

30 YEAR Strategic Plan

2017 - 2047



Recommendation
and Implementation Plan

hunterh₂O



CHAIRMAN'S FOREWORD

It is my pleasure to present the 30 Year Strategic Plan and the 5 Year Action Plan for Solomon Islands Water Authority, trading as Solomon Water.

Solomon Water is a State Owned Enterprise (SOE) that provides essential services in the areas of water and wastewater, and plays a big role in the delivery of these services. Presently, Solomon Water operates in Honiara, Auki, Noro and Tulagi but we anticipate Gizo will soon be managed by us as well, and other provincial centers in the future.

The 30 Year Plan is a guiding document that sets the long term strategic direction that Solomon Water needs to take, and the 5 Year Action Plan details the short to medium term plans which would ensure ongoing sustainable development of our water and wastewater services throughout the Solomon Islands.

It envisions a future whereby Solomon Water is able to meet its key objectives:

- Meeting forecast growth in Honiara's demand for water services including peri-urban areas;
- Developing and delivering a wastewater strategy, especially for Honiara;
- Meeting the needs of the other three urban centers: Auki, Noro and Tulagi;
- Growing Solomon Water's footprint in the Solomon Islands.

The most significant project in the plan is the development of a new water source for Honiara to enable Solomon Water to manage the rapid growth. Couple with this is reduction of non-revenue water to reduce losses through theft and leakage from old pipes.

The overall success of this Strategic Plan will require strong support from the Solomon Islands Government (SIG), donor partners and stakeholders at large. I therefore take this opportunity to appeal to all our partners and stakeholders to support and assist us for the benefit of the people of Solomon Islands and its future generations.

I commend this document to you.



Phil Bradford
Chairman

GENERAL MANAGER'S OVERVIEW

The completion of the 30 Year Strategic Plan and 5 Year Action Plan has been long awaited and this marks a very important milestone in moving Solomon Water towards meeting its overall mission and vision for our future.

Vision: Safe Water for a healthy nation

Mission: To provide reliable and safe water supply and sewerage systems within our area of operations in Solomon Islands, while working in partnership with the community to plan, deliver and operate infrastructure in a manner that seeks to minimise the social and environmental impacts of our activities.

The strategic plan is an overarching document providing clear direction for Solomon Water in the short, medium and longer term. This is a living document which will be reviewed every 3 to 5 years (depending on the dynamics and changes taking place within the internal and external operating environment), while keeping in focus Solomon Water's key objectives of providing sustainable water and wastewater services, meeting forecast growth demands, expanding its footprint in existing areas of operations, and gradually expanding services to other provincial centers as mandated under the legislation.

In the next 5 years Solomon Water will be rolling out some major projects which will mostly be funded by Donors, with contributions from Solomon Water and the Solomon Islands government. Some of the key investments will include:

- Upgrading of pipeline networks
- Construction of a new water treatment plant for Honiara
- Increase in customers as network extensions and improvements occur.
- Ongoing reduction in Non-Revenue Water.
- Construction of additional reservoirs
- Expansion of Solomon Water's footprint towards east Honiara
- Implementation of pre-paid Water meter System - Cash Water
- Implementation of the Wastewater strategy

This document gives Solomon Water the Confidence to move forward into the future. I hope the government, donor partners, and other stakeholders will embrace and support us.

I would like to acknowledge HunterH2O Holdings Pty Ltd for producing this very important document for Solomon Water and the people of this Country.

Lastly I would like to thank my staff and the Solomon Water Board of Directors for their unwavering support in producing this plan.



Ian Gooden
General Manager

CONTENTS

1	INTRODUCTION	1
2	RECOMMENDATIONS	5
2.1	Augmentation and New Assets	5
2.2	Lifecycle Management and Institutional Improvements	14
2.3	Investigations and Project Delivery	17
3	IMPLEMENTATION.....	20
3.1	Funding	20
3.2	Risk Analysis.....	26
3.3	Review and Monitoring of Plan	29
4	SUMMARY OF PROPOSED PROJECTS AND COSTS.....	30

FIGURES

FIGURE 2-1	PROPOSED WATER SUPPLY SYSTEM IN HONIARA.....	6
FIGURE 2-2	PROPOSED WASTEWATER SYSTEM IN HONIARA	7

TABLES

TABLE 1-1	SUMMARY OF WATER SUPPLY ISSUES AND ACTIONS	2
TABLE 1-2	SUMMARY OF WASTEWATER ISSUES AND ACTIONS.....	4
TABLE 2-1	INVESTMENT PRIORITISATION CRITERIA	8
TABLE 2-2	INVESTMENT CRITERIA SCORING	8
TABLE 2-3	SUMMARY OF AUGMENTATION PROGRAM	11
TABLE 2-4	RECOMMENDED CORPORATE POLICIES AND PLANNING DOCUMENTS.....	15
TABLE 2-5	SUMMARY OF INSTITUTIONAL / OPERATIONAL IMPROVEMENTS.....	16
TABLE 3-1	RISKS ASSESSMENT SUMMARY.....	26
TABLE 3-2	PRELIMINARY MONITORING AND EVALUATION FRAMEWORK	29
TABLE 4-1	SUMMARY OF PROPOSED PROJECTS.....	30

APPENDICES

Appendix A	Project Cost Estimates and Priority
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1 INTRODUCTION

This 30 year strategic plan provides the strategic direction for Solomon Water (SW), which can be integrated into business processes, to enable alignment of day to day operations and decision making with the strategic direction. The plan incorporates Solomon Water's:

Vision *Safe Water for a healthy Nation*

Mission *To provide reliable and safe water supply and sewerage services within our area of operations in Solomon Islands*

The document aims to ensure the ongoing sustainable development of SW's water and wastewater services throughout Solomon Islands to at least 2047.

This study was prepared by Hunter H2O Holdings Pty Ltd on behalf of SW in parallel to the preparation of an action plan, tariff review and social assessment. The following documents have been submitted concurrently:

- Solomon Water 30 Year Strategic Plan – Main Report
- Solomon Water 30 Year Strategic Plan – Recommendations and Implementation Plan (this document)
- Solomon Water 5 Year Action Plan
- Cost of Service and Tariff Review
- Social and Consumer Assessment

The 30 Year Strategic Plan – Main Report contains background information to the study, including:

1. Introduction
2. Current Systems
3. Service Standards and Benchmarking
4. Population and Growth
5. Challenges, Opportunities and Priorities
6. Water Supply Service
7. Wastewater Service

This document contains the recommended measures to address the challenges outlined in the Main Report. It includes both capital and operational improvements, as well as institutional changes, staging of projects and preliminary cost estimates. It also identifies measures that must be addressed in implementation of the 30 year strategic plan, including funding, mitigation of risks and review/monitoring of the plan.

Key issues relating to provision of water supply and wastewater services are summarised in Table 1-1 and Table 1-2. Proposed short term and long term measures to address these issues are included in these tables, and based on the analyses in the main report.

Table 1-1 Summary of Water Supply Issues and Actions

Area	Objectives	Existing Issues	Immediate Actions	5 Year Actions	30 Year Actions
NRW	<ul style="list-style-type: none"> Minimise water losses 	<ul style="list-style-type: none"> NRW is 60% (this is a current major focus area for SW, with short-term improvements expected) High water losses due to leaks (+high pressures) Significant losses due to theft / illegal connections Large number of unmetered properties Old, inaccurate meters need to be replaced 	<ul style="list-style-type: none"> Effective coordination of NRW reduction initiatives is a major priority, including: <ul style="list-style-type: none"> Implementation of DMAs Installation of pressure reducing valves Electronic flow metering 	<ul style="list-style-type: none"> Intermediate target of <40% NRW Establish and implement an ongoing NRW Reduction Program Major focus on identifying and repairing leaks Metering of all properties and standpipes 	<ul style="list-style-type: none"> Long term target of 20-25% NRW NRW Reduction Program to evolve into a Water Loss Management Program
Demand Management	<ul style="list-style-type: none"> Water efficiency 	<ul style="list-style-type: none"> Significant household water wastage, with taps often left running and unattended Currently partially achieved by water rationing, but risk of water usage increasing as capacity increases Lack of effective revenue collection 	<ul style="list-style-type: none"> Education / publicity focused on not wasting water (particularly not leaving taps running) 	<ul style="list-style-type: none"> Target of 175 L/p/d Implement a formal and ongoing Demand Management Program (with a focus on community education) 	<ul style="list-style-type: none"> Target of 150 L/p/d Ongoing Demand Management Program
Water Security	<ul style="list-style-type: none"> Source capacity sufficient to ensure water security 	<ul style="list-style-type: none"> Population growth outstripping water supply capacity expansion (no reserve capacity) Security issues and 'lease' costs associated with surface water / spring sources outside of town boundary (in customary lands) Some catchment areas in customary land and not protected Access issues with boreholes in settlement areas Demand often exceeds supply 	<ul style="list-style-type: none"> Maintain recent capacity improvement at 30+ ML/d (design capacity is 36 ML/d) 	<ul style="list-style-type: none"> Negotiate guaranteed, ongoing access to sources in customary land and bores in settlement areas Implement short-term source augmentation options (e.g. more groundwater bores, Mataniko River source - surface or groundwater) Identify new major water source (e.g. Lungga River) and undertake planning/design/construction for raw water offtake and WTP Undertake a comprehensive hydrogeological investigation to confirm the safe yield of groundwater 	<ul style="list-style-type: none"> Construct future stages of new water source and WTP Maintain some existing sources as backup / supplementary supply sources)
Water Quality / Health	<ul style="list-style-type: none"> Water quality meets minimum WHO health requirements 	<ul style="list-style-type: none"> Informal housing not able to be serviced properly – leading to health issues (in part due to lack of adequate urban development planning) Peri-urban areas (similar to above) that lie outside of city boundary not serviced adequately Wells and surface water are vulnerable to contamination from human & solid waste (including from informal settlement areas) WHO health guidelines not achieved consistently 	<ul style="list-style-type: none"> Protect water quality of groundwater sources Ensure all chlorination facilities are operational 	<ul style="list-style-type: none"> Improve reliability and consistency of chlorination systems Ensure all raw water is subject to chlorination Achieve WHO health requirements 90-95% of the time 	<ul style="list-style-type: none"> Achieve WHO health requirements 100% of the time
Network Capacity	<ul style="list-style-type: none"> Network capacity sufficient to achieve LOS 	<ul style="list-style-type: none"> Poor condition of key assets - trunkmains, reservoirs, pumping stations, etc. Lack of redundancy in the system (key asset failures lead to water outage and limited cross-connections between systems) Limited or no backup supply options in some zones Air entrainment Low system pressures in elevated areas 	<ul style="list-style-type: none"> Completion of all TYP works 	<ul style="list-style-type: none"> Additional reticulation storage to handle peak demand periods (reduce need to augment sources) Further trunkmain cross-connections 	<ul style="list-style-type: none"> Program of network upgrades & system expansion - major trunkmains, reservoirs, pump stations - to service major growth
LOS / Reliability	<ul style="list-style-type: none"> <i>Reliable 24/7 system that meets LOS objectives</i> 	<ul style="list-style-type: none"> Around 55% of greater Honiara population is connected to SW water supply system Non-achievement of MDG target for access to improved water supply Inconsistent achievement of 24/7 supply and compliance with WHO health guidelines 	<ul style="list-style-type: none"> Implementation of SCADA / Telemetry system to enable better monitoring of system Establish / maintain 24/7 supply 	<ul style="list-style-type: none"> 60-65% of greater Honiara households connected to SW water supply system Increase in proportion of households connected to water supply system (source capacity / NRW dependant) Increase source capacity and/or reduce NRW sufficiently to achieve / maintain 24/7 supply 	<ul style="list-style-type: none"> 90-95% of greater Honiara households connected to SW water supply system LOS are consistently being achieved (including reliability, response times, pressures, etc.)

