008	5,043

source: 2017 Census: http://www.ine.gov.mz/operacoes-estatisticas/censos/censo-2007/censo-2017



Sofala

Sofala province is located in the center of the country, with a long coastline, in a recess in the Mozambique channel. Its capital is the coastal city of Beira, located about 1190 km north of the city of Maputo. With an area of 68,018 km² and a population of 2,221,803 inhabitants in 2017, this province is divided into 13 districts and has 5 municipalities: Beira, Dondo, Gorongosa, Marromeu and Nhamatanda.

Located in the center of Mozambique, Sofala shares the Zambezi River to the north and northeast with the provinces of Tete and Zambezia. In the

east, the province meets the Indian Ocean. To the south it is separated by the Save river from the province of Inhambane while to the west it is connected to the province of Manica.

The Beira Operational Area, located in Sofala province, is the largest operational area in the Center Region, having the largest number of customers and the largest water supply system that provides water to the populations of the municipalities of Beira and Dondo, including the headquarters of the Administrative Post of Mafambisse with an estimated population of 683 831 inhabitants (2020). The estimated population in 2030 is 866859 inhabitants.

Tete

Tete is a province in the central region of Mozambique. Its capital is the city of Tete, located about 1570 km north of the city of Maputo.

The province is crossed by the Zambezi River and it is in its middle part that the Cahora Bassa dam is found, one of the largest on the African continent.

The province of Tete is located at the top of the central region of Mozambique, being the only one in border contact with 3 countries: in the northeast with Malawi, in the northwest with Zambia, in the southwest with Zimbabwe; and to the south with the provinces of Manica, Sofala and Zambézia.

FIPAG's responsibility is to supply water to the populations of the cities of Tete, Moatize and Chitma in the Cahora Bassa District. The estimated population in 2020 was 355775 and for 2030 will be of 545554 inhabitants.

Manica Province

The province of Manica is located in the central region of Mozambique. Its capital is the city of Chimoio, about 1100 km north of Maputo and about 200 km west of the coastal city of Beira. This province is divided into 12 districts and FIPAG's responsibility is to supply water to the populations of the cities of Manica, Chimoio and Gondola with a estimated population of 493.135 inhabitants (2020). The estimated population in 2030 is 709.175 inhabitants.

Situated in the interior of central Mozambique, Manica borders on the north with the province of Tete, on the east with the province of Sofala and on the south with the provinces of Inhambane and Gaza. To the west, Manica borders Zimbabwe.

Zambézia Province

Zambézia is a province located in central Mozambique. Its capital is the city of Quelimane, located about 1,600 kilometers north of Maputo.

At the eastern top of central Mozambique, Zambézia is bordered to the north by the provinces of Nampula and Niassa, to the east by the Mozambique Channel, in the Indian Ocean and to the south by the

province of Sofala. In the west, in addition to Tete province, Malawi also appears.

FIPAG's responsibility is to supply water to the populations of the cities of Quelimane and Mocuba with an estimated population of 687111 inhabitants (2020). The estimated population in 2030 is 859330 inhabitants.

2. Specific city issues

The table below shows the current and future populations in the service areas of each of the cities. Growth rates differ between urban areas, driven by specific factors, whether local economic growth or forced displacement by natural disasters or civil disturbance.

Table 1 – Population growth to 2030 for Central Region in FIPAG Water Supply Areas

City	Population			
	2019 (actual)	2020 (est.)	2025 (fcst)	2030 (fcst)
Sofala	667,804	728,409	819,871	922,819
Tete	340,890	355,774	440,548	545,553
Manica	475,540	493,135	591,371	709,175
Zambézia	672,017	687,111	768,140	859,329

Source: Projection calculated based in INE data

In all cases, much of this growth is expected to be accommodated in informal settlement areas around the cities. The remainder will occur within the existing built-up area, with increasing household sizes.

Beira and Dondo

Beira is a coastal city, consequently vulnerable to flood damage. The 2019 cyclone IDAI had a significant impact in Beira and Dondo, with severe damage to both economy and infrastructure. Population growth is forecast to continue at around 2.3% per annum to 2030.

Gorongosa

This inland district is located on the Gorongosa Mount and is primarily agricultural in nature. Much of Gorongosa's growing population will be in peri-urban low income/informal settlements around the city. Population growth is forecast to continue at around 2.3% per annum to 2030.

Tete

The 2019 cyclone Kenneth had a significant impact in Tete, with severe damage to both economy and infrastructure. Within Tete district, the FIPAG service area consists of three towns, Tete itself, Moatize and Chitima. Population growth is forecast to continue at around 3.6% per annum to 2030.

Manica

Agriculture is favored by the high rainfall and mild climate. Cashews were once an important export product. Within Manica district, the FIPAG service area consists of three towns, Manica itself, Chimoio and Gondola. Growth is forecast to continue over the next decade, albeit only at an annual rate of 1.9%.

Quelimane

Quelimane is extremely prone to floods during Mozambique's rainy season. Growth is forecast to continue over the next decade, albeit only at an annual rate of 1.8%.

Mocuba

Much of Mocuba's growing population will be in peri-urban low income/informal settlements around the city. Growth is forecast to continue over the next decade, albeit only at an annual rate of 1.8%.

B. Water sector – regional & local issues and challenges

1. Resources (e.g. dams, boreholes, transmission pipes etc)

Sofala

In Sofala Province, FIPAG has the Responsibility to Supply Water to Dondo and Beira Distrits.

Beira and Dondo

Beira and Dondo Districts have a surface resource of water: the Pungué river. The river intake was built in 2006 and is in Dingue Dingue location. The intake consists of 2+2 submersible pumps groups with a rated capacity of 1,350 m^3/h and a TMH of 17 m. The transfer between the Dingue Dingue intake and the discharge channel is through 10,700 m of DN 900 mm pipelines which has a capacity to transport water with two pumps operating simultaneously. The Channel pumping station consists of 3 +1 pump unit with a nominal capacity of 1013 m^3/h and TMH equal to 28 m. The water extraction for the treatment plant of Mutua is undertaken in a canal which serves as a reservoir of raw water.

