



Fiji Water Sector Strategy 2050

Clean reliable water
and safe sanitation
for all

April 2024

We would like to thank all the stakeholders who attended the Ideation Workshop in March 2023 and who contributed information and ideas to this strategy.

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Cover photo: Mrs Kelera Bulou of Lawai village, Nadroga holding a traditional Saqamoli.

Saqamoli

A traditional clay drinking vessel that comprised three connected spherical chambers and three hollow arms that combined to make one handle. It captures the essence of traditional clean water storage and transportation. It can be found depicted on the \$1 coin. Therefore this document with water and its investment needs is best represented by this traditional vessel.

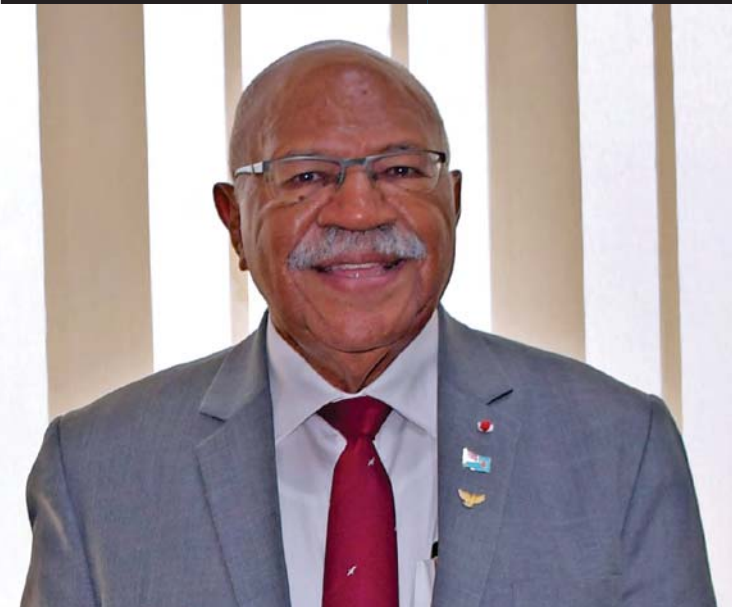


Saqamoli, FM 55/72; photographed by Mereia Luvunakoro; provided courtesy of the Trustees of the Fiji Museum.

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Foreword



Hon. Sitiveni Rabuka

Prime Minister
Republic of Fiji

The Water Sector Strategy 2050 is Fiji's first national strategy that outlines the long-term vision and provides strategic direction for ensuring sustainable and resilient water and sanitation services for all our citizens in the next three decades.

Water is not only fundamental to sustaining life; it is the bedrock upon which our communities, economies, and environments thrive. Yet, despite its critical importance, ensuring access to safe, clean water remains a challenge for many countries around the globe, including our own.


Government has accelerated efforts to achieve water-related Sustainable Development Goals (SDGs), particularly SDG 6 on "Clean Water and Sanitation" aimed at building clean, safe, and equitable water supply and sanitation that will ensure resilient, inclusive and sustainable communities in Fiji. Global experience shows that economic benefits from investment in the provision of water and sanitation services are massive and far outweigh costs.

A robust Water Sector is essential for public health, critical for protecting our pristine environment and tourism, and is a key ingredient for economic development. Our management of water and sanitation must change if we are to meet the threat

of climate change. For Fiji, like the rest of the Pacific, climate change is already here, and our only option is adaptation. This strategy identifies critical and urgent investments needed to build climate adaptation.

Government is committed in its effort to increase access to water, sanitation, and health (WASH) services in both urban, rural and informal communities, given its importance to public health. Water security is a cross cutting issue affecting multiple sectors, and a number of partnerships are active across the region. This cooperation has ensured the sharing of knowledge and has provided high level strategic guidance on climate and disaster resilience.

Notable projects that have been completed include the Rewa River Water Supply Project at Viria, the packaged water treatment plants in Nadi and Nabouwalu (Vanua Levu) and 17 rural projects. Our nation has reached a major milestone in terms of upgrades to our water infrastructure. Nationally, 82% of our people have access to clean drinking water. However, with only 17% Fijians having access to Water Authority of Fiji's (WAF) sanitation services, a similar sense of urgency is now needed to improve the state of sanitation in our country.



Through strategic investments and innovative solutions, we seek to modernize aging infrastructure, enhance water quality, and expand access to reliable services. By prioritizing efficiency, resilience, and inclusivity, we aim to safeguard this precious resource for future generations.

This plan is more than just a blueprint for development; it is a promise—a promise to prioritize the well-being of our people. It is a call to action for collaboration and cooperation across sectors and communities. Only by working together, can we overcome the complex challenges that lie ahead.

The Water Sector Strategy 2050 outlines Fiji's water sector priority projects and programs over the next three decades aimed at transforming how services are delivered, responding to climate vulnerability to services, renewing our aging water and wastewater infrastructure, contributing to the circular economy and enhancing the natural environment.

This plan is for Fiji to ensure that we take progressive steps towards infrastructure development and capacity building to be able meet future demands. Our various development partners have already shown significant support for the Water Sector 2050

Strategy, and we will work in collaboration with these partners to make this strategy a reality for all Fijians.

Together with our development partners, we will transform this strategy into action on the ground to ensure that water is accessible and sufficient to meet our growing needs and is managed in a sustainable manner.

I commend all those who have contributed to the development of this plan, from policymakers to experts to citizens who have shared their insights and concerns. Your dedication and expertise have been invaluable in shaping a vision for a more sustainable and equitable water future.

As we embark on this journey, let us remember that access to clean water is not just a basic human right - it is a foundation for prosperity, health, and dignity. Together, let us strive to fulfil this promise and build a future where every individual can thrive.



Hon. Sitiveni Rabuka
Prime Minister
Republic of Fiji

Introduction



We aim to deliver on and contribute to the following sustainable development goals:



The overarching vision for the Fiji water sector is to provide **sustainable, cost effective, efficient and reliable water and sanitation services to all.**

Water services management and related infrastructure are crucial for Fiji's economic growth, food security, public health, and tourism industry. Harnessing water's productive potential and mitigating its destructive force remain a key priority to achieve equitable social and economic outcomes in Fiji.

Fiji is tracking well against SDG6 with about 94% of the Fiji population having access to basic level water supply services – 98% urban and 89% in rural areas respectively.

Only 17% of urban households have access to WAF provided sanitation services. Ministry of Health statistics indicate that Fiji averages around 10 deaths per year from water borne diseases, which are often associated with poor sanitation.

The water sector is facing accelerating external stressors due to climate induced impacts on water resource availability and vital infrastructure, population growth and urbanisation, rapidly growing demand from tourism, poor land use management practices in critical water catchments that affect raw water quality, and a general lack of a skilled workforce due to a high rate of migration.

In addition, the current tariff structure does not cover ongoing operations and maintenance, renewals and required investment on new infrastructure. The lack of capital investment in renewals has resulted in the aging water and sanitation infrastructure having very high levels of water leakage and sewer infiltration.

To achieve improved social and economic sustainable outcomes for Fiji, the Water Sector Strategy 2050 has been prepared as an overarching plan to protect the available water resources and present a consolidated pathway for future investments. It is a long-term plan for the water sector, bringing together all key stakeholders of the economy to create a common vision for water in 2050. At its core, it prioritises the economics of the provision of water services for supporting national development, through investments in climate-resilient water infrastructure to meet environmental standards and safeguard our environment. It captures current and future challenges which affect the provision of water services and identifies the priorities to be tackled in the short-and medium-term.

It was developed through a series of stakeholder engagements that included representatives from Government of Fiji, Water Authority of Fiji (WAF), development partners, communities, customers and other relevant sector bodies.

A concept paper was developed by WAF as an input to the Ideation Workshop (attended by participants from government departments such as Environment, Finance and Public Works, and iTaukei Land Trust Board, local governments and civil society) in March 2023. Participants confirmed the five underpinning pillars and identified **10 overarching**

big ideas to be pursued to realise the stated outcomes. The sub-components of the 10 Big ideas are indicated in the Outcomes section using the icon alongside.



The outputs from this workshop were presented at the three regional Customer Service Forums in July 2023, and they form an important input to the Water Sector Strategy 2050 (this document).

The Water Sector Strategy 2050 focuses on improving customer service and delivery of water and wastewater services. This will involve implementing new technologies to improve the efficiency and reliability of water distribution and wastewater collection systems and associated treatment processes.

The Strategy will be accompanied by a monitoring and evaluation framework and will be a living document which will be periodically reviewed and updated in line with the NDP planning cycle.



Strategic outcomes for 2050



The Fiji water sector aims to deliver the following **five key outcomes** by 2050, through strategic actions and interventions:



Clean Water: Access to reliable, clean and efficient water supply services.



Safe Sanitation: Access to safe sanitation services.



Liveability & Sustainability: Supporting liveability and sustainability outcomes.



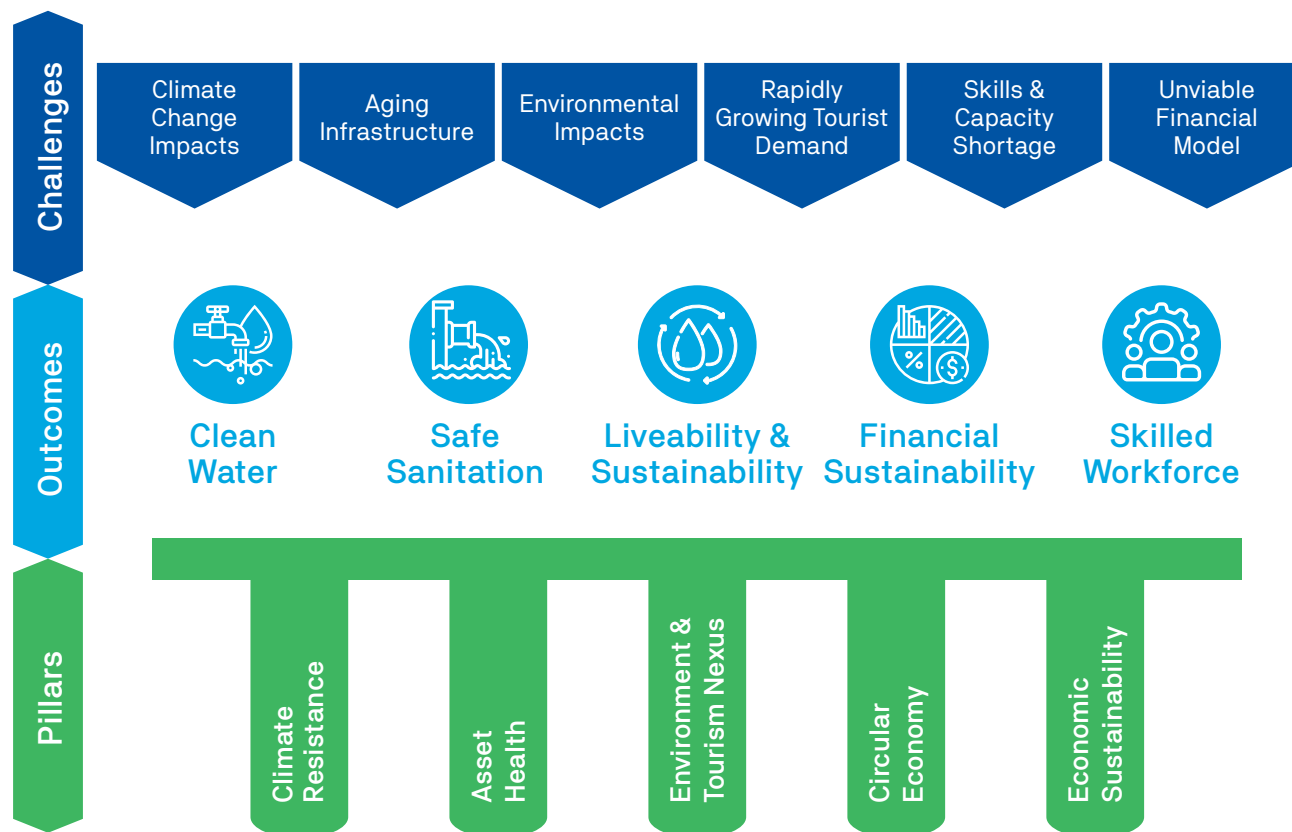
Financial Sustainability: Financially viable water sector and an independent water corporation.



