Tonga National Infrastructure Investment Plan 2021–2030

Government of the Kingdom of Tonga

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Abbreviations

ADB	Asian Development Bank
AGR	agriculture, food, and forestry (sector abbreviation)
AIR	air transport; aviation and airports (sector abbreviation)
BCD	Building Control Division
BESS	battery energy storage system
BLD	building and construction (sector abbreviation)
BSD	Building Services Division
CAD	Civil Aviation Division
CBD	central business district
CCA	climate change adaptation
CEDC	Cabinet Economic Development Committee
COA	coastal protection (sector abbreviation)
COM	community infrastructure (sector abbreviation)
CON	constitutional (sector abbreviation)
CRSP	climate resilient sector project
CSSC	Chief Secretary and Secretary to Cabinet
DEF	defense (sector abbreviation)
DFAT	Department of Foreign Affairs and Trade
DRM	disaster risk management (sector abbreviation)
EBIT	earnings before interest and tax
EBITDA	earnings before interest, tax, depreciation, and amortization
EDU	education and training (sector abbreviation)
ELD	elderly and disabled (sector abbreviation)
ENE	energy (sector abbreviation)
ENV	environment (sector abbreviation)
EU	European Union
FIAT	Fisheries Industry Association of Tonga
FIE	fire and emergency (sector abbreviation)
FIS	fisheries and marine resources (sector abbreviation)
GPA	government priority agenda
HOU	housing (sector abbreviation)
HQG	headquarter offices not included elsewhere (sector abbreviation)
HTH	health services (sector abbreviation)
ICAO	International Civil Aviation Organization
ICT	information and communication technology
IMO	International Maritime Organization
IPWEA	Institute of Public Works Engineering Australia
IQSW	International Queen Salote Wharf
ITU	International Telecommunication Union
IUDP	integrated urban development project
IUDSP	integrated urban development sector project
JICA	Japan International Cooperation Agency
JLO	justice, law, and order (sector abbreviation)
JNAP	Joint National Action Plan
JUS	justice (sector abbreviation)
LGO	local government office (sector abbreviation)
LDT	land transport (sector abbreviation)
LGA	local government administration (sector abbreviation)
LTD	Land Transport Division
M&E	monitoring and evaluation
MAFF	Ministry of Agriculture and Food, Forests and Fisheries
MCA	multicriteria assessment
MDA	ministry, department, and/or agency

MEIDECC	Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication
MET	Ministry of Education and Training
MET	meteorological (sector abbreviation)
MFAT	Ministry of Foreign Affairs and Trade
MIC	Ministry of Information and Communication
MIL	military (sector abbreviation)
MLCI	Ministry of Labour, Commerce and Industries
MLNR	Ministry of Lands and Natural Resources
MOF	Ministry of Finance
MOFi	Ministry of Fisheries
MOH	Ministry of Health
MOI	Ministry of Infrastructure
MOT	Ministry of Tourism
MPD	Marine & Port Division
MPE	Ministry of Public Enterprises
MTEF	medium-term expenditure framework
NAT	land and natural resources (sector abbreviation)
NDC	Nationally Determined Contribution
NEMO	National Emergency Management Office
NEWS	National Early Warning System
NIIP	National Infrastructure Investment Plan
NPD	National Planning Division
NSPA	National Spatial Planning Authority
NUDSP	Nuku'alofa Urban Development Sector Project
OIREP	Outer Islands Renewable Energy Project
OIEEP	Outer Islands Energy Efficiency Project
OLA	Office of Legislative Assembly (sector abbreviation)
PAD-CC	Project & Aid Development Coordination Committee
PAMD	Projects and Aid Management Division
PAT	Ports Authority of Tonga
PIPIs	Pacific Infrastructure Performance Indicators
PMO	Prime Minister's Office
POL	police (sector abbreviation)
POS	postal service (sector abbreviation)
PPA	Pacific Power Association
PRC	People's Republic of China
PREP	Pacific Resilience Project
PRI	prison (sector abbreviation)
PRIF	Pacific Region Infrastructure Facility
PSC	Public Service Commission
PWWA	Pacific Water and Wastes Association
QSW	Queen Salote Wharf
SEA	sea transport; maritime and port (sector abbreviation)
SPR	sport and youth (sector abbreviation)
SWA	solid waste and sanitation (sector abbreviation)
TA	technical assistance
TAIP	Tonga Aviation Investment Project
TAL	Tonga Airports Limited
TBC	Tonga Broadcasting Commission
TCC	Tonga Communications Corporation
TCCI	Tonga Chamber of Commerce and Industry
TCL	Tonga Cable Limited
TCRCP	Tonga Climate Resilient Transport Project
TDGSP	Tonga Digital Government Support Project
TERM	Tonga Energy Road Map
TIURSP	Tonga Integrated Urban Resilience Sector Project

TOU	tourism (sector abbreviation)
TPL	Tonga Power Limited
TRA	trade and business (sector abbreviation)
TREP	Tonga Renewable Energy Project
TRIP	Tonga Rural Innovation Project
TSCP	Transport Sector Consolidation Project
TSDF	Tonga Strategic Development Framework
TWB	Tonga Water Board
TWC	Technical Working Committee
UNDP	United Nations Development Programme
UPMSP	Urban Planning and Management System Project
VIL	villages and communities (sector abbreviation)
WAL	Waste Authority Limited
WAT	water supply (sector abbreviation)
WBG	World Bank Group

Currency Equivalents		
Currency Unit		pa'anga (T$)
T$1.00	=	$0.44
$1.00	=	T$2.29

Executive Summary

Background

The Government of Tonga is strengthening its planning and budgeting system used for infrastructure investment. The key document in this process is the Tonga Strategic Development Framework (TDSF) II, 2015–2025, which establishes Tonga's national development objectives and provides a cascading planning and budgeting system. As a strategic document, the TSDF guides the direction of infrastructure planning and development. Since 2010, Tonga issued National Infrastructure Investment Plans in 2010, 2013 and 2015 to link the TSDF objectives with infrastructure development projects and conduct a cross-sector prioritization of those investments based on the economic, social and environmental criteria.

The Government had good experience mainstreaming other important initiatives, including the 2030 Agenda for Sustainable Development and the SAMOA Pathway. The Government of Tonga has therefore requested that the Pacific Region Infrastructure Facility support the preparation of the National Infrastructure Investment Plan 2021-2030 (NIIP 3), and to support mainstreaming the NIIP processes into government processes.

The Tonga NIIP 3 was approved by the Cabinet of Tonga on 19 August 2021.

Key Learnings from Past Reviews

A review of past NIIP exercises identified the key findings and recommendations based on the lessons learned:

Lesson 1: Cover More Sectors in National Planning

Sector coverage of the NIIP was previously to economic sectors. The NIIP 3 has been expanded to cover all sectors with infrastructure projects that are funded through the government budget. This has increased the number of sectors from the initial seven to 29.

Lesson 2: Position the Process in the Tongan Planning System

Infrastructure projects to be considered for NIIP crosscutting prioritization are drawn from broader projects identified in sector or district plans and policies, government priorities, and other existing documentation. Project choices are based on the sector and other priorities established by the responsible ministries, departments, and/or agencies (MDAs) and public enterprises. Links between sector plans and the NIIP process need to be strengthened.

Lesson 3: Identify Projects in the Tongan Planning System

NIIP projects are a subset of all projects. They focus on hard infrastructure, with limited soft infrastructure that is funded through the government budget, whether managed and operated by MDAs or public enterprises. They are identified through sector planning and a variety of other documents and processes. Several NIIP projects are often packaged for funding into programs that include both hard and soft infrastructure.

Lesson 4: Establish Prioritization in the Tongan Project Cycle

NIIP projects go through the same project cycle required for all projects. The only difference is an additional cross-sector prioritization step early in the project cycle. This uses the same documentation as for the rest of the project cycle, so ensuring that this step is an integral part of project formulation, rather than stand-alone. The process is documented in the guidance manual and needs to be used by all MDAs for all projects, with regular training in the use of these procedures to embed the mainstreaming within in a strong government system.

Lesson 5: Embed the Prioritization Methodology for Tonga

The Multi Criteria Assessment (MCA) needs to be objective, manageable, and reliable, although it will still be dependent on informed judgement. Weaknesses with the past analyses, especially related to reliability, were addressed with a modified multicriteria analysis (MCA). The MCA was also built into the project documentation. Further modifications have been identified to improve the MCA for the next prioritization.

Lesson 6: Use the Assessment Priority List to Create the Government Priority List

The MCA Priority List may not be the final list as the MCA has limitations. There may be other considerations that need to be brought to bear in producing the final Government Priority List. For transparency, any changes need to be documented to describe these other considerations applied in establishing the final list.

Lesson 7: Focus on the Role of Infrastructure Planning in the Tongan Administrative System

The coverage of the NIIP needs to reflect its role as a crosscutting plan and avoid a tendency to go into too much sector detail. In addition to compiling and prioritizing existing projects across sectors, the NIIP encourages sectors to use tools such as asset registers and infrastructure key performance indicators (KPIs) to improve planning and management of infrastructure. It also builds supporting links to other crosscutting plans and policies, including resilience and land planning, for a stronger framework to support the NIIP.

Lesson 8: Build Monitoring and Evaluation into Planning and Project Processes

Monitoring and evaluation (M&E) for infrastructure KPIs and NIIP projects is essential. International KPIs are available but MDAs and public enterprises are poor at collecting and recording their data. The collapse of the government's project database makes tracking of all projects, not only NIIP ones, difficult and regular M&E of projects is limited. A temporary NIIP database and reporting on status is required until the revised Integrated Financial Management Information System database is in place and able to provide the necessary M&E.

Policy, Planning, and Institutional Settings

The TSDF II recognizes the importance of infrastructure in supporting national and sector outcomes. These focus on inclusive, sustainable, and safe infrastructure with appropriate

maintenance, providing a clear framework for more detailed sector outcomes and outputs in the relevant plans.

Addressing disaster risk management, climate change, and greater resilience is built into infrastructure design, operations, and maintenance guidance in the second Joint National Action Plan for Climate Change Adaptation and Disaster Risk Management (JNAP II). The recently established National Spatial Planning Authority provides a framework that guides improved land use planning and the distribution of infrastructure. Links between the NIIP, the Joint National Action Plan, and the National Spatial Planning Authority are all being strengthened.

Sectors with large infrastructure, especially transport and utilities, are mostly managed and operated through government owned public enterprises. This facilitates a division of labor between running the infrastructure and the regulatory and supervisory responsibilities for the infrastructure within relevant MDAs. In a few cases, including alternative energy and land transport, this separation is still not well established.

Asset registries are required from MDAs and public enterprises, but, where they exist, they focus on financial issues with little consideration of infrastructure maintenance, renovation, and replacement issues. Some improvements are underway, but much remains to be done for these registries to be an effective NIIP tool to better inform sector planning of infrastructure.

Establishing the List of Priority Projects

An initial list of 230 projects was established from all available documentation and detailed consultations with all relevant MDAs and public enterprises. This list was streamlined into 146 clear titles, removing duplications and non-NIIP projects.

From the initial list, MDAs and public enterprises identified their sector priorities for which they prepared a Project Proposal Applications (PPAs) for prioritization. The result was a shortlist of 59 projects. The remaining projects were grouped as 34 likely to be ready for a further prioritization within a year, and 53 kept for later consideration.

The MDAs and public enterprises were trained in the use of the revised PPA (for prioritization), with the MCA embedded. National Planning Department (NPD) staff took an active role in this training process.

First with support from the consultants, then increasingly on their own, NPD staff screened, assessed, and scored the 59 submissions, noting where their scores differed from the MDA or public enterprise scores. The results from the two scoring processes were generally similar, with minor differences resolved in discussion, often in favor of the NPD results. The list was also reviewed for any outlying results.

Based on an estimated funding envelope of about T$550 million over 5 years, 26 projects were included as Group 1 (highest priority), with funding likely available. The next 25 were included as Group 2, requiring additional funding. Five projects were included in Group 3 due to specific issues related to cost, lack of urgency, and being sited in unfavorable locations, e.g., the Nuku'alofa red zone, which is at risk of increased storm surges and other extreme weather events.

Projects were spread across all TSDF pillars: (i) economic institutions, (ii) social institutions, (iii) political (governance) institutions, (iv) infrastructure and technology inputs, and (v) natural resources and environmental inputs.

Projects from Pillar 4 (split into 4a for transport and 4b for utilities) accounted for a large share of Group 1 projects, while projects from Pillar 3 were not represented in Group 1. Pillar 4 accounted for more than 70% of the capital cost of all prioritized projects and about 83% of the capital cost for the Group 1 projects. Just two projects, the Fanga'uta bridge and Tongatapu water supply, accounted for nearly half of the capital cost of Group 1 projects. The small allocation to Pillar 1 reflects the fact that most investment in economic institutions as coming from the private sector.

About 55% of the Group 1 projects are located on Tongatapu, home to the national capital and much of the infrastructure connecting Tonga to the rest of the world, and where almost 75% of the country's population resides. Tongatapu also accounts for about 70% of the total capital cost of Group 1 projects. In cost per capita terms, the Niuas have the highest share of the costs.

Projects were distributed across 22 MDAs and public enterprises, with 15 of these represented in Group 1. The largest shares of the total capital cost of projects are with the Ministry of Infrastructure and the Tonga Water Board. These two entities attracted 54% of the total capital cost of Group 1 projects. They were followed the Ministry of Health, Tonga Power Limited, the Ports Authority of Tonga, and Tonga Cable Limited with a combined share of 32% of capital cost for the Group 1 projects.

Incorporating Government Priorities to Build a Final List

The final Government's high priority infrastructure projects list is shown below.

Government High Priority List

Project title	MCA score	Cost TOP'000
Nuku'alofa Power Network Upgrade Project (NNUP) Area 3, 4 and 5	91.1	34,160
Centralized Tonga Water Board and Village Water Supply Tongatapu	91.1	103,389
Additional/Replacement Generators (TBU, Vv, Hp and 'Eua)	91.1	6,000
Multi-Hazard Early Warning/Emergency Operations Centre (Niuas)	88.9	15,000
Convert dump sites to new structured landfill, Ha'apai & 'Eua	88.9	8,000
Improved Water Supply System in Vava'u (Greater Neiafu)	88.9	14,748
New international secondary / redundancy internet cable	84.4	35,000
Improved 'Eua Water Supply System	84.4	6,705
Upgrade and Expansion 'Eua Mobile and Fixed Networks	84.4	2,960
Upgrade Touliki coastal protection structure	84.4	3,000
Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (Vv) Market upgrade	84.4	5,000
Close (Kalaka) and establishing new landfill(s) Vava'u	82.2	12,000
First new tugboats	82.2	20,022

Project title	MCA score	Cost TOP'000
Upgrade and Expansion Niuas Mobile Networks	82.2	2,627
New Warehouses for NEMO (one Vava'u, Eastern District, TT)	82.2	2,000
Upgrade Fire Station 1, Nuku'alofa	82.2	2,630
Upgrading of a new public health building (Tongatapu)	80.0	5,000
Overlay of Asphalt Concrete on Primary Roads in Tongatapu	80.0	20,000
Upgrade/expand carpark, pedestrian access Fua'amotu Airports	77.8	1,000
New Fire Tender Fua'amotu	77.8	2,100
Upgrading of Vava'u Hospital (Prince Ngu Hospital)	77.8	40,000
Fanga'uta Evacuation Bridge and Roads	77.8	150,000
TIST & TMPI extension/upgrade building (more inclusive for student)	77.8	6,000
New Wharfs for Small Outer Island	77.8	16,000
New Junior Campus for Tupou College	75.6	10,000
Improve existing & build new MAFF Packing Facilities (HACCP cert.)	75.6	1,800
New Law Court Complex (Supreme and Magistrate)	46.7	13,500
New Fale Alea (Parliament House and Office Complex)	40.0	25,000

The Government of Tonga had a list of 13 priority projects in the Government Priority Agenda Document. These 13 projects were included in the long list of projects for prioritization. The MCA Priority List, along with an update of the lessons learned and applied, was presented to the joint meeting of the NIIP Technical Working Committee and the Taskforce Committee. The committees supported the findings and the application of the lessons to increase government leadership and mainstreaming of the NIIP process. A questionnaire and discussions identified other modifications to improve future prioritization.

Given the urgency to address increasing law and order problems, particularly with illicit drugs, the committees noted the need to consider alternative options to improve prison facilities. Prisons and the MOH were encouraged to review project needs, especially in the main prison, and identify less costly options for consideration in the next prioritization.

The importance of the new court complex to help accommodate increasing case loads resulted in the project being raised from Group 3 to Group 1. The need to address the conditions of the legislative assembly building, and the availability of funding, also resulted in this new building project being moved from Group 3 to Group 1.

It was also decided that the purchase of two new tugboats could be phased in, with one staying in Group 1 and one being moved into Group 2. A few additional projects were added to Group 4.

In terms of economic benefits, of the 28 projects now in Group 1, 10 (costing T$356.4 million) are judged to have high potential for economic viability; 8 (costing T$72.1 million) medium potential; and 10 (costing T$135.1 million) low potential (though these may deliver broader benefits to Tongan society).

For climate change mitigation and adaptation and environmental protection, nearly 40% of the projects rank as “medium” to “high”. For disaster risk management, over 80% of projects achieve these rankings.

Financing Options for Infrastructure Projects

Government of Tonga finances are tight and even soft borrowing for infrastructure is not envisaged. Limited government funds are needed for urgent projects that are difficult to fund and for attempts to better implement maintenance that is too often deferred.

Most public enterprises have a high capacity to meet the costs of operations and maintenance, together with smaller items of capital expenditure. Capacity to self-fund medium-scale and large-scale capital expenditure is generally low.

Development partner support, currently only in the form of grants, will have to continue to be the major source of funding for capital investment for the foreseeable future.

Limited funding may be possible from public-private partnerships, local banks, pension funds, and focused community fundraising (mostly in education and community areas).

When the 28 projects in Group 1 are operational, annual maintenance is estimated to be T$5.6 million for the government and T$3.7 million for public enterprises, requiring significant increases in maintenance expenditure by both sectors.