The WTP located in Mutua has 2 operational treatment lines:

- WTP1 has a nominal treatment capacity of 20,000 m^3/day,
- WTP3 has a nominal treatment capacity of 30 000 m^3/day.

Rehabilitating the WTP2 would be too expensive according to FIPAG therefore need for treatment capacity increase will be addressed with a fully new treatment plant. Treated waters are stored in a 3,000 m^3 reservoir.

The average daily production was around 51.800 m^3/day in 2019 and 52.523 m^3/day in 2020 (with an average of 24 production hours per day) and overall potential capacity is estimated around 50,000 m^3/day.

The water is transferred from the treated water reservoir to the Mezimbite reservoir (900 m3) by pumping. The pumping station is equipped with five pumps (Q = 800 m3/h, TMH = 65m) that feed two intake pipes which run in parallel a distance of 14.2 km: a concrete DN700 mm (over 50 years old) and a polyester fiber reinforced DN1000 mm, more recent. Dondo and Beira distribution systems are supplied by reservoir Mezimbite. The transmission line is 119 km long with an average diameter of 743 mm.

Beira and Dondo have 8 distribution centers which are supplied by 17 ground reservoirs totalizing 35490m3.

Gorongosa

The water supply system of the Municipality of Gorongosa is characterized by superficial water collection at the dam of the river Nhandare, using two submersible electric pumps 396m3 / h + 1, with a head of 57.5m. The pipeline is made of PVC with a length of 350 m from the ETA Dam.

The water treatment station is composed of 8 filters and the daily treatment capacity is 1000m3/day. It is important to note that the physical spectrum of the water is very good and indicatively presents a very low turbidity content, which suggests reduced consumption of chemicals.

The Distribution Center is composed of a supported deposit of 500m3 and an elevated tank of 150m3,15 meters high. The distribution network has about 20km in PVC pipes between 50 to 250 mm.

The district of Gorongosa is composed of approximately 42,000 inhabitants, updated data from the last Census and has about 800 domestic connections and 21 fountains, with a coverage rate of 15%.

Tete Province

In Tete Province, FIPAG is Responsible for the Water Supply System to Tete and Moatize Districts and for Chitima Village in Cahora Bassa District.

Moatize

The Moatize water resource is a well field developed along the margins of the Revubué River (a tributary of the Zambeze River). The well field is constituted with 12 boreholes yet only 11 are currently operational. The well field is reported to be operated 24/24. There is no water treatment for Moatize water supply except for disinfection.

Overall potential capacity of the resources is estimated around 10.500 m3/day according to FIPAG Database.

Regarding the Transmission Lines, in Moatize, the raw water is transferred through 2x250 mm GI pipes 2.5 Km long and new main line of the 315mm HDPE pipe with 5.3km to Moatize distribution centre (DC) from where it is further distributed to three major distribution centres namely Cruzeiro, Carbomoc and Relé.

Moatize has 4 Distribution Centers and 8 ground reservoirs totalizing 6350m3 supply the distribution center.

The transmission line is 30 km long.

Tete

The Tete water resource is based on ground water taken from two distinct well fields: the Nhartanda well field and two other satellite well fields namely the Rovubwe 1 the Canangola well fields. The Nhartanda well field is used to supply the old city of Tete and consists of 12 boreholes, all presently in operation. The Canangola, well field are used to supply the area of Samora Machel and M'Padué

The Rovubwe 1, well fields are used to supply the area of Matundo and Chingodzi which is located within the administrative boundaries of the main city but located on the other side of the Zambezi River. All together, the three well fields are equipped with 19 boreholes among which 15 are reported operational.

Water treatment is only provided to water taken from 6 of the 12 boreholes of the Nhartanda well field. The remaining 4 are used to feed the supply zone of Sansão Mutemba without any form of treatment other than disinfection at the moment but there is an on-going project to add a chlorine dosing system at this distribution centre. The existing water treatment plant is based on aeration followed by sedimentation and rapid sand filtration. Buildings and infrastructure of the water treatment works are presently in reasonable shape.

The average daily production was around 37.347 m3/day in 2019 and 42.542 m3/day in 2020. Overall potential capacity of the resources was estimated around 38.495m3/day according FIPAG Database.

In Tete, the raw water taken from the Nhartanda well field is transferred through is a new main 500 mm DI pipe 1000 m long to the water treatment plant prior to storage and distribution. A dedicated line exists that conveys part of the water taken from well field to an elevated reservoir dedicated to the supply zone of Sansão Mutemba through distribution centre of Sansão Mutemba.

The Canangola well field is transferred directly to the distribution centre of Samora Machel and supply zone of Samora Machel and part of M'padue.

The water taken from Rovubwe 1 well field is transferred directly to the distribution centre of Chingodzi (Matema).

The transmission line is 15 km long.

Tete has 5 Distribution Centers and 9 ground reservoirs totalizing 5050m3 supply to the distribution center.

The network total extension is 350 km in the Tete Water Supply System.

Chitima

In Cahora Bassa District FIPAG is responsible for the Chitima Water Supply System which, that the water supply system in the village of Chitima consists of a collection dispersed with 11 boreholes, equipped with electric pumps with maximum capacity of exploration of 14m3 / h and the minimum of 3m3 / h (nominal flows). Boreholes parts operational numbers are old in number 2 and the rest are new and open within the scope HCB's investment.

Raw water is transported through a 160mm diameter uPVC main line over a distance of 5 km and connected to intermediate 2 "pipes in material galvanized and 75mm uPVC respectively.

The treatment station is located in the 1° de Maio neighborhood, where the process of water treatment goes through a pre-designed system, that is, a pre-chlorination, aeration, flocculation, rapid filtration, post-chlorination and reserve. The treatment plant of water has a maximum capacity to treat 100m3 per hour and a reserve of 500m3 divided into 2 reservoirs of 250m3 each.

In a distance of 3 km in relation to the treatment plant is the Distribution Center located in the 25 de Junho neighborhood, consisting of a building of management (Collections and administrative offices); a warehouse; a pressure tower of 150m3 and a guardhouse.