Skilled Workforce: Skilled and adequate water sector workforce.

The water sector will need to overcome a range of **stressors** and **challenges** that stand to undermine the achievement of the outcomes, as illustrated alongside.

Underpinning this strategy are **five strategic pillars** that form the basis of our approach and guide our strategy to address these challenges and deliver the outcomes.





Challenges facing the water sector

To deliver the expected outcomes, the Fiji water sector will need to adequately respond to pressing contemporary stressors and challenges:

- Climate Change Impacts
- Aging Infrastructure
- Environmental Impacts
- Rapidly Growing Tourist Demand
- Skills & Capacity Shortage
- Unviable Financial Model.

Climate Change Impacts

In Fiji, the impacts of climate change will significantly affect our provision of reliable clean drinking water and safely managed sanitation services.

Over the past decade, Fiji has experienced major climatic events that have reduced the availability of clean water, disrupted the provision of services and damaged some critical water and wastewater assets. The impacts have been due to extremes in low rainfall periods, countered by major flooding events and extreme storm surges.

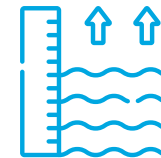
Climate change projections for the Pacific indicate rising sea levels and increased storm surges, more intense rainfall events leading to flooding, extreme rainfall variability resulting in more dry spells, and more extreme hot days and warm nights.

WAF will need to deal with higher levels of turbidity in rivers due to heavy storms, severe droughts that threatened secure water supplies at unprecedented levels and damage to assets due to sea level rise and storm surges. There is a need for greater storage capacities for periods of water scarcity, improved infrastructural robustness to mitigate damage and disruptions from storms and extreme rainfall events, and adequate treatment systems for dealing with pollution and water quality issues. Flooding, soil erosion and landslides during extreme climate-events have been identified as a particular risk to key water infrastructure.



2° to 4°

Rise of Earth's temperature to year 2100



25-50cm

Sea level rise projected by 2050



F\$4.5b

Estimated to be needed to strengthen the resilience of the water sector against climate impacts

The Climate Vulnerability Assessment report has also identified flooding during extreme climate-events as a risk to 20% of key water infrastructure.

Protecting water infrastructure against a flood with a 50-year return period would likely require investing in the relocation of more than 25 of those facilities.

Aging Infrastructure

Asset health is about the condition and the extent to which an asset delivers the required performance now and into the future.

Without investment in systematic maintenance of water and wastewater assets over the past years, Fiji's water infrastructure assets have lost value and now increasingly need replacement.

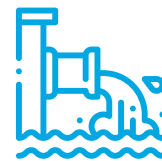
Wastewater collection networks and trunk mains are subject to high levels of inflow and infiltration, which has led to the overloading of available hydraulic capacity at critical pump stations and wastewater treatment facilities. This is likely to get worse under climate change induced sea level rise and more severe storm surges and flooding.

Current infrastructure systems have not kept pace with the digital transformation. They need to be upgraded to improve automation and real time data collection for efficient and effective operations and monitoring.



Most of Fiji's water assets are nearing the end of their economic life.

This has resulted in disruptions and inefficiencies in the delivery of water and wastewater services. Water pipe networks have high levels of bursts and leakages. System water losses are currently around 47% of the total clean water produced. There is a need to invest in asset renewal and system redundancy at critical points to ensure a reliable 24/7 service supply to customers. Half of the current water and sanitation assets will need to be renewed over the next 30 years.



1600

Blocked sewers in 2023 (Central Division)



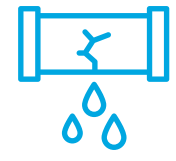
47%

Non-revenue water lost across the whole water network



F\$3b

Estimated cost of replacing aging infrastructure



125

Pipe bursts per 100km of water mains (international benchmark is 13)

Environmental Impacts

Many activities from ridge to reef negatively impact the natural environment, biodiversity and ocean health, which reduces the amenity for the local communities and tourists – such as swimming, fishing and recreation.

These activities include poor catchment management and agricultural practices, poorly performing household septic tanks, sewer overflows and non-compliant wastewater treatment facilities, and industries discharging liquid trade waste directly to rivers and streams.

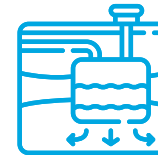
In addition, land use practices (including sand and gravel extraction from rivers) and the over extraction of surface water can negatively impact on the necessary environmental flows to sustain the downstream biodiversity in fauna and flora.

Illegal dumping of waste in sewers, illegal stormwater connections, and infiltration into aging pipes in some areas has resulted in sewer overflows into waterways and the ocean. The introduction of microplastics into ecosystems via solid waste disposal into rivers and wastewater discharges into the ocean results in these particles affecting aquatic life.

The high energy demand from water and wastewater pumping and treatment means that the carbon footprint of the water sector is relatively high.

None of WAF's 11 wastewater treatment plants and associated reticulation systems are currently environmentally compliant.

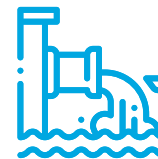
Treatment systems are operating at well over their design capacity or have chronic mechanical malfunctions. WAF is currently operating under Interim Permits from the Department of Environment. Future growth, as well as the connection of backlog customers currently on septic tanks in the major urban centres, will see this situation exacerbated.



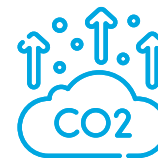
78% of Suva residents rely on septic tanks to treat sewage, resulting in contaminated local environments and poorly managed faecal sludge



289 Prohibition and non-compliance notices were issued to industries and companies in 2021/22 by the Department of Environment



30 Sewer overflows per 100km of sewer network annually



16,500 tonnes of CO₂ are emitted into the atmosphere due to electricity demand for pumping and treatment in WAF

Rapidly Growing Tourist Demand

Fiji's tourism sector is fundamental to the economy, contributing over 40% of the GDP.

Currently Fiji has an estimated 450 licensed accommodation providers, with a total of nearly 13,000 rooms. This is set to expand to 17,000 rooms over the next 3-5 years, and to 23,000 rooms by 2035. This will add further demand on limited water resources and require safe and reliable wastewater management.

In tourist-heavy areas, the large volumes of solid waste generated by hotels and other tourist related facilities go to landfill. The responsible management of solid waste and safe treatment of wastewater in these tourist locations is paramount to ensuring that the local environment and public health are not negatively affected.

A circular economy approach to managing solid and liquid waste from the tourism sector could further confirm its eco-tourism credentials. This could be done using nature-based wastewater treatment systems, utilising recycled water for outdoor use and toilet flushing, applying treated biosolids to gardens, and adopting water efficient practices to reduce their average water demand.



40%

of the Fiji GDP comes from tourism



10x

1 hotel tourist uses up to 10 times the water demand of local urban resident



27%

of all the daily water demand by Nadi customers is consumed by hotels

The tourism growth corridor on the Coral Coast will need new water supply and wastewater collection networks and associated treatment facilities to ensure the tourism industry, the local communities and the environment are vibrant and healthy. Creative technological and financing approaches will be needed to meet this servicing gap.

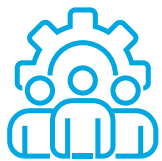
Skills & Capacity Shortage

Nationally, there is a large workforce skill and capacity gap which affects all economic sectors in Fiji.

Skilled workers are being attracted offshore leaving an eroded skills base in critical water sector positions, both in Government and at WAF. There is an urgent need to continually train new people (including our youth) and to support skilled people to remain in the country and be more economically productive. This is critical to the economic growth of Fiji.

Further, there is a gender disparity in the water sector where men make up the majority of employed personnel, and roles are aligned with traditional gender stereotypes. Most institutions that operate in this sector do not have gender equity and social inclusion policies or action plans.

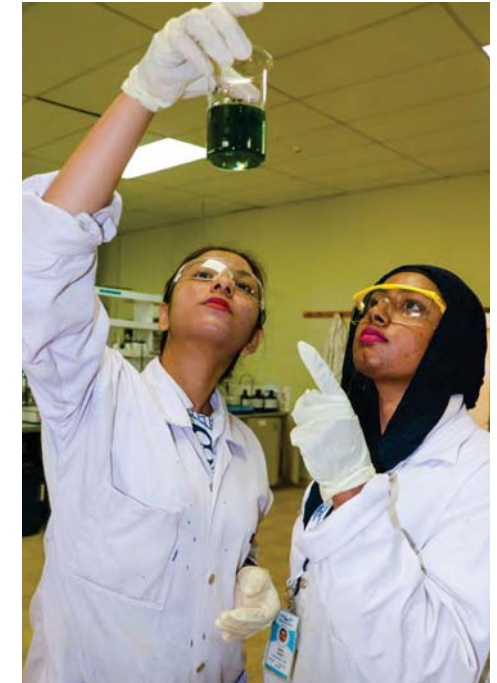
After the reopening of the international borders post COVID, **more than 55,000 Fijians left the country on work and student permits in 2022 and 2023.** (PS Finance 25 Nov 2023).



950 skilled staff lost by WAF over the past four years due to staff turnover, including migration



15% of WAF staff are female



Unviable Financial Model

It is vital that the water sector operates on a sound financial basis, ensuring that revenue recovered directly offsets operation and maintenance costs, and is used for investments in asset for renewal and growth.

Even though WAF was initially set up to be a commercial statutory body in 2010 it is still heavily reliant on government funding. The water tariff in Fiji is one of the lowest in the Pacific and has not been amended since VAT was removed from the tariff in 1999; as a result the tariff now covers less than 50% of the operating costs to deliver water and wastewater services to all its customers (with no allowance for capital expenditure for renewals, augmentation and new infrastructure). Moving forward, if no viable financial model is explored and adopted, WAF will continue to rely heavily on the GoF to fund the operational shortfall and capital expenditures for renewals and growth servicing will continue to be deferred.

Water tariff adjustments and a realistic and urgent scaling up of targeted capital investments is now needed to achieve the expected outcomes of the Water Sector Strategy 2050.