Further Strengthening and Mainstreaming of the Planning Process

The testing the new mainstreamed approach has been successful, with strong support from staff of the NPD, MDAs, and public enterprises. There is a desire to undertake a further prioritization exercise by mid-2022 and to apply some further lessons learned from the testing but not yet integrated into the NIIP process.

MDAs and public enterprises are also seeking further training in project formulation and the application of the MCA.

Progress with the overall mainstreaming of the NIIP process is dependent on the presence of an effective project database, supported by effective project M&E. Improved data collection and recording for internationally recognized KPIs, and development of improved asset registers to better inform sector plans, will also be needed.

1 Introduction and the Tonga Context

1.1 Tonga Geography and Demography

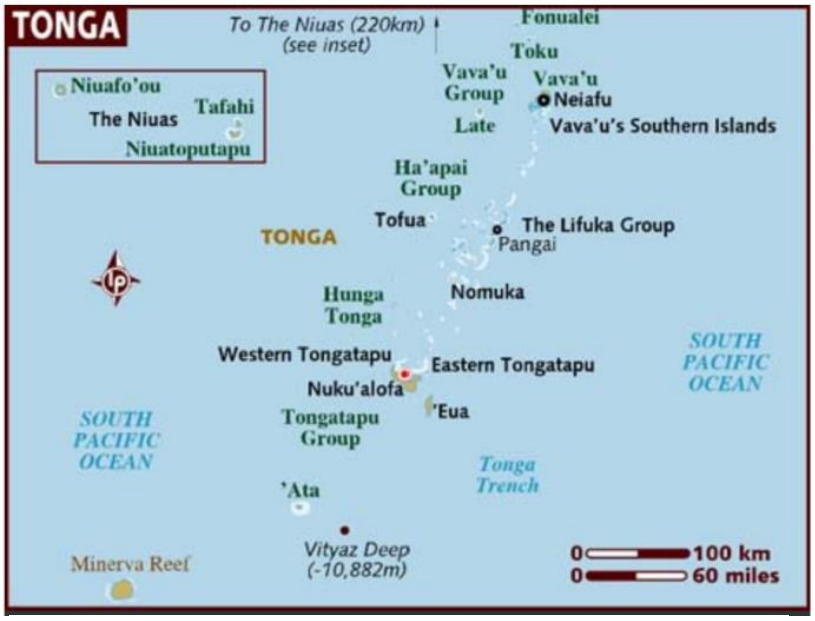
The Kingdom of Tonga is an archipelago of 172 coral and volcanic islands disbursed over a distance, south to north, of some 600 kilometers. The archipelago is grouped into: Tongatapu (the main island), 'Eua (one island), Ha'apai (many islands), Vava'u (a large island with smaller ones), and Ongo Niua—also known as the Niuas (two main islands).

The population of approximately 100,000 is dispersed across 40 inhabited islands. About 75% of people live on the main island of Tongatapu, which makes up about 35% of the total land area. This is also the site of the capital, Nuku'alofa, and other major infrastructure. Each of the remaining four groups have their own small administrative centers serviced by an airport and wharf. Access to all other islands is by small wharf, jetty, or direct access onto the beach.

Tonga is a constitutional monarchy, with all land vested in the Crown and divided into royal, government, and noble estates, then in turn distributed to the people as tax and town allotments. While Tonga's land area is only 706 square kilometers, much of it is fertile.

There are no freehold land title arrangements in Tonga. Land may be leased under several arrangements. The land system protects Tongans from loss of land to foreigners, as happens in many countries. However, it is recognized that improvements in the lease system would enhance longer-term investment by the private sector.

Figure 1.1: Map of Tonga



km= kilometer

Source: www.lonelyplanet.com

The country's Exclusive Economic Zone is substantial at 700,000 square kilometers. This provides significant fish and marine resources and the possibility of seabed mining.

The economy is mainly based on agriculture, fisheries, and tourism, and is supported by remittances and high levels of development assistance. Regional labor schemes offer

agricultural work in Australia and New Zealand for over 1,000 workers annually. This also supports household incomes, though social problems and difficulties for domestic employers are also on the rise, with workers being away for long periods. There is minimal domestic manufacturing. The Tongan diaspora is of a similar size to the domestic population.

The economy is remote from larger markets in Asia and the rest of the world. Most goods are imported from Australia, New Zealand, the United States (US), and, increasingly, Asia. Good transport and communications infrastructure are thus of great importance.

Since the 1970s, much of the natural population growth has been moderated by large immigration to Australia, New Zealand, and the US. Within Tonga, especially in recent decades, the populations of Ongo Niua, Vava'u, and Ha'apai have declined quite sharply. 'Eua has remained relatively stable, while Tongatapu has increased from 68% of the total population in 1996 to 74% in 2016.

Tonga is particularly vulnerable to extreme natural events and climate change. From 2014 to 2020, three severe tropical cyclones inflicted serious damage to different parts of the country. The World Risk Index 2020[1] ranks Tonga as the world's second most vulnerable country to extreme natural events. The Global Climate Risk Index for 2020 ranked Tonga first in the world in 2018 and fourth over 1999–2018 in losses per unit of gross domestic product (GDP) from extreme weather events.

1.2 Recent Key Developments

Remoteness, combined with the government's rapid shutdown of international travel, has (so far) provided Tonga with protection from the epidemiological impact of the COVID-19 pandemic. This is particularly important; the health profile of the population would render many people susceptible to the worst outcomes of the virus. Despite recent investments to better manage a potential outbreak, the health system would rapidly come under serious challenges.

Tonga's economy, however, has not been immune. Apart from occasional charter flights, there is only one scheduled international flight a week, thanks to the support of the New Zealand government through Air New Zealand. International shipping has been much less affected but is experiencing some disruptions.

Tourism fell from some 60,000 visitors per year to zero, and there is little likelihood of visitors for at least the rest of 2021. Since tourism is a smaller proportion of the Tongan economy than for many neighbors in the Pacific, the net impact has been less severe. Domestic expenditure on tourist-related activities has slightly mitigated conditions on Tongatapu.

Some migrant workers stranded overseas were able to continue earning a living, but this was not the case for many. New workers were not able to take up work. Given the urgent need for

1 A statistical model for assessing the global risk of disasters that arise directly from extreme natural events such as earthquakes, storms, floods, droughts, or sea-level rise, and assessing risk in terms of exposure, vulnerability, susceptibility, coping capacities, and adaptive capacities.

agricultural labor in Australia and New Zealand, an early resolution is likely. Arrangements have already been negotiated for a few flights to allow Pacific Island workers into the two countries, though there have been some disruptions. The first group of new workers to Australia, managed under COVID-19 protocols, took place in April 2021.

Meanwhile, Tonga's private domestic airline has collapsed and had to be taken over by the government. The process of finding a suitable private investor for the airline may take some time, even more so until the COVID-19 situation is better resolved. In the meantime, the government is running the basic operations. Tonga Airports Limited is one of the most-affected public enterprises. Despite the drop in traffic, it must maintain basic airport operations and has been drawing on its financial reserves to do so. If the situation continues for too long, the enterprise will be forced to find additional financial support to continue to meet its basic obligations under the International Civil Aviation Organization.

Despite the drop in overseas workers, remittances have continued to hold up. For example, in a recent phone-in competition for which calls were charged, just one village in Tongatapu received nearly T$1 million worth of calls funded from overseas. Fundraising by Tonga High School for a new building to celebrate their 75th anniversary in 2022 has already raised over T$2.5 million from village events. This may in part be due to the large stimulus and support directed at workers in some of the key diaspora countries. With the unwinding of some of this support in response to improving economic conditions in these countries, the consequences for Tongan remittances have yet to be seen.

Tonga's development partners have responded positively to the COVID-19 situation as well as for recovery and reconstruction after Tropical Cyclone Harold. New options for assistance for climate change and resilience are also being pursued. The limited options for travel have disrupted technical assistance. Some long-term technical experts have been able to travel, but all short-term technical assistance projects (where suitable inputs are not available in country) have had to be done remotely. This is disruptive to support for infrastructure design and implementation, which is best delivered in person. For instance, a road engineer from the United Kingdom recently took nearly 2 months from departure at Heathrow to exit from Tonga quarantine. Currently, it looks like development assistance to Tonga can be expected to remain relatively stable, though there may be some delays in implementation.

Migration to urban centers in Tonga is changing the siting of social and administrative infrastructure. However, given the dispersed nature of the country and remoteness of many small communities, there remains a demand for improved transport infrastructure, especially access by sea and air. This supports the Tonga Strategic Development Framework (TSDF) outcomes of inclusive and sustainable development, but the process remains costly. Recent investments in improved information and communication infrastructure, such as the submarine cable linking the main centers in the Pacific, is helping to provide virtual solutions that address some of the challenges of distance and isolation. The COVID-19 experience is also driving greater use of such virtual approaches. The availability of funding support for this infrastructure is holding up, but the pandemic is delaying implementation.

Macroeconomic Indicators

Table 1.1 includes select macroeconomic indicators for Tonga, providing estimates for fiscal year (FY) 2017 (ended 30 June 2017) to FY2020 as well as projections for FY2021 to FY2023.

Table 1.1: Macroeconomic Indicators for Tonga

Item	FY2017 Estimates	FY2018 Estimates	FY2019 Estimates	FY2020 Estimates	FY2021 Projections	FY2022 Projections	FY2023 Projections
Real GDP (annual % change) [a]	5.4	0.2	3.0	(2.3)	(3.6)	2.6	2.3
Consumer prices (annual % change, period average)	7.2	7.0	4.1	1.3	2.2	1.3	1.2
Public debt - external plus domestic (% of GDP)	46.0	45.6	41.6	39.7	37.7	36.0	38.7
External debt (% of GDP)	39.1	37.7	34.1	30.7	27.6	25.0	28.0
Debt servicing (% of GDP)	1.3	1.1	2.1	2.0	1.9	1.8	1.7
Exports fob (% of GDP)	4.6	2.9	3.4	4.6	4.8	4.9	5.0
Imports fob (% of GDP)	45.2	44.9	49.9	52.5	52.9	53.6	54.1
Remittances (% of GDP)	27.4	29.4	30.0	28.5	29.5	28.1	27.8
Gross official foreign reserves ($ million)	192.2	214.9	212.8	212.3	205.2	179.5	158.3
Gross official foreign reserves (in months of imports)	7.2	6.9	6.2	5.8	5.2	4.3	3.7

$ = United States dollars, FY = fiscal year, fob = free on board. GDP = gross domestic product.

Note: As these estimates and projections were prepared in early 2020, they do not account fully for the impact of the COVID-19 pandemic.

a. The GDP growth estimate for FY2020 and the projection for FY2021 have been taken from the *Budget Strategy and Funding Envelope 2021/22*, released in November 2020, which better accounts for the impact of the pandemic.

Source: International Monetary Fund. 2020. *Staff Concluding Statement IMF 2020 Article IV Consultation Mission*. February. Washington, DC.

Growth in real GDP in Tonga has been characterized by a series of declines associated with natural disasters (and the current pandemic), followed by periods of recovery that are supported by increases in development assistance associated with emergency relief. While the average rate of growth has been very modest, GDP per capita has performed better in the context of a stable or even falling population.

Other key features of Tonga's macroeconomic position include:

(i) a downward trend in inflation, probably associated with weakness in world prices.
(ii) limited signs of unemployment in terms of people urgently seeking work, with business complaining about the lack of committed workers.
(iii) capacity shortages in the building industry, including issues with quality of work.
(iv) the relatively high level of public debt, particularly external debt, removing the option for external borrowing, which is a source of infrastructure funding.
(v) a significant trade imbalance, with exports averaging less than 10% of imports; however, given the large inflows of remittances and aid, this gap is to be expected.
(vi) apart from a drop associated with the global financial crisis, a consistently high level of remittances from the Tongan diaspora in Australia, New Zealand, and the US; and
(vii) a high level of foreign reserves, though the International Monetary Fund is projecting a downward trend in both dollar terms and in terms of months of import cover.

1.3 The Tonga NIIP

Based on 10 years of experience with infrastructure investment planning, the Government of Tonga decided to follow the process more rigorously and more often than the five-yearly events to launch each iteration of the national investment plan, which will require mainstreaming the NIIP processes into the government planning processes To address this, in February 2020, the government asked the Pacific Region Infrastructure Facility (PRIF) Coordination Office (PRIFCO) for technical assistance to support the Prime Minister's Office (PMO) in producing the Tonga National Infrastructure Investment Plan 2020–2030 (NIIP3), which reflects Government priorities.

Assistance was also requested, as part of the government's broader and ongoing mainstreaming of external processes, to revisit and upgrade NIIP processes—including tools and templates for project proposals and the project prioritization methodology—and to ensure that the NIIP was well integrated into Tongan planning and budgeting systems. This exercise should include coordination and linkages with government ministries, departments, and/or agencies (MDAs) as well as the public enterprises that are heavy users of infrastructure. It was hoped that this might increase the use of the NIIP process, its contribution to planning in general, and infrastructure-related planning in particular.

The main modifications, especially as they related to the project cycle, were tested in collaboration between the consultants and staff of the National Planning Department (NPD), line MDAs, and public enterprises. This included identification of infrastructure needs, completion of project proposal concept notes, scoring and prioritization, and review by the NIIP Technical Working Group (TWC) and the NIIP Task Force Committee (TFC), before endorsement by the Project Aid Development Coordination Committee (PAD-CC) for approval by Cabinet. The report was drafted in close consultation with staff to ensure that it captured the desired focal points of the government and laid a stronger foundation for the future contribution of the mainstreamed NIIP process in Tonga.

The report is complemented by a separate guidance manual with templates documenting the mainstreamed infrastructure planning and programming tools and processes, along with a number of attachments that offer additional information and suggestions for further development of the mainstreamed approach.

1.4 Institutional Arrangements

The technical assistance has been a joint implementation of the consulting team in collaboration with a governmental team. It has entailed the further development of the NIIP process in Tonga, beyond the approaches used in the past. This has required a degree of testing and modification as the work has progressed.

Due to COVID-19 restrictions and the resulting limitations on travel, the consulting team was split between the team leader in Germany and an economist in Australia providing remote support to the process, while the deputy team leader and national economist in Tonga provided regular local support in country. PRIFCO also provided remote assistance. The consultancy team met virtually to facilitate their work. The government team was composed of three groups as set out in Appendix 1.

The NIIP National Support Staff (NSS) included a loose grouping of staff from the NPD and the two key ministries in charge of infrastructure investment and related finance; the Ministry of Infrastructure (MOI) and the Ministry of Finance (MOF). These staff, along with relevant MDAs and public enterprises, provided significant inputs to facilitate mainstreaming of the NIIP process, information sharing, preparation of project proposals, screening and scoring of projects, and guiding the meetings of the related decision-making committees.

The TWC, reestablished by the Government of Tonga for the NIIP process, was composed of at least one staff member from each major MDA and public enterprise managing and/or operating public infrastructure. Their tasks included the review, assessment, and modification of the NIIP mainstreaming process, the resulting list of priorities, and the report layout and content. Any modifications were to be recommended to the TFC. After the NIIP3 was approved by Cabinet, the TWC was responsible for supporting its implementation and reporting on its status to further enhance infrastructure planning and management.

The TFC was composed of the Chief Secretary and Secretary to Cabinet (CSSC) with the chief executive officers of all other MDAs and public enterprises responsible for managing and/or operating significant public infrastructure. Their tasks included reviewing the recommendations from the TWC and endorsing the final report and decisions to the PAD-CC. During the chief executive officers technical assistance, a subcommittee—comprising the CSSC and the chief executive officers of the MOF, MOI, and Ministry of Health (MOH)—was identified to first review and endorse the upgraded multicriteria assessment (MCA) and approach to mainstreaming. The subcommittee was also tasked with reviewing the project list and the report to ensure it covered key issues, before submitting it to the TWC.

The NPD and key staff from MDAs and public enterprises were active participants and leaders of much of the work. For convenience, two meetings of the full TWC and TFC were held as a joint gathering. As future arrangements are under consideration, this initiative may be repeated.

2 Review of Existing Planning Processes

This chapter reviews past NIIPs in Tonga, identifying the key findings and recommended responses grouped into eight lessons. It validates the government's observation to improve mainstreaming the infrastructure investment planning process into government systems.

2.1 Review of previous NIIPs

Reasons for Prioritization of Infrastructure

The role of PRIFCO in supporting improved infrastructure planning and management is understood in core MDAs in Tonga. This includes the value of better-informed prioritization to help focus limited funding and time resources on those infrastructure projects that are most likely to make the greatest contribution to the outcomes of the TSDF. A cross-sectoral prioritization, taking account of geographic locality, can help to improve the management and planning of infrastructure in an island archipelago.

Sector-based prioritization of projects is moderately well established, especially for those sectors with better formulated planning, which may be documented in a sector plan or policies, or for some of the public enterprises in their strategic and/or business plans. This includes, to varying degrees, each public enterprise in its area of responsibility. District- and/or community-level planning is also making progress, with active community participation establishing cross-sector project needs at this level. Although district projects tend to be small, this helps to raise the appreciation of the role of cross-sector prioritization.

Tonga has participated in the NIIP process since 2010 and increasingly incorporated NIIP processes into the government planning processes.

Significant reform to the planning, project cycle, and budgeting systems, with mainstreaming of externally driven processes, has been undertaken. It is within this framework that the government request for support from PRIFCO was formulated. In response, the first steps in the consultancy were to review the lessons learnt from the use of NIIPs in Tonga to establish the key findings and develop recommendations as required by the government.

National Infrastructure Investment Plan 1 (2010)

Tonga's first NIIP was prepared in 2010 by three individual consultants (international and national), provided by PRIF, working in consultation with the then Ministry of Finance and National Planning (MFNP) and other MDAs. This covered major infrastructure for utilities (energy, telecommunications, water, solid waste management) and for transport (roads, ports and shipping, and airports) over the next 5–10 years.

Based on information from MDAs, public enterprises, and development partners, 66 projects were identified: 42 were defined as underway, committed, or not considered to be needed in the next 5 years. The remaining 24 proposed projects were prioritized using a multicriteria

assessment (MCA), with 12 projects identified as high priority. No documentation was provided for individual projects.