The distribution network was built mostly in the central area of the village, benefiting a large part of the government services facilities and another

part the supply of 36 rehabilitated and built fountains. It has an extension with about 30 km with primary and secondary branches.

Manica

The purpose of the Manica water supply system is to supply water to the populations of the cities of Manica, Chimoio and Gondola. The system is supplied by to 2 main resources:

Chicamba resource

The resource is constituted of Chicamba reservoir, located approximately 36 km southeast of Manica. Raw water is abstracted through a catchment tower in Chicamba reservoir. The tower intake has two entries at different levels in order to allow a better quality of surface water according to the seasonal cycles of water level in the reservoir. Water is pumped through 1.6 km of DN 500 mm from the station to the water treatment plant in Chicamba.

The raw water passes through slow sand filters which removed silt in suspension and reduced microbial concentration. The filtered water is then disinfected with the addition of chlorine gas, and then transported to the storage treated water tank (2,000 m3). The WTP has been designed to supply treated water to the distribution system at a flow rate of 1,600 m3/h.

Manica resource

Manica district has two surface captures (small dams) on rivers Chirambandine and Nhamatanda and one conventional WTP. This old system has a 2,400 m3/day estimated capacity.

The treated water is transfered from the pumping station through 3 pipelines to distribution centers in Chimoio, Chigodole and Manica:

3+1 pumps (500 m3/h, 104 m) in the pipeline DN 700 mm towards the main reservoir (10,000 m3) supplying Gondola and Chimoio distribution systems,

2+1 pumps (120 m3/h, 163 m) in the pipeline DN 350 mm towards Manica,

1+1 pumps (90 m3/h, 134 m) in the pipeline DN 160 mm towards Chicamba reservoir.

The average total daily production was around 28 200 m3/day in 2019 and 28.700 m3/day in 2020 (with an average of 24 production hours per day) and a overall potential capacity of the resources is estimated around 40 000 m3/day.

The transmission line is 125km long with an estimated average diameter of 550 mm.

Chimoio/Manica/Gondola has 7 distribution centers which are supplied by 9 ground reservoirs totalizing 18,100 m3.

Zambézia

The Responsibility of FIPAG in Zambézia Province is to Supply Quelimane and Mocuba Districts.

Quelimane:

The Water Supply System of the City of Quelimane comes from two groundwater fields: *Licuari and Nicoadala*.

The Licuari resource is rather old and consists of 6 artesian wells, out of which one was equipped recently. 5 are operational with total production of 392 m3/h and transport the raw water to the Licuari treatment plant. The Licuari borefield contains a high iron levels, which led to the construction of a WTP equipped with an aeration system and 5 cells of slow sand filters. The treated water is stored in a 250 m3 capacity reservoir where it is pumped to a 500 m3 capacity water tower and disinfected with HTH. The pumping station is equipped with 2 pumps of nominal capacity: 250 m3/h, 30 m.

The new borehole was drilled by DNA in 2000 for groundwater investigations. FIPAG equipped it at the end of 2013 and installed a transmission line to the WTP (160 mm PVC) as well as a dedicated power line. The capacity of this new borehole is ~3 500 m3/day.

The Nicoadala resource was built during the year 2006 and consists of 6 artesian wells with a total capacity of 300 m3/h. These 6 boreholes supply a 200 m3 capacity water tower. The water from the borehole field Nicoadala, is of good quality, not requiring treatment and only have a bacteriological treatment (chlorination). In Nicoadala field was built during the year 2016 one borehole and in the Pravida project, built two more boreholes in the year 2019.

The total average daily production for Quelimane System was 16.300 m3/day in 2019, and 17 600 m3/day in 2020 according to FIPAG database (with an average of 24 production hours per day). Overall potential capacity of the resources is estimated around 20.000 m3/day.

The pipeline system consists of three intake pipes. An ancient aqueduct in Fiber Cement from DN 350 mm to Licuari, a second new pipeline in Ductile Iron from Nicoadala DN500 mm and the third adductor composed of Ductile Iron DN 500 mm from Licuari. The latter ends in Nicoadala by joining by means of a fork in the other pipeline Ductile Iron DN 500 from the Nicoadala well field.

Water flow by gravity from the Nicoadala water tower through a DN 500 mm towards an intersection where arrives also water by gravity from Licuari water tower through a DN 500 mm. From this intersection, water continues to flow by gravity towards Quelimane head reservoirs (3,500 m3) and Sampene head reservoirs (2,500 m3).

The transmission line is 56 km long with diameter of 500 mm and main line 350 mm AC, it is used as network pipe with 35km of extension.

Quelimane has 5 Distribution Centers which are supplied by 5 ground reservoirs totalizing 6310 m3.

Mocuba

The Water Supply System of the Municipality of Mocuba was conceived in 1974 and benefited from two rehabilitation projects, one in 2004 which culminated in the construction of 2 units of decanters, and the other one in 2015 where 2 units of quick filters were installed with 8 cells each.

The water supply system of the Municipality of Mocuba consists of a surface catchment in the Lugela River, a transmission main of approximately 2km of PVC pipe with a diameter of 250mm and 3 suction cups during the route to the ETA / CD.

In the 2020 was built requalification water supply system of the Mocuba, which consisted of Built new intake in the Lugela river with (1+1) pumps 240m3/h and 27km of network.

The Water Treatment Plant and the Distribution Center are located in the same enclosure, where the decanters are built and installed quick filters in containerized mobile units, Chlorinators, two electro pump groups with the capacity to deliver a flow of 160m^3 /h each, to take the water from the decanters to the filters. There are two semi-buried reservoirs with a storage capacity of 300m^3, a pair of lifting pumps with an estimated flow of 120m^3 /h+1 for the 20m high tower, which supports a high deposit of 180m^3 in concrete, an inlet piping of 150mm in Asbestos Cement and discharges the network from a pipe of the same material with a diameter of 100mm, it should be noted that its network is branched and mostly pipe with a dimension of ¾ ".

2. **Technical (e.g. distribution infrastructure, coverage, quality and quantity, physical water loss)**

Sofala

Beira and Dondo

The existing Beira and Dondo water distribution network is approximately 800km in length and current coverage of 59%.