In Greater Suva, around 75% of WAF water customers are not yet connected to the sewer network. The current sewer tariff will not cover the capital cost to address these backlog customers, let alone any new customers to the area.



15c/1000L

is paid by customers for the first tier of the tariff – the lowest in the Pacific



40%

of the operational cost of supply is not covered by the average residential revenue received



25 years

since the last change in the residential water tariff



Strategic pillars underpinning our approach

- 1 Climate Resilience
- 2 Infrastructure & Asset Health
- 3 Environment & Tourism Nexus
- 4 Circular Economy
- 5 Economic Sustainability

Strategic pillars underpinning our approach

To achieve the outcomes for the Fiji water sector in light of the identified challenges, the water sector strategy is underpinned by five thematic pillars, which have been integrated throughout this strategy. These key pillars or approaches serve to guide the implementation of the Water Sector Strategy 2050. They are strategically designed to address various aspects of water and wastewater planning and management to ensure a holistic, sustainable, and resilient water sector.



Climate Resilience

With the anticipated increase in climate driven disruptions and associated impacts on water and sanitation services, the water sector will need to adopt an adaptive planning and management approach to ensure business continuity and uninterrupted service provision.



Infrastructure & Asset Health

To deliver the outcomes, water and sanitation infrastructure will need to be climate resilient, well maintained and renewed when they reach the end of their useful life. Strong linkages between service and asset performance, risk, and financial performance with low environmental impact will need to be established.



Environment & Tourism Nexus

Sustainable tourism development is heavily dependent on a healthy and pristine natural environment. The water sector needs to be ready for an increased demand for water and wastewater services, with a view to maintaining the healthy water bodies into which treated effluent is discharged.



Circular Economy

Adopting a circular economy approach provides an opportunity to use resources efficiently, reusing waste products such as biosolids and organic waste to generate energy and produce organic fertiliser and to look to energy efficient nature-based solutions.



Economic Sustainability

The water sector needs to be equipped to cater for the expected growth in economy over the next coming decades, specifically in tourism, agriculture, construction, manufacturing and real estate. Targeted investments and tariff reform will be needed to scale up the water servicing agencies to meet this future need and be financially sustainable in their own right.

Strategic outcomes for 2050

The Fiji water sector aims to deliver the following five key outcomes by 2050, through strategic and in some cases explorative actions and interventions. These are described in more detail on the next pages.



Access to reliable clean and efficient water services



Access to safe sanitation services



Supporting liveability and sustainability outcomes



Financially viable water sector and an independent water corporation



Skilled and adequate water sector work force

Access to reliable clean and efficient water services



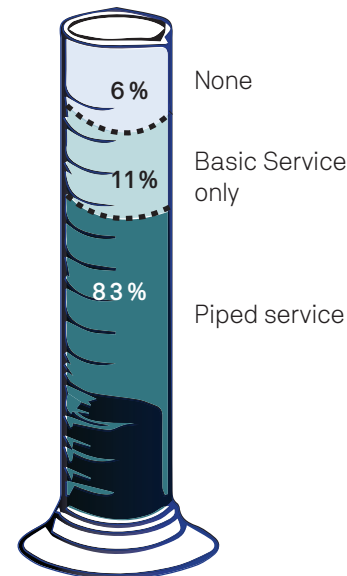
Current situation

- 83% of the total population has access to piped water services. High rates of urbanisation will increase the demand for water in the major urban centres by 2050.
- 94% of the total population (98% of urban and 89% of rural) have access to at least a basic water service (protected or piped supply). Only 58% of rural households have access to WAF provided piped water.
- Customers currently experience intermittent and disrupted water servicing and due to constraints on freshwater supplies through drought and high turbidity.
- High levels of leakage in distribution pipes are currently being experienced due to aging infrastructure.
- Inefficient water use by customers and leakage of around 30% of residential total consumption has been observed.
- No rural water masterplan is currently in place.

Expected outcome by 2050


Reliable (24/7) supply of safe water to meet all domestic, commercial and industrial needs in both urban and rural settings, through integrated water planning and management that ensures resilience to a changing and uncertain climate.

Population with access to clean water



Access to reliable clean and efficient water services continued

Response Strategy

- Manage and protect catchment collaboratively to provide surface water and groundwater recharge by adopting land-use practices that do not release high chemical and nutrient loads into the downstream waterways, drawing on scientific and traditional knowledge in an integrated way. This will require determining the inter- and intra- catchment value of water used, over and above the necessary environmental flows for the specific catchment.
- 
 - Reduce the risk of water scarcity inherent in single-source dependency and the impacts of climate induced water shortages and turbidity through integrated water management approaches, such as:
 - Increasing the storage capacity of weirs and dams (such as raising Vaturu Dam wall).
 - Designing conjunctive supply solutions to include diverse sources such as surface water, groundwater, desalination, recycled water and stormwater.
 - Mandating rainwater harvesting on all new developments for non-potable uses and to build resilience during disrupted supplies through on-site storage for urban residents.
 - Water reuse options for irrigation of parks and sports fields.
 - Negotiate collaborative water treatment and supply arrangements with commercial developers (e.g. tourism) to include supplies to local workforce and communities.

Living Lab opportunities

- Pilot a catchment management and pricing model to ensure catchment protection for improved water quality and avoided treatment costs (working with iTaukei Affairs).
- Pilot collaborative public-private partnership water treatment and supply arrangements with tourism resort developers that includes services to local communities.

Access to reliable clean and efficient water services continued

Response Strategy continued



- Reduce the level of system water losses to an economic level of 15% nationally by 2050 through asset renewal and leak reduction programs, and improved collaboration between utility partners to expedite repairs (with interim targets of less than 20% losses in Nadi-Lautoka by 2035 and in Lami-Suva-Nausori by 2030). WAF to invest around 50% of capital expenditure on asset renewals.



- Expand the reticulation networks in urban centres to keep the level of access to potable water at above 98%, by adopting a **hub and spoke strategy** i.e. first focusing on urban centres and then next logical peri-urban locations.



- Reduce customer water demand and improve efficient water use through:
 - Regulations for water efficiency performance standards and labelling on water appliances and fittings.
 - Water conservation programs that target high use residential customers focusing on behaviour change and water efficient appliances and fixtures.
 - Water efficiency programs and incentives for the hotel industry and other high commercial users.
 - Policies that ensure efficient appliances and fittings are installed in all new builds.

- Future proof critical infrastructure assets through increase system redundancy to mitigate the impacts of system failures and climate induced disruptions.



- Deploy cost effective SCADA and digital metering (commercial customer and network) to support real time monitoring of distribution network and water losses.

- Prepare and implement a masterplan for rural water supplies.



Access to reliable clean and efficient water services continued



National initiatives

Rural water and sanitation master plan

The lack of a strategic approach to delivering water and sanitation services to rural communities by Government, WAF and NGOs has resulted in an uncoordinated approach to the installation, governance and ongoing operation and maintenance of these systems.

A 2050 masterplan for rural water and sanitation is being prepared (funded by UNICEF). The options under consideration will include both unsewered and sewer systems, with treatment facilities being nature-based with minimal operational and maintenance requirements, such as trickling filters and wetlands. This masterplan should register and prioritise the communities in need of (water and) sanitation services.

The governance and ownership model for the (water and) sanitation services will be outlined, with clearly defined accountability for ongoing operation and maintenance to ensure their ongoing functionality.

Catchment Management Pilot: (Kena iTaukei ni wai)

Unprotected catchments with commercial activities such as gravel mining, sand extraction and logging result in high levels of turbidity in downstream water offtakes and storage dams, which puts pressure on the treatment facilities to meet water quality standards and customer demand.

Strategies to improve the water quality in these sensitive catchments include pressing for the introduction of more sustainable practices and/or minimising commercial activities via financial compensation agreements, and working with local communities and iTaukei Affairs to set up catchment protection protocols and agreements. The value of the incentive in each catchment will need to be established based on the value associated with water treatment costs saved by improved raw water quality.



Access to reliable clean and efficient water services continued



National initiatives

Water Efficiency Performance Standards and Labelling (WEPSL) Program

To shift the existing inefficient water appliance and fittings stock gradually over time to one that is more efficient on average will require customers to be informed about which appliances and fittings are indeed water efficient. This can be done by using WEPSL, in a similar manner to how the existing minimum energy performance standards and labelling (MEPSL) scheme provides customers with energy efficiency information.

The WEPSL will allow building standards to mandate the level of water efficiency to be installed for all new buildings and renovations. This together with the natural turn-over of stock will reduce the demand for water.

Introduce a scheme to ensure that all water using appliances are compliant with Australian/New Zealand Standard 6400:2016 Water Efficient Products – Rating and Labelling or similar.

Hotel water and energy conservation

With the growth in the number of beds projected to double by 2040, further pressure will be placed on the currently stressed water resources. A hotel leak fix and efficient (WEPSL rated) appliance and fixture rebate program has the potential to save up to 20% of demand per hotel.

On average more than 50% of water in hotels is used in bathrooms. Efficient showers and toilets can reduce this demand. Using water efficient shower heads has the added benefit of also reducing the amount of hot water used, and therefore reduces the energy demand and associated GHG emissions.



Access to reliable clean and efficient water services continued



Significant regional plans and initiatives

Central Region – Naboro/Suva/Nausori area

Based on the census growth rate of 1.01% and a higher growth scenario of 2% growth (inclusive of growth in tourism and high rates of urbanisation), the planned augmentations for the Viria water treatment facility would be required as follows:

- Phase 2 – 15,000 ML/yr: between 2032-2040 (F\$100m)
- Phase 3 – 7,000 ML/yr: from 2041-2050 (F\$50m)

Under a 2% growth rate – a new water source and treatment augmentation will be needed around 2045. If network water losses (NRW) are reduced to between 15% to 20% by 2050, the additional planned treatment capacity and investment required can be delayed.

Central Region – Residential and school efficiency programs

Water conservation should be a first step in closing the gap between demand and available supplies, before looking for supply augmentations.

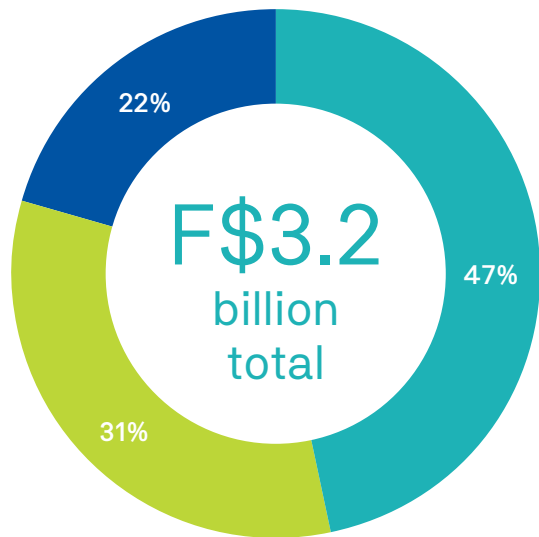
To assist residential customers with reducing their water usage, a shower head replacement program is being piloted in Suva. Once lessons have been learnt, the program will be rolled out to other major urban centres where water resources are constrained.

To reduce the demand for water by schools, a small pilot Schools Leak Fix program has been implemented demonstrating that the cost to save the water was roughly half the cost to produce and supply clean water.