The MCA drew on Tonga's national objectives as outlined in the national strategic planning framework that was designed to cover FY2010 to FY2015. The MCA prioritization was undertaken by the consulting team in collaboration with senior MFNP staff.

National Infrastructure Investment Plan 2 Phase 1 (2013–2023)

The next NIIP was prepared in 2013 by a team of five consultants (international and national), again supported by PRIF, working in consultation with the MFNP and other MDAs. The release of the TSDF I for 2011–2014 provided a justification for moving relatively quickly to an update of NIIP 1.

Phase 1 of NIIP 2 outlined government priorities and plans for major infrastructure in the same sectors as NIIP 1, over 5–10 years. Climate change adaptation and disaster risk management aspects of infrastructure development, management, and operation were given higher focus. The document provided about a 2-page sector plan summary for each sector.

Based on the same source of information, 74 projects were identified, with 31 defined as underway or committed and 11 not considered to be needed in the next 5 years. The remaining 32 projects were prioritized using a revised MCA, with 13 identified as high priority. This 13, with the 31 projects underway or committed, formed the NIIP 2 Phase 1 project list. While named a plan for 2013 to 2023, detailed planning covered only the first 5 years of the period.

The MCA drew on Tonga's national objectives as outlined in the TSDF I. Prioritization using the MCA was undertaken by the consulting team in consultation with senior staff of MFNP.

More information on individual projects was included than in NIIP 1, with profiles of the 13 high priority proposed projects annexed. These were prepared by the consulting team, as were the formats for the profiles and suggested future monitoring and evaluation (M&E) of projects. At that time, a newly government project management cycle was being introduced. The NIIP complemented those initiatives although the idea that the NIIP could engage with this project cycle, even be mainstreamed into it, was not explored. The document provided a cursory consideration of the relationship between the NIIP and the sector plans.

NIIP 2 Phase 1 preparation followed a very similar path to that taken for NIIP 1. A review of progress with the implementation of NIIP 1 concluded that it had been broadly successful in terms of formal adoption by the government, facilitating dialogue with development partners and attracting funding for priority projects and initiatives, which was the objective of the support. However, the proposed M&E templates were not used to monitor the implementation of the NIIP1.

National Infrastructure Investment Plan 2 Phase 2 (2015)

In 2015, a review for the NIIP 2 Phase 2 provided support to review the implementation progress of NIIP 2 Phase 1. This was prepared by an international consultant working with the MFNP and other MDAs, supported by PRIF.

This early review arose from the release of the TSDF II, the implications for infrastructure priorities of damage caused by Cyclone Ian in January 2014, and the implications for infrastructure development of the planned hosting of the Pacific Games in 2019.

NIIP 2 Phase 2 proposed a change in approach to achieve a process that was more government led and owned for NIIP preparation and monitoring of implementation. The key output was the road map for strengthening the NIIP process, with Excel-based templates for use by MDAs and public enterprises in preparing submissions, linking with a template for project prioritization by the MFNP, and with a proposed format for MFNP monitoring of project implementation.

The revised MCA placed greater reliance on objective, quantified criteria in assessing sector performance—through the monitoring of sectoral key performance indicators (KPIs)—required from NIIP project submissions and in project prioritization. Greater involvement was sought from the NIIP working group and the Project and Aid Coordination Committee in NIIP project prioritization.

Training was provided to MDAs, public enterprises, and the MFNP in the use of these templates. Manuals were prepared for ongoing use in training and for the conduct of annual NIIP updates.

NIIP 2 Phase 2 included a review of progress and performance in each NIIP sector in an annual monitoring report for FY2015, following a format recommended in the review. This tracked project progress and included an updated list of proposed projects prioritized using the revised MCA. Some projects carried over from NIIP 2 Phase 1, while others were identified during the implementation review. A list of 23 high-priority projects seeking funding was produced. These included a government-requested expansion of coverage to include the education and health sectors.

A government-led process followed in 2016 (while the national planning function was still under the MFNP), with an attempt to update the NIIP in the manner envisaged in Phase 2 and applying the Excel-based templates designed for that purpose. New projects were identified and ranked using the MCA, but the process stalled due to various issues. It was not completed nor presented for approval by the government and no documentation of the attempt was available. No further attempts were made.

The observed lack of progress from this one attempt lay the foundation for the government's request to review the lessons from past NIIPs and for mainstreaming of the NIIP process in line with the mainstreaming of other international initiatives such as the Sustainable Development Goals.

Factors which may help to explain this lack of progress include:

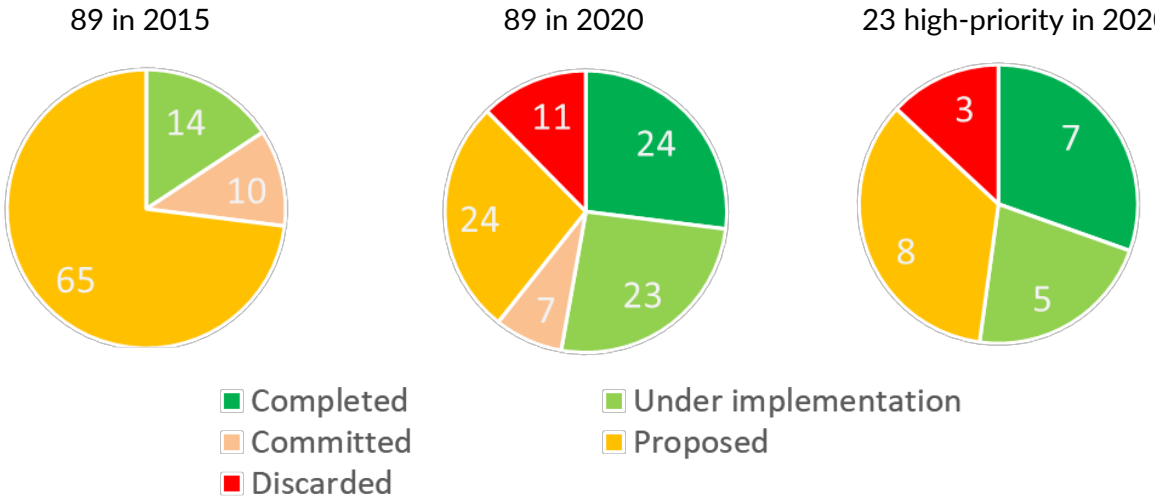
(i) While the NIIP 2 Phase 2 was more government-led, it remained an exclusively NIIP process, separate from the broader processes of government.
(ii) The Excel-based templates for project submission and prioritization were relatively advanced. They may have been beyond the technical capacity of some stakeholders and subject to file-corruption in the hands of inexperienced users.
(iii) While the MCA criteria were objective and manageable, there were concerns with the reliability of the resulting ranking of projects, especially given the simplistic nature of some criteria, including a focus on completeness of the documentation rather than the merits of the project.
(iv) The return of national planning to the PMO—and the project processing and aid coordination functions remaining in the MOF—necessitated coordination across two ministries in managing NIIP preparation.
(v) There was a lack of technical support to embed the proposed processes in the road map.

(vi) The NIIP may have been perceived in government as being primarily of use to development partners, with insufficient value-add as a government planning tool.

Outcomes of the 2015 Project Pipeline in 2020.

It was not easy to assess the status of NIIP 2 Phase 2 projects in 2020, given the absence of a project database and the grouping of NIIP projects into larger programs for funding. Figure 2.1 shows the summary status of these projects in five categories: proposed (P), committed2 (C), under implementation (U), completed (CP), and discarded or no longer eligible (D). The 89 projects are fully listed in Appendix 2.

Figure 2.1: Status in 2020 of Projects from the 2015 Infrastructure Investment Plan (numbers)



Source: Calculations of the National Infrastructure Investment Plan 3 consulting team.

In 2015, 27% of the projects were committed or under implementation. By 2020, including completed projects, this had risen to nearly 61%. For all projects, and the 23 high-priority projects, over half were under implementation or completed. These projects are listed in Table 2, with further details provided in Appendix 3.

[2] A project is considered committed if a contract has been signed with a development partner for its implementation.

Table 2.1: Status in 2020 of High-Priority Projects in the 2015 Infrastructure Investment Plan

Project Code NIIP2+	Sector	Project Name	(CP)	(U)	(C)	(P)	(N), (D)
A12	AIR	Control Tower for Fua'amotu					
A14-2015	AIR	Cargo Facility Fua'amotu					
A11	AIR	Resurfacing Ha'apai runway, apron, taxiway					
A9	AIR	Expand apron area at Fua'amotu					
E15	ENE	Biomass Generation ('Eua)					
E19	ENE	Upgrade of Nuku'alofa Electricity Network					
E-2015-1	ENE	Smart Metering and Prepayment Procedures					
Ed-2015-2	EDU	Pacific Games Village (THS) (16th PG)					
Ed-2015-3	EDU	Pacific Games Village (TCA) (16th PG)					
Ed-2015-4	EDU	Structural Improvement of High-Risk Building					
Ed-2015-5	EDU	School Ground Development for Resilience					
H-2015-1	HTH	Replacing Asbestos Roofing at Vava'u Hospital					
M5	ENV	Ha'apai community resilience project					
R10	LDT	Outer Islands Roads Upgrading Program					
R9	LDT	Overlay of AC Road in Tongatapu					
R-2015-1	LDT	Backlog Road Maintenance Program (TSCP 2)					
R-2015-2	LDT	Tonga Public Transport System Upgrading					
R6	LDT	Agricultural Road Program					
R8	LDT	New road link to southern side of Fanga'uta Lagoon					
S6	SWA	New Landfill or Transfer Station on Ha'apai					
T-2015-3	ITC	3G Upgrade for Outer Islands					
T8	ITC	International Fiber-Optic Cable					
T9	ITC	Fiber-Optic Cable to Ha'apai, Vava'u etc.					

AIR = air transport, C = committed, CP = completed, D = discarded, EDU = education, ENE=energy, ENV = environment, ITC = information technology and communication, LDT=land development transport, N=not relevant, P = proposed, SWA = sanitation and waste, TCA = Tonga College Atele, THS=Tonga High School, TSCP = Transport Sector Consolidation Project, U = under implementation.

Note: Green blocks indicate project status in 2020. Source: Government of Tonga, Ministry of Infrastructure. NIIP 2 project list updated for 2020.

2.2 Lessons and Recommendations from the Review

With the benefit of hindsight, it can be concluded that, while a more government-led process for the NIIP may have been a necessary condition for sustainability, it may not have been sufficient. The government has limited capacity to manage planning systems and focuses this capacity on systems of the highest priority. A stand-alone NIIP process is unlikely to be sustainable and closer integration and mainstreaming with existing planning and project processing systems appears to also be needed for the NIIP to be sustained. If it is to be a cross-sectoral approach to prioritization, the process must also take account of all infrastructure needs from all sectors. It must also avoid taking over the role of each sector in the planning of its own infrastructure as part of overall sector planning. Based on these conclusions, eight lessons were identified and are listed below with the recommended approaches to address them.

Lesson 1: Cover More Sectors in National Planning

The first lesson is that national infrastructure plans need to move beyond the initial focus on economic infrastructure. NIIPs progressively expanded their focus until the NIIP 3, which can be considered a full national infrastructure plan that provides a comprehensive coverage of all large infrastructure managed through the government budget.

All infrastructure needs across all sectors were considered for the NIIP 3. The sectors, listed in Table 2.2, all have projects included in this latest plan. Further sectors may be added in the future to cover both infrastructure projects and those non-infrastructure related projects. Sectors are presented and grouped according to the five pillars of the TSDF II. The framework recognizes that there is not necessarily a one-to-one linkage between sectors (or even pillars) and the mandate of a particular MDA.

Table 2.2: Sectors Covered under the National Infrastructure Investment Plan 3

Sector/Institution and Abbreviation		Lead MDA and/or PE (may include others)	Abbreviation
TSDF Pillar 1: Economic institutions			
Agriculture and Forestry	AGR	Ministry of Agriculture, Food, Forestry	MAFF
Fisheries & Marine Resources	FIS	Ministry of Fisheries	MOFi
Tourism	TOU	Ministry of Tourism	MOT
Trade & Business	TRA	Ministry of Trade and Economic Development	MTED
		Tonga Market Corporation Limited	TMCL
TSDF Pillar 2: Social institutions			
Education	EDU	Ministry of Education and Training	MET

Sector/Institution and Abbreviation		Lead MDA and/or PE (may include others)	Abbreviation
Health	HTH	Ministry of Health	MOH
Housing	HOU	Ministry of Infrastructure	MOI-BCD
Youth & Sport	SPR	Ministry of Internal Affairs	MIA-YD, SD
Elderly & Disabled	ELD	Ministry of Internal Affairs	MIA-DIS
Community Infrastructure	COM	Prime Minister's Office	PMO-LG
TSDF Pillar 3: Political (governance) institutions			
Constitutional	CON	Legislative Assembly	OLA
Justice Law & Order	JLO	Ministry of Justice & Prisons - Justice	MJP-J
		Ministry of Justice & Prisons - Prison Service	MJP-PS
		Ministry of Police, Fire & Services - Tonga Police	MPFS-TP
Other HQ Central Govt	HQG	[any ministry HQ not included elsewhere in Pillar 3]	
Local Govt Admin	LGA	Ministry of Internal Affairs - LGA (moving to PMO in 2021) - and other central government offices on outer islands	PMO, others
CERT/E-governance	ICT	MEIDECC	MEIDECC-CERT
Defense	DEF	His Majesty's Armed Forces	HMAF
TSDF Pillar 4a : Infrastructure & technology Inputs (transport) inputs			
Land Transport	LDT	Ministry of Infrastructure	MOI
Sea Transport	SEA	Ports Authority Tonga	PAT
		Ministry of Infrastructure	MOI-MPD
Air Transport	AIR	Tonga Airports Limited	TAL
TSDF Pillar 4b: Infrastructure & technology Inputs (utilities) inputs			
Energy	ENE	Tonga Power Limited	TPL
Communication	ICT	Tonga Communication Corporation	TCC
		Tonga Cable Limited	TCI
Postal Services	POS	Tonga Post Ltd.	TPost
Water Supply	WAT	Tonga Water Board	TWB
Solid Waste & Sanitation	SWA	Waste Authority Limited	WAL

Sector/Institution and Abbreviation		Lead MDA and/or PE (may include others)	Abbreviation
TSDF Pillar 5: Natural resources and environmental inputs			
Land & Natural Resources	NAT	Ministry of Lands and Natural Resources	MLNR
Environment	ENV	MEIDECC (2)	MEIDECC-Env.D
		Ministry of Agriculture, Food and Forestry	MAFF
		Ministry of Fisheries	MoFi
		Ministry of Lands and Natural Resources	MLNR
Disaster Risk Management	DRM	MEIDECC	MEIDECC-DRMD
Fire and Emergency	FIE	Ministry of Police and Fire Services - Fire & Emergency Services	MPFS-TFES
Coastal Protection	COA	MEIDECC	MEIDECC-CCD
Meteorology	MET	MEIDECC	MEIDECC-MET

CON=constitutional; HQ = headquarters; MDA = ministry, department, and/or agency; MEIDECC = Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications; PE = public enterprise; PMO = Prime Minister's Office; TSDF = Tonga Strategic Development Framework

Note: The listing of MDA and/pr PE by sector is not comprehensive; should an MDA or PE undertake a project that belongs to that sector, the project must be recorded under than sector; should a project cover more than one sector, place it within the sector on which it is most focused. This is only a partial list relevant to the sectors in the National Infrastructure Investment Plan 3. A fuller list will be provided later for the database.

Source: Ministry of Finance, 2021

Action taken in developing NIIP3:

1a. Review the list of sectors and modify to ensure it covers all projects.

Lesson 2: Position the Process in the Tongan Planning System

Having determined the extent of NIIP coverage, it is easier to determine where the plan fits within the Tonga planning system. There are a variety of plans in Tonga, including sector, crosscutting, corporate, strategic, district, island, and community plans. The TSDF cascading

system seeks to apply the following key results-based steps for all plans no matter what topic or area they cover[3]:

(i) **gap analysis** of levels and gaps in performance of the topic or area in delivery of its outputs to support its outcomes.
(ii) **diagnosis analysis** of the reason for the gaps, which may include the inputs and activities used to produce the outputs; and
(iii) **solution analysis** to identify viable options to address these reasons; what modifications are required to inputs and activities; solutions may cover both hard and soft infrastructure, as defined in section 0.

While called "national infrastructure plans", the earlier NIIPs were focused on economic infrastructure, namely utilities and transport. This probably arose from their dependence on hard infrastructure inputs. Summary "sector plans" for each sector were included, focusing on hard infrastructure but also noting "complementary initiatives" or soft infrastructure inputs.

The NIIP 3 now covers 29 sectors or institutions. It thus becomes quite impossible to undertake even the limited level of sector summary in previous documents, both in terms of time and size[4] of report, during the usual 3 months or so of an NIIIP consultancy. The NIIP 3 is now squarely placed in its positioning as a crosscutting plan for hard infrastructure. It has a similar status to other crosscutting plans such as the Joint National Action Plan. While crosscutting plans may identify some projects, their role tends to focus on building cross-sector understanding of an issue, e.g., climate change, into all relevant sector plans. In the same way, the NIIP has a role to build understanding of improved infrastructure planning and management into sector plans. It does not "own" the sector projects[5].

Action taken in developing NIIP3:

2a. Ensure guidance for sector plans has clear links to the crosscutting NIIP to improve infrastructure planning and management in sectors.

Lesson 3: Identify Projects in the Tongan Planning System

To facilitate the mainstreaming of the NIIP, all projects (or major interventions) can be placed into one of two broad categories:

NIIP projects. All projects costing T$1 million or above, including substantial hard infrastructure (constructions, plant, heavy equipment, etc.) and perhaps some limited

[3] The TSDF is designed on a results-based approach as are the corporate plans. Other plans remain with a mix of process, though the NPD is gradually encouraging improved alignment behind a standard language and approach.

[4] The sector summaries took up 16 of the 53 pages of the NIIP 1 (phase 1) report. At this level, NIIP 3 would require some 64 pages just for the summaries.

[5] During the NIIP consultations a similar issue arose: which MDA or public enterprise and sector is responsible for the project? In the initial response to the NIIP, the resilience and climate change team had listed many of the projects already under the responsibility of other MDAs as belonging to the resilience sector.

soft infrastructure components, in any sector receiving funding under the government budget,[6] from all sources (domestic revenue, aid).