Area	Objectives	Existing Issues	Immediate Actions	5 Year Actions	30 Year Actions
Asset Management / Operations	<ul style="list-style-type: none"> Sound Asset Management to maximise asset life 	<ul style="list-style-type: none"> There is not yet a well-established preventative maintenance and monitoring culture No scheduled servicing (reactive only) Pumps not operating at best efficiency point (leading to extra power costs) Limited network storage, redundancy (backup pumps) and cross-connection of systems High energy consumption due to pumping requirements Inadequate office, workshop and storage facilities 	<ul style="list-style-type: none"> Ensure pumps at all water sources are maintained and groundwater bores are maintained 	<ul style="list-style-type: none"> Pump station maintenance program (incl. replacement of inefficient motors/pumps and installation of VSDs if appropriate) Design & Construction Standards O&M Plan (incl. SOPs) Develop new depot facility to consolidate all SW functions at one location (Mataniko) 	<ul style="list-style-type: none"> Implement Asset Management Program (with preventative maintenance program, renewals program, etc.)
Resilience	<ul style="list-style-type: none"> Manage climate change & extreme event risks 	<ul style="list-style-type: none"> Vulnerability to natural events and climate change (lack of resilience) 	<ul style="list-style-type: none"> 	<ul style="list-style-type: none"> To be developed 	<ul style="list-style-type: none"> To be developed
Financial Sustainability	<ul style="list-style-type: none"> Financial sustainability (reducing dependence on external support over time) 	<ul style="list-style-type: none"> High operating costs (particularly energy costs due to pumping requirements, which account for 35% of operational cost) Collection of water rates Unbilled water consumption (not all properties metered, illegal connections, etc.) Insufficient income from water rates to support both capital and operating expenditure 	<ul style="list-style-type: none"> Identify potential funding partners (loans, grants) Green funding opportunities 	<ul style="list-style-type: none"> Improve financial performance / tariff reform Metering of all properties (minimise illegal connections) 	<ul style="list-style-type: none"> Financial sustainability Sound financial management principles are in place and being followed (& audited)
SW Technical Capacity	<ul style="list-style-type: none"> Technical independence & sustainability 	<ul style="list-style-type: none"> Limited technical capacity of SW staff 	<ul style="list-style-type: none"> Use operations network model to 'troubleshoot' network issues (valves, leaks, cross-connections, etc.) Training on O&M of new JICA assets 	<ul style="list-style-type: none"> Ongoing capacity development activities (establish long term partnerships) Ongoing strategic planning, revisit 30 year plan and develop new 5 year plan 	<ul style="list-style-type: none"> Established strategic planning capacity

Table 1-2 Summary of Wastewater Issues and Actions

Area	Objectives	Existing Issues	Immediate Actions	5 Year Actions	30 Year Actions
Sewage Treatment / Effluent Discharge	<ul style="list-style-type: none"> To minimise the environmental impact of sewage discharge and improve the quality of drinking water sources 	<ul style="list-style-type: none"> No treatment at any part of the network (except privately operated systems) Direct discharge of raw sewage to the environment No screening of flows, resulting in network blockages and solid waste discharge 	<ul style="list-style-type: none"> Repair/replacement of ocean outfalls 	<ul style="list-style-type: none"> Screening of all flows prior to discharge Effective dilution of all flows through deep ocean outfall 	<ul style="list-style-type: none"> Secondary treatment of all flows discharged to the SW network
Water Quality / Health	<ul style="list-style-type: none"> Water quality meets minimum WHO health requirements 	<ul style="list-style-type: none"> Informal housing not able to be serviced properly – leading to health issues (in part due to lack of adequate urban development planning) Peri-urban areas (similar to above) that lie outside of city boundary not serviced adequately Widespread use of poorly constructed and maintained septic systems – leading to septage and effluent leakage to surface streams and groundwater aquifers No monitoring of water quality in discharge environments No trade waste policy 	<ul style="list-style-type: none"> Water quality monitoring program 	<ul style="list-style-type: none"> Urban WASH programs Improved wastewater servicing in areas with high impact on raw water supplies Improved wastewater servicing of non-domestic customers Begin transitioning of septic systems to the SW network 	<ul style="list-style-type: none"> Continued transitioning of septic systems to the SW network
Sewerage Network Coverage	<ul style="list-style-type: none"> Improved access to sanitation, Reliable system that meets LOS objectives 	<ul style="list-style-type: none"> Around 9% of greater Honiara population is connected to sewer system Non-achievement of MDG target for access to improved sanitation Non-compliance of WHO health guidelines 	<ul style="list-style-type: none"> Develop LOS / design guidelines for sewer network 	<ul style="list-style-type: none"> >90% of non-domestic customers in greater Honiara connected to SW network 10% of domestic customers in greater Honiara connected to SW network Increase network capacity to service new customers 	<ul style="list-style-type: none"> 30% of greater Honiara domestic customers connected to SW network LOS are consistently being achieved (including reliability, response times, pressures, etc.)
Network Capacity	<ul style="list-style-type: none"> Network capacity sufficient to achieve LOS 	<ul style="list-style-type: none"> Poor condition of pumping stations resulting in unreliable discharge of flows Small diameter gravity mains limiting network capacity, with no spare capacity for future growth Groundwater and stormwater infiltration levels unknown due to lack of flow monitoring 	<ul style="list-style-type: none"> Develop monitoring and maintenance strategies Upgrade existing pumping stations 	<ul style="list-style-type: none"> Upgrade existing pumping stations Increase network capacity to service new customers 	<ul style="list-style-type: none"> Program of network upgrades & system expansion - major trunkmains, pump stations - to service major growth
Asset Management / Operations	<ul style="list-style-type: none"> Sound Asset Management to maximise asset life 	<ul style="list-style-type: none"> There is not yet a well-established preventative maintenance and monitoring culture No scheduled inspection and servicing (reactive only) No maintenance strategies for septic systems (HCC) Illegal discharge to network by effluent tankers Frequent blockage of pipes, resulting in health hazards and damage/inconvenience due to localised flooding Limited access to equipment required for maintenance of sewers (e.g. jetting machines) Pumps not operating at best efficiency point (leading to extra power costs) Lack of redundancy (backup pumps) Inadequate office, workshop and storage facilities 	<ul style="list-style-type: none"> Ensure pumps are maintained Develop maintenance strategy for sewer network Develop maintenance strategy for septic systems Develop sustainability targets Develop asset management plans Purchase equipment to allow routine unblocking of sewers Assist HCC in developing maintenance strategy for septic systems 	<ul style="list-style-type: none"> Pump station maintenance program (incl. replacement of inefficient motors/pumps and installation of VSDs if appropriate) Design & Construction Standards O&M Plan (incl. SOPs) 	<ul style="list-style-type: none"> Implement Asset Management Program (with preventative maintenance program, renewals program, etc.)
Resilience	<ul style="list-style-type: none"> Manage climate change & extreme event risks 	<ul style="list-style-type: none"> Vulnerability to natural events and climate change (lack of resilience) 		<ul style="list-style-type: none"> To be developed 	<ul style="list-style-type: none"> To be developed
Financial Sustainability	<ul style="list-style-type: none"> Financial sustainability (reducing dependence on external support over time) 	<ul style="list-style-type: none"> High operating costs (particularly energy costs due to pumping requirements) Low collection of sewer rates Insufficient income from sewer rates to support both capital and operational expenditure Historical underinvestment in sewerage assets, resulting in the need for high investment to service existing customers 	<ul style="list-style-type: none"> Identify potential funding partners (loans, grants) Assess green funding opportunities 	<ul style="list-style-type: none"> Improve financial performance / tariff reform Negotiate and implement a system of Community Service Obligations with SI government Develop a maintenance and funding program for septic systems 	<ul style="list-style-type: none"> Financial sustainability Sound financial management principles are in place and being followed (& audited)
SW Technical Capacity	<ul style="list-style-type: none"> Technical independence & sustainability? 	<ul style="list-style-type: none"> Limited technical capacity of SW staff Previous efforts have focussed on water supply and neglected sanitation 	<ul style="list-style-type: none"> Training on O&M of sewer assets Investment in O&M equipment 	<ul style="list-style-type: none"> Ongoing capacity development activities (establish long term partnerships) Ongoing strategic planning, revisit 30 year plan and develop new 5 year plan 	<ul style="list-style-type: none"> Established strategic planning capacity

2 RECOMMENDATIONS

2.1 Augmentation and New Assets

The current population in the greater Honiara area is around 105,000, and is projected to increase to approximately 295,000 over the next 30 years. High growth is also expected in urban provincial centres. Significant augmentation of the existing systems is required in order to meet the required levels of service for existing users and accommodate future demand for services.

The augmentation program presented in this Strategic Plan is based on the following targets by 2047:

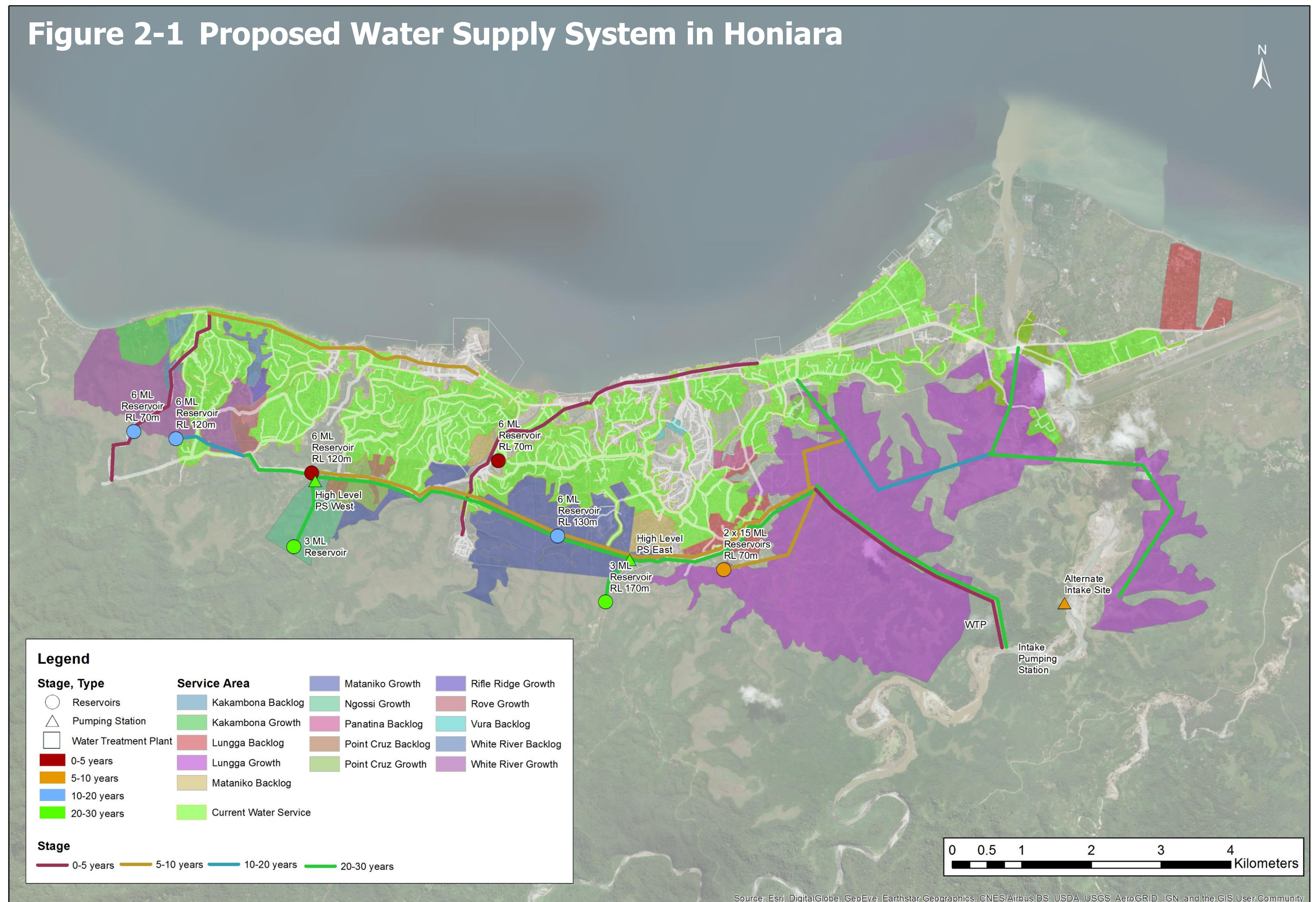
- Increase water supply coverage from 55% to 95%
- Increase wastewater coverage from 9% to 30%
- Provide water supply reticulation and connect 42,000 existing residents to the water supply network
- Provide wastewater reticulation and connect 79,000 existing residents to the wastewater network
- Provide water supply and sewerage reticulation to all new subdivisions and developments

Major capital works recommended under this Plan include:

- Raw water sources
- Water treatment plant
- Reservoirs
- Water pump stations and distribution mains
- Wastewater treatment plant
- Wastewater pump stations and trunk mains

The proposed capital works in Honiara are summarised in Figure 2-1 for water supply and Figure 2-2 for wastewater. Further details are provided in Sections 6 and 7 of the Main Report