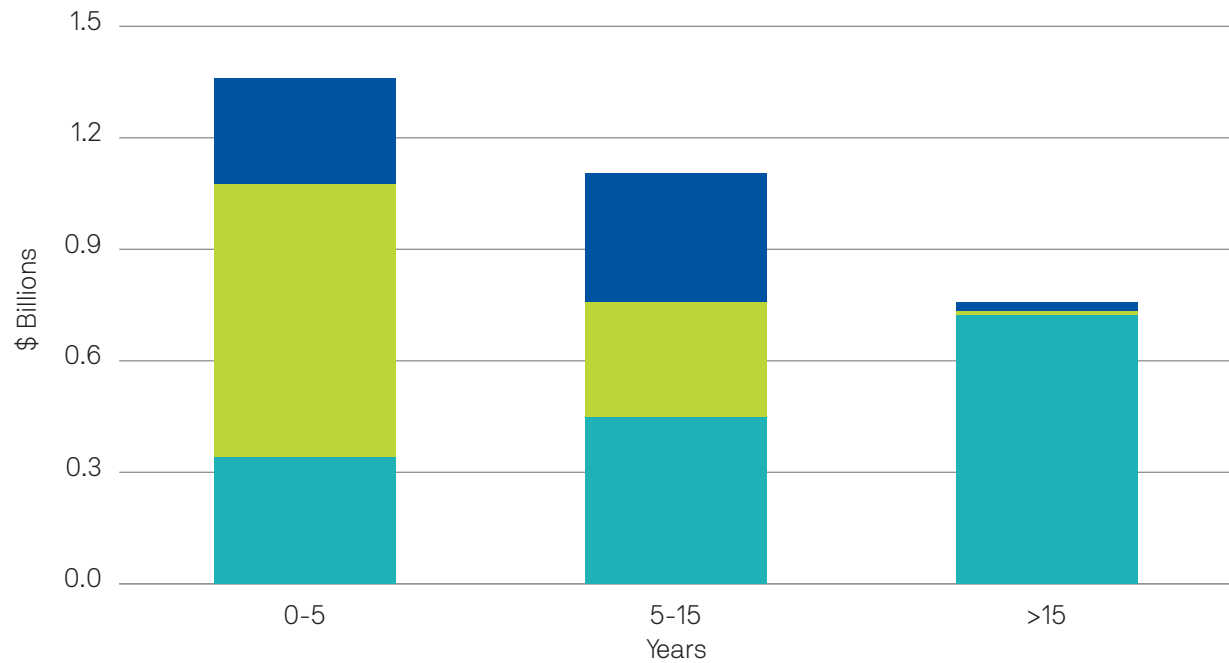
In collaboration with the International Solar Alliance, energy efficiency programs at schools can be run together.

Access to reliable clean and efficient water services continued

National water capital investments



- **Asset renewals and replacement** \$1.5 billion
- **Augmentation to increase system capacity** \$1.0 billion
- **New servicing systems** \$0.7 billion



Note: all amounts in present day figures with no escalation.

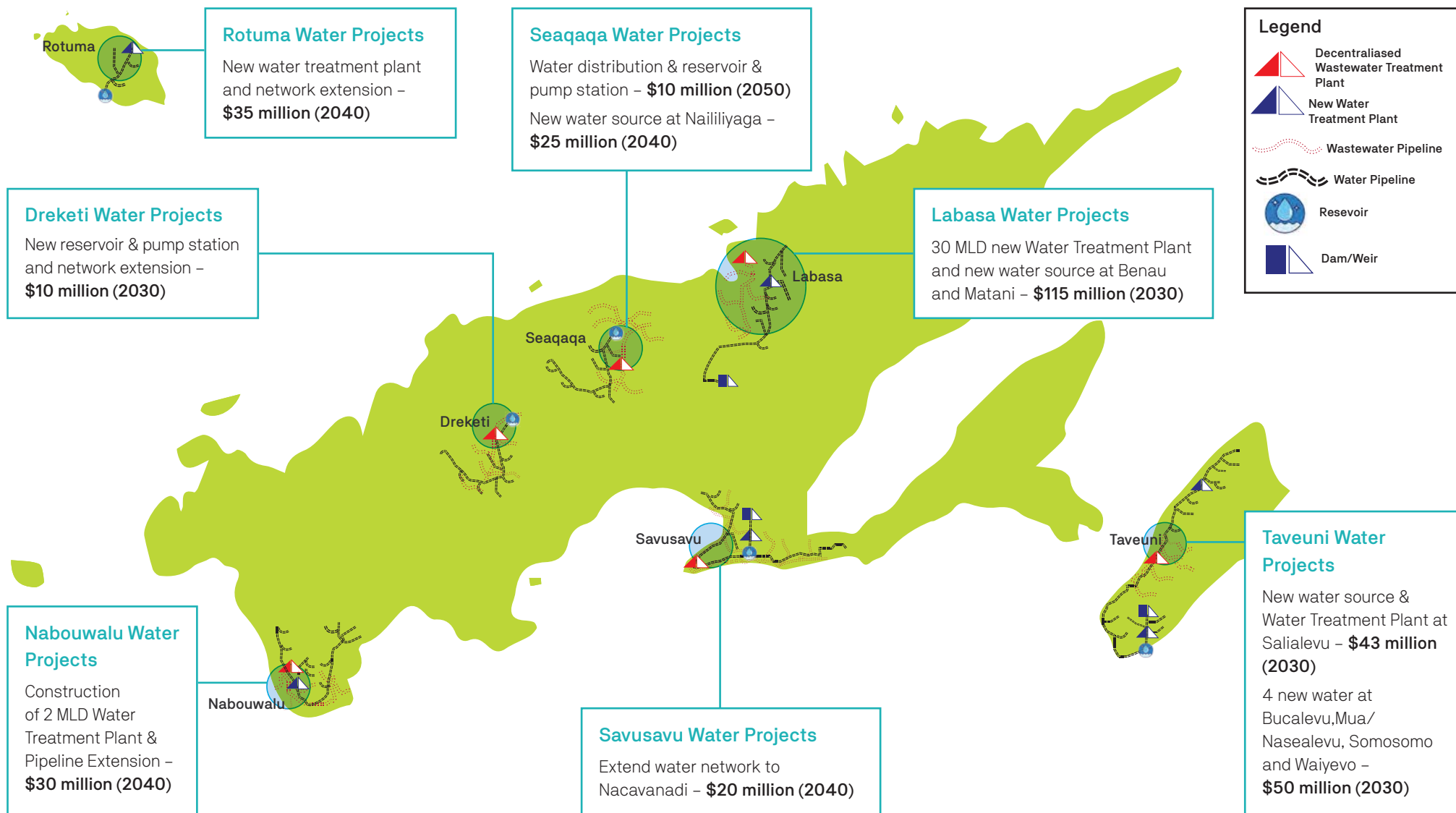
Vanua Levu

Investments in new and augmentation water projects – Northern Division and Rotuma



F\$218m
by 2030

F\$120m
by 2031-2050



Viti Levu

Investments in new and augmentation water projects – Western Division



F\$465m
by 2030

F\$221m
by 2031-2050

Ba/Lautoka Water Projects

Ba-Lautoka trunk mains upgrade and extension – **\$17.1 million (2040)**
 Ba-Lautoka Distribution mains upgrade and extension – **\$26 million (2040)**
 Ba water supply scheme trunk main upgrade – **\$12.4 million (2040)**
 Ba-Tavua reticulation extension – **\$10.6 million (2040)**

Nadi/Lautoka Water Projects

Nadi/Lautoka Water sources & Water treatment plant upgrade – **\$103 million (2030)**
 Nadi/ Lautoka Water Reservoirs, Pump Stations & Trunk Mains – **\$116.3 million (2030)**
 2 MLD Nawaicoba water supply scheme and network extension – **\$6 million (2030)**
 New water source at Teidamu (Lautoka) & Votualevu (Nadi) – **\$35.8 million (2040)**
 Vaturu to Nagado Trunk Main upgrade – **\$135.9 million (2030)**

Rakiraki Water Projects

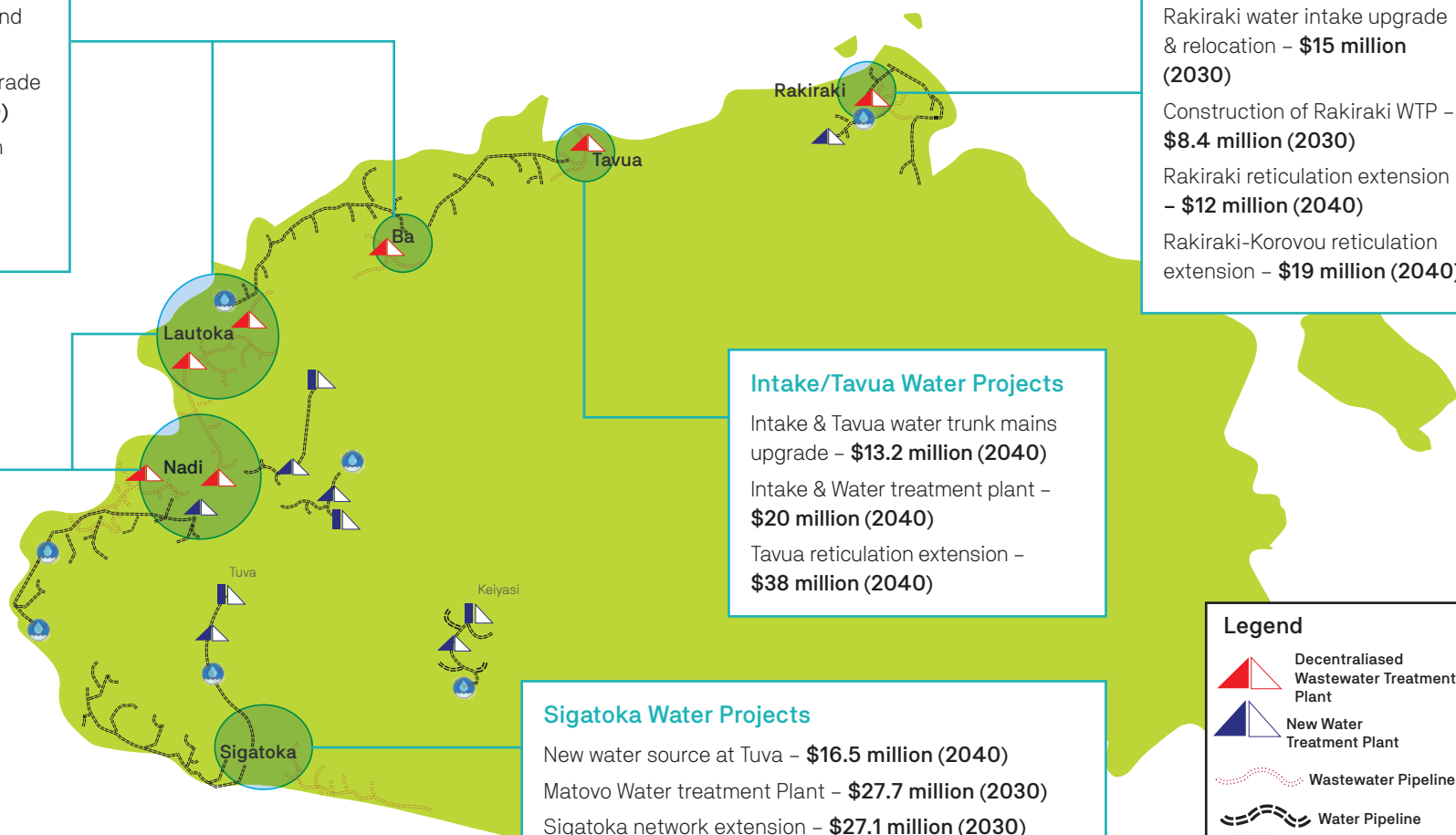
Rakiraki water intake upgrade & relocation – **\$15 million (2030)**
 Construction of Rakiraki WTP – **\$8.4 million (2030)**
 Rakiraki reticulation extension – **\$12 million (2040)**
 Rakiraki-Korovou reticulation extension – **\$19 million (2040)**