Non-NIIP projects. Any project that does not fall within category 1, including all projects under T$1 million, whether or not they have a large hard infrastructure component, plus all projects of T$1 million and above with limited, if any, hard infrastructure, which includes all soft infrastructure (small equipment, laws, rules, processes, systems, skills, etc.).

Well-formulated projects cover all the required components (both hard and soft infrastructure) to deliver complete solutions. The choice of solution will tend to impact the balance between NIIP and non-NIIP projects, so NIIP projects should not be formulated in isolation of wider sector considerations.[7]

These projects are identified in many sources, including sector plans and policies; district, island, or community plans and constituency reports; and Cabinet decisions. Following extreme natural events, rapid assessments are also used to identify project needs. These plans, policies, and assessments are all intended to identify required solutions to help better deliver necessary outputs within the sectors.

Where supported by development partners, a more structured analysis to identify the most economically and/or sustainably viable solutions is often taken. The district, island, or community plans tend to have a stronger community consultation with varying degrees of participation. Constituency reports tend to be less technical processes drawn from consultations between members of Parliament and their constituents.

If all projects identified through these various processes and documents were recorded on a project database, it would be a simpler task to establish the NIIP list. Unfortunately, the project database in Tonga is now not operational, waiting to be revived as part of the Integrated Financial Management Information System (IFMIS) reform in the MOF.

Action taken in developing NIIP3:

3a. Ensure future NIIP projects identified in various processes and documents are captured in the NIIP list.

Lesson 4: Establish Prioritization in the Tongan Project Cycle

The project cycle covers the whole process from identification to formulation, appraisal, approval, funding, and implementation, with appropriate M&E at each stage. Prioritization can take place at various stages in the cycle.

[6] Infrastructure fully funded by a public enterprise from its own resources are not included as they do not directly impact on the national budget and are not processed by the MOF.

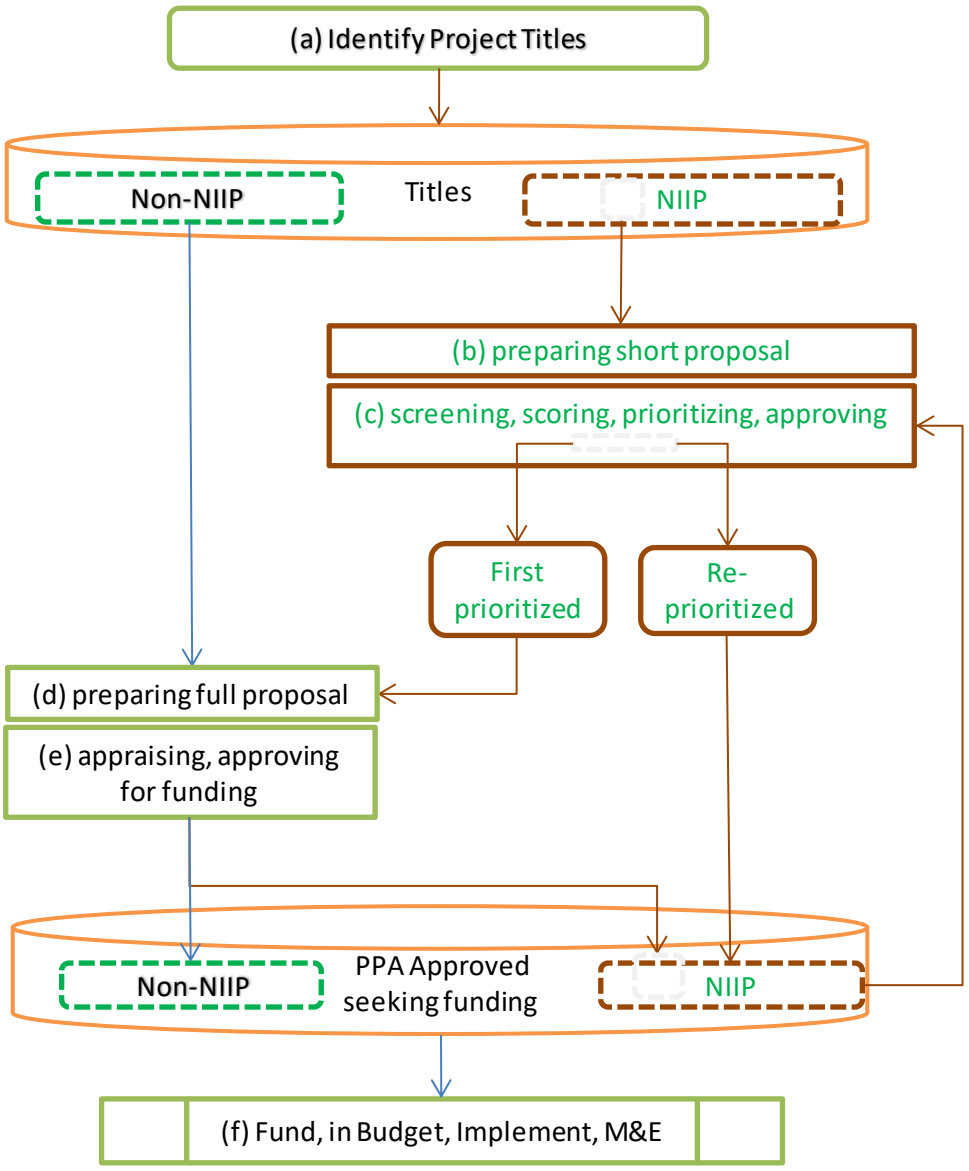
7 For example, lack of capacity to deal with the size of the prison population may include solutions to change sentencing guidelines versus building a larger prison.

Prioritization often takes place during sector or district planning. Once projects are combined across sectors and/or districts, etc., they could be put through a cross-sector prioritization to guide future work. Historically, however, project planning processes and manuals used in the Pacific have focused on the application of the project cycle to individual projects, without a cross-sector prioritization. The Tongan project cycle—and the guidance required for all projects—is no exception. This suggests that detailed cross-sector prioritization tends to be considered too demanding for small administrations.

The mainstreaming of NIIP prioritization into the project cycle will retain the focus of prioritization on NIIP projects and, at least for now, avoid considering extending this to non-NIIP projects. The focus will remain on prioritization at the early stages of project preparation to guide and focus the formulation of projects, and seeking of donor funding, on those projects with greater impact. However, the prioritization may include more developed but still-unfunded projects.

All projects in Tonga are required to go through this cycle. A simple version of the project cycle in Tonga, with prioritization, is shown in Figure 2.2.

Figure 2.2: The Tongan Project Cycle with Infrastructure Prioritization Mainstreamed



M&E = monitoring and evaluation, NIIP = National Infrastructure Investment Plan, PPA = project proposal application.

Note: At the funding stage, projects may be grouped into larger programs, including a mix of NIIP and non-NIIP projects. In some cases, a project may be split into small projects.

Source: Edits to government flow charts by Authors, based on consultation with staff.

The prioritization steps (brown boxes with green text) are fully mainstreamed with the other stages (green box, black text). The key steps, with the extent of modifications, are:

(a) ALL: Identifying project needs with a clear title, and record in the database, distinguishing NIIP and non-NIIP projects [enhanced]

(b) NIIP: Preparing short project proposals for prioritization, with MCA [new]

(c) NIIP: Screening, scoring, prioritizing, and approving [upgraded from NIIP 2 process]

(d) ALL: Preparing full project proposals [enhanced]

(e) ALL: Appraising and approving for funding [new option for basic economic analysis]

(f) ALL: Funding and implementing M&E [minor points of clarification]

To ensure smooth operations between the PMO and the MOF, in their respective roles in the project cycle, the need for close cooperation between the two is recognized. To facilitate communications with and through the PAD-CC, it is recognized that the Head of the NPD needs to attend the meeting to support the Chief Secretary and Secretary to Cabinet (CSSC) in his role.

Following these steps, and using the mainstreamed templates, is important to ensure all projects use the relevant parts and are well considered and formulated and, in the case of NIIP projects, are effectively prioritized. MDAs and public enterprises are required to respect the responsibilities of the PMO and the MOF and ensure that all projects follow these steps. This is also supported by the requirements of the Cabinet Manual that submissions to Cabinet follow the established procedures and regulations.

The detailed application of this process is documented in the guidance manual, supplied with this report.

Existing and Modified Tongan Documents, Tools, and Processes

For the steps to function, while retaining the consistency of the whole cycle and the integrity of the NIIP process, existing Tongan documents, tools, and processes were appropriately modified. These were tested during the preparation of the NIIP3. In summary, these are:

Documents for identifying project needs. These include sector and cross-sector plans; district, island, and/or community plans; government priorities or strategies; constituency reports; Cabinet decisions; rapid assessments; etc. In future, greater use of service KPIs, asset registers, maintenance and/or replacement schedules is encouraged to better inform sector planning. [no modifications required].

Modified project proposal application (PPA). This has been updated and streamlined to work better for all projects. It now contains:

(i) project concept note: suitable for small, simple projects and part of the document for the prioritization of NIIP projects [modified]

(ii) full project proposal: used for large projects, including NIIP projects that have been prioritized, for seeking government approval for funding [modified]

(iii) risk and hazard assessment: of risk to and from the project, first used as part of the documentation for the prioritization stage [modified]

(iv) MCA: used for the NIIP scoring and prioritization [new]

Tools for generating the Government Priority List of NIIP projects. These include:

(i) PPA (for Prioritization), prepared by MDA or public enterprise and consisting of project concept note, risk and hazard assessment, and MCA with MDA scores [new]

(ii) guidance for screening PPA (for Prioritization) [new]

(iii) NPD scoring within the PPA, with note for any differences to score by MDA [new]

(iv) ranking workbook for summing scores, ranking projects, grouping by different cut-off points, and other analysis within the data limitations [new]

(v) guidance for briefing the TWC TFC and processing projects to the endorsed list for submission to Cabinet for final approval of prioritization [new]

Tools for generating approved unfunded list of projects. These include:

(i) Full project proposal prepared by MDA or public enterprise to complete the PPA [modified]

(ii) appraisal: limited trial of basic economic analysis with guidance [new]

Tools for funding, implementing, monitoring, and evaluation of projects. These include:

(i) recording projects in corporate plans [suggestions for next corporate plan guidance revision]

(ii) identifying funding [modified guidance to use prioritization when seeking funding];

(iii) projects in the budget [no modifications]

(iv) project implementation and M&E [use existing NPD reporting]

(v) asset register and maintenance [better use and content of existing registers as required by legislation, separate note on possible infrastructure asset management framework for future consideration]

Project database, tracking projects through project cycle. This includes:

(i) temporary NIIP database [captures early recording of titles; populated initially as two lists—funded and unfunded—from the NIIP 3 review; options for extending]

(ii) new IFMIS project database awaiting IFMIS upgrade [Suggestions on information requirements, engaging with the MOF on design, links to e-governance, etc.]

Regular infrastructure reviews and reports. These include:

(i) a short report after each prioritization

(ii) continuation of 5-yearly detailed reviews

Some other tools also require modification. This includes how to better to deal with NIIP projects in corporate plans and annual reports, how to modify the asset registers (with links to the proposed Tonga asset management framework), and how to build the asset registers into effective tools. Down the line, the possibility of strengthened economic analysis and appraisal of projects may also be further considered.

These steps are set out in more detail in the guidance manual. The repeated evidence is that modifications to procedures and systems must be embedded and then need to become part of the ongoing training program of the government. The failure to do this adequately is a significant factor in failures to adequately build the system and its required capacity. Training, mentoring, and coaching in the use of the PPA for all projects is needed across all MDAs. More focused training is needed for the NPD, as well as the two relevant divisions within the MOF,

to ensure they have the capacity to do this. Refreshers in the mainstreamed NIIP process will be required before the next prioritization, supported by improved capacity to carry this on with local staff.

The need for regular and ongoing capacity for the NPD to support and train planners in the MDAs has been recognized. This ongoing training needs to include project and NIIP related tools as part of a strengthened NPD planners forum.

Action taken in developing NIIP3:

4a. Circulate the revised project cycle guidance to all MDAs and public enterprises and ensure NIIP and non-NIIP projects follow the appropriate procedures.

4b. In consultation with the Public Service Commission, ensure staff responsible for projects and planning have this clearly set out in their job descriptions and are required to participate in regular training related to these skills.

4c. MoF and NPD to establish how the regular training is to take place and build it into their respective work plans.

4d. Ensure other relevant guidance is updated to capture this modified project cycle and the enhanced documentation, for example, how the corporate plans and annual reports can support the NIIP process.

4e. Have MDAs use the government's NIIP priority list to guide PPA preparation for funding and have the MoF use the list to seek funding.

4f. MOF and Ministry of Foreign Affairs share the NIIP report with development partners and invite them to use it in their development programming with Tonga.

4g. Head of the NPD to attend PAD-CC meetings as an advisor to the CSSC.

Lesson 5: Embed the Prioritization Methodology for Tonga

Applying Prioritization

The NIIP process focusses on project prioritization at an early stage in the cycle, at early concept stage, before more detailed prefeasibility or feasibility studies. This helps identify projects and establish priorities for further assessment and development of projects. This prioritization—or a later, more detailed one—can also inform funding and implementation negotiations with development partners. NIIP 3 prioritization is based on project screening and MCA[8]. These were tested in the preparation of the MCA priority NIIP list (Chapters 4 and 5).

[8] As project development becomes more advanced, more elaborate project documentation is expected to become available allowing more detailed project appraisal, which could include basic economic analysis on a selective basis. The guidance documentation attached to this report provides some suggestions for such more advanced economic assessment of the viability of infrastructure projects.

Project Screening

MDAs or public enterprises prepare submissions using the PPA template covering the sections for prioritization. This should contain all the information required for prioritization in one document, which can later be built into a more detailed proposal.

The NPD receives the PPAs (for prioritization) and ensures their status and progress is updated on the project database. The department screens the submissions to ensure that they meet minimum standards, are consistent with government policy (TSDF and other plans), are adequately completed, contain information on consultations with other key planning and related regulators, face no risks significant enough to cancel the project, and contain a completed MCA. Submissions not passing any of these screening steps are returned to the MDA or public enterprise for reconsideration. Those passing are then transferred to the NPD for scoring and ranking via the MCA.

Multicriteria Analysis

MCA is a rapid appraisal technique used to rank projects and is particularly useful at the early stage of project preparation. It defines a set of criteria against which projects are assessed and applies a scoring system to this assessment, with a weighting system to allow adjustments to the relative importance of criteria where appropriate.

The MCA ranks projects but does not establish their viability. Viability is established by other, data-intensive tools, which are unlikely to be practicable at the early stage of project formulation Appendix 4 discusses a basic economic analysis to appraise projects when they are more developed as full project proposals.

The MCA guides more informed judgement by decision-makers in ranking projects. Each criterion is applied with judgment based on limited information. The resulting MCA Priority List must be reviewed for consistency against other considerations, after which the Government Priority List can be established. The resulting rank is to guide the order of future work: it is not a process for approving or rejecting projects.

Criteria

The criteria used in the MCA have been developed in line with the TSDF and the review of the criteria used in the NIIP 2 Phase 2[9]. Principles applied in selecting criteria, recognizing that there can be competition among these principles, were:

[9] Results of the review of prioritization criteria used in NIIP 2 (phase 2) were included in the Inception Report for the technical assistance (Section 6 and Table 7). The review concluded that the prioritization criteria performed well in terms of objectivity and manageability, but less well in terms of the reliability of the resulting priorities. Concerns identified in relation to reliability included methodological weaknesses in the scoring of some criteria (particularly those involving scoring quantified benefits without adjusting for project cost), and that some of the scoring was directed more at the completeness of the Project Profile Document than at the intrinsic merits of the project.

Objectivity. The criteria should be evidence-based and involve quantitative data to the extent possible.

Manageability. The criteria should be easy to use and should recognize the capacity constraints faced by user organizations.

Reliability. The criteria should inspire confidence that the resulting project priorities are sound.

Table 2.3 shows the five criteria groups and 15 criteria approved by the subcommittee of the TFC for use in the MCA, together with linkages between the criteria and the TSDF. Given the different numbers of criteria in each group, it was agreed to only report scores by criterion rather than criterion group in the ranking workbook.

Table 2.3: Assessment Criteria Groups and Links to the Development Framework

Criteria Group / Criteria	Link to TSDF Pillars by Number[a]
1: Infrastructure performance	
1.1 Linkages with other infrastructure[b]	[4] seeks reliable, safe, and affordable infrastructure
1.2 Optimal use of existing infrastructure[b]	[4] seeks reliable, safe, and affordable infrastructure
1.3 Improvements in service coverage, reliability, safety, or compliance with relevant government regulations or international obligations	[4] seeks reliable and safe infrastructure; [3] seeks improved law and order and domestic security appropriately applied; [2] seeks improvements in education and training, lifetime education, and improved healthcare and delivery systems (universal health coverage)
2. Project risk	
2.1 Number of critical risk ratings to the project (as assessed using the Risk Screening Toolkit)	[4] seeks reliable and safe infrastructure; [5] seeks more resilient infrastructure
2.2 Number of critical risk ratings from the project (as assessed using the Risk Screening Toolkit)	[4] seeks reliable and safe infrastructure; [5] seeks a cleaner environment, climate change adaptation, and DRM.
3. Project climate change / disaster risk management / environmental protection benefits	
3.1 Contribution of the project to climate change mitigation or adaptation functions or environmental protection benefits	[5] seeks improved resilience to the impact of climate change, and a cleaner environment, supported by JNAP for Climate Change and DRM II
3.2 Contribution of the project to disaster preparedness	[3] seeks improved governance, better building codes, and other policies; [5] seeks improved resilience to extreme natural events
4. Economic and social impact	
4.1 Investment cost per beneficiary[c]	[4] seeks affordable infrastructure services
4.2 Employment creation in operational phase (cost per full-time equivalent job)[c]	[1] seeks a closer public-private partnership for economic growth and strengthened business enabling environment

Criteria Group / Criteria		Link to TSDF Pillars by Number[a]
	4.3 Efficiency gains or reduction in costs for infrastructure users[b]	[1] seeks a strengthened business enabling environment; [3] seeks improved law and order and domestic security appropriately applied; 4] seeks affordable infrastructure services
	4.4 Contribution to private sector activity	[1] seeks a closer public-private partnership for economic growth and a strengthened business enabling environment
	4.5 Contribution to improved social services or community activity	[2] seeks improvements in education and training, lifetime education, improved healthcare and delivery systems (universal health coverage), better care and support for vulnerable groups such as the disabled, building stronger communities, and links with the diaspora
	4.6 Potential for economic viability	[1] seeks a closer public-private partnership for economic growth and improved public enterprise performance; [4] seeks reliable, safe, and affordable infrastructure.
5. Operational sustainability *		
	5.1 Ability to meet costs of operation and maintenance (in % of O&M costs) *	[1] seeks improved public enterprise performance; [4] seeks reliable, safe, and affordable infrastructure.
	5.2 Institutional capacity of project implementing agency and operator	[1] seeks improved public enterprise performance; [4] seeks reliable and safe infrastructure.