Figure 2-1 Proposed Water Supply System in Honiara



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Figure 2-1 Proposed Water Supply System in Honiara

Figure 2-2 Proposed Wastewater System in Honiara

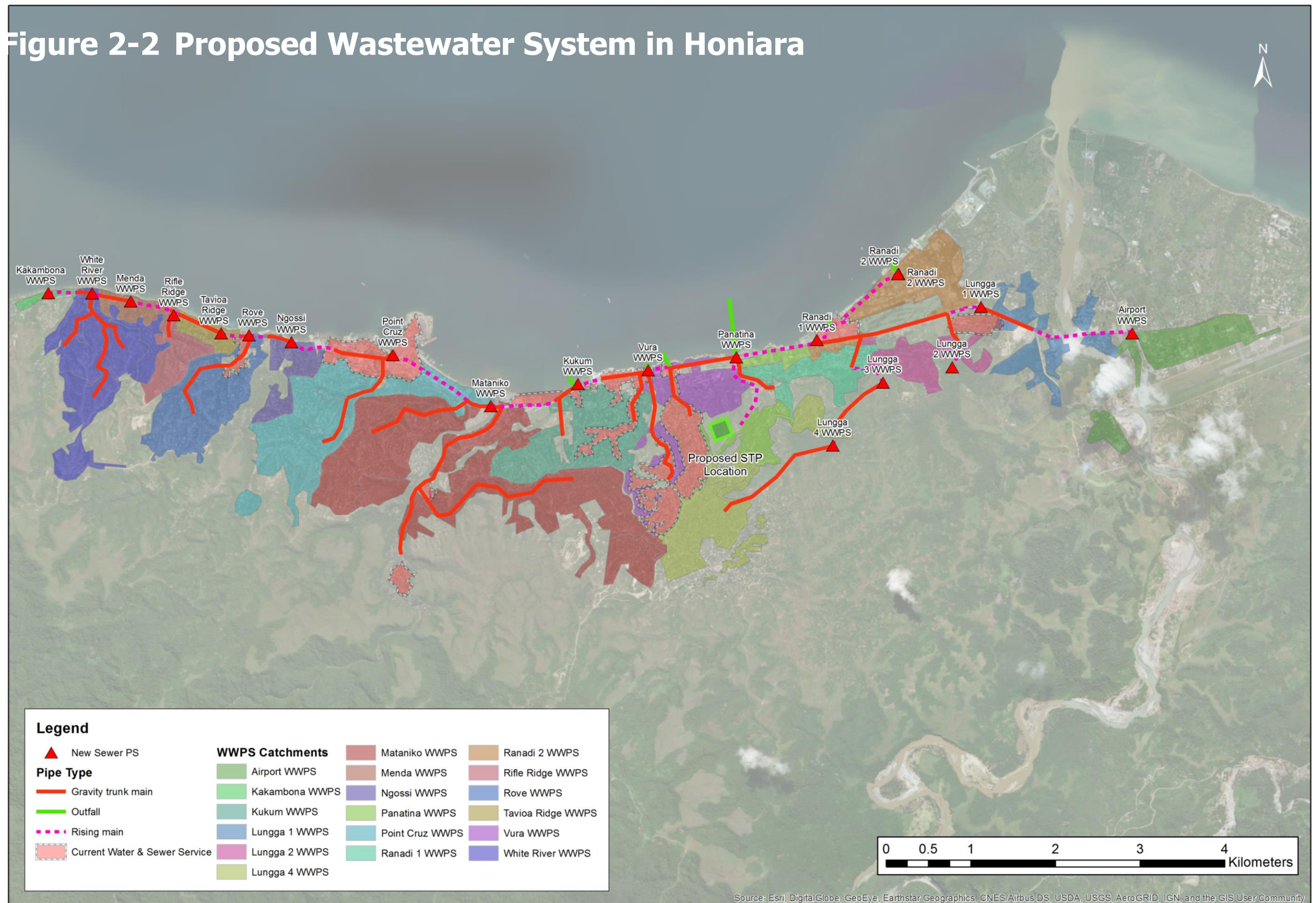


Figure 2-2 Proposed Wastewater System in Honiara

2.1.1 Sequencing of Projects

An investment prioritisation tool was developed in order to assist with determining staging of all projects required under this 30 Year Strategic Plan, and inform the required timing of investment. The tool considered 8 key criteria for each project, with weightings assigned based on the importance of each criterion, as summarised in Table 2-1. Results are detailed in Appendix A.

Table 2-1 Investment Prioritisation Criteria

Criterion	Description	Weighting
Health improvement	Contribution to improved drinking water quality / improved effluent quality	25%
Environmental improvement	Contribution to improved catchment health and reduced consumption of energy / materials	15%
Customer improvement	Increased availability of services, improved water security, improved water supply pressure, increased quality of potable water	20%
Capital / operating cost ratio	Dollars per population served, energy consumption, maintenance costs	5%
Alignment with business drivers	Alignment with government/corporate direction, improved efficiency	5%
Constructability	Challenges relating to access, land tenure and topography	15%
Operations and maintenance	Ease of operation, maintenance equipment and construction complexity	10%
Staging	Reliance on other works, impact on existing assets	5%

For each project, a score was assigned to each criterion based on the ratings in Table 2-2. Criterion weightings were then applied to determine an overall score for each project, which were used to determine the required timing of investment.

Table 2-2 Investment Criteria Scoring

Description	Score
Health improvement	
No health improvement	0
Small improvement, which may increase over time	1
Small health improvement over large areas, or moderate health improvements in local areas	2
Moderate health improvements over large areas or a considerable improvement in local areas	3
Considerable health improvement over a large area or significant improvement in a local areas	4
Significant health improvements over much of the area serviced which will be ongoing	5
Environmental improvement	
No environmental improvement	0
Small improvement, which may increase over time	1
Small environmental improvement over large areas, or moderate environmental improvements in local areas	2
Moderate environmental improvements over large areas or a considerable improvement in local areas	3
Considerable environmental improvement over a large area or significant improvement in a local areas	4
Significant environmental improvements over much of the area serviced which will be ongoing	5
Customer improvement	
No customer benefit	0
Very small number of customers benefit (<5% of available population)	1
Small number of customers benefit (between 5-20% of available population)	2
Moderate number of customers benefit (between 20-50% of available population)	3

Description	Score
Large number of customers benefit (between 50-80% of available population)	4
Majority of customers benefit (>80% of available population)	5
Capital / operating cost ratio	
>50%	0
25-50%	1
10-25%	2
3-10%	3
1-3%	4
<1%	5
Alignment with business drivers	
Investment is not aligned with either Government policy or organisational strategy and planning	0
Slight alignment with either Government policy or organisational strategy and planning	1
Some alignment with either Government policy or organisational strategy and planning	2
Moderate alignment with either Government policy or organisational strategy and planning	3
Strong alignment with either Government policy or organisational strategy and planning	4
Significant alignment with either Government policy or organisational strategy and planning	5
Constructability	
Highly complex construction related matters including unresolved land tenure, challenging access and topography	0
Complex construction matters including unresolved land tenure and access	1
Moderate construction matters	2
Minor construction related matters requiring further investigation/resolution	3
Minor construction related matters easily resolvable	4
Simple or resolved construction matters	5
Operations and maintenance	
Highly complex operations and/or maintenance requiring highly skilled experienced and qualified employees	0
Complex operations and/or maintenance requiring intervention by experienced employees	1
Complex operations and/or maintenance requiring intervention by trained employees	2
Moderately complex operational and maintenance complexity requiring intervention by trained employees	3
Limited operation and/or maintenance requiring little intervention by trade employees	4
Simple operation and/or maintenance requiring no intervention	5
Staging	
Significant impact on existing assets and reliant upon pre construction of other major infrastructure works	0
Significant impact on existing assets and reliant upon pre construction of other minor infrastructure works	1
Moderate impact on existing assets and reliant upon preconstruction of other infrastructure works	2
Moderate impact on existing assets and not reliant upon preconstruction of other infrastructure works	3
Minor impact on existing assets and/or not reliant on other new works	4
No impact on existing assets and not reliant on any new major works	5

2.1.2 Preliminary Cost Estimates

Preliminary cost estimates have been developed for the recommended projects based on typical supply and installation rates for various assets. A review of recent SW contracts indicates that construction costs are similar to Australian rates, largely due to the need to employ international contractors. Therefore estimates are typically based on international rates, with the exception of projects that can typically be completed by local contractors (e.g. reticulation). The estimates include the following:

- Supply and installation
- Allowances for construction difficulty relating to area and terrain
- Establishment / disestablishment
- 20% allowance for survey, investigation, design and supervision
- 30% construction contingency
- Local adjustment factor of 1.1

Details of the preliminary cost estimates for the proposed projects have been separately submitted to SW in spreadsheet format.

The following ongoing costs have been allowed for the proposed projects:

- Operational costs, including power and materials consumption
- Maintenance costs, including monitoring, cleaning and repair/replacement of parts
- Asset renewal based on expected design life

Ongoing costs are typically based on the Solomon Islands design manual rates, with power costs set to \$0.75USD/kWh.

2.1.3 Summary of Augmentation Program

A summary of the proposed augmentation program is provided in Table 2-3, including asset details, timing, cost estimates and population served.

The proposed augmentation program is based on the adopted growth areas outlined in the Strategic Plan. It is noted that the location of actual development into the future may differ from the areas adopted in this plan; for example the Department of Lands, Housing and Survey has recently indicated that areas north and south of the airport at Henderson are likely to be fully developed over the next 30 years. The location of actual growth should be monitored in the short term and the potential impacts on the augmentation program outlined in this strategy should be reviewed. However, it is noted that the majority of augmentations outlined in this strategy provide capacity to broad regions in the Greater Honiara area, and variances in actual growth areas are not expected to significantly impact on the sizing and location of trunk infrastructure. For example, there is sufficient capacity in the trunk network to service Henderson if were to develop more quickly than the Lungga development area.

Table 2-3 Summary of Augmentation Program

Type	Item	Details	Stage	Capital Cost (USD)	Annual O&M (USD/yr)
Reservoir	Network Storage (Stage 1a)	2x 6 ML Reservoir	2017-2022	\$5,700,000	\$14,250
Bores	Additional Bores	White River Bores Recommission	2017-2022	\$300,000	\$208,200
Bores	Additional Bores	Mataniko Bores	2017-2022	\$800,000	\$455,600
Water trunkmain	Water trunkmain (Stage 1a)	White River Trunkmain (3.15km DN250)	2017-2022	\$1,400,000	\$9,100
Water trunkmain	Water trunkmain (Stage 1a)	Mataniko Trunkmain (2.5km DN300, 3km DN375)	2017-2022	\$2,900,000	\$18,850
Water reticulation	Backlog Water Reticulation (Stage 1a)	Backlog Water Reticulation (45km DN100)	2017-2022	\$9,400,000	\$61,100
Water pumping station	Raw Water Intake Pumping Station (Stage 1)	40 ML/d	2017-2022	\$2,300,000	\$2,269,714
Water trunkmain	Raw Water Transfer Pipeline (Stage 1)	Raw Water Transfer Pipeline (3.7km DN600)	2017-2022	\$4,100,000	\$26,650
WTP	Water Treatment Plant (Planning/design) - Lungga	WTP Planning/design	2017-2022	\$8,200,000	\$0
WTP	Water Treatment Plant (Construction Stage 1) - Lungga	40 ML/d	2017-2022	\$27,100,000	\$542,000
Water trunkmain	Water trunkmain (Stage 1b)	Trunk Mains from WTP to Low and Medium Zones (10.9km DN450)	2022-2027	\$8,600,000	\$55,900
Water trunkmain	Water trunkmain (Stage 1b)	Trunk Mains within Zones (4km DN250)	2022-2027	\$1,500,000	\$9,750
Water pumping station	Water Pumping Station (Stage 1b)	WTP Pumping Station (40 ML/d)	2022-2027	\$900,000	\$694,500
Water pumping station	Water Pumping Station (Stage 1b)	Medium Level Pumping Station (20 ML/d)	2022-2027	\$900,000	\$1,028,250
Reservoir	Network Storage (Stage 1b)	15 ML Reservoir Low Level	2022-2027	\$4,700,000	\$11,750
Reservoir	Network Storage (Stage 2)	2x 6ML Reservoir	2027-2037	\$5,700,000	\$14,250
Reservoir	Network Storage (Stage 2)	White River 6ML Reservoir	2027-2037	\$2,900,000	\$7,250
Water pumping station	Raw Water Intake Pump Station (Stage 2)	Extra 20 ML/d	2027-2037	\$500,000	\$1,773,471
WTP	Water Treatment Plant (Construction Stage 2) - Lungga	Extra 20 ML/d (60 ML/d total)	2027-2037	\$13,600,000	\$272,000
WTP	Water Treatment Plant (Construction Stage 2) - Kongulai	10 ML/d	2027-2037	\$14,700,000	\$294,000
Water trunkmain	Water trunkmain (Stage 2)	Trunk Mains Within Zones (1km DN300, 2.5km DN375)	2027-2037	\$2,000,000	\$13,000