Intake/Tavua Water Projects







Intake & Tavua water trunk mains upgrade – **\$13.2 million (2040)**
 Intake & Water treatment plant – **\$20 million (2040)**
 Tavua reticulation extension – **\$38 million (2040)**

Sigatoka Water Projects

New water source at Tuva – **\$16.5 million (2040)**
 Matovo Water treatment Plant – **\$27.7 million (2030)**
 Sigatoka network extension – **\$27.1 million (2030)**
 Keiyasi 3 MLD water treatment plant – **\$13 million (2030)**
 Nadarivatu water treatment plant and network extension – **\$13 million (2030)**



Legend

-  Decentralised Wastewater Treatment Plant
-  New Water Treatment Plant
-  Wastewater Pipeline
-  Water Pipeline
-  Reservoir
-  Dam/Weir

Viti Levu

Investments in new and augmentation water projects – Central Division



F\$325m
by 2030

F\$366m
by 2031-2050



Access to safe sanitation services



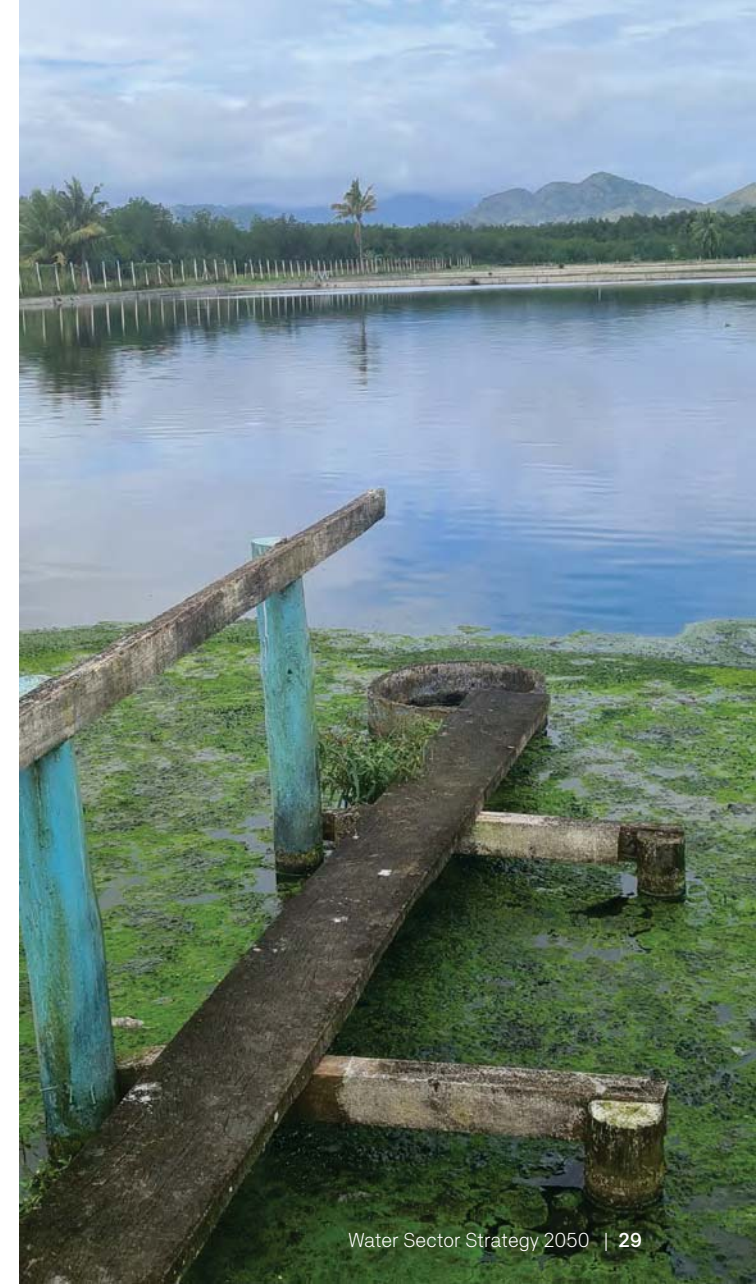
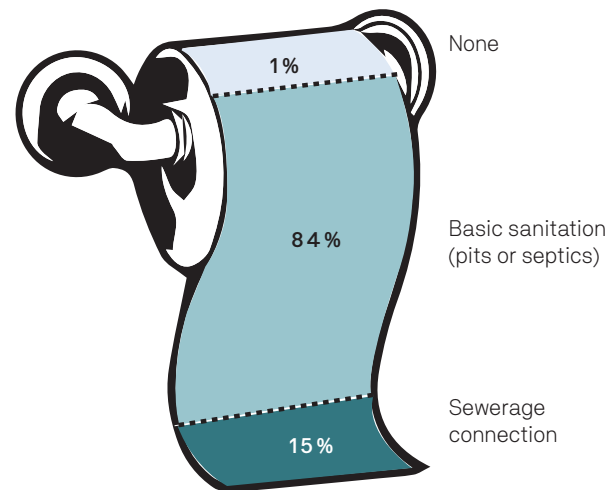
Current situation

- Only 17% of all urban residential customers connected to WAF water supplies have access to sewerage sanitation infrastructure. The remainder of urban residents have septic tanks.
- WAF’s 11 wastewater treatment plants do not have the capacity to effectively treat the wastewater they receive. Pond treatment systems are well over capacity. Mechanical systems are also over their hydraulic design capacities and have chronic malfunctions.
- Due to urbanisation, large informal settlements in major cities lack adequately designed and managed sewage treatment systems, including for faecal sludge.
- There is no proactive faecal sludge management in place. The emptying of household pits and septic tanks is not regulated and current biosolds are stock piled.
- Compliance with the National Liquid Waste Standards is poor in the absence of adequate regulation and is adding to the treatment capacity problem.
- There is no sanitation masterplan in place for rural areas.

Expected outcome by 2050

Access to safe sanitation services to meet all domestic, commercial and industrial needs in both urban and rural settings, that is resilient to climate change impacts.

Population with access to clean sanitation



Response Strategy



- Expand the coverage of urban sewer services to include backlog customers with septic tanks and new growth areas. Prioritise backlog sewerage programs in urban areas based on density loadings and soil/groundwater considerations.
- Develop loading/density criteria for when septic tank systems in rural and peri-urban areas are inadequate and need to be replaced with a decentralised sewerage treatment system.
- Improve alignment with Town and Country Planning so that new infrastructure and developments are in sync.



- Utilise decentralised systems and/or nature-based systems for informal settlements and for out of sequence housing and commercial developments (e.g. the RISE pilot nature-based pilot at Tamavua-i-wai shown alongside).



- Reduce the level of inflow and infiltration in the sewer network through asset improvement and replacement programs, and verify the integrity of customer connections.
- Improve trade waste compliance through regulation, proactive monitoring and enforcement.
- Develop a holistic national faecal sludge management framework and capacity plan.
- Prepare and implement a masterplan for safe rural sanitation.



Living Lab opportunities:

- Pilot a PPP model for construction and/or operation of wastewater treatment infrastructure.
- Pilot collaborative water treatment and supply arrangements with tourism resort developers.
- Adopt a circular economy approach for the productive use of treated wastewater and biosolids.

Photo courtesy of RISE.

Access to safe sanitation services continued

Response Strategy continued



- Upgrade the existing 11 WAF wastewater treatment facilities to meet current demand and comply with outcomes based environmental discharge requirements as a matter of urgency.



- Implement decentralised wastewater treatment strategy to minimise the extensive energy and costs involved with long distance piping and pumping.



- Prioritise nature-based wastewater treatment approaches over energy intensive and centralised solutions.



- Implement collaborative wastewater treatment arrangements with the private sector and tourism resort developers to include services to local workforce and communities.
- Prepare revised national design standards and guidelines that incorporate resilience to climate change impacts, such as storm surges, flooding and sea level rise. Review and upgrade existing sanitation infrastructure and design and build new sanitation infrastructure in accordance with these standards.



Access to safe sanitation services continued

National initiatives



Protecting wastewater assets from sea level rise and storm surge

Rising sea levels, more frequent and intense storm surges, and flooding due to climate change will increase the level of inflow and infiltration of the sewer network, and will cause critical pump stations to malfunction. This will result in contamination of the local environment and water ways creating public health risks.

Critical assets along the Lami/Suva/ Nausori, and Nadi to Lautoka coastlines are most vulnerable. Sewers should be relined to be watertight and pump stations should be protected from inundation using either protection walls, be elevated, or be relocated. Future alignment of sewer infrastructure should take into consideration future sea level rise and increased storm surges, and the associated additional cost implications.



Wastewater treatment management strategies

A national wastewater strategy is being prepared by WAF (funded by UNDP). An estimated \$1.1 billion is recommended to upgrade or replace all 11 wastewater treatment facilities. The cost benefit analysis provides a compelling case for improving societal welfare.

Central to this success is private sector involvement through Public-Private Partnerships (PPPs), coupled with an unwavering commitment to long-term sustainability.

The provision of credit guarantees to incentivise private sector participation and the integration of employment and skills transfer provisions in all Public-Private Partnership contracts is recommended. Under these arrangements, the government will need to secure financing to bridge the financial gap between tariff revenue and projected expenditure.

Biosolids and faecal sludge management

There is currently no policy, strategy or infrastructure in place for the safe management of faecal sludge and biosolids from septic tanks and wastewater treatment facilities. Septic tanks are not emptied regularly and biosolids are currently stockpiled, leading to environmental contamination.

A national strategy leading to the construction of appropriate infrastructure to safely manage biosolids and septic tank sludge will be prepared. This strategy will adopt circular economy principles and seek beneficial uses for biosolids through waste to energy investments or products for agricultural land application. This will involve engaging with stakeholders from the energy and agricultural sectors to build the necessary knowledge and markets for the products.

This initiative will also support the national Climate Change objective of achieving net zero emissions by 2050 through a reduction in the use of diesel-powered energy sources for wastewater treatment. It will also reduce methane emissions from sludge digestion and landfill disposal, while also reducing the load on the landfills. A pilot scheme will be used to build the necessary capacity in Fiji.