DRM = disaster risk management, O&M = operation and maintenance, TSDF = Tonga Strategic Development Framework.

a. TSDF pillars are [1] Economic Institutions, [2] Social Institutions, [3] Political Institutions, [4] Infrastructure and Technology Inputs, and [5] Natural Resources and Environmental Inputs.

b. Criteria groups and criteria retained from the National Infrastructure Investment Plan 2 Phase 2.

c. Criteria retained from the National Infrastructure Investment Plan 2 Phase 2, with accounting for project scale added.

Source: Authors.

Guidance notes on the use of the criteria are set out in Section 4 of the PPA template. Based on the lessons learn from the finalization of the priority lists, further lessons for enhancing the MCA have been identified for consideration for the next prioritization exercise.

Project Scoring and Weighting System

The NIIP 2 Phase 2 scoring system was retained: a four-point scale from 0 to 3 (from lowest to highest performance) against each criterion. The MCA defaults to equal weighting for all

criteria.[10] The weights can be adjusted for sensitivity analysis. Changes in weights must be based on rational, transparent, and pre-considered justifications. They should never be used to force a ranking just because it looks appropriate for other reasons.

Producing the Assessment Priority List

The PPA (for Prioritization) is the source for the NPD to enter the information into the Excel project sheet in the project ranking workbook. This produces the draft MCA Priority List. Since the MCA is only a tool, the initial rankings are subject to a "quality control" check by the NPD to confirm there are no obvious anomalies that may need to be addressed before the MCA Priority List is released. This also provides an opportunity to consider any important linkages or interdependence among projects, which have been missed by scoring projects individually.

Action taken in developing NIIP3:

5a. Consider the additional lessons for further improving the MCA and how to apply them for the next prioritization.

Lesson 6: Use the Assessment Priority List to Create the Government Priority List

The MCA Priority List is submitted (with any notes) by the NPD to the TWC and TFC for cross-government consultation and consideration. The TWC and TFC are expected to use the MCA prioritization as a starting point to inform their considerations. Where there is a consensus that the ranking needs to be modified, based on considerations not in the MCA, a clear reasoning needs to be provided to justify the change.

After the meeting, the NPD updates the MCA Priority List to become the Government Priority List for endorsement by the PAD-CC to Cabinet, with the reasoning for any adjustments between the two lists. After Cabinet approval—and any possible final modifications—the approved Government Priority List will be published with any further analysis considered desirable. To facilitate transparency and improve future decision-making, Cabinet notes the benefit of providing the reasoning for any modifications they require.

If an MDA informally approaches a development partner with a NIIP type project, they are required to first ensure that it is on the NIIP list and preferably of a relatively high priority. Development partners are also encouraged to consult with the MOF or NPD to ensure the same thing. In this way, future infrastructure investment programs will better align with government priorities.

[10] The five broad five criteria groups are used only for grouping. There is not a combined score at this level, but this possibility may be considered in the future.

Action taken in developing NIIP3:

6a. Plan the approach for the next prioritization to take place, once the various follow-up actions have been conducted.

Lesson 7: Focus on the Role of Infrastructure Planning in the Tongan Administrative System

As noted at the start of this chapter, the justification for having a NIIP prioritization process is the high cost of hard infrastructure, the time it takes to develop, and the need to focus limited resources across competing sectors. Without this justification, the only remaining reason to have a NIIP would be to highlight important crosscutting issues related to improved infrastructure management and maintenance.

Action taken in developing NIIP3:

7. Consider funding and other issues that impact the ability to invest in priority infrastructure and properly operate and maintain it.

Lesson 8: Build Monitoring and Evaluation into Planning and Project Processes

In Tonga, M&E remains a general weakness throughout government. MDAs and public enterprises still have difficulty formulating KPIs. However, with plenty of these KPIs available internationally for infrastructure, this should not be a constrain for NIIPs. The major constraint is the accurate and timely collection and recording of data against these KPIs. Asset registries, which can also be a valuable source of some of these data, are not well formulated. Where registries exist, they tend to focus on financial data. Some of these infrastructure KPIs, and their limited data, are listed in Appendix 7 They show the many gaps both in quality and actual data that still exist. These KPIs need to be improved so that they can be better used to guide the identification of infrastructure needs in sector planning. Various projects are working on developing asset registers.

Beyond these KPIs, there is a problem even keeping track of projects. Analysis of the status of NIIP 2 Phase 2 projects in 2020 indicates that only a little over half were completed or underway—and getting this data proved difficult. The government project database, a critical tool for the effective management of a project cycle, has ceased to operate. Its reestablishment is dependent on the project management unit for the revised IFMIS, which is still under consideration. In the meantime, a temporary Excel database for NIIP projects can be established from the funded and unfunded project lists identified during the NIIP 3 preparation. When the new project database is launched, the NPD will work with the MOF to ensure that NIIP projects' recording requirements are properly captured and to feed the temporary database into the full IFMIS database.

The MOF has a format for regular monitoring of projects, but this is not operating effectively and the format was not considered during the mainstreaming for the NIIP 3. Given the slow movement with infrastructure projects, the NPD plans to start with a simple report format for NIIP project status, provided at least once a year as part of the budget preparation. This may be extended to a second time later in the calendar year. The NPD and MOF will collaborate on rebuilding project M&E on a suitable frequency and format.

Action taken in developing NIIP3:

8a. While the new project database is being developed, establish the temporary NIIP database with the basic functionality required to track the status of NIIP projects through the project cycle (ready to merge into the new IFMIS database when up and running).

8b. Design a simple format for annual reporting on the status of NIIP projects, consistent with the overall reporting on project status, including updates on other enhancements to NIIP processes such as improved asset registers and infrastructure KPIs.

8c. Ensure the implementation of the project database component of the new IFMIS fully captures all requirements for an effective project cycle, including the NIIP projects.

3 Tonga Policies, Strategies, and Institutional Settings for Infrastructure

3.1 His Majesty's Priorities

During the opening and closing of Parliament, His Majesty the King of Tonga regularly emphasizes the importance of healthy living, education, and the economy for the well-being of the people. In recent years, he has expressed increasing concern about the rise in illicit drugs and the failure to address this danger. Such drugs damage people's health, education, and economic well-being. These concerns are taken into account in the report.

3.2 Government Strategies and Priorities

Tonga Strategic Development Framework II (2015–2025)

The TSDF II sets out a results-based framework to guide the development of Tonga over a 10-year period. The overall focus is on inclusive and sustainable development. The framework consists of just one national impact: "A more progressive Tonga supporting a higher quality of life for all."

The TDSF II is structured under seven high-level national outcomes, of which the most relevant for the NIIP is, "… a more inclusive, sustainable and successful provision and maintenance of infrastructure and technology." Details on each outcome are provided in Appendix 5.

The framework notes that: "Infrastructure consists of the human-made physical and organization structures and facilities such as buildings, roads, air and marine ports, utilities, sports facilities, schools, hospitals etc. that are needed for a society or economy to function".

Reliable infrastructure is thus essential to progress on all seven national outcomes, supported by organizational outcomes grouped into five pillars:

Pillar 1: Economic institutions
Pillar 2: Social institutions
Pillar 3: Political (governance) institutions
Pillar 4: Infrastructure and technology inputs (for the NIIP analysis, these are split into two subgroups: 4a for transport and 4b for utilities, given the large number of projects); and
Pillar 5: Natural resources and environmental inputs.

The TSDF provides key guidance to help build inclusive and sustainable infrastructure in Tonga. These include:

(i) supporting service delivery to a dispersed population, facilitating growth and wellbeing

(ii) the high cost of building and maintaining infrastructure in a large archipelago with a small economy far from markets

(iii) demand for human skills to build and maintain infrastructure supported by sound systems and procedures

(iv) the challenge of centralized versus decentralized provision of infrastructure, including

(a) the impossibility of providing equal access to all inhabited islands

(b) the need to maintain a minimum standard, taking note of groups with special needs

(c) the impact of distribution of infrastructure on population movement, and the impact of such movement on future demand for infrastructure; and

(v) the sensitivity of infrastructure to current and future risks from extreme natural events and its role in increasing resilience to such events, as well as potential damage to the environment infrastructure may cause.

The Government Priority Agenda and Projects in the Budget Statement

While the TSDF II sets a broad agenda of 10 years, it is recognized that each new government may wish to focus on particular areas of development. Rather than rewriting the framework, the Government Priority Agenda (GPA) is the vehicle through which a government can focus its priorities while still respecting the outcomes of the TSDF. The GPA may stay constant for the 4 years of a government term in office or may be modified during this period.

The GPA 2020–2023 is reflected in the 2020–2021 Budget Statement. The projects and focus covered in the GPA were used as part of the assessment of infrastructure needs and gaps for building the full project list for the NIIP 3. Key areas of focus in the GPA include:

Health. Infrastructure needs to manage COVID-19 and improve health delivery

Control of illicit drugs. Infrastructure needs for border control, policing, and prisons.

Quality education. Infrastructure needs for safer schools (against extreme events) and to meet needs for improved education delivery.

Economic development. Recognizing the need to promote investment (with funding options) by the private sector to improve economic activity; fostering government support to public enterprise operations so they better manage their infrastructure; and seeking to improve produce packing facilities.

Infrastructure. Recognizing the need to:

(i) enhance the NIIP 3 with stronger processes to guide all infrastructure development initiatives in Tonga

(ii) improve road maintenance and development, build the Fanga'uta Bridge to improve journey times, and facilitate relocation of communities from low-lying areas to higher grounds

(iii) establish the Road Maintenance Fund to improve maintenance and sustainability of roads under the proposed Land Transport Authority; and

(iv) improve the Infrastructure Insurance Scheme, Asset Management and Valuation Policy Framework.

Energy, climate change, and disaster risk reduction. Recognizing the need to:

(i) build resilience capability to coordinate the government's resilience agenda and coordination of financing for climate change and disaster risk reduction

(ii) implement the Housing Reconstruction Policy and establish a National Public Housing Policy for less-fortunate citizens

(iii) complete the implementation of the individual housing and school reconstruction programs following recent tropical cyclones

(iv) initiate a new "Safer Schools" program

(v) better enforce compliance with building codes

(vi) promote renewable energy, climate change, and disaster risk management policies.

In addition to the GPA, the budget statement lists other large infrastructure projects either underway or under design. These lists have been merged with others to build the list of funded and unfunded projects in the NIIP 3.

3.3 Climate Change, Natural Disaster Risks, and Health Shocks

Vulnerability to Natural Disaster and Climate Change

Tonga is one of the world's most exposed countries to climate change and extreme natural events. This undermines attempts at economic and social development. The threats are expected to increase from the impact of climate change, irrespective of global action to reduce greenhouse gas emissions.

Tonga's 2015 Nationally Determined Contribution under the Paris Agreement already identified that, "climate change is the single biggest issue that will determine the future of the country over the coming decades and will require a whole-of-Tonga level of cooperation and coordination."

Tonga's emissions are globally minuscule, but the country is committed to supporting mitigation through the energy sector by promoting the development and use of renewable energy. Mitigation efforts are also being pursued in agriculture and by improved management of solid waste. Tonga recognizes that its major response to climate change will have to be through adaptation; by building stronger, safer, and more cost-effective infrastructure (including private housing); by improved disaster risk management and better management of water resources, agriculture, fisheries, and marine resources; and by maintaining biodiversity.

Joint National Action Plan II (2018–2028)

The awareness of threats from climate change is reflected in Tonga's strategic plans and policies, in addition to the TSDF II. These include the Climate Change Policy (2016–2035), Joint National Action Plan I (2010–2015), and current Joint National Action Plan II (2018–2028).

These documents bring together issues and initiatives linked to climate change adaptation and disaster risk management.

Under the Joint National Action Plan II, subobjective 4.1 focuses on the design and implementation of key infrastructure for a resilient Tonga by 2035. The expected outcome is, "safer and stronger coastal and marine infrastructures; cleaner and renewable sources of energy; integrated coastal and ecosystem-based adaptation implemented; flood management and to achieve food and water security".

Programmed activities include (i) strengthening of coastal infrastructure; (ii) improving the resilience of transport infrastructure; (iii) strengthening renewable energy infrastructure; (iv) implementing SMART agricultural and water management; and (v) designing and implementing appropriate, environmentally sensitive flood management responses in all low-lying areas around Tonga.

Except for the renewable energy sector, which is gathering momentum, implementation is advancing slowly in other areas. The need is recognized for better plans and more consistent implementation, linked to local community plans, and provision of basic infrastructure such as shelters, water supply, jetties, roadways, rural clinics, etc. Building closer links between the Joint National Action Plan II and the NIIP 3 is intended to help address this.

A key need is for infrastructure that can withstand Category 5 tropical cyclones, but this makes buildings and structures more expensive. Tonga's key development partners have been willing to fund a range of climate-resilient projects to help mainstream resilience, develop early warning systems and preparedness, strengthen transport, and construct safer buildings.

While basic natural disaster and emergency management systems are in place, they need enhancement by finalizing the reform of the National Emergency Management Act. This will strengthen the role of the National Emergency Management Office; give clearer guidance on implementation of disaster preparedness, response, and recovery; and enable a more inclusive approach involving village, district, and regional committees for planning and implementation.

Other initiatives supporting more resilient infrastructure planning and implementation aim to ensure adherence to:

(i) MOI building codes to avoid serious hazards (Category 5 tropical cyclones)
(ii) National Emergency Management Office alignment of infrastructure with disaster preparedness policies and facilities
(iii) National Spatial Planning Authority guidance on land-use constraints linked to possible impacts of climate change.

The modifications to the PPA, as part of the NIIP mainstreaming process, have helped with testing the risk screening toolkit and ensuring links to the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications (MEIDECC), the National Spatial Planning Authority, and others at an early stage of infrastructure planning. The MCA was also strengthened to take greater account of climate change adaptation and disaster preparedness. It is by building such links that these various initiatives can be better aligned with government processes and so are more likely to improve infrastructure planning, implementation, and management.

COVID-19 Impact and Mitigation

Tonga's rapid and well-organized response to the COVID-19 pandemic was possible due to improved disaster risk management and response, the willingness of MDAs and others to collaborate, and the political fortitude to sanction difficult decisions at short notice. The success has been enhanced by careful management and gradual arrival of residents and other key personal from overseas, along with the rapid response to initiatives to access vaccines thanks to the support from key development partners.

The government provided several million pa'anga to upgrade the main hospital, construct additional medical quarantine facilities, and modify hotels and other facilities to safely isolate arriving passengers. As a result, projects that might only have been anticipated in the NIIP 3 have already been funded. Projects for upgrading district hospitals are included as part of a wider focus on health needs.

Due to a deeper resilience, building on strong relations with the Tongan diaspora and goodwill of development partners, the economic impacts of the pandemic have not been as bad as originally anticipated. To maintain this resilience, building better and stronger plans, policies, and infrastructure, as well as relationships, is recognized as critical. Plans, like the NIIP, need to be better mainstreamed to be more dynamic and flexible in adjusting easily to changing conditions.

3.4 Integrating Spatial Planning for Infrastructure Development

The National Spatial Planning Act, establishing the National Spatial Planning Authority (NSPA), has only recently come into effect. The act gives the NSPA extensive powers to guide infrastructure and other developments. The authority is currently working on the regulations under the act.

The NSPA is expected to cover a range of issues that impact significantly on improving infrastructure planning and implementation. Briefly, these include:

(i) Promoting strategic planning and/or coordinated action in relation to sustainable land use
(ii) Coordinating with other MDAs on related functions and powers
(iii) preserving buildings and areas or places of scientific, aesthetic, architectural or historical interest or otherwise of special cultural value
(iv) promoting education and community awareness concerning urban and planning issues
(v) assisting coordination in the provision of infrastructure and services by ministries and public authorities for the benefit of the community
(vi) ensuring clear notification, protection of rights, and dispute resolution, etc.

The NSPA is still in the establishment phase. A successful NSPA has the potential to make important contributions to improved infrastructure planning and implementation in Tonga. On the other hand, a poorly established authority could become a worrying bottleneck. This is recognized and will be monitored.

3.5 Sector, Corporate, and Business Plans

As already noted in this report, the NIIP process does not seek to directly identify new project needs. This role is covered by sector-wide plans and policies, to some extent MDA corporate plans, and various planning documents produced by public enterprises. These documents are encouraged to follow the TSDF's cascading planning and budgeting system. This requires SMART KPIs on which to base the gap analysis.

The period and detail covered by sector planning varies. Some sectors have detailed sector plans and other policies, while some have less-structured assessments of project needs. MDAs produce 3-year rolling corporate plans as part of the annual corporate planning and budgeting exercise. These are complemented by annual reports, which are unfortunately often late in being published. Public enterprises are required to produce business plans and reports. These are complemented by other documents, including policy and investment needs. Based on these various documents, most MDAs and public enterprises maintain a list of project needs from which the NIIP projects have been drawn.

In the process of the consultancy for this report, key data covering performance and assets, using internationally recognized SMART KPIs relevant to infrastructure, were sought from MDAs and public enterprises. This included information that is needed for good asset registers contributing to infrastructure maintenance, renovation, and/or replacement programs[11]. This information was slow in coming and of very variable quality, so it provided a limited contribution to the identification of the full NIIP 3 project list. It was used as a secondary source, to help ensure that no significant projects had been left out of the list provided by MDAs and public enterprises.