Type	Item	Details	Stage	Capital Cost (USD)	Annual O&M (USD/yr)
Water pumping station	Water Pumping Station (Stage 2)	WTP Pumping Station Upgrade (additional 20 ML/d)	2027-2037	\$900,000	\$694,500
Water pumping station	Water Pumping Station (Stage 2)	Medium Level Pumping Station Upgrade (additional 10 ML/d)	2027-2037	\$1,200,000	\$1,037,250
Water pumping station	Raw Water Intake Pump Station (Stage 3)	Extra 20 ML/d (60 ML/d total)	2037-2047	\$1,900,000	\$1,815,471
Water pumping station	Raw Water Transfer Pipeline (Stage 3)	Raw Water Transfer Pipeline (Duplicate 3.7km DN600)	2037-2047	\$4,200,000	\$27,300
WTP	Water Treatment Plant (Construction Stage 3) - Lungga	Extra 20 ML/d (80 ML/d total)	2037-2047	\$13,600,000	\$272,000
Water trunkmain	Water trunkmain (Stage 3)	Trunk Mains from WTP to Low and Medium Zones (8.9km DN300, 4.9km DN375, 4km DN450)	2037-2047	\$10,100,000	\$65,650
Reservoir	Network Storage (Stage 3)	15 ML Reservoir Low Level	2037-2047	\$4,600,000	\$11,500
Reservoir	Network Storage (Stage 3)	High Level 2 x 3ML Reservoirs	2037-2047	\$3,400,000	\$8,500
Water pumping station	High Level Pumping Station x 2	High Level Pumping Station (2.6ML/d) x 2	2037-2047	\$1,200,000	\$529,950
Water pumping station	Low Level Pumping Station Upgrade	WTP Pumping Station Upgrade (additional 20 ML/d)	2037-2047	\$2,400,000	\$1,629,500
Water pumping station	Medium Level Pumping Station Upgrade	Medium Level Pumping Station Upgrade (additional 10 ML/d)	2037-2047	\$3,000,000	\$2,092,500
Sub-total Water Supply				\$164,700,000	\$15,963,707
Provincial water supply	Auki Water Supply Upgrades	Auki investigations, recommission high tank, pumps and pipeline from Gallery	2017-2022	\$2,700,000	\$81,000
Provincial water supply	Tulagi Water Supply Upgrades	Tulagi investigations, standby pump, AIV	2017-2022	\$500,000	\$15,000
Provincial water supply	Noro Water Supply Upgrades	Noro investigations, groundwater assessment	2017-2022	\$600,000	\$18,000
Provincial water supply	Gizo Water Supply Upgrades	Gizo investigations, groundwater assessments, secure Leoko pipeline	2017-2022	\$800,000	\$24,000
Provincial water supply	Auki Water Supply Upgrades	Auki Further Water Supply Upgrades	2022-2047	\$9,200,000	\$276,000
Provincial water supply	Tulagi Water Supply Upgrades	Tulagi Further Water Supply Upgrades	2022-2047	\$1,300,000	\$39,000
Provincial water supply	Noro Water Supply Upgrades	Noro Further Water Supply Upgrades	2022-2047	\$8,800,000	\$264,000
Provincial water supply	Gizo Water Supply Upgrades	Gizo Further Water Supply Upgrades	2022-2047	\$22,900,000	\$687,000
Sub-total Provincial Centres				\$46,800,000	\$1,040,000
STP	Sewage Treatment Plant (Design and Construction)	25 ML/d IDAL, 1.5km DN900 transfer rising main, 1.5km DN750 effluent gravity main	2037-2047	\$34,900,000	\$1,047,000

Type	Item	Details	Stage	Capital Cost (USD)	Annual O&M (USD/yr)
Sewer outfall	Temporary Ocean Outfalls x 5	Kukum, Vura, Ranadi	2017-2022	\$1,000,000	\$32,500
Sewer outfall	Ocean outfall (Planning/Design)	Outfall planning/design	2017-2022	\$1,100,000	\$0
Sewer outfall	Ocean outfall (Construction)	1000m DN750	2022-2027	\$6,700,000	\$217,750
Sewer outfall	Ocean outfall pumping station	Panatina WWPS 500L/s, DN8, screens (to Outfall)	2022-2027	\$2,800,000	\$351,414
Sewer reticulation	Sewer reticulation (Stage 1a)	Mataniko, Ngossi, Panatina, Point Cruz, Ranadi 2, Vura	2017-2022	\$8,200,000	\$53,300
Sewer reticulation	Sewer reticulation (Stage 1b)	Kukum, Mataniko, Vura, Ranadi 1, Point Cruz	2022-2027	\$8,300,000	\$53,950
Sewer reticulation	Sewer reticulation (Stage 2)	Airport, Lungga 1, Lungga 2, Lungga 4, Mataniko, Menda, Ngossi, Panatina, Point Cruz, Rifle Ridge, Rove, Tavioa, Vura, White River	2027-2037	\$18,000,000	\$117,000
Sewer reticulation	Sewer reticulation (Stage 3)	Airport, Lungga 1, Lungga 2, Lungga 4, Kakambona, Kukum, Mataniko, Panatina, Point Cruz, Rifle Ridge, Rove, Tavioa, White River	2037-2047	\$27,200,000	\$176,800
Sewer pumping station	Sewer pumping stations (Stage 1a)	Ranadi 2	2017-2022	\$1,100,000	\$63,820
Sewer pumping station	Sewer pumping stations (Stage 1b)	Kukum, Vura, Point Cruz	2022-2027	\$4,000,000	\$492,172
Sewer pumping station	Sewer pumping stations (Stage 2)	Airport, Mataniko, Lungga 1, Lungga 2, Lungga 3, Lungga 4, Menda, Ngossi, Rifle Ridge, Tavioa Ridge, Point Cruz, Rove, Ranadi 1, Panatina	2027-2037	\$17,100,000	\$1,411,240
Sewer pumping station	Sewer pumping stations (Stage 3)	Kakambona, White River, Panatina	2037-2047	\$4,600,000	\$455,168
Sewer mains	Sewer rising mains and trunk mains (Stage 1a)	Kukum, Mataniko, Vura	2017-2022	\$2,200,000	\$14,300
Sewer mains	Sewer rising mains and trunk mains (Stage 1b)	Kukum, Vura, Ranadi 2	2022-2027	\$3,400,000	\$22,100
Sewer mains	Sewer rising mains and trunk mains (Stage 2)	Airport, Mataniko, Lungga 1, Lungga 2, Lungga 3, Lungga 4, Menda, Ngossi, Rifle Ridge, Tavioa Ridge, Rove, Ranadi 1, Panatina	2027-2037	\$9,000,000	\$58,500
Sewer mains	Sewer rising mains and trunk mains (Stage 3)	Kakambona, White River, Panatina	2037-2047	\$7,000,000	\$45,500
Sub-total Wastewater				\$156,600,000	\$4,612,515

2.2 Lifecycle Management and Institutional Improvements

In addition to the new assets outlined in the previous section, operational and institutional improvements are recommended to ensure that SW can meet corporate objectives and achieve required levels of service for existing customers. Key recommendations are summarised below, with further details provided in Section 8 of the Main Report.

2.2.1 NRW Reduction

The current NRW reduction activities are somewhat sporadic and piecemeal in nature due to the lack of an overarching strategy and driver for NRW Management. Therefore, it is proposed to develop a more comprehensive NRW Management Program, which will target the progressive reduction in NRW from the current unsustainable levels of around 60% to the long-term target levels of around 25%. It is envisaged the program will incorporate many of the existing NRW reduction activities along with additional targeted initiatives and will be supported by a comprehensive monitoring and reporting process to track progress and ensure accountability.

2.2.2 Operations and Maintenance

The capital works recommended in this study will require significant lead time during funding application, investigation and design, construction and commissioning. Many projects have also been recommended in the medium and long term in order to avoid sporadic investment and meet future needs.

In addition to the highest priority capital works, SW should focus on consolidation and optimisation of the existing system in the short term, which may be realised with a significantly shorter lead time. This will ensure that improvements to levels of service are achieved with minimal investment of funds and resources, and that future assets are connected to the system efficiently.

The following measures are recommended:

- Maintenance/replacement/installation of 2 air valves/year
- Replacement or installation of 1500 customer meters/year, including extension of the Cash Water scheme
- Purchase of sewer jetting equipment
- Replace 9km/year water mains
- Replace/reline 1.2km/year sewer mains
- Engage a contractor to undertake CCTV inspection of wastewater system, review wet weather performance and identify defects
- Refurbish pumping units at 5 stations
- Review the performance of 7 recently installed PRVs
- Undertake pressure testing at 5 DMA locations/year and review against SCADA and hydraulic model data
- Incorporate a screening system into all outfall pump stations and develop a solids disposal strategy for screenings. Allow for screens in the design of new pump stations
- Short term tankering of wastewater from Tuvaruhu and Rove
- Purchase of truck for short term transfer of sewage from Tuvaruhu and Rove communal septic tanks to Point Cruz WWPS
- Construct or undertake long term lease of new office accommodation, stores and workshop

2.2.3 Corporate Policy and Planning

Corporate policy and planning documentation are necessary to ensure that SW is able to efficiently deliver services, maintain financial stability and properly manage risk. The recommended corporate policies and planning documents are summarised in Table 2-4. Further details are provided in the Main Report.

Table 2-4 Recommended Corporate Policies and Planning Documents

Item	Purpose
Water safety plan	To improve the safety of the water catchment and improve efficiency of water use. Components include disaster management plan, catchment management plan, climate change risk assessment and adaptation plan, drought management plan and demand management plan
Design and construction standards	To set minimum standards and levels of service for design, delivery and operation of assets
Developer contribution policy	To determine the contributions towards capital works associated with providing capacity for new customers connecting to the system
Liquid trade waste policy	To set the volume and level of pre-treatment required from commercial and industrial customers discharging to the wastewater network, and set appropriate rates for large customers
Asset management plans	To ensure that assets are effectively managed across the whole asset life cycle. Components include maintenance strategies, data management plans

2.2.4 Data Management

An important part of asset management is the collection and storage of data on the status, operation and performance of the system. A sound data management system provides an important tool in good decision making processes.

The following measures are recommended:

- Engage international consultants to assist in creating a data management strategy and provide ongoing SCADA technical support
- Engage international consultants for ongoing hydraulic modelling technical support
- Review water quality monitoring performance against the two year plan objectives and implement any outstanding measures
- Develop system monitoring procedures and purchase appropriate software. Investigate monitoring requirements for other provincial centres

2.2.5 Summary of Operational and Institutional Improvements

A summary of the proposed operational and institutional improvements is provided in Table 2-5, including details, timing, cost estimates and population served.

Table 2-5 Summary of Institutional / Operational Improvements

Type	Item	Details	Stage	Capital Cost (USD)
Lifecycle management / institutional improvement	Annual Watermain Pipe Replacement	9km/yr	2017-2022	\$1,800,000 p.a.
Lifecycle management / institutional improvement	Annual Sewer main Pipe Replacement	1.2km/yr	2017-2022	\$600,000 p.a.
Lifecycle management / institutional improvement	NRW reduction	Leakage detection, operational improvements, disconnections	2017-2022	\$600,000 p.a.
Lifecycle management / institutional improvement	Urban WASH programs	Communal standpipes, septic management program	2017-2022	TBA
Lifecycle management / institutional improvement	Maintenance improvements	Air valves, customer meters, maintenance equipment, CCTV	2017-2022	\$540,000 p.a.
Lifecycle management / institutional improvement	Operational improvements	Pump station refurbishment, PRVs, zoning and cross connection, wastewater screening, tankering	2017-2022	\$295,000 p.a.
Lifecycle management / institutional improvement	Operational improvements	Wastewater tanker	2017-2022	\$150,000
Lifecycle management / institutional improvement	Maintenance facilities	Workshop, maintenance depot and office	2017-2022	\$2,000,000
Lifecycle management / institutional improvement	Institutional reform, corporate policy and planning	Water safety plan, climate change adaption planning, design and construction standards, developer contribution policy, liquid trade waste management, asset management	2017-2022	\$300,000
Lifecycle management / institutional improvement	Data management	SCADA integration, hydraulic modelling, monitoring	2017-2022	\$170,000 p.a.
Lifecycle management / institutional improvement	Project management unit	Project Manager, environmental, financial, land, community specialists, preliminary design and planning of WTP	2017-2022	\$600,000 p.a.
Lifecycle management / institutional improvement	Capacity building	Institutional reform, demand management, NRW, data management, maintenance	2017-2022	\$250,000 p.a.