Significant regional plans and initiatives

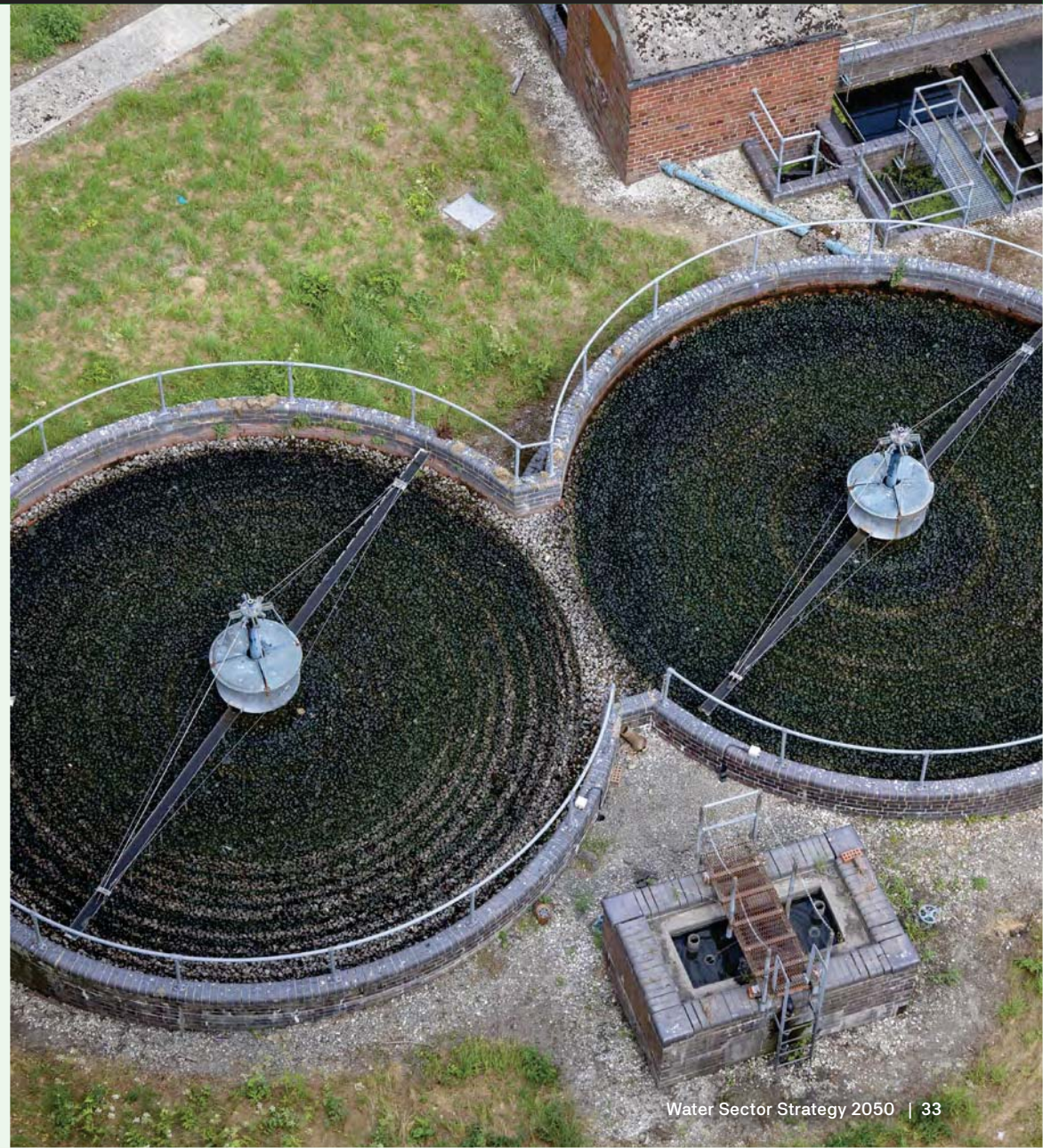
Northern Region: Pilot – Wastewater management infrastructure and systems in Savusavu

The World Bank has signed an agreement with the Government of Fiji to allocate F\$137m to help Fiji deliver its vision for more sustainable, inclusive, and resilient tourism across the country, with an initial focus on Vanua Levu. Of this, F\$4m will be used to carry out a feasibility study for wastewater management infrastructure and systems in Savusavu, including a small-scale pilot of a sewerage treatment facility with climate change impact considerations in the design. Currently all households and businesses use septic systems.

Solutions have been identified by WAF, including a full upgrade of the sewerage and treatment system in Labasa and the installation of a sewerage system in Savusavu. The latter is more urgent because of the environmental pollution already being detected in places, such as Savusavu Bay.

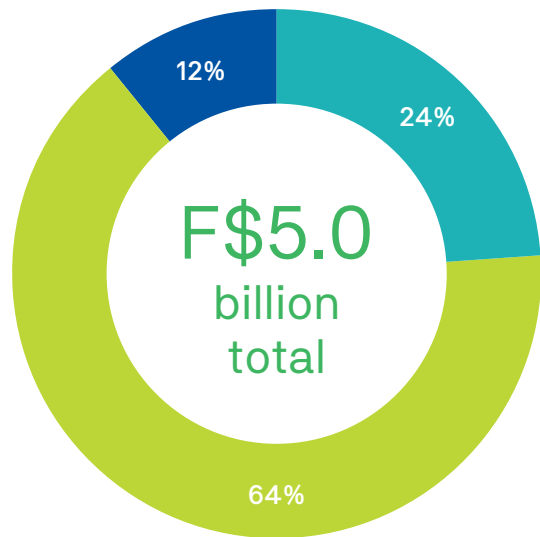
One of the possible least-cost techniques is the bio-trickling filter, which is easy to operate without the need for high operational competency, and is environmentally friendly and climate resilient, as they require less energy.

The study includes an impact analysis to assess the potential impacts of climate change on the proposed wastewater treatment performance. The findings from the feasibility study and learning from the pilot program will guide climate-informed investments in the next phase of the program and other locations in Fiji.

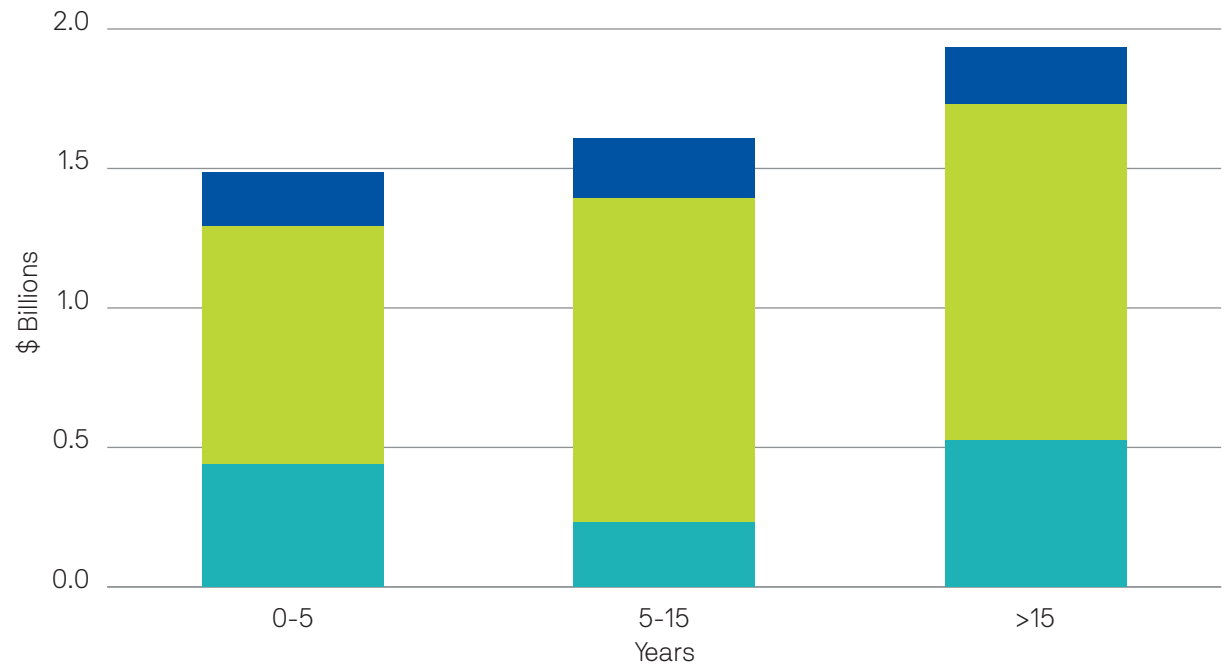


Access to safe sanitation services continued

National capital investments



- **Asset renewals and replacement** \$1.2 billion
- **Augmentation to increase system capacity** \$3.2 billion
- **New servicing systems** \$0.6 billion



Note: all amounts in present day figures with no escalation.

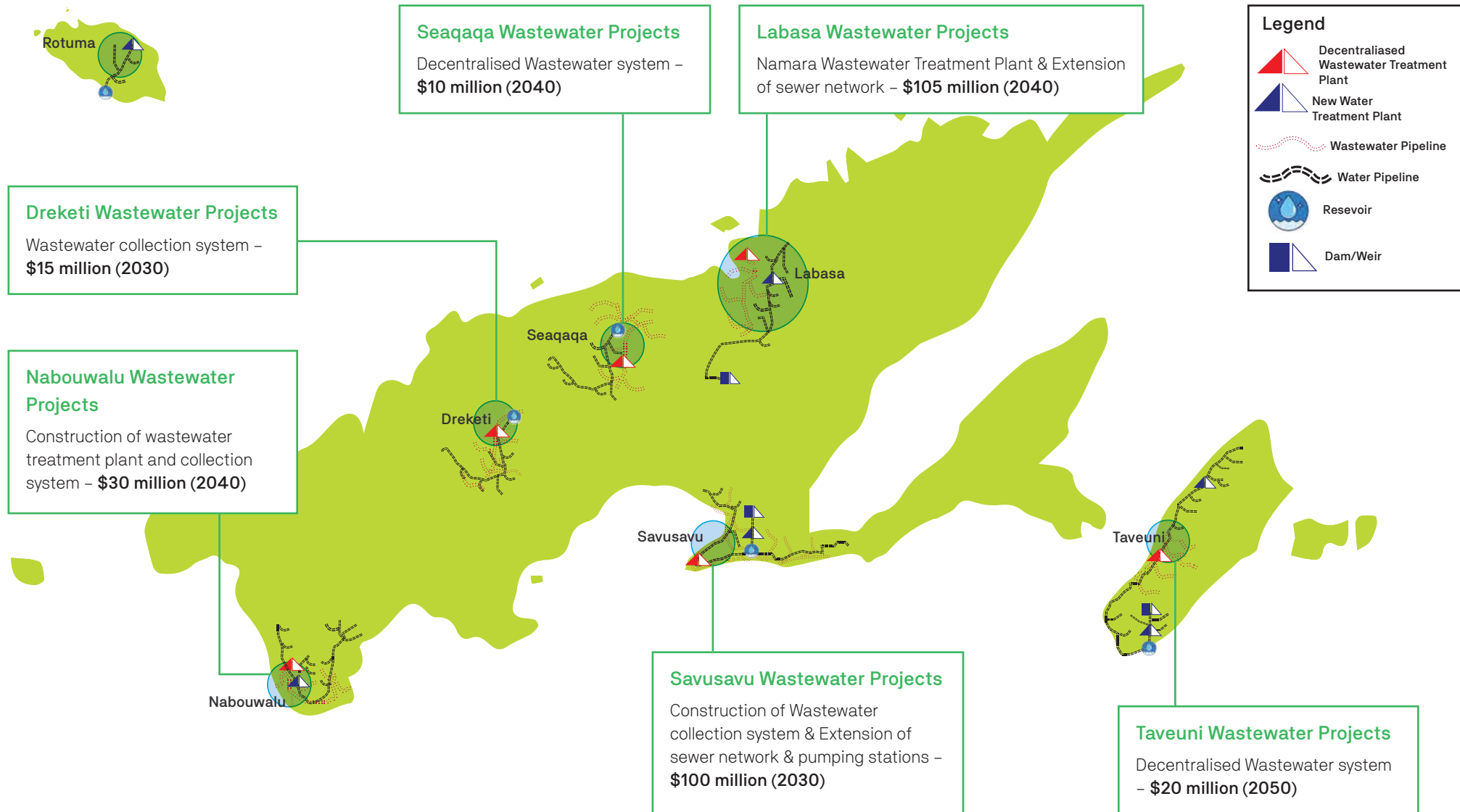
Vanua Levu

Investments in new and augmentation wastewater projects – Northern Division and Rotuma