The issues facing Beira and Dondo can be summarised as follows:

- Increasing water production capacity and expanding the water transmission and distribution networks to keep pace with population growth.
- Reducing non-revenue water to both increase revenues and reduce water losses.

Gorongosa

The existing Gorongosa water distribution network is approximately 20km in length. Coverage is low within the direct urban area, around 20%.

The main issue for Gorongosa is in expanding the water transmission and distribution networks to keep pace with population growth.

Tete

The current coverage of Tete and Moatize system is around 74 and 83% respectively. Non-revenue water is the highest in Central region, 48% and 58% respectively.

The main issue for Tete is in continuing to reduce non-revenue water to both increase revenues and decrease water losses.

Manica

The existing Manica water distribution network is approximately 406km in length and current coverage of 59%.

The issues facing Beira and Dondo can be summarised as follows:

- Increasing water production capacity and expanding the water transmission and distribution networks to keep pace with population growth.
- Reducing non-revenue water to both increase revenues and reduce water losses.

Zambézia

Quelimane

The existing Quelimane water distribution network is approximately 338km in length and current coverage of 46%.

The main issue for Quelimane is limitation of raw water resource.

Mocuba

The existing Mocuba water distribution network is approximately 42km in length. Coverage is low within the direct urban area, around 13%.

The main issue for Mocuba is limitation of raw water resource.

3. Financial & organisational (e.g. commercial water loss, financial situation, capacity)

The table below shows the reported billings and collections for the Northern Region urban areas for the period January - August 2020.

Table 2 – Billing and collections report

Revenues in US$	*Billing*				*Collection*			
US$1 = MZN 57.2	Residential	Non-res	Stand-posts	Total	Residential	Non-res	Stand-posts	Totals
Beira	4,333,077	2,125,420	48,881	6,507,378	3,331,399	1,797,972	10,122	5,139,493
Dondo								
Tete								
Cahora Bassa	2,687,028	1,016,434	25,087	3,728,549	2,071,434	773,776	8,566	2,853,776
Moatize	470,769	202,010	3,497	676,276	387,448	156,132	1,735	545,315
Chimoio								
Gondola	2,368,269	537,871	5,323	2,911,464	1,895,122	414,843	3,689	2,313,654
Manica								
Quelimane	1,308,339	553,706	7,955	1,870,000	1,087,990	420,157	3,566	1,511,713
Mocuba	91,993	29,283	122	121,399	80,175	17,832	122	98,129
Central Region	9,859,143	3,881,735	82,788	13,823,667	7,685,402	3,142,723	24,112	10,852,238

These values provide the collection ratios shown in the table below.

	Collection ratio (in %)			
	Domestic	Industrial	Stand-posts	Total
Beira and Dondo	77	85	21	79
Tete	77	76	34	77
Moatize	82	77	50	81
Manica	80	77	69	80
Quelimane	83	76	45	81
Mocuba	87	61	100	81
Central Region	**78**	**81**	**31**	**79**

3. CURRENT PROJECTS TO ADDRESS THESE CHALLENGES

A. Description and components (for each city)

Sofala

After Cyclone IDAI in 2019, the World Bank increased its support for FIPAG through the WASIS II project. This included rehabilitation of water supply network and construction of a pumping station.

Tete

A US$40m project is currently underway to increase production and storage capacity. Works include a new treatment plant, which will also be expanded from 12,000m^3/day to 24,000m^3/day. There are a series of plans for projects to add pumping, storage and pipe capacity at various locations in both the transmission and distribution networks.

Manica

With sufficient raw water resources until 2030, there are outline plans to construct a new intake and treatment plant in Chicamba dam. These plans also include, transmission pipes, storage reservoirs and distribution networks.

Zambézia

Due insufficient raw water resources, there is a need to identify new sources to attend water needs until 2030, although more detailed studies have yet to be undertaken.

B. Rationale/technical areas to be addressed (incl. critical/steady state/growth components)

As part of a review of FIPAG's investment programme for the urban areas it served in the Central region, an overall water demand model was created. This model used data provided by FIPAG for each of their service areas as follows:

- the current and forecast populations for the areas served by FIPAG (note: these do not correspond exactly with INE forecasts for those cities and districts);
- the current number of domestic, industrial, commercial and municipal connections;
- the current number of stand-posts;
- the current asset infrastructure in place e.g. reservoirs and well-fields, treatment plants, transmission pipes, storage reservoirs & distribution networks lengths; and
- the current level of non-revenue water (physical and commercial losses).

Based around the 2013 Artelia Report a set of consumption and engineering assumptions were considered. These were as follows:

Conventional system coverage in 2030	*80% (75% by individual connections, 25% by stand-posts)*
Total reserve capacity	*1 day's production*
Household size	*5.3 people*
No. of people served by stand-post	*300*
Consumption – current average	*90,0 litres/capita/day*
Consumption – new /future	*120,0 litres/capita/day*
Consumption @stand-post	*20 litres/capita/day*
Hours of supply	*24*
Maximum day demand production factor	*1.1*
Production capacity	*24h/day*

From this data and assumptions, water demand forecasts for each urban area were developed that meet the **80% %** through conventional system and **20%** coverage through point sources coverage by 2030. Included in these water demand forecasts were FIPAG NRW targets for the relevant region as reviewed in the Sustainable Services NRW Concept Note. For the Central region, the 2030 target for NRW is 25% of water into supply.

The outcomes of this water demand assessment are shown in the table below.

Table 3 – 2030 water demand projection with installed treatment capacities: 80% coverage

Forecast water demand & current available/installed capacity		2,021	2,024	2,030
		(m3/day)		
PROVINCE	**DISTRICT**	***CURRENT CAPACITY***	***FORECAST DEMAND***	
Sofala	CIDADE DA BEIRA	60,000	56,189	80,891
Sofala	DONDO	60,000		
Sofala	GORONGOSA	1,000	1,381	4,083
Tete	CIDADE DE TETE	50,495	34,053	43,906
Tete	CAHORA-BASSA	880	991	1,725
Tete	MOATIZE	11,808	6,887	8,358
Manica	CIDADE DE CHIMOIO	28,644	39,109	60,241
Manica	GONDOLA	3,880		
Manica	MANICA	8,120		
Zambezia	CIDADE DE QUELIMANE	17,000	19,183	30,053
Zambezia	MOCUBA	3,300	10,148	39,150

The red text/pink shading shows where the current installed infrastructure runs out of capacity to supply the relevant population in that urban area.