This information and detailed analysis of infrastructure sectors are contained in Appendix 7.

3.6 Asset Management

The importance of infrastructure asset management systems, such as the asset registry, is recognized, including the important support they can provide to the infrastructure planning needs of sectors and decisions regarding options between:

(i) maintenance; corrective or preventive measures to be implemented within a year to sustain the optimal operability of infrastructure functionalities
(ii) renovation; corrective or preventive measures to be implemented within 1 to 5 years to maintain or improve the performance of the infrastructure
(iii) reconstruction; which has a longer-term orientation (more than 5 years) with the aim of changing or upgrading the functions of infrastructure that is becoming obsolete.

[11] Better asset registers might help reduce the number of projects that arise from poor maintenance, though lack of funding is also an important consideration even where the need for maintenance is well understood.

Asset Registers at Ministries, Departments, and Agencies

MDAs are required under Section 79 of the Treasury Instructions of the Public Finance Management Act 2010 to keep proper systems in place to maintain a fixed asset inventory of public infrastructure under the MDA's control. This includes an updated list of all property, plant, or equipment with a value in excess of T$500, with relevant information on item, cost, date of acquisition, location, depreciation, etc.

These are essentially accounting and financial functions to document the fair value of operated public infrastructure. They are not aimed at managing and optimizing the function and operation of the infrastructure. MDAs lack discipline in reporting asset values: an MDA with infrastructure worth hundreds of millions of pa'anga reports only T$12 million worth of assets. Other MDAs seem not to have reported any data to the MOF in recent years.

According to the Auditor General's national performance audit report of infrastructure assets (June 2019), the Tonga Asset Management Framework, approved by Cabinet in December 2015, has not practically been initiated by the MOF, which awaits assistance for the framework. The report also recommends, "…as part of Annual Report, MDAs should include the assets managed on behalf of the public and/or held to deliver services and how they directly relate to the delivery of their mandate". Such a recommendation was already mentioned as part of the NIIP 2 2015 review report and guidance.
This poor asset management and underfunding contribute to poor maintenance of much government infrastructure. To better address these weaknesses and support mainstreaming of NIIP processes into sector planning, the following information is recognized as needed: (i) an overview of each sector's main assets, (ii) KPIs measuring status of infrastructure and service delivery, (iii) replacement values of assets, and (iv) estimated remaining useful life of assets. Options for better recording of such information in corporate plans and annual reports is being considered.

Asset Registers at Public Enterprises

The Tonga Water Board, under the Nuku'alofa Urban Development Sector Project (2012–2020), received support to develop an asset management system and plan. Tonga Power Limited has a basic asset register covering the four main island groups, comprising only the asset name and location by main island groups.

The Ports Authority Tonga recognizes the need to address its ageing infrastructure and facilities with the help of an asset management plan whose development is to be included in its capital expenditure budget. Tonga Aviation Limited highlights a financial asset register and an assets management function and notes the need to develop a 1–3-year asset plan to be reviewed and updated every year.

Other public enterprises also have, or are in the process of implementing, asset registers, although none of them were able to provide reasonably complete asset registers for assessment under the consultancy for the NIIP 3. Appendix 6 provides guidance on how an asset register can be upgraded to an effective infrastructure asset management plan.

Disaster Risk Asset Register

The Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), launched in 2007 then enhanced as the PCRAFI Facility in 2015, promotes disaster risk financing and insurance in Pacific Island countries. The facility is part of the broader agenda to strengthen disaster risk management and climate change adaptation in the Pacific region. One of its tasks is to develop an Excel-based asset register of all buildings and infrastructure, with their coordinates on geographic information system (GIS) maps (known as the PACRIS dataset).

The register received for Tonga covers several types of infrastructure: private and public buildings, roads, coastlines, and special public infrastructure (jetties, wharves, runways, power plants, fuel storage facilities, and water supply boreholes) with their location and shape. There is, however, no information on the physical state of the structures, nor information on their functional integrity, performance rating, or expected technical obsolescence.

PCRAFI, in its upcoming next phase, will help deepen the dataset for Tongatapu to enable a detailed assessment of hazard, exposure, and risk by improving the asset register's coverage of each structure's vulnerability to natural disaster and the need for renovation and/or reconstruction. This will help infrastructure planning in relevant sectors.

3.7 Delegation of Institutional Responsibilities by Development Framework Pillar

Pillar 1: Economic Institutions

The private sector is seen as the major driver of development in these sectors and thus the major source of investment. There is limited government direct investment in produce processing or packing and storage facilities, especially to facilitate exports. Markets for the sale of local produce, handicrafts, and some imported goods are also operated and maintained by Tonga Market Corporation Limited, a public enterprises. The Ministry of Fisheries operates some limited boat building and maintenance facilities. The Ministry of Tourism operates and maintains key sites of tourist interest.

The government focusses on establishing a business-friendly environment within a sound policy framework. Key support is provided through the Ministry of Agriculture, Food and Forestry; the Ministry of Fisheries; the Ministry of Tourism; and the Ministry of Trade and Economic Development. The MOF also contributes by maintaining overall fiscal and/or macroeconomic stability in partnership with the National Reserve Bank of Tonga, which is responsible for sound monetary policy and maintaining adequate levels of foreign exchange reserves. Other MDAs, such as those responsible for taxation, customs, justice, and police, also contribute to the enabling environment.

Pillar 2: Social Institutions

Tonga's social institutions have a major contribution from the nongovernment sector. This includes community groups, churches, and nongovernment organizations (NGOs). The Ministry of Education and Training leads policy and covers operations and investment for most primary, a little secondary, and much of tertiary education infrastructure. Some primary and most secondary education is run by nongovernment entities, especially the churches. While these organizations lead the investment in these areas, the government is increasing its support to infrastructure in church-run schools. Ex-students associations, backed by the Tongan diaspora, also support infrastructure investment in schools.

Apart from some private clinics, the government runs the health system and is responsible for all health infrastructure, led by the Ministry of Health. It is responsible for policy and for the operation and maintenance of a countrywide network of medical buildings and equipment. Several NGOs also collaborate with the Ministry of Health.

Formal social welfare and protection is limited in Tonga. The Ministry of Internal Affairs leads policy on support to disabled, elderly, and others with special needs, and delivers to these groups in partnership with NGOs. The Ministry of Infrastructure (MOI), in collaboration with the Ministry of Internal Affairs, provides support to improved housing, replacement of private housing after natural disasters, and community facilities such as halls. The construction is usually undertaken by the private sector under contract. The MOI is also focusing on increasing the resilience of private housing as well as public buildings.

Pillar 3: Political or Governance Institutions

This pillar covers all administrative buildings for central and local government. It includes buildings for the Head of State (His Majesty the King), legislature, justice and courts, police, prisons, defense, local government and other core functions of government, and any headquarters dedicated only to the functioning of the relevant MDA. Maintenance and construction of these buildings is usually accounted for through the relevant MDA. The MOI provides the technical support and supervises private sector construction unless it is for a large building, in which case the development partner funding the project is likely to also arrange for an external building company. The quality of the local building industry often does not reach sufficiently high standards.

Pillar 4: Infrastructure and Technology Inputs

This pillar includes subcategories 4a for transport and 4b for utilities. The transport and utilities sectors are largely beyond the capacity of private sector management, being dependent on large-scale infrastructure and experiencing large economies of scale. In nearly all cases, these sectors are run by government-owned public enterprises, which are established as limited liability companies (Table 2.2). There is limited private business or local government and community involvement in some sectors. The government sets the regulatory environment for the operations of transport and utilities, with the MOI and the MEIDECC taking the major lead, and the Ministry of Public Enterprises setting the business and management framework for the public enterprises.

These institutional arrangements facilitate, in nearly all cases, the separation of operations from regulatory functions. The management of all ports and wharves has recently been fully delegated to the Ports Authority of Tonga, with the MOI focusing on regulations, except for

one major outer island wharf that is still under discussion. The MOI continues to lead the land transport sector by operating and building infrastructure—including via private businesses, though they have limited capacity—while providing policy direction. The MEIDECC, responsible for regulation of energy, also continues to lead the implementation of alternative energy, while Tonga Power Limited runs the diesel generation and distribution network. The purchase, storage, and distribution of all fuels and gas are managed by the private sector.

The information and communication technology sector is a mix of public enterprises and private operators. Solid waste management, sanitation, and water supply are run by a public enterprise, with limited community and private sector participation.

Pillar 5: Natural Resources and Environmental Inputs

This pillar provides significant crosscutting inputs to projects, especially infrastructure. This includes climate change and disaster risk or response management, environmental protection, and land management and spatial planning. Ministry of Lands and Natural Resources and the MEIDECC provide major policy inputs to these areas, including infrastructure to enhance land use and protect it from erosion and flooding. Fire and emergency services are provided by the Ministry of Police and Fire Services. Evacuation centers and routes overlap with multipurpose community halls and regular road works.

4 Establishing the Priority List of Assessed Infrastructure Projects

The tools and templates mainstreamed in the project cycle, described in this chapter were tested for the development of the NIIP 3 project list. There was some iteration during the process as lessons were learned and issues clarified. Further lessons were also learned that could not be addressed during this trial. They are outlined in Chapter 0 for the further development of tools for the next prioritization exercise, preferably in June 2022.

4.1 Identifying Potential Projects

Process Applied to Identify Gaps and Project Needs

Based on Lesson 3 as described in Chapter 2, a list of 230 projects were identified through the compilation of available lists and documentation in sector and/or corporate plans, budget statements, the government priority agenda, needs assessments, Cabinet decisions, constituency reports, development partners' lists, and other sources. This was complemented by a round of virtual consultations with MDAs and public enterprises[12] . These consultations

[12] All consultations or meetings were undertaken in close collaboration between staff in the NPD and the consultants.

were followed by detailed face-to-face meetings with every MDA and public enterprise involved in infrastructure management. NPD staff took an active part in these meetings, increasingly leading the discussion.

During the consultations, MDAs and public enterprises helped to remove duplicates, non-NIIP projects, and any projects already committed or under implementation. These entities were challenged to consider any potential gaps and the approximate sector importance of the projects, especially where they did not already have a sector prioritization. This provided a comprehensive list of 148 projects across sectors (Appendix 8), grouped as:

(i) 56 projects with a high sector priority[13] under the MCA scoring and ranking system;
(ii) 45 projects with a medium sector priority, requiring more work to clarify basic details, before having a PPA (for Prioritization) prepared for the next prioritization round; and
(iii) 47 remaining projects, with lower urgency and longer lead time, for later prioritization.

Preparing Submissions for Assessment and Screening

Following the update of the PPA and training in its use, the project submissions were prepared by MDAs and public enterprises, using the PPA (for Prioritization). Some of these entities picked up the process quickly, while others required more mentoring, which was provided by staff of the NPD and the consultants in country. Costing of projects was an area of common concern.

MDAs were assured that costing projects at any stage of the project formulation is challenging and requires a well-formulated project and the skills of qualified quantity surveyors. Even after the detailed design stages, costs can fluctuate greatly. At this early stage of a project, there are only limited options for meaningful scrutinizing of costs, including “rules of thumb” (cost per square meter for buildings; cost per kilometer for roads, runways, seawalls, etc.) and comparison with other similar projects (if available). These methods need to be applied with flexibility and discretion and were taken into consideration during the screening of the project concepts.

Process to Prioritize Assessed Projects

Using the process set out in section 0, the NPD screened, assessed, and scored all the submissions received[14] using the PPA template. This was initially done with assistance from the consulting team, with the NPD increasingly taking the lead. NPD scores were compared with the scores entered by the MDA or public enterprise, then differences were explained.

As a cross-check the consultants also ran a parallel screening and scoring to see if there were any significant outliers. The overall project rankings determined by the NPD and the

[13] A few high priority projects had to remain on the medium list as the basic information required for prioritization was not yet available. This is one of the reasons the NPD may run a further prioritization exercise.

[14] 59 projects were received from the MDAs, 3 of which had already allocated funding. 56 projects remained in the unfunded list and were consequently scored and ranked.

consultants were remarkably similar. Differences in scoring were discussed and resolved, often in favor of the NPD. This confirms the importance of training and promoting scoring by industry professionals with good local knowledge evenly distributed across all sectors. As the NPD gains skills in this area, further improvements over time can be expected. It was agreed that, for future prioritization, a small team with representation from the NPD, MOF, and MOI would be worth considering.

Table 4.1 shows the scoring and ranking for the MCA Priority List of 56 projects, after three projects were funded by the government, reducing the list from the original 59. Table 4.1 shows the same projects with ranking by criteria scores.