2.3 Investigations and Project Delivery

This Strategic Plan outlines a significant program of capital upgrades and operational/institutional improvements. A number of additional investigations are recommended in order to confirm the feasibility of proposed works and ensure efficient use of funds. Additional resources are also required to ensure that SW is capable of delivering the proposed programs. Key recommendations are summarised below, with further details provided in the Section 8 of the Main Report.

2.3.1 Project Delivery

Managing the design and delivery process for major capital works is a complex task that requires highly skilled technical (engineering) staff with both project management and hands on design and/or operations experience. SW still lacks sufficient numbers of skilled and experienced staff, and the current SW corporate structure does not include a role or team that is focused on construction or capital works delivery.

It is recommended to develop a Project Management Unit to assist SW with delivery of the 5 Year Action Plan. This would ideally be contracted out to an international consultant, in conjunction with local consultants and some SW staff. The team would be responsible for program management, coordination of investigations and approvals, as well project/contract management of design and construction.

2.3.2 Technical Capacity Building

In order for SW to be self-sufficient and sustainable, SW needs to develop sufficient in-house technical capacity to manage and operate the complexities of modern water and wastewater systems. Significant external support is required in the short to medium term through partnerships and/or consultancies. Capacity building is needed in areas such as NRW management, demand management, operational planning, hydraulic modelling, asset management, mechanical / electrical maintenance, strategic planning, finance, billing, customer service, communications, ICT and infrastructural management.

2.3.3 Investigations and Design of Treatment Systems

The 30 Year Strategic Plan has identified the Lungga River as the preferred long-term primary supply source for Honiara. However, due to the nature of this large river source, substantial field investigation will be required in order to confirm the viability of using the Lungga River as a primary supply source.

Investigations and planning work that needs to be undertaken before proceeding with construction of the Lungga River water source and treatment plant includes:

- Hydrogeological study of groundwater sources around Honiara to confirm whether there is sufficient yield to supply long term demands, particularly around Mataniko River, Eastern Honiara and Mount Austin.
- Raw water quality analysis at multiple locations on the Lungga River to confirm treatability of water source.
- Detailed assessment of the full range of river flows to identify minimum flows and levels, maximum flood levels (at least to the 1 in 100 year flood event) and average flow conditions.
- Field assessment of the current saltwater interface zone within the Lungga River and desktop assessment of the likely upstream movement of the saltwater interface under future climate change scenarios due to increases in ocean levels.
- Field investigation of viable locations for the river intake and pump station structure, including assessment of geotechnical conditions, bank stability and riverbed stability.

- Field investigations of viable locations for the WTP, including assessment of geotechnical conditions and flood levels (if relevant).
- Regulatory and stakeholder liaison, including Department of Environment, Climate Change, Disaster Management and Meteorology, Department of Health and Medical Services and the Ministry of Mines, Energy and Rural Electrification.
- Options assessment of river intake and pump station and WTP.
- Preliminary assessment of power and access requirements, including liaison with power and roads authorities.
- Preliminary environmental and social impact assessments.
- Assessment of land acquisition requirements and any resettlement impacts.
- Concept design, including confirmation of design capacity requirements and key infrastructure sizing, location, material and construction type. Concept design would also include preliminary site layouts, treatment process selection, control philosophy and construction methodology as well as ensuring the plant can operate whilst subsequent upgrades are being constructed.

A new ocean outfall in Honiara is required to replace the existing 13 outfalls, which are damaged and discharging near shore. The location of the discharge facilities will largely be driven by the location of proposed future treatment facilities. Therefore, it is prudent to begin investigations now in order to secure appropriate land and prepare for the construction of a new outfall.

A full concept design and specification of the outfall needs to be prepared, which would require additional studies to be undertaken prior to implementation of the new outfall:

- Investigation of preferred long term sewage treatment plant site
- Regulatory and stakeholder coordination, including Department of Environment, Climate Change, Disaster Management and Meteorology, and Department of Fisheries and Marine Resources
- Bathymetric survey, including shore, intertidal and offshore levels for the proposed route(s)
- Benthic morphology survey, to identify organisms living along the proposed route(s)
- Current study, to determine likely current movements in the receiving waters
- Wave buoy survey, to assist in wave force analysis
- Dilution modelling, to determine the effectiveness of dilution at the proposed discharge location and assist in design of diffusers
- Environmental impact study, including impact on coral and ocean life
- Geotechnical study, to determine the extent of anchoring required along the proposed route(s)
- Detailed design

2.3.4 Servicing Informal and Peri-Urban Areas

Interim solutions are required to provide water supply and wastewater services to informal settlements and peri-urban areas, which are unlikely to be connected to the SW systems within the life of this Strategic Plan.

It is recommended to undertake further trials of communal standpipe systems in order to identify barriers to access to drinking water. This should be done in conjunction with the assessment of pro-poor government subsidised tariff structures and/or bulk supply discounts, and the use of pre-paid water meters where possible.

The SIG needs to set national targets and budgets for sanitation services in Solomon Islands, including an assessment of the role for SW in providing wastewater services in urban areas (especially management of septic systems), as well as the role of NGOs in improving sanitation systems in informal and peri-urban areas.

2.3.5 Investigations for Provincial Centres

Limited data is available for the provincial centres, particularly with regard to asset condition and performance. In addition to the general operational and institutional improvements outlined above, additional investigations are required in order to confirm recommendations for provincial centres, particularly with regard to new water sources.

Recommended investigations include: inspection of the condition, operability and capacity of existing key assets; installation of flow meters at water sources, bores and pump stations; review of the feasibility of SCADA systems; and assessment of current demands and NRW.

3 IMPLEMENTATION

3.1 Funding

There is a considerable amount of valuable information and analysis on funding available in previous planning reports. This summary report on funding does not duplicate the details of this previous work but rather focuses on the dynamic nature and approach that is needed to optimise funding as a normal and important feature of the management of SW.

The approach is to start with an outline of the proposed projects and their broad costs that require funding and then discuss different features of these projects that are important to the funding decision. This is not a comprehensive list of features, as funders review their programs and objectives regularly, and sometimes opportunities arise outside the normal programs or new programs arise. Consequently, ongoing networking with funders is an important management task to seek out these opportunities.

There are a whole range of funding sources available to SW, including from its own customers, and an outline is given of the more likely targets. Finally a funding strategy is proposed with the focus being on the extra funding possibilities that this Strategic Plan creates for SW as there is usually a handsome payback from having a very good Strategic Plan.

3.1.1 Funding Features

In broad terms, SW is looking at a total investment in the order of US\$400m over the next 30 years, including around US\$50m over the next 5 years. Some of the features pertinent to the investment decision and gaining funds for these projects are now commented on.

Annual Operating Costs

It is evident that the annual operating costs of projects for growth, greenfield development and adding resilience to the water supply system are significant. The ongoing funding of these projects from local sources is going to be critical to the decision to proceed as it is difficult to procure ongoing funding for long term operating costs.

Institutional versus Infrastructure capital expenditures

The funding of capital expenditure that increases the capability of SW in various ways is likely to have more opportunities for short-term 'institutional' funding than large infrastructure investments. An example would be components of the non-revenue water project involving capacity building. Projects may also gain priority where they have features such as promoting gender diversity and other objectives which are being pursued by different funders.

Recoverable versus Non-recoverable

Generally where projects have the potential to generate extra revenue for SW and project financing costs are recoverable then funding providers will be looking at providing loans rather than grants. These projects can also be analysed for private sector financing opportunities such as concession and leasing arrangements. In contrast, projects like new sewerage schemes where there are large capital investments and recoverable costs are low will require usually a mix of grants, concessional loans and Government assistance.

Five year versus longer term programs

Capital expenditure programs are normally prepared as five year programs for funding purposes with the Strategic Plan outlining a longer program of works over many decades to ensure the five year program is consistent and is sequenced efficiently for the longer term. However, the advantage of having a Strategic Plan is that funding programs can be configured in different ways according to program objectives, delivery timing and other funding needs. This allows for funding to be pursued in an interactive way that optimises opportunities for funding.

Investment Prioritisation

The prioritisation of investment to indicate the right sequencing of investment in Projects over time is important and often a mandatory requirement of some funders. This Strategic Plan provides the tool to do prioritisation and gives the results for the projects in the Strategic Plan based on current circumstances. Circumstances will change with time and the tool allows for the resequencing of projects as this occurs.

There may also be funding opportunities that fall outside this prioritised sequence of projects and the tool allows for the sequence to be recalibrated based on the opportunities that arise.

Private sector funding and/or delivery

Whilst there has been a conventional approach to infrastructure delivery based on private consultants designing works, private constructors building them and public utilities operating and maintaining them, other options are available particularly for larger scale works which have revenue streams attached to them. Various forms of operating lease and concession agreements can be devised for these situations.

The private sector is likely to be interested in projects which have the following characteristics:

- A clear user revenue stream
- Reliable and tested revenue collection mechanisms
- Relatively low levels of risk, or risk reducing guarantees
- The opportunity for the private sector to take the lead in project development and operation
- A strong utility partner which can resolve land disputes and other issues.

The private sector is likely to be interested in larger urban water schemes and far less interested in projects in rural water supply and sanitation where the above characteristics are not satisfied. Multilateral development banks now have facilities to provide guarantees to the private partner over the revenue stream in relation to country and institutional risk and facilitating more private sector projects.

A whole variety of other contractual forms can be adopted to incentivise the private sector partners in projects including pain/gain contracts based on KPI's, partnering arrangement for delivering large projects and even support over maintenance and operations.

Climate change impacts

Considerable funds are becoming available for projects that provide resilience and deal with the impacts of climate change. Water supply and wastewater projects are going to be a very important feature in many developing nations of preparing and responding to climate change and these features of projects are important to identify so that climate change funds can be pursued.

3.1.2 Sources and Types of Funds Available

SW Customers

The prime source of funds for SW is its customers. However there are likely to be affordability limits for the current customer base. The tariff model will assist different tariff and affordability issues to be assessed. The aim of efficient tariffs is to recover the annual operating and maintenance costs, the replacement and renewal costs of existing assets over time and the interest on loans. Grants and concessional funding are required if this cannot be achieved at affordable tariff levels.

Solomon Islands Government (SIG)

SW competes with all other national expenditures when it comes to seeking Government funding. The budget process is as follows.

The SIG Consolidated Fund is broken down into two sections, revenue and development. Infrastructure funding is normally part of the development budget. SIG determines its budget on an annual basis, in line with the prevailing financial instructions, and SW is usually not consulted or involved in this process. Each bid for funds is required to be supported by standardised documentation, setting out the rationale for the project.

Cabinet identifies priorities for funding from the line agencies. Where development partner funding is allocated to a scheme, this is identified and the required match funding set aside in the budget. SIG will then approach development partners about projects which have not yet attracted development partner support.

The total SIG development budget is determined based upon estimates of SIG revenues and development partner support, on an annual basis. Based upon this available funding, decisions are made regarding the highest priorities for funding and the development budget allocated as appropriate.

One significant change relating to SIG funding, is the approach being taken by a number of development partners. This is moving from a project based funding process, to one based upon general revenue or sector support. This changes the emphasis of project planning and implementation, as funding applications need to compete with other SIG priorities within the budget process described above.

The Community Service Obligation (CSO) was developed by SIG as part of its State Owned Enterprise (SOE) Governance Strengthening Program as a mechanism to provide support to SOEs operating loss-making services to provincial communities. The SIG intends to scale this program back over the long term, therefore CSOs should only be considered as a short-medium term funding source. The key objectives of the CSO policy framework are to ensure that:

- SIG understands the true costs and benefits of providing a community service obligation and therefore make better decisions about using SOEs to achieve policy objectives;
- delivery of CSOs does not negatively impact the performance incentives of SOEs or their commercial results; and
- CSOs are efficiently provided and their social goals are effectively identified, that is CSO outputs are delivered at least cost, whilst also meeting the appropriate products/service standards and measured through outcomes.