The main constraint identified in this model is treatment capacity. Whilst this aspect is important, there are associated downstream issues such as storage capacity that would also need to be addressed in the event of an increase in treatment capacity.

This model does however assume that there would be adequate raw water resource to supply any upgraded treatment capacity. No assessment has been undertaken of water resources in the work for this Note, and any reference herein refers to work in this area found in the Artelia 2013 report. As reported in earlier sections, for several of these urban areas the issue of raw water resource is critical and requires further investigation.

C. Results, objectives, outputs and outcomes

The table below shows for each of the Central Region urban areas the increase in numbers of people served by 2030 with 80% coverage, separated into individual connections and stand-posts.

Table 4 – 2030 served population by urban area with 80% coverage

AREA		POPULATION SERVED			
		Connections		StandPots	
PROVINCE	DISTRICT	2,020	2,030	2,020	2,030
Sofala	CIDADE DA BEIRA	289,158	163,275	82,152	22,250
	DONDO	51,028	28,813	18,648	5,051
	GORONGOSA	3,726	50,366	6,300	2,400
	Total	***340,186***	***192,088***	***100,800***	***27,300***
Tete	CIDADE DE TETE	185,277	284,989	37,500	83,927
	CAHORA-BASSA	3,440	12,674	10,500	4,225
	MOATIZE	39,167	62,875	16,800	20,958
	Total	***227,884***	***360,538***	***64,800***	***109,111***
Manica	CIDADE DE CHIMOIO	197,383	328,640	18,300	109,547
	GONDOLA	21,030	46,878	12,900	15,626
	MANICA	18,857	49,987	6,300	16,662
	Total	***237,270***	***425,505***	***37,500***	***141,835***
Zambezia	CIDADE DE QUELIMANE	117,856	193,969	45,900	17,400
	MOCUBA	14,119	249,996	1,200	63,000
	Total	***131,975***	***443,965***	***47,100***	***80,400***

More importantly, the following table identifies some of the additional infrastructure required to achieve this 80% coverage target by 2030.

Table 5 – Asset requirements by Central region urban area with 80% coverage by 2030.

		Assets											
		Intakes+WTP (m3/day)		Transmission Main (km)		Storage Volume (m3)		Distrib (km)		Connections		Stand Posts	
PROVINCE	SERVICE AREA/CITY	2,020	2,040	2,020	2,040	2,020	2,040	2,020	2,030	2,020	2,030	2,020	2,030
Sofala	CIDADE DA BEIRA	60,000	94,581	240	360	35,420	94,581	810	1,541	54,558	30,807	274	74
	DONDO							235	400	9,628	5,436	62	17
	GORONGOSA	1,000	4,634	0.4	10.4	650	4,634	20	0	703	9,503	21	8
	Total	***61,000***	***94,581***	***240***	***360***	***35,420***	***94,581***	***1,045***	***1,941***	***64,186***	***36,243***	***336***	***91***
Tete	CIDADE DE TETE	50,495	61,240	14	29	5,050	61,240	303	774	34,958	53,771	125	280
	CAHORA-BASSA	880	2,278	7	17	500	2,278	30	73	649	2,391	35	14
	MOATIZE	11,808	11,969	30	45	4,620	11,969	105	217	7,390	11,863	56	70
	Total	**63,183**	**75,487**	**51**	**91**	***10,170***	***75,487***	**437**	***1,063***	**42,997**	***68,026***	**216**	***364***
Manica	CIDADE DE CHIMOIO							284	904	37,242	62,008	61	365
	GONDOLA	40,644	79,794	125	226	18,550	79,794	39	161	3,968	8,845	43	52
	MANICA							82	229	3,558	9,432	21	56
	Total	**40,644**	**79,794**	**125**	**226**	**18,550**	**79,794**	**406**	**1,294**	**44,768**	**80,284**	**125**	**473**
Zambezia	CIDADE DE QUELIMANE	17,000	37,201	51	101	6,000	37,201	338	851	22,237	36,598	153	58
	MOCUBA	3,300	43,565	2	27	600	43,565	42	1,356	2,664	47,169	4	210
	Total	***20,300***	***80,766***	***53***	***128***	***6,600***	***80,766***	***380***	***2,206***	***24,901***	***83,767***	***157***	***268***

In this model, it should be noted when the 2030 water demand forecast was not met by the current (2020) installed capacity, the requirements for new abstraction, treatment plants, storage reservoirs and transmission main were based on 2040 water demand forecasts (see Table 2).

This is because general water engineering practice is to provide for longer periods than 5 years and infrastructure of this type is generally 'lumpy' in its implementation rather than linear.

D. Cost estimates

The capital costs were based on the following new asset infrastructure:

- Water treatment by source: surface water, borehole (Cl_2 disinfection only) and borehole (Fe & Mn removal and disinfection).
- Ground reservoirs (by volume from 1,000m^3 to 10,000m^3)
- Transmission mains (by diameter)
- Elevated storage (towers @average capacity of 250m^3) and pumping stations
- Distribution networks (by diameter)
- Individual connections and stand-posts

These were used to develop estimates for the costs of the required new assets to meet the 2030 coverage target of 80%. These are shown by urban area in Table 6 below.

Table 6 – New asset costs by urban area with 80% coverage by 2030.