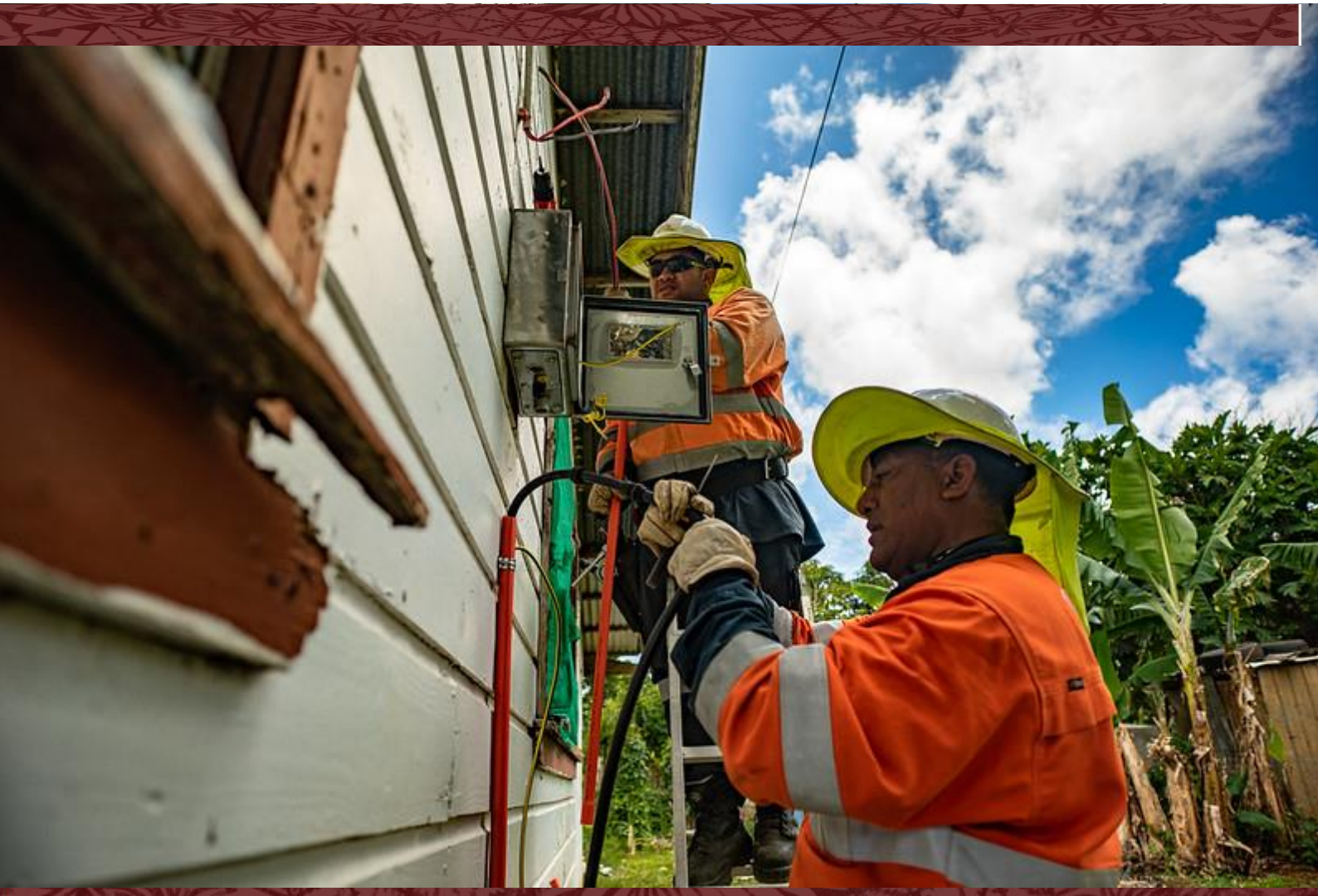


Table 4.1: Multicriteria Assessment Priority List by Score and Ranking

Proj. No.	MDA or PE Propose	Project title	MCA score	Cost TOP'000	Accumu-lated Cost TOP'000	Pillar No	Sec-tor *
001	TPL	Nuku'alofa Power Network Upgrade Project (NNUP) Area 3, 4 and 5	91.1	34,160	34,160	4.2	ENE
022	TWB	Centralized Tonga Water Board and Village Water Supply Tongatapu	91.1	103,389	137,549	4.2	WAT
055	TPL	Additional/Replacement Generators (TBU, Vv, Hp and 'Eua)	91.1	6,000	143,549	4.2	ENE
024	MEIDECC	Multi-Hazard Early Warning/Emergency Operations Centre (Niuas)	88.9	15,000	158,549	5.0	DRM
037	WAL	Convert dump sites to new structured landfill, Ha'apai & 'Eua	88.9	8,000	166,549	4.2	SWA
029	TWB	Improved Water Supply System in Vava'u (Greater Neiafu)	88.9	14,748	181,297	4.2	WAT
009	TCL	New international secondary / redundancy internet cable	84.4	35,000	216,297	4.2	ICT
020	TWB	Improved 'Eua Water Supply System	84.4	6,705	223,002	4.2	WAT
042	TCC	Upgrade and Expansion 'Eua Mobile and Fixed Networks	84.4	2,960	225,962	4.2	ICT
049	HMAF	Upgrade Touliki coastal protection structure	84.4	3,000	228,962	5.0	COA
054	TMCL	Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (Vv) Market upgrade	84.4	5,000	233,962	1.0	TRA
011	WAL	Close (Kalaka) and establishing new landfill(s) Vava'u	82.2	12,000	245,962	4.2	SWA
013	PAT	Two New Tug boats	82.2	40,045	286,007	4.1	SEA
041	TCC	Upgrade and Expansion Niuas Mobile Networks	82.2	2,627	288,634	4.2	ICT
050	MEIDECC	New Warehouses for NEMO (one Vava'u, Eastern District, TT)	82.2	2,000	290,634	5.0	DRM
058	MPFS-FED	Upgrade Fire Station 1, Nuku'alofa	82.2	2,630	293,264	5.0	FIR
017	MOH	Upgrading of a new Public health building (Tongatapu)	80.0	5,000	298,264	2.0	HTH
052	MOI	Overlay of Asphalt Concrete on Primary Roads in Tongatapu	80.0	20,000	318,264	4.1	LTD
004	TAL	Upgrade/expande carpark, pedestrian access Fua'amotu Airports	77.8	1,000	319,264	4.1	AIR
005	TAL	New Fire Tender Fua'amotu	77.8	2,100	321,364	4.1	AIR
014	MOH	Upgrading of Vava'u Hospital (Prince Ngu Hospital)	77.8	40,000	361,364	2.0	HTH
019	MOI	Fanga'uta Evacuation Bridge and Roads	77.8	150,000	511,364	4.1	LTD
038	MET	TIST & TMPI extension/upgrade building (more inclusive for student)	77.8	6,000	517,364	2.0	EDU
027	PAT	New Wharfs for Small Outer Island	77.8	16,000	533,364	4.1	SEA
008	MET	New Junior Campus for Tupou College	75.6	10,000	543,364	2.0	EDU
021	MAFF	Improve existing & build new MAFF Packing Facilities (HACCP cert.)	75.6	1,800	545,164	1.0	AGR
026	PAT	Relocation and Rebuild of Nafanua Habour – 'Eua	75.6	26,000	571,164	4.1	SEA
030	T Post	Tonga National Home & Street Addressing	75.6	6,732	577,896	4.2	POS
043	MET	New ICT building & infrastructure Tupou Tertiary Institute (TTI)	75.6	2,000	579,896	2.0	EDU
015	MOH	National Pharmacy Warehouse No2	73.3	2,500	582,396	2.0	HTH
023	MEIDECC	Renewable Energy Testing and Research Center	73.3	4,000	586,396	4.2	ENE
051	MIA	Upgraded National Mini Sports Stadium/Rugby Field (VV, HP, 'Eua)	73.3	1,200	587,596	2.0	SPR
007	MoFi	New maintenance workshop and boat ramp upgrade (HP, VV)	71.1	3,000	590,596	4.1	SEA
010	MoFi	Fisheries Export Refrigerator Storage – Fua'amotu Airport	71.1	1,500	592,096	1.0	FIS
033	MPFS-TP	New and Renovated Police District Accommodation Quarters	71.1	3,000	595,096	3.0	JLO
039	MET	New 'Safer Schools' warehouse building	71.1	2,000	597,096	2.0	EDU
044	MET	New Tonga Side School Complex	71.1	10,000	607,096	2.0	EDU
048	HMAF	New Kauvai and Tufumahina military camps	71.1	1,500	608,596	3.0	DEF
056	MPFS-FED	New staff quarters Fire Stations (FS1, FS2, FS3, FS6) (TT, VV, HP)	71.1	1,183	609,779	5.0	FIR
059	MOH	Upgrading 'Eua Hospital (Niu'eiki Hospital)	71.1	5,500	615,279	2.0	HTH
053	MEIDECC	New water and sewage testing laboratory building	71.1	3,000	618,279	4.2	WAT
003	TAL	Light for Runways at all domestic airports	68.9	9,700	627,979	4.1	AIR
012	MJP-PD	Expanded and upgraded facilities Hu'atolitoli prison (Tongatapu)	68.9	12,000	639,979	3.0	JLO
057	MPFS-FED	Construction of new Fire & Emergency Service HQ	68.9	1,542	641,521	5.0	FIR
006	TAL	New Fire Tender Lupepau'u Airport (Vava'u)	66.7	2,100	643,621	4.1	AIR
028	MPFS-TP	New Tonga National Police Head Quarters	66.7	5,000	648,621	3.0	JLO
036	MJP-PD	Expanded and upgraded facilities for Sainai Prison ('Eua)	66.7	6,000	654,621	3.0	JLO
046	MEIDECC	Hahake (TT) coastal area protection	64.4	22,000	676,621	5.0	COA
047	MEIDECC	Ha'apai coastal area protection	64.4	11,000	687,621	5.0	COA
034	MJP-PD	Expanded and upgraded of facilities for Fale'one Prison (Ha'apai)	62.2	6,000	693,621	3.0	JLO
035	MJP-PD	Expanded and upgraded facilities for Ha'alefo Prison (Vava'u)	62.2	6,000	699,621	3.0	JLO
025	PAT	New International Cruise Wharf, Vava'u	60.0	54,000	753,621	4.1	SEA
002	TAL	Runway extension at Fua'amotu airport	53.3	103,100	856,721	4.1	AIR
045	MEIDECC	Hihifo (TT) coastal area protection	48.9	38,000	894,721	5.0	COA
031	MJP-J	New Law Court Complex (Supreme and Magistrate)	46.7	13,500	908,221	3.0	JLO
018	OLA	New Fale Alea (Parliament House and Office Complex)	40.0	25,000	933,221	3.0	CON

Key:

- Group 1 (within likely funding)
- Group 2 (needs extra funding)
- Group 3 (delay, and/or revise)

* See Sectors in Table 2-2

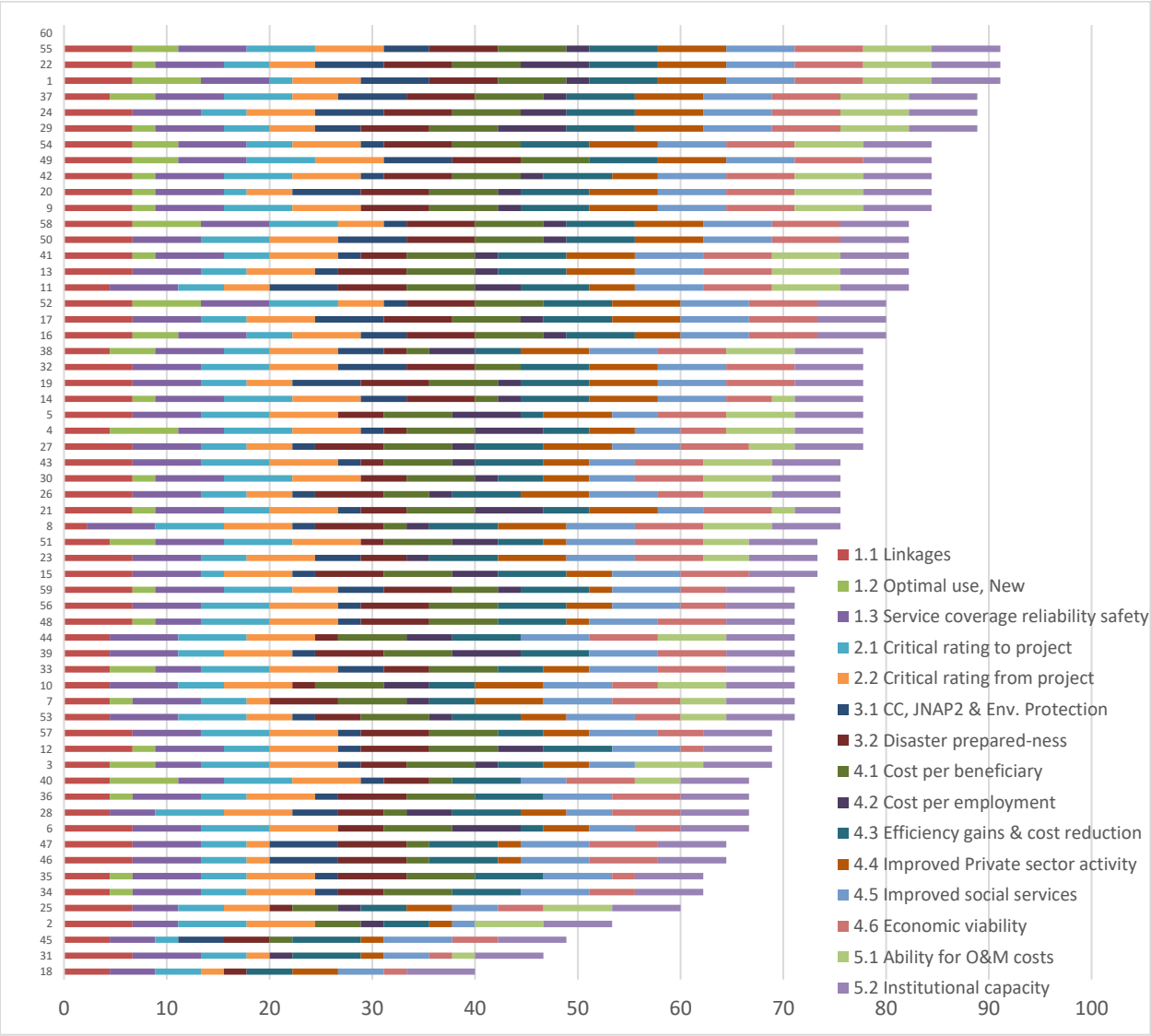
TSDF Pillar 1: Economic institutions	1.0
TSDF Pillar 2: Social institutions	2.0
TSDF Pillar 3: Political (governance) institutions	3.0
TSDF Pillar 4: Infrastructure & technology Inputs (transport)	4.1
TSDF Pillar 4: Infrastructure & technology Inputs (utilities)	4.2
TSDF Pillar 5: Natural resources and environmental inputs	5.0

HMAF = His Majesty's Armed Forces; MAFF = Ministry of Agriculture Forestry and Fisheries; MCA = multicriteria assessment; MET = Ministry of Education and Training; MEDIDECC= Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MIA = Ministry of Internal Affairs; MJP-J = Ministry of Justice and Police; MJP-PD = Ministry of Justice and Prisons; MOFi= Ministry of Fisheries; MOH = Ministry of Health; MPFS-FED= Ministry of Police and Fire Services, PAT = Ports Authority of Tonga; T$ = pa'anga; TAL=Tonga Airports Limited; TCC = Tonga Communications Corporation; TCL=Tonga Cable Limited; TPL=Tonga Power Limited; T Post=Tonga Post; TMCL=Tonga Market Corporation Limited; TPL = Tonga Power Limited; TWB = Tonga Water Board; WAL = Waste Authority Limited.

Note: The table covers 56 prioritized projects (59 were initially prioritized, but three were funded during the process, leaving 56 for the Multicriteria Assessment Priority List).

Source: Authors

Figure 4. 1: Multicriteria Assessment Project List by Criteria Scores



CC = climate change, JNAP = Joint National Action Plan, O&M = operation and maintenance.

Source: Authors.

The MCA and prioritization process applied for the NIIP 3 has been well received by the staff of the NPD, who found the process "a value-add", and by MDAs and public enterprises, who have taken full ownership of the process and tools.

4.2 Priority Groupings for Assessed Infrastructure Projects

The 15 criteria applied in the MCA were weighted equally in the base case applied for the NIIP 3. The ranking sheet has the functionality to group the prioritized projects based on the choice of different ranking cut-off points, considering the number of projects and their individual and aggregated total estimated cost. Several rankings were considered to see how the groups might vary. The chosen option is shown in Table 4.2.

Table 4.2: Project Groupings Used in the Analysis

	Total	G1 >= 75	G2 < 75	G3 < 61
Project Count	56	26	25	5
Cost (T$ '000)	933,221	545,164	154,457	233,600

> = greater than, < = less than, G = group, T$ = pa'anga.

Note: The table covers 56 prioritized projects (59 were initially prioritized,

but three were funded during the process, leaving 56 for the Multicriteria Assessment Priority List).

Source: National Infrastructure Investment Plan 3 Ranking Workbook.

The cut-off point chosen for this report, between Group 1 and Group 2 projects, is based on the estimated funding envelope of T$550 million over 5 years. Group 2 projects are still desirable but would require additional funding. Projects identified as Group 3 had significant policy or timing issues requiring resolution prior to them being accorded any higher priority.

For example, the runway extension at Fua'amotu airport is considered by alternative reviews to provide limited additional flight access, especially given its high cost. The joint conclusion is that this should not be considered for another 10 years, so all benefits lie outside the medium-term planning horizon used in the MCA.

Two politically important buildings—new legislative assembly and court complexes— rank low when objectively assessed, as is often the case for such buildings. They have important status but limited direct benefits as measured by the MCA. In addition, the current site places them close to the waterfront. This is an ideal position, historically, but during the lifetime of the buildings is likely to come under regular annual threat from sea-level rise and storm surges. This area is already designated as a red zone. The St George's Office complex is constructed in a similar position: it already has problems with drainage and overflow of malodourous wastewater. The limited adaptation possible for the two key buildings would add considerably to their cost. These factors all contribute to the low MCA score.

If these two buildings were placed on higher ground, as part of moving Nuku'alofa into a safer zone, they would be considerably safer, less costly to build, more responsible in terms of climate change adaptation, and less prone to extreme natural events. Most importantly, as key anchor projects, they could be used to start the process of moving the center of Nuku'alofa into a safer and more climate-responsible zone. This would be more consistent with stated government policies on climate change and place Tonga in a better position in seeking funding for climate- proofing of public infrastructure. Redesign of the projects, particularly in relation

to location, would lower costs and see them rank considerably higher in subsequent prioritizations.

4.3 Analysis of Prioritized Projects

Prioritized Projects by Development Pillar

Table 4.1 provides a breakdown of the number and costs of grouped projects by TSDF pillar. There is a spread of projects across all TSDF pillars, though projects from categories 4a and 4b account for a large share of Group 1 projects, while projects from Pillar 3 are not represented in Group 1.

Table 4.1: Number and Cost of Projects by Priority Grouping and Development Pillar

TSDF Pillars		Project numbers				Project costs (TOP ' 000)			
		G1	G2	G3	Total	G1	G2	G3	Total
1: Economic institutions	1.0	2	1	-	3	6,800	1,500	-	8,300
2: Social institutions	2.0	4	6	-	10	61,000	23,200	-	84,200
3: Political (governance) institutions	3.0	-	7	2	9	-	39,500	38,500	78,000
4.1: Infrastructure & tech (transport)	4.1	6	4	2	12	229,145	40,800	157,100	427,045
4.2: Infrastructure & tech(utilities)	4.2	10	3	-	13	225,589	13,732	-	239,321
5: Natural resources/environment	5.0	4	4	1	9	22,630	35,725	38,000	96,355
Total		**26**	**25**	**5**	**56**	**545,164**	**154,457**	**233,600**	**933,221**

G = group, T$ = pa'anga, TSDF = Tonga Strategic Development Framework.

Source: Authors.

Projects from categories 4a and 4b account for more than 70% of the total capital cost and about 83% of the capital cost for Group 1 projects. It should be noted that just two of these projects, the Fanga'uta bridge and Tongatapu water supply, account for nearly half of the capital cost of Group 1 projects.

Prioritized Projects by Location

Providing equitable access to infrastructure in a large archipelago with significant variations in population size and density is never easy. It is usually more efficient, viable, and economical to provide large infrastructure to more populated locations.

Table 4.2 provides a breakdown of the number and costs of grouped projects by location, using the five island groupings, as well as two projects that apply to the whole of Tonga[15].

[15] These are 009 New international secondary / redundancy internet cable (in Group 1) and 030 Tonga National Home & Street Addressing (in Group 2).

Table 4.2: Number and Cost of Projects by Priority Grouping and Location

Island Group	Project numbers				Project costs (TOP ' 000)			
	G1	G2	G3	Total	G1	G2	G3	Total
Tongatapu (TT)	14	13	4	32	387,324	70,444	179,600	637,368
Eua (E)	3	4	-	6	15,165	40,321	-	55,486
Ha'apai (HP)	1	3	-	4	10,300	21,711	-	32,011
Vava'u (VV)	5	3	1	9	79,748	12,823	54,000	146,571
Ongo Niua (NN)	2	0	-	2	17,627	2,425	-	20,052
Kingdom Tonga (KT)	1	1	-	2	35,000	6,732	-	41,732
Total	**26**	**25**	**5**	**56**	**545,164**	**154,457**	**233,600**	**933,221**

G = group, T$ = pa'anga,

Source: Authors

About 55% of projects are located on Tongatapu, noting that Tongatapu contains the national capital and the major international transport entry points as well as accounting for almost 75% of the population. This island grouping accounts for nearly 70% of the total capital cost of projects and just over 70% of the capital cost for Group 1. The bridge and water supply projects make up about two-thirds of the Tongatapu project cost in Group 1.

Prioritized Projects by Responsible Entity

Table 4.3 provides a breakdown of the number and costs of grouped projects by the MDA or public enterprise responsible. There are projects spread across 22 administrative entities, with 15 of these represented in Group 1 projects. Organizations accounting for the largest shares of the total capital cost of projects are the MOI, Ports Authority of Tonga, Tonga Water Board, Tonga Airports Limited, and the MEIDECC. Meanwhile, the MOI, Tonga Water Board, MOH, Tonga Power Limited, Ports Authority of Tonga, and Tonga Cable Limited account for the largest shares of the Group 1 projects.

The MDAs or public enterprises accounting for the largest shares of the total capital cost of projects are the MOI, Ports Authority of Tonga, Tonga Water Board, Tonga Airports Limited, and the MEIDECC. Due to two very large projects, the MOI (which includes the Fanga'uta bridge) and the Tonga Water Board (which includes the Tongatapu water supply) take up 54% of Group 1. They are followed by the Ports Authority of Tonga, MOH, Tonga Power Limited, and Tonga Cable Limited in the middle range accounting for 32% of the Group 1 projects.