Currently the Solomon Islands has a deteriorating outlook of -6.1% for its current account deficit for 2017, inflation of 4.5% and GDP growth of 2.5%. So the SIG budget will remain very competitive and other sources of funds will be required for major projects by SW.

Bilateral and multilateral aid funding

The **Australian Government** (Department of Foreign Affairs and Trade/ Australian Aid) has been a major financial supporter of SW over the last five years but this role is ending. It is unlikely to be a major source of funds for new infrastructure. However the Australian Government has a bilateral agreement with the SIG. DFAT has many programs relating to institutional support that should be pursued through this bilateral agreement and it will remain as a key back-up for emergency coordination and support. Possibilities for funding include a twinning program with targeted training and development, governance and emergence training and development, and scholarships for actual and potential SW staff.

The European Union (EU) is increasing its funding to SW under its 11th European Development Fund (EDF). The EDF is the EU's main instrument for providing development aid to Pacific countries. The EDF funds cooperation activities in the fields of economic development, social and human development as well as regional cooperation and integration, and has set aside €18m for urban water from 2018 to 2023.

It is financed by direct contributions from EU Member States. The total financial resources of the 11th EDF amount to €30.5 billion for the period 2014-2020.

The EU is a likely funding source for some infrastructure funding and general institutional support over the period up to 2020.

New Zealand through its Ministry of Foreign Affairs and Trade is active in Pacific nations supporting training and responses to emergencies. It is a possible funding partner for some SW training activities but unlikely to fund infrastructure.

The **Green Climate Fund (GCF)** is a fund within the framework of the United Nations Framework Convention on Climate Change (UNFCCC) founded as a mechanism to assist developing countries in adaptation and mitigation to counter climate change. The GCF is based in South Korea and governed by a Board of 24 members and initially supported by a Secretariat. The Green Climate Fund supports projects, programs, policies and other activities in developing country parties using thematic funding windows. It is intended to be the centre piece of efforts to raise Climate Finance of \$100 billion a year by 2020. A total of US\$10.3 billion has been pledged so far, which is meant to cover investments over a four year period.

The Water Authority of Fiji has obtained funding from the Green Climate Fund to fund some of its master plan works where there is a climate resilience aspect to the works. This Fund is a good possibility for some funding of SW Strategic Plan projects.

The **Pacific Rim Infrastructure Fund (PRIF)** is an aggregation of multilateral agencies with Pacific interests and acts as a quick source of funds for short-term studies and projects in a timeline under 6 to 12 months. PRIF funded an investigation for SW and more recently funded tariff reviews. PRIF funds activities that other agencies find difficult to process within a short timeframe.

Multilateral Development Banks

There are several major multilateral development banks providing concessional loans for water and sanitation in Pacific countries. Generally the loans are long term (20 to 30 years), have a low interest rate of about 1% p.a., and development country factors are taken into account if the loan becomes unserviceable for periods due to national emergencies and disruptions.

The World Bank is the largest development bank while the Asian Development Bank is active in the Pacific due to its regional focus on Asia and the Pacific. These banks do provide some grant funds for minor activities but their main focus is on low interest loans for projects in developing nations. The loans need to be guaranteed by the Government and so there will be competition within countries between different service departments and agencies for procuring loans.

These multilateral development banks are a potential source of funding for SW projects over time but as there is a deteriorating current account deficit, it is likely that there will be significant competition within country to get access to loans.

The Asian Infrastructure Investment Bank (AIIB) started operation in January 2016 and is another potential multilateral bank that could fund infrastructure projects in future. AIIB is 30% owned by the Government of the Peoples Republic of China and so will bring a fresh perspective to development banking in the region.

Investment Banks and Other Funding Sources

Investment banks have become more involved in financing water and other projects in Pacific nations over recent decades. Usually these banks will provide project finance to a private company which delivers the project. The investment bank will usually seek guarantees from the Government over loan repayments. The most prominent of these banks is the China Exim bank.

The Export–Import Bank of China (Chexim - China Exim Bank) is one of three institutional banks in China chartered to implement the state policies in industry, foreign trade, diplomacy, economy, and provide policy financial support so as to promote the export of Chinese products and services. Established in 1994, the bank is subordinated to the State Council of the Chinese Government.

The focus of the bank is to promote foreign trade and investment as well as development assistance in concessional funding. It is the sole provider of Chinese government concessional loans. Exim is not limited though to concessional funding and commercial operations form the backbone of the bank. Commercial activity includes export credits mainly in the infrastructure fields (roads, power plants, oil and gas pipelines, telecom, and water projects) and investment loans for Chinese businesses to establish overseas in the energy, mining and industrial sectors.

Exim does not publish figures for overseas loans. It is likely that the China Exim bank and its co-patriot China Development Bank together sign more loans annually than the World Bank, which operates on a \$100 billion budget.

A Chinese-owned company backed by the Exim bank is a possible provider of infrastructure funding and delivery for SW. The loans are usually long term at a rate of up to 2% p.a. Like other investment banks, the Exim bank expects interest and loans to be paid and will revert to the Government guarantee for payment if necessary. There needs to be a good specification on the quantity and quality of outcomes sought from projects to be guaranteed a good outcome from projects financed and delivered this way. Also pricing needs to be carefully benchmarked as many sole sourced arrangement have been entered into in the past.

The Japanese International Cooperation Agency (JICA) has an active history of supporting development in Pacific countries, including the Solomon Islands, and has an active water resources program. JICA have been a major funder of SW, particularly over the past decade. JICA projects generally are tied to specific Japanese supply arrangements and vary from master plans to desalination plants. Considerable thought needs to be given to longer term operations and maintenance needs and costs before these projects are enacted as many are limited to design and installation of specific facilities.

The private sector will normally use a mix of local and international banks for project finance and guarantees to deliver projects. The country risk can be abated through the purchase of export finance guarantees that are available to companies operating in many western countries. Public-private partnerships (PPP) involve a contractual relationship between government entities and private sector entities. The contracts generally stipulate risk allocation, funding arrangements and transparency requirements. Such relationships may be used to contract out non-core or specialist business functions. They may also be used to fund capital projects, particularly where the private entity is able to externally source capital funding in return for guaranteed long term payments (e.g. through tariffs and/or fees). A number of models exist, including build-own-operate-transfer (BOOT) and design-build-operate-transfer (DBOT). Such models are suited to major projects such as treatment plants, where there is a large capital cost, need for specialist designers and operators, and a clear long term income stream.

Other possibilities for finance include **institutional investors and NGOs**. These entities are unlikely to be involved in the large projects listed on this Strategic Plan.

3.1.3 Funding Strategy

Immediate

The development of the Strategic Plan has already provided opportunities for SW to become involved in discussions with potential funders such as the EU, ADB, DFAT etc. The availability of the Strategic Plan provides an ideal opportunity to start and promote further discussions with likely funders, especially about funding of the five year program of projects. The suggested process is to:

- Send out a flyer to make potential funders aware of the proposed projects, their social and environmental benefits and funding needs
- Once the Strategic Plan is available then send the formal report for their consideration of projects that are aligned to their programs and objectives

In addition there are several funders of 'institutional' programs which could benefit SW for specific capability development activities. The current EU funding has a strong focus on strengthening SW and these activities could be complemented by pursuing suitable programs available from Australia, New Zealand, JICA and the Asian Development Bank. Since there is a long history with DFAT in Australia and a bilateral agreement in place, considerable ongoing opportunities should exist from this source to develop staff and their capabilities further.

Ongoing Funding Strategy

The immediate priority is to get parts or all of the five year program funded from grant and low cost funding sources. Different components of the five year and longer term projects have already been scrutinised for their suitability for funding from the Green Climate Fund and this will require a submission in an appropriate format. A process is already being outlined for soliciting the interests of other funding sources and new sources such as the Asian Infrastructure Investment Bank. Any projects suitable for private sector delivery will need separate scrutiny and development. The results of these actions will comprise an initial funding strategy with a table of funders, their objectives, the cost of funds and the probable and actual projects to be funded with their costs and project outcomes.

As there are significant longer term funds required, it is important that SW continues to review and update its funding action list of activities and develops skills and expertise to do so. With time, more detail will become available on future projects and funding programs will change. It will be a healthy result for SW if it has good relationships with a number of funding partners and has the skills on board to adapt its programs to the development and environmental objectives sought by different funding sources.

3.2 Risk Analysis

A risk assessment has been undertaken, with input from SW staff, to identify the critical risks to SW's water and wastewater business. The baseline for the risk assessment assumed the 30 Year Strategic Plan had not been developed or implemented.

The outcomes of the risk assessment are summarised on Table 3-2, which includes all risks rated as High or Extreme, and includes suggested additional mitigation measures to reduce risks to more acceptable levels; i.e. in addition to implementing the key recommendations contained within the 30 Year Strategic Plan.

Table 3-1 Risks Assessment Summary

Risk	Likelihood	Consequence	Risk Level	Additional Mitigation Measures / Actions
Political & Policy (Government)				
Failure to secure aid funding	Likely	Extreme Limited capital works, inability to meet growth	Extreme	<ul style="list-style-type: none"> 30 Year Strategic Plan and 5 Year Action Plan to be provided to development agencies
Inability to secure new water sources	Almost Certain	Extreme Inability to supply water to large proportion of customers	Extreme	<ul style="list-style-type: none"> Proposed new water sources in 30 Year Strategic Plan to be presented to SIG and major sources included in NIIP
Insufficient urban development / planning	Likely	High Continuing to generate backlog areas	Extreme	<ul style="list-style-type: none"> Work with SIG and Honiara City Council to ensure sufficient urban development planning occurs
No regulation of on-site sewage disposal	Almost Certain	Extreme Contamination of groundwater sources, overuse	Extreme	<ul style="list-style-type: none"> SIG issue
Existing regulations not being enforced	Almost Certain	Extreme Catchment contamination	Extreme	<ul style="list-style-type: none"> SIG issue
Non-appointment of Board members	Almost Certain	High Inability to achieve quorum, lack of governance	Extreme	<ul style="list-style-type: none"> Work with SIG to ensure sufficient Board members are maintained
Regulated tariff is too low	Possible	High Cannot meet financial or regulatory obligations	High	<ul style="list-style-type: none"> SIG issue
Failure to comply with environmental regulations	Possible	High Served with improvement notices resulting in need for upgrades to achieve compliance	High	<ul style="list-style-type: none"> Work closely with SIG (Ministry of Environment, Climate Change, Disaster Management & Meteorology) to ensure environmental compliance

Risk	Likelihood	Consequence	Risk Level	Additional Mitigation Measures / Actions
Governance (Board)				
Lack of SW independence / effectiveness	Likely	High Lack of diversity and/or clear direction and leadership	Extreme	<ul style="list-style-type: none"> Work with SIG to ensure independence of SW Board
Business (Executive Leadership)				
Business continuity failure	Possible	High Loss of service to customers, reputational risk	High	<ul style="list-style-type: none"> Implement operational improvements (including system redundancy / backup improvements) and 30 Year Capital Works Program
Strategic (Management Team)				
Lack of planned maintenance (critical assets)	Likely	Medium Potential for extended loss of supply and additional repair costs	High	<ul style="list-style-type: none"> Prepare and implement proposed planned maintenance initiatives – including Asset Management Plans and Maintenance Strategies for all key assets
Inability to attract right staff	Likely	Medium Inefficient work programs, stress for existing staff, high turnover of staff, system collapse	High	<ul style="list-style-type: none"> There is a need for improvements in staff salaries (and other associated incentives) over time as SW becomes more financially sustainable
Operational (Management Team)				
Assets damaged by third party construction activities	Likely	Medium Customer impacts, negative publicity	High	<ul style="list-style-type: none"> Ongoing development of SW Design Standards and better supervision of works undertaken by contractors
Unauthorised system access / cyber attack	Possible	High Failure of systems, theft of information and funds	High	<ul style="list-style-type: none"> Specific assessment of cyber-security vulnerabilities is needed to identify mitigation measures
Water quality does not meet required standards	Likely	Medium Potential health impacts	High	<ul style="list-style-type: none"> Improvements in the maintenance of disinfection systems and monitoring of water quality and chlorine residuals are proposed (in 5 Year Action Plan). 30 Year Strategic Plan proposes centralised WTP for Honiara
Sewer system at capacity	Almost	High	High	<ul style="list-style-type: none"> 30 Year Strategic Plan includes system augmentations to cater for additional connections