NEW ASSET COSTS (BY URBAN AREA)			Cost by Asset Type (in US$ 2020 values)				
			Intakes+WTP	Transmission Main	Storage	Distribution	Connections
PROVINCE	**SERVICE AREA/CITY**	**247,859,484**	**60,682,000**	**93,065,000**	**25,367,500**	**33,500,000**	**35,244,984**
Sofala	Beira	**100,753,952**	20,000,000	61,215,000	6,587,500	7,500,000	5,451,452
	Gorongosa	**7,269,932**	2,382,000	1,750,000	750,000	1,000,000	1,387,932
	TOTAL	***108,023,884***	***22,382,000***	***62,965,000***	***7,337,500***	***8,500,000***	***6,839,384***
Tete	Tete, Moatize and Cahora Bassa	**41,681,600**		20,000,000	10,830,000	7,500,000	3,351,600
	TOTAL	***41,681,600***		***20,000,000***	***10,830,000***	***7,500,000***	***3,351,600***
Manica	Chimoio/Manica/Gondola	**15,130,000**				10,000,000	5,130,000
	TOTAL	**15,130,000**				**10,000,000**	**5,130,000**
Zambezia	Quelimane	**23,644,000**	11,000,000		4,700,000	2,500,000	5,444,000
	Mocuba	**59,380,000**	27,300,000	10,100,000	2,500,000	5,000,000	14,480,000
	TOTAL	***83,024,000***	***38,300,000***	***10,100,000***	***7,200,000***	***7,500,000***	***19,924,000***

The model also included the costs of existing asset renewal in line with current FIPAG policies for each asset type. The analysis also considered FIPAG's own assessment of the condition of its assets by urban area. The totals are shown in Table 7 below:

Table 7 – Asset renewal costs by urban area with 80% coverage by 2030.

ASSET RENEWAL COSTS (BY URBAN AREA)			Cost by Asset Type (in US$ 2020 values)				
			Intakes+WTP	Transmission Main	Storage	Distribution N.	Connections
PROVINCE	**DISTRICT**	**90,011,629**	**41,967,041**	**22,114,612**	**4,237,468**	**10,155,391**	**11,185,199**
Sofala	CIDADE DA BEIRA	**35,701,177**	12,948,552	11,899,797	2,191,827	3,748,437	3,408,967
	DONDO					988,645	514,951
		351,918	179,841	3	28,080	84,140	59,854
	Total	***36,053,095***	***12,948,552***	***11,899,797***	***2,191,827***	***4,737,082***	***3,923,919***
Tete	CIDADE DE TETE	**18,759,484**	13,495,314	1,205,230	311,971	1,403,581	2,343,388
	CAHORA-BASSA	**421,990**	158,260	51,994	28,080	124,107	59,550
	MOATIZE	**4,740,627**	2,868,919	703,451	259,461	440,347	468,449
	Total	***23,922,101***	***16,522,493***	***1,960,675***	***599,512***	***1,968,035***	***2,871,387***
Manica	CIDADE DE CHIMOIO	**18,285,641**				1,196,592	2,225,374
	GONDOLA	**425,257**	7,359,094	6,462,806	1,041,775	165,814	259,444
	MANICA	**568,903**				347,012	221,892
	Total	***19,279,802***	**7,359,094**	**6,462,806**	**1,041,775**	**1,709,418**	**2,706,710**
Zambezia	CIDADE DE QUELIMANE	**9,775,556**	4,543,427	1,765,078	370,658	1,564,163	1,532,230
	MOCUBA	**981,075**	593,475	26,256	33,696	176,694	150,953
	Total	***10,756,631***	***5,136,902***	***1,791,334***	***404,355***	***1,740,857***	***1,683,184***

It should be emphasised that these cost estimates do not include the budget(s) for any project(s) currently under construction within the Central region. Several outline studies have been undertaken/are underway for further projects in the region to address the water demands in the various urban areas.

E. Programme/implementation timeline

As part of model development, it was necessary to assume an expenditure profile for works to meet the growth in demand. The assumption used is shown in the table below.

2022	2023	2024	2025	2026	2027
5%	10%	25%	25%	25%	10%

It should be emphasised that this is a general profile for demand modelling purposes not a profile for any project in any city. These would be developed as needed for specific projects.

F. Environmental & social aspects (incl. SDG aspects)

The main interventions identified include surface water abstraction works, expanding water supply intakes, borehole drilling, construction of water treatment plants, transmission mains, storage and water distribution networks.

These activities are considered likely to generate significant and irreversible environmental and social impacts. All projects should include mitigation measures to minimize the impacts; inter alia, noise vibrations, generation and disposal of construction waste, health and safety risks for contracted workers involved in construction activities, health risks and community safety.

These activities may be also associated with soil erosion and degradation, dust emissions of increased road traffic and construction activities within the community, workflow, physical and economic displacement of PAPs and risks related to Gender Based Violence (GBV).

All proposed projects must be preceded by an Environmental and Social Impact Assessment (ESIA). This will include the Environmental and Social Management Plan (ESMP) according to the Mozambican Environment Law (Law No. 20/97 of 1 October) and other international Environmental & Social Safeguards including those from the financier.

These policies are based on the precautionary principle that focuses on preventing the occurrence of significant or irreversible negative environmental impacts, regardless of the existence of scientific certainty about the occurrence of such impacts on the environment.

The environmental policies define the procedures for assessing the environmental impact as a preventive tool in the environmental management of projects. They also support the Government of Mozambique in making decisions regarding the granting of the environmental licenses for project development.

A range of Environmental and Social instruments will be prepared as appropriate. These are as follows;

(i) Environmental and Social Management Framework (ESMF) due to the size of project area.
(ii) Environmental and Social Impact Assessment/ESMP when the projects have been defined and for the environmental licensing following the Mozambican legislation.
(iii) Resettlement Policy Framework (RPF) and subsequently the Resettlement Action Plan to address the physical and economic displacement of Project Affected People (PAP).
(iv) Gender Based Violence and Sexual Harassment (GBV/ SH) Plan.
(v) Stakeholder Engagement Plan (SEP) including the Grievance Redness Mechanism (GRM).

Conducting an Environmental and Social Impact Assessment involves the following key steps:

1) Screening and classification by the Ministry of Land and Environment (MTA).
2) Preparation of a Pre-Feasibility Study and Environmental Scoping (EPDA) and preparation of a Terms of Reference (ToR) for the ESIA.
3) Preparation of the ESIA, including an Environmental and Social Management Plan (ESMP) and Resettlement Action Plan after the approval of the EPDA and ToR.

FIPAG has significant experience of preparing and presenting ESIA's as part of the Greater Maputo Water Supply Master Plan Project Phase II (GMWSP II). This experience will prove invaluable for application on other projects in the Northern Region as appropriate.