F\$115m
by 2030

F\$165m
by 2031-2050



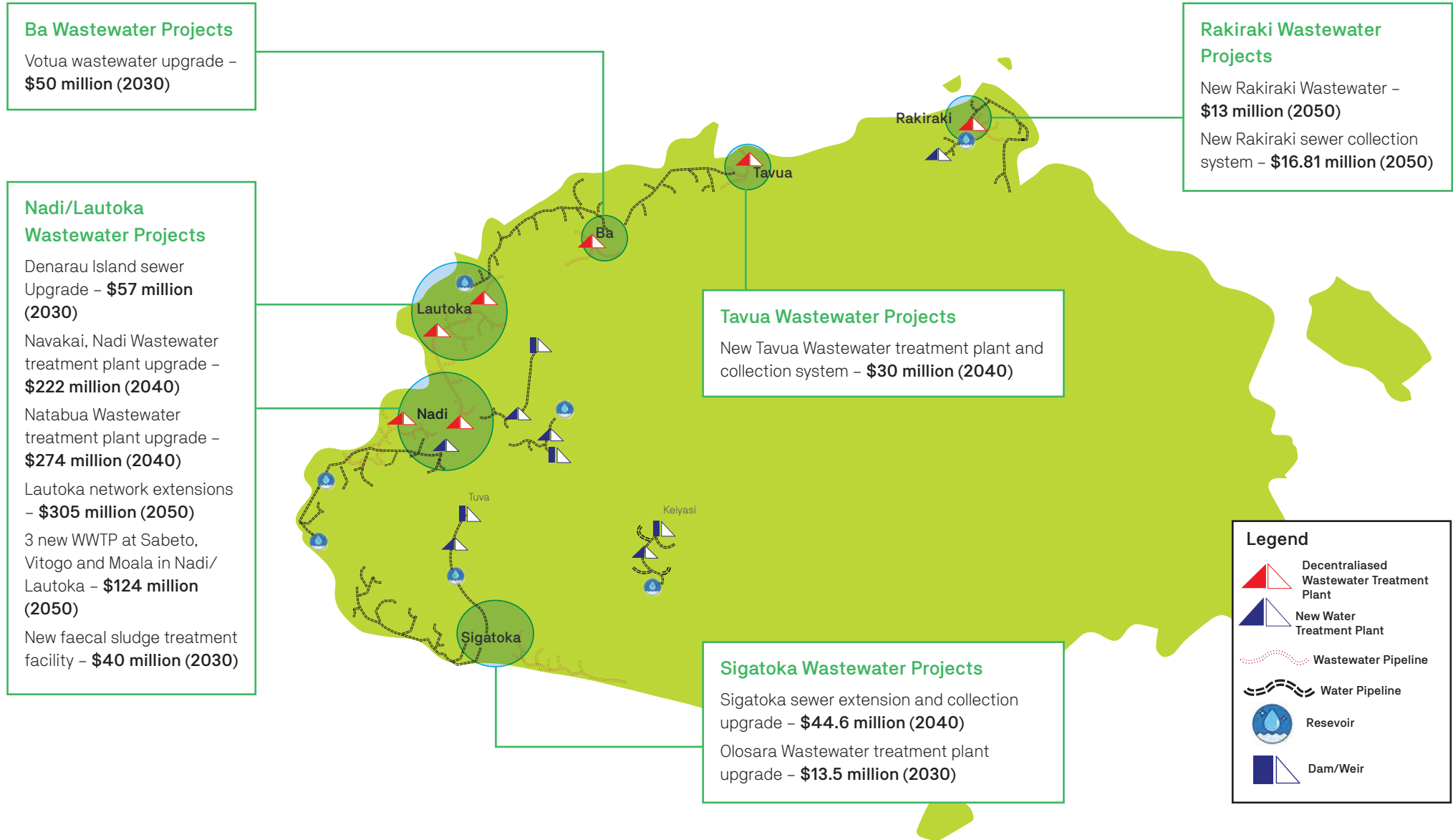
Viti Levu

Investments in new and augmentation wastewater projects – Western Division



F\$161m
by 2030

F\$1,029m
by 2031-2050



Viti Levu







Investments in new and augmentation wastewater projects – Central Division



F\$746m
by 2030

F\$1,618m
by 2031-2050

Legend

-  Decentralised Wastewater Treatment Plant
-  New Water Treatment Plant
-  Wastewater Pipeline
-  Water Pipeline
-  Reservoir
-  Dam/Weir

Korovou Wastewater Projects

- New Korovou Wastewater treatment plant – **\$15 million (2050)**
- New Korovou sewer collection system – **\$9 million (2050)**

Levuka Wastewater Projects

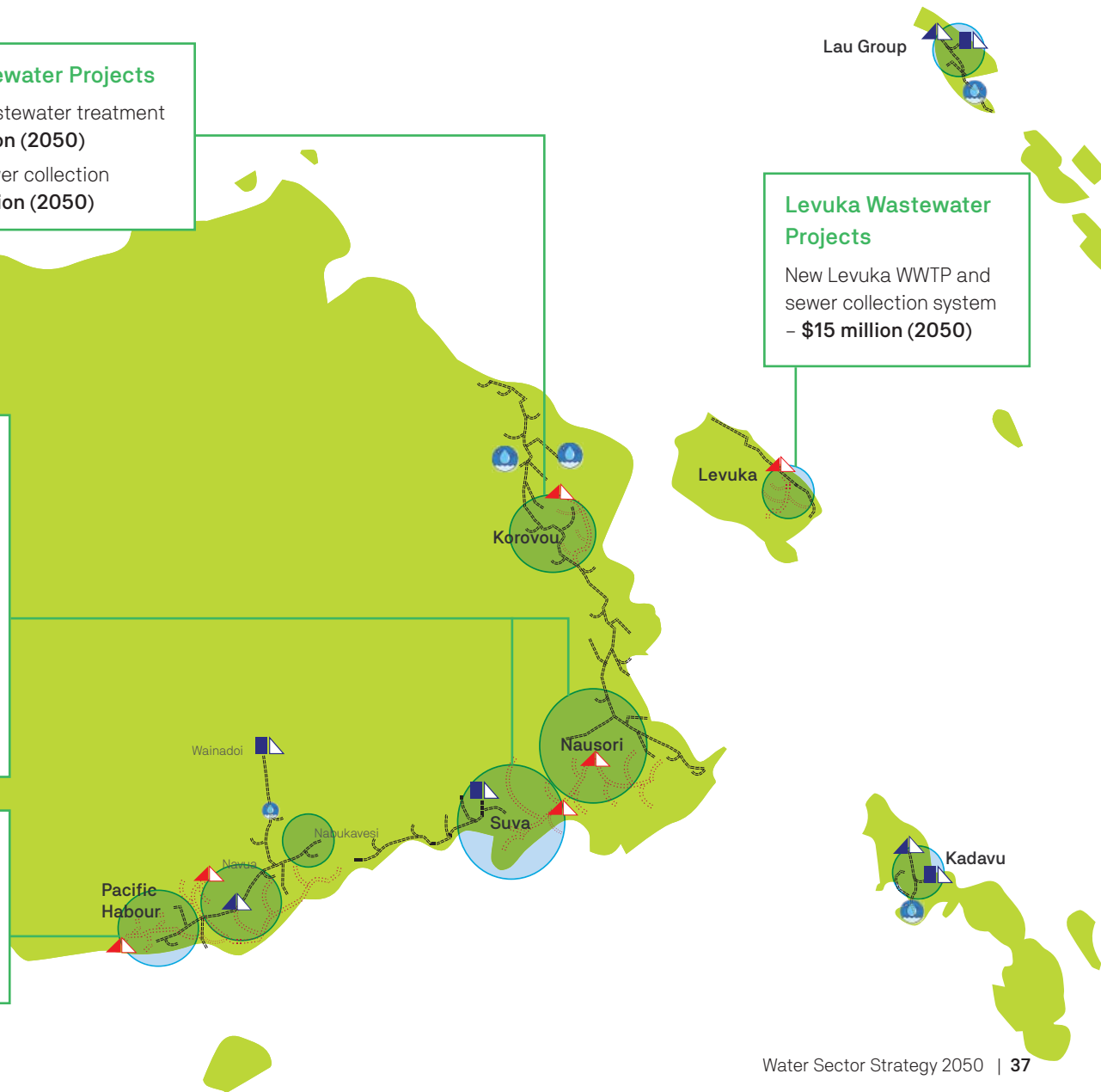
- New Levuka WWTP and sewer collection system – **\$15 million (2050)**

Suva/Nausori Wastewater Projects

- Kinoya Wastewater plant Upgrade – **\$600 million (2030)**
- Two new wastewater treatment plants:
 - Nausori – **\$60 million (2040)**
 - Lami – **\$45 million (2040)**
- Suva sewer extension – **\$540 million (2040)**
- Nausori and Lami sewer extension – **\$250 million (2050)**
- Wastewater Nadali, Adi Cakabau, Wailada upgrades – **\$6.2 million (2030)**
- Suva Coastal sewer interceptor – **\$650 million (2050)**
- New faecal sludge treatment facility – **\$40 million (2030)**

Pacific Harbour Wastewater Projects

- Pacific Harbour treatment plant and Wastewater collection system Upgrade – **\$100 million (2030)**
- Naboro WWTP upgrade and extension – **\$3.6 million (2040)**
- New Navua WWTP and sewer collection system – **\$30 million (2040)**



Supporting liveability and sustainability outcomes



Current situation

- All 11 WAF wastewater treatment facilities do not currently comply with environmental discharge standards due to capacity constraints.
- Sports fields and parks are irrigated with treated drinking water.
- In the absence of a biosolids beneficial use policy, biosolids from wastewater treatment and septic tanks are currently stockpiled.
- The dependence on fossil fuels and the high energy intensity of water and wastewater pumping and treatment results in high greenhouse gas (GHG) emissions and operational cost.
- Food waste from commercial food processors and hospitality venues is dumped in landfill which contributes to greenhouse gas emissions and impacts on landfill capacity.
- A draft Fiji National Organic Policy Paper is under review to support organic farming.