Risk	Likelihood	Consequence	Risk Level	Additional Mitigation Measures / Actions
	Certain	No new connections possible leading to unsatisfactory on-site disposal or open defecation		and increase wastewater coverage from 9% to 30%
Poor or no septic tank management	Likely	High Possible contamination of groundwater	Extreme	<ul style="list-style-type: none"> SW to work SIG on septic tank management (including potential role in pumping out high risk septic systems) 30 Year Strategic Plan includes system augmentations to cater for additional connections and increase wastewater coverage from 9% to 30% (including in areas where groundwater contamination risks are high)
Natural Events (Management Team)				
Unreliable assets due to lack of redundancy	Possible	High Negative publicity, reduce revenue	High	<ul style="list-style-type: none"> Implement operational improvements (including system redundancy / backup improvements) and 30 Year Capital Works Program
Significant damage to facilities due to fire	Unlikely	Extreme All paper records destroyed, facility destroyed	High	<ul style="list-style-type: none"> Prepare and implement Disaster Management Plans for each system
Health & Safety (All)				
Threats to staff personal security and safety	Possible	High Threats to personnel – injury	High	<ul style="list-style-type: none"> Internal SW issue
Poorly documented procedures	Possible	High Accidents due to unsafe work practices – injury	High	<ul style="list-style-type: none"> Internal SW issue
Failure to follow and enforce safety procedures	Almost Certain	High Injury to personnel	Extreme	<ul style="list-style-type: none"> Internal SW issue
Lack of record keeping	Almost Certain	High Accident trends not being monitored with potential for more serious accidents	Extreme	<ul style="list-style-type: none"> Internal SW issue

3.3 Review and Monitoring of Plan

Ongoing monitoring and review of the 30 Year Strategic Plan is critical to ensuring that the desired Plan outcomes are achieved in both the short and long term. The 30 Year Strategic Plan should be fully revised and updated every 5 years, along with a review of the previous 5 Year Action Plan outcomes and preparation of a new 5 Year Action Plan for the proceeding 5 year period.

Regular reviews (at least annually) should also be undertaken on the progress of delivering the proposed capital works program, as well as progress on implementing the proposed operational and institutional improvements. To assist in the review process, a preliminary Monitoring and Evaluation Framework has been developed (see Table 3-2 below), which includes core objectives for the 30 Year Strategic Plan, KPIs against each of the core objectives and specific targets for both the 5 Year Action Plan and the 30 Year Strategic Plan. The KPIs are generally similar to key Levels of Service criteria and Corporate Objectives (refer to 30 Year Strategic Plan – Main Report).

A project steering committee may be set up to ensure that key stakeholders (including funding agencies and government agencies, in addition to SW) are included in the monitoring and review process.

Table 3-2 Preliminary Monitoring and Evaluation Framework

Core Objectives	KPIs	5 Year Target	30 Year Target
Water Supply To provide a continuous, clean water supply	% coverage of water supply system (Honiara)	70%	95%
	Average hours of continuous supply at normal pressure	24	24
	% compliance with drinking water quality requirements	95%	100%
	% NRW	45%	25%
Wastewater To provide a centralised wastewater and effluent management system	% residential coverage of centralised wastewater system (Honiara)	20%	30%
	% coverage of centrally managed / collected septic tank systems (Honiara)	??	??
	% compliance with effluent discharge requirements (Honiara)	N/A	100%
	% population with access to improved sanitation facilities	75%	100%
Business Sustainability To operate a sustainable water and wastewater business	% operating cost recovery (operating)	100%	100%
	% capital works program delivered (capital)	100%	100%
	Improve institutional capacity (% key positions filled)	TBD	TBD
	Improve customer satisfaction (complaints)	TBD	TBD
Environmental Resilience To operate a resilient and environmentally sustainable business	Water usage / capita / day	170	150
	% compliance with beach water quality requirements	N/A	95%
	Implementation of disaster risk management strategies	TBD	TBD
	Implementation of climate change mitigation strategies	TBD	TBD

4 SUMMARY OF PROPOSED PROJECTS AND COSTS

The proposed projects recommended in this 30 Year Strategic Plan are summarised in Table 4-1, including the intended effect of each type of projects and preliminary cost estimates. Projects have been grouped together by location and the issues that they address. Details of individual works are provided in Table 2-3 and Table 2-5, including forecast timing. Further details are provided in Appendix A, including project priority.

Table 4-1 Summary of Proposed Projects

Item	Current Issues	Proposed Projects	Project Effect	Cost Estimate (USD)
Honiara Water (\$165m)				
Water sources	Current demand exceeds supply capacity	Recommission White River bores, expand bore extraction at Mataniko	System yield increased from < 30 ML/d to 40 ML/d, with the ability to supply projected demands to 2025	\$1.1m + \$0.7 p.a.
Water network pressure	Insufficient transfer capacity to deliver water from sources to customers	New trunkmains at Mataniko and White River	Ability to supply customers with adequate pressure 24/7	\$4.3m + \$0.03m p.a.
System Redundancy	Insufficient backup during supply interruptions and inadequately maintained assets	Additional Reservoir Storage and ongoing maintenance to improve operational lifespan	Ability to supply customers during operational interruptions, and reduction of interruptions due to better maintenance	\$27m + \$0.07m p.a.
Unserved areas	Areas currently not receiving water	Infill reticulated supply	Existing residents to receive potable water supply	\$9.4m + \$0.06m
System Growth	Future demand significantly exceeds supply capacity	New source at Lungga River to new WTP, plus future provision for treatment at Kongulai	System yield increased from 40 ML/d to 100 ML/d, with the ability to supply projected demands to 2047	\$100m + \$15m p.a.
Greenfield Development	Existing Infrastructure insufficient for future growth	Interconnected pipes, pumping stations and reservoirs for future expansion areas	Structured plan for provision of supply to future customers	\$26m + \$0.2m p.a.

Item	Current Issues	Proposed Projects	Project Effect	Cost Estimate (USD)
Honiara Wastewater (\$155m)				
Environmental and Health Improvement	Multiple near-shore outfalls	Temporary outfalls Single consolidated deep water outfall	Improved dilution and reduced human contact with sewage	\$12m + \$0.6m p.a.
Reticulated Wastewater Collection	Extensive un-serviced areas	Progressive rollout of reticulated sewerage to all existing water customers	Improved health and environmental outcomes- lower risk of contaminating local aquifers	\$110m + \$3m p.a.
Wastewater Treatment	No treatment is currently provided	Sewage Treatment Plant	Improved health and environmental outcomes	\$35m + \$1.0m p.a.
Provincial Towns Water (\$50m)				
Auki	Inadequate provision of secure water service	Investigations, new sources, improved storage and pumping capacity	Secure, sustainable water supply	\$12m
Tulagi				\$2m
Noro				\$10m
Gizo (not currently serviced by SW)				\$25m
Operational and Institutional Strengthening (\$30m over 5 years)				
NRW reduction	High levels of non-revenue water	Leakage detection, operational improvements, disconnections	Ongoing, measurable reduction in NRW, improved system capacity, increased revenue, reduced operational costs.	\$0.6m p.a.
Urban WASH programs	Significant population without access to improved water supply and sanitation, challenges in supplying reticulation	Communal standpipes, septic management program	Increased access to improved water supply and sanitation	TBD
Maintenance improvements	SW staff participating in unsafe maintenance practices, aging/failing customer meters, requirement to service new customers	Air valves, customer meters, maintenance equipment, CCTV	Improved billing collection, better network performance	\$0.54 p.a.
Existing asset replacements	Aging/failing infrastructure limiting supply, causing sewage overflows	Water main and sewer main renewals	Improved supply to customers, reduced risk of failure, reduced impact of sewage overflows	\$2.4m p.a.

Item	Current Issues	Proposed Projects	Project Effect	Cost Estimate (USD)
Operational improvements	Pumps not operating at design level, lack of redundancy and risk of failure, threat to raw water source	Pump station refurbishment, backup power, PRVs, zoning and cross connection, wastewater screening, Tuvuru tankering	Improved reliability of major assets, reduced system failure, reduced discharge of gross pollutants, reduced health and environmental threats	\$0.3m p.a.
Maintenance facilities	Aging/lacking office accommodation and storage facilities, lack of capacity for increasing staff	Workshop, maintenance depot and office	Improved workforce performance	\$2.15m
Institutional reform, corporate policy and planning	Lack of planning, ineffective reactive responses to issues, inefficient collection of revenue, inaccurate information about assets and customers	Legislative changes, disaster management, catchment management, climate risk, drought management, demand management, climate change adaption planning, design and construction standards, developer contribution policy, liquid trade waste management, asset management	Better preparedness, more efficient maintenance and operations, reduced operating costs, increased revenue	\$0.3m
Data management	Inaccurate information about assets and customers	SCADA integration, hydraulic modelling, monitoring	Improved ability to track asset performance and customer records	\$0.17m p.a.
Project management unit	Inability of SW staff to deliver capital works	Project Manager, environmental, financial, land, community specialists, preliminary design and planning of WTP	Ability to deliver capital works and meet desired goals	\$0.6m p.a.
Capacity building	Lack of technical capacity of SW staff	Institutional reform, demand management, NRW, data management, maintenance	Improved performance of SW staff, increased efficiency	\$0.25m p.a.

APPENDIX A: PROJECT COST ESTIMATES AND PRIORITY

WATER SUPPLY SUMMARY							
Start Year	WTP	Bores	Water pumping station	Reservoir	Water reticulation	Water trunkmain	TOTAL
2017	\$35,300,000	\$1,100,000	\$2,300,000	\$5,700,000	\$0	\$8,400,000	\$52,800,000
2022	\$0	\$0	\$6,000,000	\$4,700,000	\$9,400,000	\$10,100,000	\$30,200,000
2027	\$28,300,000	\$0	\$3,900,000	\$8,600,000	\$0	\$2,000,000	\$42,800,000
2037	\$13,600,000	\$0	\$10,700,000	\$8,000,000	\$0	\$10,100,000	\$42,400,000
							\$168,200,000
WASTEWATER SUMMARY							
Start Year	STP	Sewer Outfall	Sewer pumping station		Sewer Reticulation	Sewer mains	TOTAL
2017	\$0	\$2,100,000	\$1,100,000		\$8,200,000	\$2,200,000	\$13,600,000
2022	\$0	\$9,500,000	\$4,000,000		\$8,300,000	\$3,400,000	\$25,200,000
2027	\$0	\$0	\$17,100,000		\$18,000,000	\$9,000,000	\$44,100,000
2037	\$34,900,000	\$0	\$4,600,000		\$27,200,000	\$7,000,000	\$73,700,000
							\$156,600,000
PROVINCIAL WATER SUPPLY							
Start Year	Auki	Tulagi	Noro	Gizo			TOTAL
2017	\$2,700,000	\$500,000	\$600,000	\$800,000			\$4,600,000
2022	\$1,840,000	\$260,000	\$1,760,000	\$4,580,000			\$8,440,000
2027	\$3,680,000	\$520,000	\$3,520,000	\$9,160,000			\$16,880,000
2037	\$3,680,000	\$520,000	\$3,520,000	\$9,160,000			\$16,880,000
							\$46,800,000
LIFECYCLE MANAGEMENT / INSTITUTIONAL IMPROVEMENT SUMMARY							
Start Year	Renewals	Operation and Maintenance	Facilities and Equipment	Institutional Improvement			TOTAL
2017	\$12,000,000	\$1,435,000	\$2,150,000	\$5,400,000			\$20,985,000
2022	\$12,000,000	\$0	\$0	\$0			\$12,000,000
2027	\$24,000,000	\$0	\$0	\$0			\$24,000,000
2037	\$24,000,000	\$0	\$0	\$0			\$24,000,000
							\$80,985,000