G. Risks & mitigations (city-specific if required)

FIPAG has developed a standard framework for assessing high-level risks and identifying suitable mitigations. For each specific project, a more detailed risk assessment and mitigation process would be developed and implemented.

FACTOR/ RISK	COMMENTS	RISK CHARACTERIZATION			MITIGATION MEASURES
		PROBABILITY	SEVERITY	RISK TYPE	
		3	3		
EXTERNAL FACTOR/ RISK *Coastal location and vulnerability of urban settlements to natural disasters such as erosion affecting the distribution network, saline intrusion and reduction of recharge rates in aquifers.*		High Probability 4	Strong 4	Extreme	The water supply master plans will include risk mitigation measures/ reduction and capacity building in systems management, including water sources.
EXTERNAL FACTOR/ RISK *Poor maintenance capacity reducing equipment life and efficiency.*		Possible 3	Strong 4	High 12	An institutional capacity building plan will be developed, including regular staff training and retention strategy, maintenance planning and equipment performance audit.
EXTERNAL FACTOR/ RISK *High level of non-revenue water reducing the financial sustainability of water supply operations.*		Almost Certain 5	Extreme 5	Extreme	The actions for services expansion will be anchored to non-revenue water programs and community education.
EXTERNAL FACTOR/ RISK *Climate change affecting water supply infrastructures.*		Possible 3	Moderate 3	Moderate	The interventations will include incorporating resilience actions towards impact of climate change.

4. REGIONAL SUMMARY

A. Summary cost table

The various requirements to meet water demand and the objective of 80% coverage service area populations in the urban areas served by FIPAG are summarised for the region by province in the table below.

Table 8 – Total estimated new & renewal costs by province with 80% coverage by 2030.

Value (in US$m)	Extension Works	Renewal Works	Secured Projects
Sofala	108,023,884	35,701,177	
Tete	41,681,600	7,500,000	
Manica	15,130,000	21,631,686	
Zambezia	83,024,000	10,721,676	
NRW	35,400,000		
EEP	6,200,000		
Capacity Building	7,300,000		
Total	**289,459,484**	**75,554,539**	**365,014,023**

As noted in the previous section it should be emphasised that these cost estimates do not include the budget(s) for any project(s) currently under construction within the Central region. Several outline studies have been undertaken/are underway for further projects in the region to address the water demands in the various urban areas.

B. Summary technical results, objectives, outputs and outcomes – with contribution to regional/national measures

The technical results for various indicators are summarised below at the national level, with the Northern regional contribution to these listed separately. There is no attempt to list these indicators by specific urban area; this would be done for each project as it is developed.

Indicator by 2030	National	Central Region
Total connections	1,200,000	318,479
Additional connections	480,000	184,251
Total population served	9,000,000	1,687,939
Additional population served	2,500,000	976,530
Coverage by conventional system	80%	80%
Additional coverage by point sources	20%	20%
Network length (km)	15,000	2,908

C. Summary financial outcomes (revenue growth, OPEX falls, P&L etc)

The financial impact of the various actions to meet water demand and the objective of 80% coverage service area populations in the urban areas served by FIPAG are summarised at the national level in the tables below.

SUMMARY FINANCIAL OUTCOMES - RATIOS											
	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030
Revenue Growth Rate	-16%	24.4%	5.4%	4.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%
OPEX Variations	-6%	2.1%	6.5%	5.0%	4.9%	4.9%	5.0%	5.0%	5.0%	5.1%	3.7%
Operating cost coverage ra	89%	73%	74%	74%	75%	77%	78%	80%	81%	82%	83%
Debt Service Coverage Rat											
Minimum	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Projection	-0.03	2.74	2.86	2.73	2.73	2.05	2.02	1.98	0.73	0.71	0.71

Revenue Growth Rate

The expected revenue growth rate fell by 16% between 2019 and 2020, due to the COVID-19 pandemic. This situation influenced the forecast for the year 2021, which ends up with an increase of about 24% (which seems high). From 2022 onwards, growth is forecast to return to trend levels of 5.4%, 4.1% and 3.1% to 2024, and from 2025 onwards, the growth rate is fixed in 3.1% until 2030.

Operating Cost Coverage Rate

The operating cost coverage ratio normally ranges between 60% and 80%. Lower values indicate good cost control. For 2020, the percentage was higher, due to loss of revenue caused by the pandemic. From 2021, the coverage ratio is expected to be within the accepted limits, except from 2028 to 2029 which it is forecast to be above the accepted range.

OPEX

Operating costs are forecast to increase annually by a constant 5% rate. There was a sharp reduction in this rate of increase to 2.1% between 2020 and the forecast for 2021. In addition, from 2019 to 2020 there was also a fall due to the pandemic.

SUMMARY OF PROFIT & LOSS											
	2,020	2,021	2,022	2,023	2,024	2,025	2,026	2,027	2,028	2,029	2,030
Operating Revenue	2,141,164,627	2,664,460,932	2,809,470,903	2,923,700,886	3,015,573,754	3,110,183,186	3,207,552,478	3,308,042,708	3,411,786,965	3,518,923,018	3,629,536,914
Operating Expenses	1,900,375,630	1,939,570,055	2,065,236,719	2,168,679,328	2,274,494,258	2,386,424,783	2,504,820,670	2,630,137,690	2,762,761,403	2,903,063,692	3,011,439,435
Operating Results	**240,788,998**	**724,890,877**	**744,234,184**	**755,021,558**	**741,079,496**	**723,758,403**	**702,731,808**	**677,905,018**	**649,025,562**	**615,859,326**	**618,097,480**
Financial result	(250,048,435)										
EBITDA	(9,259,437)	724,890,877	744,234,184	755,021,558	741,079,496	723,758,403	702,731,808	677,905,018	649,025,562	615,859,326	618,097,480
Depreciation	291,442,899	507,000,000	452,185,171	455,075,373	458,047,803	461,032,309	464,114,436	467,380,527	470,749,178	474,225,867	477,816,470
Total interest expenses	60,883,255	56,268,639	51,654,024	57,212,460	52,371,777	68,048,310	62,423,709	56,799,109	108,813,097	103,785,362	99,073,435
Net earnings	**(361,585,591)**	**161,622,238**	**240,394,989**	**242,733,725**	**230,659,916**	**194,677,784**	**176,193,662**	**153,725,382**	**69,463,287**	**37,848,096**	**41,207,576**