Expected outcome by 2050

A circular economy approach is mainstreamed in all land-use, infrastructure and resource planning.

The ocean and all inland water bodies sustain healthy ecosystems and provide safe recreation.

WAF's energy demand is independent of fossil fuel generation, and their overall carbon footprint is net positive.

Supporting liveability and sustainability outcomes continued

Response Strategy



- Shift the focus from wastewater treatment to resource recovery by adopting a circular economy approach for the beneficial use of organic waste sources, including biosolids and commercial food waste, for energy production and organic farming.
- Determine the carbon footprint for WAF services, and implement initiatives (including monitoring and reporting) to achieve net zero carbon by 2050.



- Prioritise investments in line with this to reduce the levels of contaminants being discharged into receiving waters from wastewater treatment facilities (see Outcome 2).
- Identify opportunities for co-locating wastewater recycling facilities and high water demand industries.
- Implement nature-based treatment solutions where feasible (see outcome 2) to reduce the energy intensity of wastewater treatment facilities and to recover nutrients where viable.
- Incorporate nutrient recovery such as phosphorus and nitrogen based on the cost and benefit to agriculture and impacts on the environment.



Living Lab opportunities

- Biogas digester using biosolids and processed food waste.
- Pilot use of use of biosolids from wastewater treatment facilities and organic waste on specific crops.

Supporting liveability and sustainability outcomes continued



National initiatives



Waste to energy – e.g. Kinoya Wastewater treatment facility

Following a circular economy approach, a biogas digester is proposed as part of the overall waste treatment improvements at Kinoya. It will combine wastewater biosolids and food waste from commercial food processing for onsite energy generation and use. This will involve the construction of a new digester, a sludge tanker receiving area and sludge dewatering facility.

Collaboration with utility partners will be required for the location of the gas turbine.

Renewable energy and energy intensity

Reduce the reliance on fossil fuel-based energy and reduce overall energy intensity of water and wastewater services through:

- Efficient pumps, variable speed pumps and off-peak pumping.
- Power purchase agreements with solar and mini-hydro generators.
- Solar power installed on WAF assets to offset demand on the grid.
- Waste to energy facilities.

Supporting liveability and sustainability outcomes continued

National initiatives

Resource recovery

Adopt a circular economy approach for wastewater treatment and recycling facilities, incorporating nature-based solutions and irrigation of golf courses and open space. Pilot the use of macroalgae in the final polishing ponds for agricultural use.

- Central region: Pacific Harbour and Nausori (Nadali).
- Western region: Sigatoka (Olosara) and Lautoka (Natabua).

Beneficial use of biosolids

The Ministry of Agriculture, in consultation with the stakeholders and POETCom, has developed a draft Fiji National Organic Policy Paper to attract investments in organic agriculture. Along with the national organic policy, the Fiji Organic Task Force has also developed a national organic action plan for the implementation of the Fiji national organic policy.

Biosolids from wastewater treatment processes can play a role as a substitute for imported and synthetic fertilisers.



- Develop a national biosolids policy to enable its beneficial use and co-management with other organic waste products.
- A new faecal sludge facility to be developed to supply organic fertilizer for productive use in organic agriculture.
- Pilot biosolids recovered for land application in organic agriculture.



Financially viable water sector and an independent water corporation



Current situation

- WAF currently recovers approximately less than 50% of their current operating costs for water from the block tariff currently in place.
- Free water for the first 92 kl per year is currently supplied to approximately 22% of the total residential customer base, making up 5% of the total demand.
- The water and sanitation tariff does not reflect a full cost recovery model to address asset renewal and the mitigation of climate change impacts on critical assets.
- All revenue collected by WAF is transferred to the Government of Fiji.
- Capital expenditure for addressing growth is funded directly by the Government and through loans and grants.
- A Water Resource Tax (2009) is imposed by Government on any business extracting water in its natural state (1c per litre and 18c per litre in excess of 10kl per month). The tax contributed 4.2% of Government tax revenue in 2022.
- There are currently no mechanisms for WAF to seek developer contributions to cover the additional infrastructure costs due to the proposed new developments.

Expected outcome by 2050

WAF operating as an independent and self-sustaining commercial entity and delivering cost effective services.

4 Financially viable water sector and an independent water corporation continued

Response Strategy

- Strengthen the regulatory model with clear lines of responsibility as recommended by ADB.
- Implement recommendations to achieve financial sustainability and WAF corporatisation, which include revenue retention (ADB commissioned PSDI report).



- Restructure the water and sanitation tariff to reflect a full cost recovery model with strong protection for low-income households.

- Complete the valuation of WAF owned infrastructure assets and account for depreciation to ensure asset health outcomes.



- Trial various financing and contracting models for capital investments and operational functions, including public-private-partnerships.



- Continue to develop partnerships with development partners for grants or other long-term funding options for critical and/or climate-resilient infrastructure needs.



- Create a mechanism for developer charges for water and wastewater servicing (headworks charges) for new developments.



Living Lab opportunities

- Pilot a public-private-partnership for capital investments and/or operational functions e.g. tourism developments on the Coral Coast to create such a partnership for water and wastewater services.

Skilled and adequate water sector work force





Current situation

- Sufficient trained personnel across the sector are unavailable to ensure water services are adequately planned, operated, maintained, regulated, and financed.

Expected outcome by 2050:

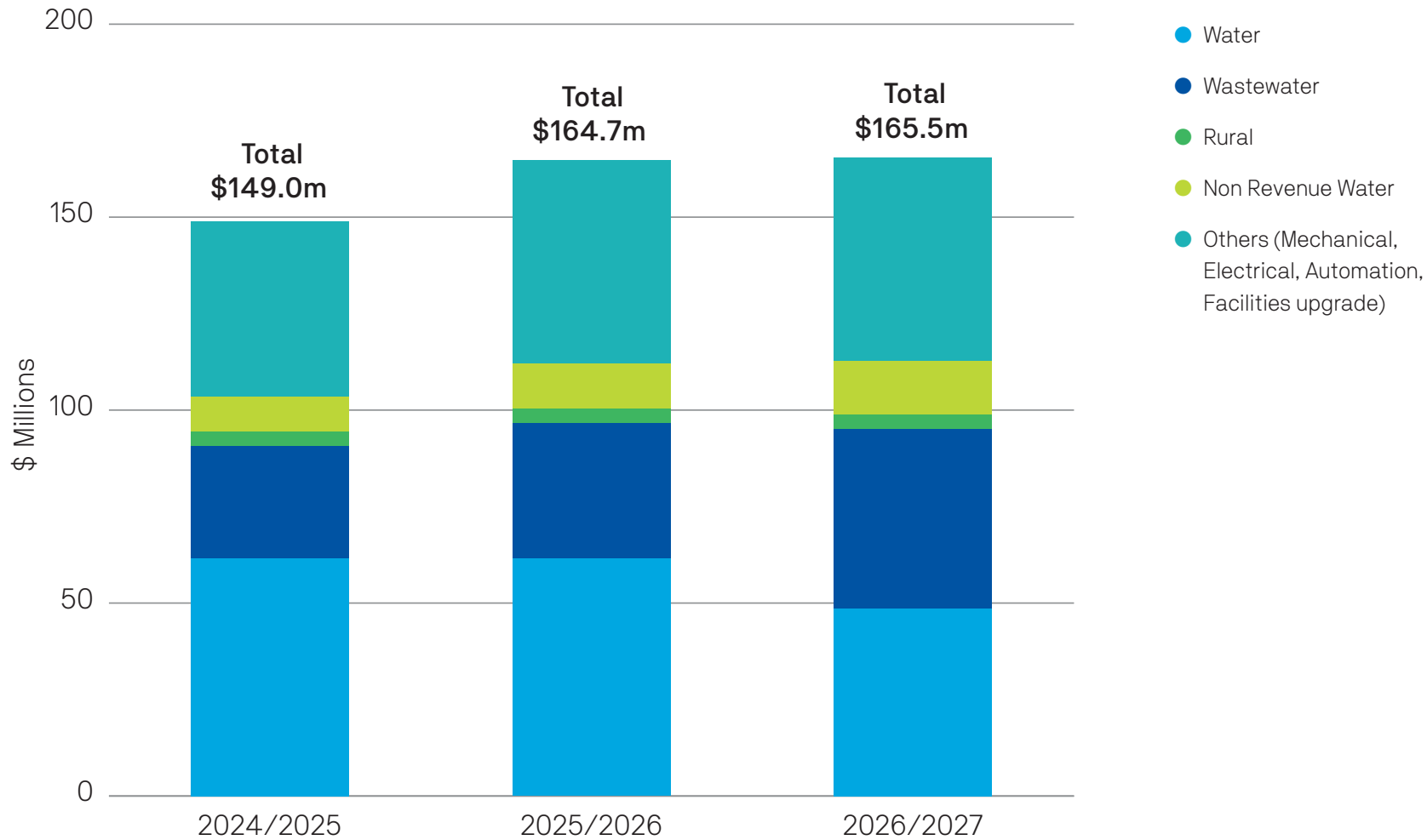
The Fijian water sector consists of a dynamic, gender balanced, committed and appropriately trained workforce with the required knowledge education and skills.

Response Strategy

- Create a capacity building hub such as a Pacific Water School in Fiji, to foster peer-to-peer learning, a community of practice and network building. 
- Prepare a human resources strategy for future water sector needs under the rapidly evolving technological advancements with the aim of spending around 1% of operating costs across the water sector.
- Design and implement technical and vocational education and training (TVET) capacity building programs through mentorship, coaching and exchange programs.
- Offer a government/donor funded bursary scheme for university graduates with the requirement that they work at DWS or WAF for a matching period.
- Set up life-long learning opportunities for water sector personnel on building capability in: 
 - Life-cycle asset management.
 - Designing and management of nature-based sanitation solutions.
 - Incorporating resilience and adaptive planning in practice.
- Provide a targeted apprentice program for female school leavers.

Appendix

WAF capital investment requirements submitted to NDP



Acronyms used in this document

CAPEX Capital Expenditure

CBA cost benefit analysis

DWS Department of Water and Sewerage

GDP Gross Domestic Product

GHG Greenhouse gas

GoF Government of Fiji

JMP Joint Management Program

MEPSL Minimum energy performance standards and labelling

NDP National Development Plans

NGOs Non-government Organisations

NIIP Nation Infrastructure Investment Program

NRW Non-revenue Water

OPEX Operating Expenditure

RISE – Revitalizing Informal Settlements and their Environments

SCADA Supervisory Control and Data Acquisition

TVET Technical and vocational education and training)

UN United Nations

UNICEF United Nations Children’s Fund

VIP Ventilated Improved Pit

WAF Water Authority of Fiji

WEPSL Water Efficiency Performance Standards and Labelling

WHO World Health Organisation

WSS2050 Water Sector Strategy 2050

WWTP Wastewater Treatment Plant

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