Capital Works Item	Detail	CRITERIA								SCORE	Asset Type	Capital Cost (USD)	Annual O&M (USD/yr)
		Health Improvement	Environmental Improvement	Customer Improvements	Capital/Operating Cost ratio	Alignment with Business Drivers	Constructability	Operations and Maintenance	Staging				
Network Storage (Stage 1a)	2x 6 ML Reservoir	2	0	2	4	1	4	3	5	2.2	Reservoir	\$5,700,000	\$14,250
Additional Bores	White River Bores Recommission	3	2	3	1	2	1	2	5	2.35	Bores	\$300,000	\$208,200
Additional Bores	Mataniko Bores	3	2	3	1	2	1	2	5	2.35	Bores	\$800,000	\$455,600
Water trunkmain (Stage 1a)	White River Trunkmain (3.15km DN250)	2	1	3	4	2	2	3	4	2.25	Water trunkmain	\$1,400,000	\$9,100
Water trunkmain (Stage 1a)	Mataniko Trunkmain (2.5km DN300, 3km DN375)	2	1	3	4	2	2	3	4	2.25	Water trunkmain	\$2,900,000	\$18,850
Backlog Water Reticulation (Stage 1a)	Backlog Water Reticulation (45km DN100)	4	3	2	4	4	1	4	3	3	Water reticulation	\$9,400,000	\$61,100
Water Treatmentment Plant (Planning/design) - Lungga	WTP Planning/design	0	0	5	5	3	5	5	5	2.65	WTP	\$8,200,000	\$0
Raw Water Intake Pumping Station (Stage 1)	40 ML/d	5	2	5	0	3	0	1	2	2.75	Water pumping stati	\$2,300,000	\$2,269,714
Raw Water Transfer Pipeline (Stage 1)	Raw Water Transfer Pipeline (3.7km DN600)	5	2	5	0	3	0	2	2	2.85	Water trunkmain	\$4,100,000	\$26,650
Water Treatmentment Plant (Construction Stage 1) - Lungga	40 ML/d	5	2	5	0	4	0	0	2	2.7	WTP	\$27,100,000	\$542,000
Water trunkmain (Stage 1b)	Trunk Mains from WTP to Low and Medium Zones (10.9km DN450)	4	1	4	3	2	2	3	2	2.75	Water trunkmain	\$8,600,000	\$55,900
Water trunkmain (Stage 1b)	Trunk Mains within Zones (4km DN250)	3	1	3	4	2	2	3	4	2.5	Water trunkmain	\$1,500,000	\$9,750
Water Pumping Station (Stage 1b)	Low Level Pumping Station (4.3ML/d)	4	1	3	1	2	3	3	4	2.75	Water pumping stati	\$900,000	\$694,500
Water Pumping Station (Stage 1b)	Medium Level Pumping Station (4.3 ML/d)	4	1	3	1	2	3	3	4	2.75	Water pumping stati	\$900,000	\$1,028,250
Network Storage (Stage 1b)	15 ML Reservoir Low Level	3	0	2	4	1	4	3	5	2.45	Reservoir	\$4,700,000	\$11,750
Network Storage (Stage 2)	2x 6ML Reservoir	2	0	2	4	2	4	3	5	2.2	Reservoir	\$5,700,000	\$14,250
Network Storage (Stage 2)	White River 6ML Reservoir	2	0	2	4	1	4	3	5	2.2	Reservoir	\$2,900,000	\$7,250
Raw Water Intake Pump Station (Stage 2)	Extra 20 ML/d	5	2	5	0	3	4	1	0	3.25	Water pumping stati	\$500,000	\$1,773,471
Water Treatmentment Plant (Construction Stage 2) - Lungga	Extra 20 ML/d (60 ML/d total)	5	2	5	0	4	4	0	0	3.2	WTP	\$13,600,000	\$272,000
Water Treatmentment Plant (Construction Stage 2) - Konga	10 ML/d	5	2	5	0	4	4	0	5	3.45	WTP	\$14,700,000	\$294,000
Water trunkmain (Stage 2)	Trunk Mains Within Zones (1km DN300, 2.5km DN375)	3	1	4	4	2	3	3	4	2.8	Water trunkmain	\$2,000,000	\$13,000
Water Pumping Station (Stage 2)	Low Level Pumping Station Upgrade	4	1	3	1	2	4	3	0	2.7	Water pumping stati	\$900,000	\$694,500
Water Pumping Station (Stage 2)	Medium Level Pumping Station Upgrade	4	1	3	1	2	4	3	0	2.7	Water pumping stati	\$1,200,000	\$1,037,250
Raw Water Intake Pump Station (Stage 3)	Extra 20 ML/d (60 ML/d total)	5	2	5	0	3	4	1	0	3.25	Water pumping stati	\$1,900,000	\$1,815,471
Raw Water Transfer Pipeline (Stage 3)	Raw Water Transfer Pipeline (Duplicate 3.7km DN600)	5	2	5	0	3	0	2	0	2.75	Water pumping stati	\$4,200,000	\$27,300
Water Treatmentment Plant (Construction Stage 3) - Lungga	Extra 20 ML/d (80 ML/d total)	5	2	5	0	4	4	0	0	3.2	WTP	\$13,600,000	\$272,000
Water trunkmain (Stage 3)	Trunk Mains from WTP to Low and Medium Zones (8.9km DN300, 4.9km DN375, 4km DN450)	4	1	4	3	3	2	3	0	2.7	Water trunkmain	\$10,100,000	\$65,650
Network Storage (Stage 3)	15 ML Reservoir Low Level	3	0	2	5	1	3	3	0	2.1	Reservoir	\$4,600,000	\$11,500
Network Storage (Stage 3)	High Level 2 x 3ML Reservoirs	2	0	2	5	1	4	3	0	2	Reservoir	\$3,400,000	\$8,500
High Level Pumping Station x 2	High Level Pumping Station (2.6ML/d) x 2	2	1	2	4	1	4	2	0	2.05	Water pumping stati	\$1,200,000	\$529,950
Low Level Pumping Station Upgrade	Low Level Pumping Station Upgrade	4	1	3	3	2	4	2	0	2.7	Water pumping stati	\$2,400,000	\$1,629,500
Medium Level Pumping Station Upgrade	Medium Level Pumping Station Upgrade	4	1	3	3	2	4	2	0	2.7	Water pumping stati	\$3,000,000	\$2,092,500
Auki Water Supply Upgrades	Auki investigations, recommission high tank, pumps and pipeline from Gallery	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$2,700,000	\$81,000
Tulagi Water Supply Upgrades	Tulagi investigations, standby pump, AIV	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$500,000	\$15,000
Noro Water Supply Upgrades	Noro investigations, groundwater assessment	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$600,000	\$18,000
Gizo Water Supply Upgrades	Gizo investigations, groundwater assessments, secure Leoko pipeline	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$800,000	\$24,000
Auki Water Supply Upgrades	Auki Further Water Supply Upgrades	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$9,200,000	\$276,000
Tulagi Water Supply Upgrades	Tulagi Further Water Supply Upgrades	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$1,300,000	\$39,000
Noro Water Supply Upgrades	Noro Further Water Supply Upgrades	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$8,800,000	\$264,000
Gizo Water Supply Upgrades	Gizo Further Water Supply Upgrades	5	1	1	0	4	1	1	3	2.2	Provincial water sup	\$22,900,000	\$687,000
Sewage Treatment Plant (Design and Construction)	25 ML/d IDAL, 1.5km DN900 transfer rising main, 1.5km DN750 effluent gravity main	5	5	3	3	5	0	0	2	3.2	STP	\$34,900,000	\$1,047,000
Temporary Ocean Outfalls x 5	Kukum, Vura, Ranadi	4	4	3	4	4	1	3	5	3.35	Sewer outfall	\$1,000,000	\$32,500
Ocean outfall (Planning/Design)	Outfall planning/design	0	0	3	5	4	5	5	5	2.4	Sewer outfall	\$1,100,000	\$0
Ocean outfall (Construction)	1000m DN750	5	5	3	3	5	0	1	5	3.45	Sewer outfall	\$6,700,000	\$217,750
Ocean outfall pumping station	Panatina WWPS 500L/s, DN8, screens (to Outfall)	5	4	3	0	3	1	1	2	3	Sewer outfall	\$2,800,000	\$351,414
Sewer reticulation (Stage 1a)	Mataniko, Ngossi, Panatina, Point Cruz, Ranadi 2, Vura	4	4	1	4	4	1	4	3	3.05	Sewer reticulation	\$8,200,000	\$53,300
Sewer reticulation (Stage 1b)	Kukum, Mataniko, Vura, Ranadi 1, Point Cruz	4	4	1	4	4	1	4	3	3.05	Sewer reticulation	\$8,300,000	\$53,950
Sewer reticulation (Stage 2)	Airport, Lungga 1, Lungga 2, Lungga 4, Mataniko, Menda, Ngossi, Panatina, Point Cruz, Rifle Ridge, Rove, Tavioa, Vura	4	4	1	4	4	1	4	3	3.05	Sewer reticulation	\$18,000,000	\$117,000
Sewer reticulation (Stage 3)	Airport, Lungga 1, Lungga 2, Lungga 4, Kakambona, Kukum, Mataniko, Panatina, Point Cruz, Rifle Ridge, Rove, Tavioa	4	4	1	4	4	1	4	3	3.05	Sewer reticulation	\$27,200,000	\$176,800
Sewer pumping stations (Stage 1a)	Ranadi 2	3	3	1	1	3	2	2	1	2.25	Sewer pumping stati	\$1,100,000	\$63,820
Sewer pumping stations (Stage 1b)	Kukum, Vura, Point Cruz	3	3	1	1	3	2	2	1	2.25	Sewer pumping stati	\$4,000,000	\$492,172
Sewer pumping stations (Stage 2)	Airport, Mataniko, Lungga 1, Lungga 2, Lungga 3, Lungga 4, Menda, Ngossi, Rifle Ridge, Tavioa Ridge, Point Cruz, Rove	3	3	1	1	3	2	2	1	2.25	Sewer pumping stati	\$17,100,000	\$1,411,240
Sewer pumping stations (Stage 3)	Kakambona, White River, Panatina	3	3	1	1	3	2	2	1	2.25	Sewer pumping stati	\$4,600,000	\$455,168
Sewer rising mains and trunk mains (Stage 1a)	Kukum, Mataniko, Vura	3	3	1	4	3	1	3	1	2.35	Sewer pumping stati	\$2,200,000	\$14,300
Sewer rising mains and trunk mains (Stage 1b)	Kukum, Vura, Ranadi 2	3	3	1	4	3	1	3	1	2.35	Sewer mains	\$3,400,000	\$22,100
Sewer rising mains and trunk mains (Stage 2)	Airport, Mataniko, Lungga 1, Lungga 2, Lungga 3, Lungga 4, Menda, Ngossi, Rifle Ridge, Tavioa Ridge, Rove, Ranadi 1	3	3	1	4	3	1	3	1	2.35	Sewer mains	\$9,000,000	\$58,500
Sewer rising mains and trunk mains (Stage 3)	Kakambona, White River, Panatina	3	3	1	4	3	1	3	1	2.35	Sewer mains	\$7,000,000	\$45,500
Annual Watermain Pipe Replacement	9km/yr	2	1	2	3	2	1	3	4	1.9	Sewer mains	\$1,800,000	\$0
Annual Sewer main Pipe Replacement	1.2km/yr	3	3	1	4	2	1	3	4	2.45	Sewer mains	\$600,000	\$0
NRW reduction	Leakage detection, operational improvements, disconnections	3	1	4	3	5	5	2	4	3.1	Lifecycle manageme	\$600,000	\$0
Urban WASH programs	Communal standpipes, septic management program	5	4	2	4	5	2	2	5	3.55	Lifecycle manageme	\$0	\$0
Maintenance improvements	Air valves, customer meters, maintenance equipment, CCTV	1	1	0	5	3	4	2	5	1.9	Lifecycle manageme	\$540,000	\$0
Operational improvements	Pump station refurbishment, PRVs, zoning and cross connection, wastewater screening, tankering	4	3	0	3	3	4	2	5	2.95	Lifecycle manageme	\$295,000	\$0
Operational improvements	Wastewater tanker	4	4	1	2	2	2	2	4	2.85	Lifecycle manageme	\$150,000	\$0
Maintenance facilities	Workshop, maintenance depot and office	2	0	0	3	4	2	4	5	1.8	Lifecycle manageme	\$2,000,000	\$0
Institutional reform, corporate policy and planning	Water safety plan, climate change adaption planning, design and construction standards, developer contribution p	2	1	0	5	5	5	5	5	2.7	Lifecycle manageme	\$300,000	\$0
Data management	SCADA integration, hydraulic modelling, monitoring	1	0	0	5	5	5	5	5	2.25	Lifecycle manageme	\$170,000	\$0
Project management unit	Project Manager, environmental, financial, land, community specialists, preliminary design and planning of WTP	1	2	0	5	5	5	5	5	2.65	Lifecycle manageme	\$600,000	\$0
Capacity building	Institutional reform, demand management, NRW, data management, maintenance	1	1	1	5	5	5	5	5	2.6	Lifecycle manageme	\$250,000	\$0

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