Revenue Growth

The growth of sales by almost 59% until 2030 can be explained as follows:

- ✓ Over the period up to 2030, new connections will increase by 145,500.
- ✓ The current customer base will grow from 594,070 active connections to approximately 739,600.
- ✓ The coverage rate is currently (2020) at around 54%, but the forecast until 2030 is to maintain it, therefore, it will somehow increase the population growth forecasted by INE in more than 50% from 2020 to 2030.
- ✓ In 2020 FIPAG had about 10,415 km of network. By 2030 this is expected to increase to 15,082 km, an increase of about 45%. Extending the network allows more customers to be connected.
- ✓ The tariff will increase 2% annually from 2021 to 2030. This increase will be applied across all FIPAG Operational Companies.

D. Supporting measures for delivery & risk mitigation (e.g. tariffs, organisational changes)

Sustainability Support Measures Based on Tariffs Adjustment

The new Tariff Schedule and the proposed tariff adjustments will allow:

- ✓ Full recovery of operation and maintenance costs.
- ✓ Recovery of investments in the medium term.
- ✓ Promotion of decentralization of services and guarantee of sustainability.

Thus, a tariff proposal is presented, focused on the cost and investment coverage targets previously mentioned and corrected for the effects of inflation.

Despite the adjustments applied, given the revenues generated by the companies, it has not been possible to cover the costs related to the operation of the companies and the payment of the debt service, since the cost of limited cross-subsidy and conditions of financial equilibrium, the systems are conditioned to provide continuity of these services, putting pressure on the installed capacity of the systems.

Tariff Adjustment Impact

The adjustment process is designed to deliver the following outcomes:

- Continuation of the subsidy for an additional 1.5 million people in the social bracket, thus contributing to the maintenance of the basic food basket.
- Improvements in the efficiency in the provision of services, reductions in losses and increased hours of service and water quality.
- Creation of favourable conditions to attract investment and participation from the private sector.
- Guaranteeing the payment of the debt service of approximately US$9.8m per year.
- Supporting the smaller scale water supply systems that are or have been rehabilitated and operate under the delegated management regime.
- Continue to guarantee coverage of costs from the current 70% to 86%.

Management Process Support & Risk Management

RISK LOG FRAME APPROACH				
FACTOR/ RISK	RISK CHARACTERIZATION			Mitigation Actions
	PROBABILITY	SEVERITY	RISK TYPE	
EXTERNAL FACTOR/ RISK or Risk Title	Possible	Strong	High	The Government of Mozambique (GoM) has implemented measures austerity, to minimize the effects; In 2019, FIPAG implemented cost / expense containment measures to ensure the continuity of the operation.
Change in the country's political and macroeconomic situation	*3*	*4*		
INTERNAL FACTOR/ RISK	Unlikely	Low	Low	FIPAG, established the ethics and anti-corruption committee at central and operational levels; FIPAG will publish its performance (report of accounts) for public knowledge, in an efficient and continuous manner.
Governance	*2*	*2*		
EXTERNAL FACTOR/ RISK	Possible	Moderate	Moderate	The government approved the decree that encourages the participation of the private sector in the strategic initiatives of the DMF and the creation of Regional Societies; FIPAG approved the new organic statute to respond to the current institutional changes.
Weak implementation of DMF strategic options	*3*	*3*		
INTERNAL & EXTERNAL FACTOR/ RISK	High Probability	Strong	Extreme	The Government has encouraged the search option capabilities through PPPs and other internal investment options; FIPAG has been sharing projects with other financing coverage with other partners; FIPAG has prepared pre-feasibility studies and economic analyzes to guide future investments.
Lack of resources for projects implementation	*4*	*4*		
EXTERNAL FACTOR/ RISK	Possible	Moderate	Moderate	FIPAG, has observed the adjustments tariff rates in compliance with the cycle approved by the government. The last tariff adjustment took place in 2018.
Non-adjustment of water tariffs	*3*	*3*		
EXTERNAL FACTOR/ RISK	Almost Certain	Strong	Extreme	The Government, through the water sector, has coordinated efforts to respond to the insufficiency of resources, through financing from other sources of resources (eg water desalination); FIPAG has prepared pre-feasibility studies and Master Plan, to answer and guide current demands in terms ofsources.
Insufficiency of water resources to ensure sources of water abstraction (Climate changes - Droughts and Floods)	*5*	*4*		
EXTERNAL FACTOR/ RISK	Possible	Moderate	Moderate	FIPAG has been developing internal strategies to involve the private sector in systems management in order to engage new financing opportunities and fill the existing deficit
The water sector has been experiencing a retraction of funding to invest in the expansion of water supply(difficulties in finding other alternative sources of funding)	*3*	*3*		

5. FINAL REMARKS

The estimated budget to achieve the objectives mentioned above in the Central region is estimated at **740.41 M USD**. The summary of investment needs (table 9) below details the budget proposed.

Table 2. The Center regional proposed budget

CENTRAL REGION	TOTAL (Million USD)
RESILIENT INFRASTRUCTURE - WATER SUPPLY	$ 365.01
RESILIENT INFRASTRUCTURE - DAM	$ 326.50
SUSTAINABLE SERVICES- NRW	$ 35.40
SUSTAINABLE SERVICE - ENERGY EFFICIENCY	$ 6.20
SUSTAINABLE SERVICE - OTHERS	$ 0.00
CAPACITY BUILDING	$ 7.30
TOTAL WATER SUPPLY	$ 413.91
TOTAL WATER RESOURCES (DAM)	$ 326.50
TOTAL	$ 740.41

The implementation of this project will increase average coverage from 45% to 80% allowing for an additional of more than 976,530 people to have access to safe drinking water. It will also reduce water losses from around 41% to 25 %. Therefore, the implementation of the current project is essential for the Economic and Social development of Central region