Table 4.3: Number and Cost of Projects by Priority Grouping and Responsible Entity

MDA or PE Proposing	Project numbers				Project costs (TOP ' 000)			
	G1	G2	G3	Total	G1	G2	G3	Total
HMAF	1	1	-	2	3,000	1,500	-	4,500
MAFF	1	-	-	1	1,800	-	-	1,800
MEIDECC	2	4	1	7	17,000	40,000	38,000	95,000
MET	2	3	-	5	16,000	14,000	-	30,000
MIA	-	1	-	1	-	1,200	-	1,200
MJP-J	-	-	1	1	-	-	13,500	13,500
MJP-PD	-	4	-	4	-	30,000	-	30,000
MoFi	-	2	-	2	-	4,500	-	4,500
MOH	2	2	-	4	45,000	8,000	-	53,000
MOI	2	-	-	2	170,000	-	-	170,000
MPFS-FED	1	2	-	3	2,630	2,725	-	5,355
MPFS-TP	-	2	-	2	-	8,000	-	8,000
OLA	-	-	1	1	-	-	25,000	25,000
PAT	2	1	1	4	56,045	26,000	54,000	136,045
T Post	-	1	-	1	-	6,732	-	6,732
TAL	2	2	1	5	3,100	11,800	103,100	118,000
TCC	2	-	-	2	5,587	-	-	5,587
TCL	1	-	-	1	35,000	-	-	35,000
TMCL	1	-	-	1	5,000	-	-	5,000
TPL	2	-	-	2	40,160	-	-	40,160
TWB	3	-	-	3	124,842	-	-	124,842
WAL	2	-	-	2	20,000	-	-	20,000
Total	**26**	**25**	**5**	**56**	**545,164**	**154,457**	**233,600**	**933,221**

HMAF=His Majesty Armed Forces; MCA = multicriteria assessment; MDA = ministry, department, and/or agency; MAFF = Ministry of Agriculture Forestry and Fisheries; MET = Ministry of Education and Training; MJP = Ministry of Justice and Police; MEDIDECC = Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MIA = Ministry of Internal Affairs; MOH = Ministry of Health; MPFS-FED = Ministry of Police and Fire Services, MJP-PD=Ministry of Justice and Prisons; MoFi = Ministry of Fisheries; OLA=Office of Legislative Assembly, PAT=Ports Authority of Tonga; PE=Public Enterprise; T$=pa'anga; TCC=Tonga Communications Corporation; TAL=Tonga Airports Limited; TCL=Tonga Cable Limited; TMCL=Tonga Market Corporation Limited; TWB = Tonga Water Board; WAL = Waste Authority Limited.

Source: Authors

4.4 Sensitivity Analysis of Multicriteria Assessment Results

Sensitivity analyses were carried out to test the impact on project rankings of changes in the weighting of criteria in the MCA.

Firstly, recognizing the high profile of climate change in policy considerations, the weight applied to criterion 3.1—contribution of the project to climate change mitigation or adaptation

functions, or environmental protection benefits—was tripled and other criteria weights were adjusted downwards accordingly. This did result in some minor reordering of projects, though the grouping of the top 26 projects remained substantially intact (three projects moved into the bottom end of Group 1 and three moved down to Group 2)[16]. The lack of movement can be explained by the fact that 10 of the 12 projects achieving the highest score for the climate-change-related criterion were already within Group 1. The remaining two projects achieving the highest score for this criterion advanced their standing in Group 2, but remained in this group.

The second sensitivity analysis was to double the weight applied to three criteria that might lend support to an economic recovery in times of adversity, such as the current COVID-19 pandemic. These criteria covered employment creation in operational phase or cost per full-time-equivalent job (criterion 4.1), contribution to private sector activity (criterion 4.2), and potential for economic viability (criterion 4.6). Other criteria weights were adjusted downwards accordingly. Again, there was some minor reordering of projects, while the grouping of the 26 projects in Group 1 remained unchanged. The explanation for this result again lies in the fact that the projects already in Group 1 tend to be those that perform well in relation to these economic criteria.

The conclusion reached from the sensitivity analyses undertaken is that the grouping of the 26 projects in Group 1 is robust and collectively exhibits the all-round strengths sought in the prioritization exercise.

[16] The projects moving into Group 1 under this sensitivity analysis were project 23 *Renewable Energy Testing and Research Center*, project 33 *New and Renovated Police District Accommodation Quarters*, and project 59 *Upgrading 'Eua Hospital (Niu'eiki Hospital)*. The projects moving down to Group 2 were project 5 *New Fire Tender Fua'amotu*, project 008 *New Junior Campus for Tupou College*, and project 21 *Improve existing & build new MAFF Packing Facilities (HACCP cert.)*.

5 Establishing the Government Priority List

5.1 Status of Cabinet Priority Projects

The NIIP process is only one method used by the government to prioritize projects. The overall direction of infrastructure development is set in the TSDF, without setting specific priorities. The government priority agenda is the approach for each administration to focus attention on priority areas. Each administration uses this tool slightly differently. They always include a list of priority projects that the incumbent Prime Minister and Cabinet wish to focus on. The current list approved by Cabinet was provided to the consultants by the CSSC at the first meeting of the TWC and TFC.

The priorities are drawn from consultations conducted by the Prime Minister and Cabinet when they first took office, and other overarching priorities they consider important as reflected in constituency reports and community development plans. The criteria on which these decisions are made may be many and varied.

The NIIP process is based on a more technical set of criteria as set out in Table 2.3. A few of the Cabinet-approved projects were not yet ready to go through the NIIP prioritization process. Of the rest, their MCA rankings vary across the whole spectrum of the grading system. These projects, along with their MCA scoring and grouping in the MCA Priority List, are shown in

Table 5.1.

Table 5.1: Government Priority Projects by Multicriteria Score and Priority Grouping

MCA Score	Group	MDA/PE	Title	Cost (T$ '000)	Sector
84.4	1	TCL	New international secondary / redundancy internet cable	35,000	ICT
80	1	MOH	Upgrading of a new public health building- with cold room TT	5,000	HTH
77.8	1	MOH	Upgrading Vava'u Hospital (Prince Ngu Hospital)	40,000	HTH
77.8	1	PAT	New Wharfs for Small Outer Islands	16,000	SEA
75.6	1	MAFF	Improved existing and build new MAFF Agriculture Packing Facilities with HACCP certification	1,800	AGR
75.6	2	PAT	Relocate/Rebuild of Nafanua Habour – 'Eua	26,000	SEA
71.1	2	MET	New Tonga Side School Complex	10,000	EDU
68.9	2	TAL	Lights for runways at all outer Islands	9,700	AIR
46.7	4	MJP	New Law Court Complex (Supreme & Magistrate)	13,500	JLO

MCA Score	Group	MDA/PE	Title	Cost (T$ '000)	Sector
Partly covered by new wharves		PAT	Outer Islands Wharf Jetties affected by TC Harold	NA	SEA
Still working on concept		MEIDECC	Establishment of fuel tank farm	NA	ENE
Arrangements not yet finalized		MET	New Tonga National University campus	30,000	EDU
Study still underway		TPL	First Wind Farm (Vava'u)	NA	ENE

MDA = ministry, department, and/or agency; PAT= Ports Authority of Tonga; MAFF = Ministry of Agriculture, Forestry and Fisheries; MJP = Ministry of Justice and Police; MEDIDECC= Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MET = Ministry of Education and Training; MOH = Ministry of Health; PE=Public Enterprise; T$ = pa'anga; TAL=Tonga Airports Limited; TCL=Tonga Cable Limited; TPL=Tonga Power Limited

Source: Authors.

The first five projects obtained an MCA score that places them in Group 1. The 'Eua Harbour project is just on the cut-off point between Groups 1 and 2. It did not quite make Group 1 due to its high cost and some residual questions about the viability of the new site. The Tonga side school project ranked near the top of Group 2. The runway lights for outer islands project ranked in the middle of Group 2. The relative cost and the limited need for night flights held back its ranking. As noted in section 5.2, the new law court complex ranked low because of its situation in the red zone in Nuku'alofa, which will make it increasingly susceptible to storm surges over its expected life.

The status of the project for jetties affected by Tropical Cyclone Harold was not clear. These are partly covered by the project for upgrade of outer island jetties in Group 1. The remaining four projects were discussed with the MDAs responsible, but the entities confirmed that the projects were not sufficiently clear for a PPA (for Prioritization) to be prepared. These projects require further study so they can be included in future prioritizations.

The end of Appendix 8 shows all projects listed in recent MOI corporate plans that are also of relatively high importance. However, most of these projects were not ready for the development of PPAs, so are included in Group 4 for the next prioritization.

5.2 Determining the Government Priority List

The second meeting of the TWC and TFC reviewed the progress with mainstreaming the NIIP process. Attendees endorsed the recommended approach and the use of the MCA to guide their consideration for the list to be endorsed to the PAD-CC and Cabinet. Before the meeting, MDAs and public enterprises had already expressed appreciation for the support they had been provided. At the meeting, they scored the support received, and the organization of the meetings for discussion, as averaging from "good" to "very good" (the top two responses in a five-level grading system).

Some of the key points raised for future consideration included:

(i) the need to expand MCA criteria and scoring to better capture the role of improved governance under Pillar 3, and its contribution to social and economic needs, e.g., justice, law, and order need to be strengthened to manage the illicit drug usage and the damage it is doing to social and economic well-being
(ii) how to better capture the political considerations that may lie outside of clearly established developmental objectives
(iii) the need to determine how well the MCA captures risks or constraints to management capacity
(iv) the need to ensure the project cycle, including prioritization, is sufficiently frequent to avoid problems with delays
(v) the importance of ensuring that MDAs and public enterprises followed the procedure and do not try to "jump the queue" by sending submissions directly to Cabinet, and seeking to influence development partners
(vi) the importance of maintaining the transparency of the process through all steps
(vii) the need for better data for project formulation and MCA assessment, and how access to all planning documents can be improved, e.g., constituency reports and island plans
(viii) the need for regular training to maintain skills in project formulation, KPIs, data collection, and MCA and asset registries.

Some MDAs expressed concern that some of their projects had low rankings, but overall, the groupings were agreed with the following additional considerations:

(i) There was concern for the capacity of the prison system to handle the increased incidence of serious drug-related crimes, mixing of juveniles with older prisoners, and handling of prisoners with special mental needs. Prisons and the MOH were encouraged to review the needs, especially in the main prison, and seek to identify less costly options for consideration in the next prioritization.

(ii) The status of the court system and the increased demands to deal with increased case loads (including criminal, domestic or family disputes, and some commercial cases) was discussed. Given this has already been given a high priority by the government, it was agreed that the project for a new law court complex was not adequately captured by the MCA. It was agreed to move this project from Group 3 to Group 1.

(iii) The status of the legislative assembly facilities following the destruction of the main building by Tropical Cyclone Gita, the lack of certainty related to the temporary alternative arrangements, the importance of embedding of recent constitutional reforms, and the strong support from two development partners to fund the new Parliament building, were considered sufficient justifications to move the new legislative assembly building project from Group 3 to Group 1.

(iv) The technical problems with the location of both buildings in the red zone, and the greater cost associated with making the buildings more climate-proof, have been noted with concern by all relevant MDAs during the NIIP consultancy. However, no viable alternative site has yet been identified.

(v) The two tugboats were considered, and it was agreed that they could be phased in, with one still included in Group 1 and one moved into Group 2.

(vi) A few projects, already identified but not captured during the consultations, were added to Group 4.

(vii) The slight increase in the total value of Group 1 from T$545 million to T$ 564 million was considered acceptable given the broad estimates for the funding envelope.

Based on these decisions, Table 5.2 shows the Government Priority List, including the three adjustments from the MCA Priority List as discussed above. Following the adjustments, 28 projects were in Group 1; 26 in Group 2; 3 in Group 3; 45 in Group 4; and 47 in Group 5, adding to a total listing of 149 projects.

Table 5.2: Summary of Government Priority List

Proj. No.	MDA or PE Propose	Project title	MCA score	Cost TOP'000	Accumu-lated Cost TOP'000	Pillar No	Sec-tor*
001	TPL	Nuku'alofa Power Network Upgrade Project (NNUP) Area 3, 4 and 5	91.1	34,160	34,160	4.2	ENE
022	TWB	Centralized Tonga Water Board and Village Water Supply Tongatapu	91.1	103,389	137,549	4.2	WAT
055	TPL	Additional/Replacement Generators (TBU, Vv, Hp and 'Eua)	91.1	6,000	143,549	4.2	ENE
024	MEIDECC	Multi-Hazard Early Warning/Emergency Operations Centre (Niuas)	88.9	15,000	158,549	5.0	DRM
037	WAL	Convert dump sites to new structured landfill, Ha'apai & 'Eua	88.9	8,000	166,549	4.2	SWA
029	TWB	Improved Water Supply System in Vava'u (Greater Neiafu)	88.9	14,748	181,297	4.2	WAT
009	TCL	New international secondary / redundancy internet cable	84.4	35,000	216,297	4.2	ICT
020	TWB	Improved 'Eua Water Supply System	84.4	6,705	223,002	4.2	WAT
042	TCC	Upgrade and Expansion 'Eua Mobile and Fixed Networks	84.4	2,960	225,962	4.2	ICT
049	HMAF	Upgrade Touliki coastal protection structure	84.4	3,000	228,962	5.0	COA
054	TMCL	Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (Vv) Market upgrade	84.4	5,000	233,962	1.0	TRA
011	WAL	Close (Kalaka) and establishing new landfill(s) Vava'u	82.2	12,000	245,962	4.2	SWA
013	PAT	First New Tug boats	82.2	20,022	265,984	4.1	SEA
041	TCC	Upgrade and Expansion Niuas Mobile Networks	82.2	2,627	268,611	4.2	ICT
050	MEIDECC	New Warehouses for NEMO (one Vava'u, Eastern District, TT)	82.2	2,000	270,611	5.0	DRM
058	MPFS-FED	Upgrade Fire Station 1, Nuku'alofa	82.2	2,630	273,241	5.0	FIR
017	MOH	Upgrading of a new Public health building (Tongatapu)	80.0	5,000	278,241	2.0	HTH
052	MOI	Overlay of Asphalt Concrete on Primary Roads in Tongatapu	80.0	20,000	298,241	4.1	LTD
004	TAL	Upgrade/expande carpark, pedestrian access Fua'amotu Airports	77.8	1,000	299,241	4.1	AIR
005	TAL	New Fire Tender Fua'amotu	77.8	2,100	301,341	4.1	AIR
014	MOH	Upgrading of Vava'u Hospital (Prince Ngu Hospital)	77.8	40,000	341,341	2.0	HTH
019	MOI	Fanga'uta Evacuation Bridge and Roads	77.8	150,000	491,341	4.1	LTD
038	MET	TIST & TMPI extension/upgrade building (more inclusive for student)	77.8	6,000	497,341	2.0	EDU
027	PAT	New Wharfs for Small Outer Island	77.8	16,000	513,341	4.1	SEA
008	MET	New Junior Campus for Tupou College	75.6	10,000	523,341	2.0	EDU
021	MAFF	Improve existing & build new MAFF Packing Facilities (HACCP cert.)	75.6	1,800	525,141	1.0	AGR
031	MJP-J	New Law Court Complex (Supreme and Magistrate)	46.7	13,500	538,641	3.0	JLO
018	OLA	New Fale Alea (Parliament House and Office Complex)	40.0	25,000	563,641	3.0	CON

Proj. No.	MDA or PE Propose	Project title	MCA score	Cost TOP'000	Accumu-lated Cost TOP'000	Pillar No	Sec-tor*
013	PAT	Second New Tug boats	82.2	20,022	626,095	4.1	SEA
026	PAT	Relocation and Rebuild of Nafanua Habour – 'Eua	75.6	26,000	589,641	4.1	SEA
030	T Post	Tonga National Home & Street Addressing	75.6	6,732	596,373	4.2	POS
043	MET	New ICT building & infrastructure Tupou Tertiary Institute (TTI)	75.6	2,000	598,373	2.0	EDU
015	MOH	National Pharmacy Warehouse No2	73.3	2,500	600,873	2.0	HTH
023	MEIDECC	Renewable Energy Testing and Research Center	73.3	4,000	604,873	4.2	ENE
051	MIA	Upgraded National Mini Sports Stadium/Rugby Field (VV, HP, 'Eua)	73.3	1,200	606,073	2.0	SPR
007	MoFi	New maintenance workshop and boat ramp upgrade (HP, VV)	71.1	3,000	629,095	4.1	SEA
010	MoFi	Fisheries Export Refrigerator Storage – Fua'amotu Airport	71.1	1,500	630,595	1.0	FIS
033	MPFS-TP	New and Renovated Police District Accommodation Quarters	71.1	3,000	633,595	3.0	JLO
039	MET	New 'Safer Schools' warehouse building	71.1	2,000	635,595	2.0	EDU
044	MET	New Tonga Side School Complex	71.1	10,000	645,595	2.0	EDU
048	HMAF	New Kauvai and Tufumahina military camps	71.1	1,500	647,095	3.0	DEF
056	MPFS-FED	New staff quarters Fire Stations (FS1, FS2, FS3, FS6) (TT, VV, HP)	71.1	1,183	648,278	5.0	FIR
059	MOH	Upgrading 'Eua Hospital (Niu'eiki Hospital)	71.1	5,500	653,778	2.0	HTH
053	MEIDECC	New water and sewage testing laboratory building	71.1	3,000	656,778	4.2	WAT
003	TAL	Light for Runways at all domestic airports	68.9	9,700	666,478	4.1	AIR
012	MJP-PD	Expanded and upgraded facilities Hu'atolitoli prison (Tongatapu)	68.9	12,000	678,478	3.0	JLO
057	MPFS-FED	Construction of new Fire & Emergency Service HQ	68.9	1,542	680,020	5.0	FIR
006	TAL	New Fire Tender Lupepau'u Airport (Vava'u)	66.7	2,100	682,120	4.1	AIR
028	MPFS-TP	New Tonga National Police Head Quarters	66.7	5,000	687,120	3.0	JLO
036	MJP-PD	Expanded and upgraded facilities for Sainai Prison ('Eua)	66.7	6,000	693,120	3.0	JLO
046	MEIDECC	Hahake (TT) coastal area protection	64.4	22,000	715,120	5.0	COA
047	MEIDECC	Ha'apai coastal area protection	64.4	11,000	726,120	5.0	COA
034	MJP-PD	Expanded and upgraded of facilities for Fale'one Prison (Ha'apai)	62.2	6,000	732,120	3.0	JLO
035	MJP-PD	Expanded and upgraded facilities for Ha'alefo Prison (Vava'u)	62.2	6,000	738,120	3.0	JLO
025	PAT	New International Cruise Wharf, Vava'u	60.0	54,000	792,120	4.1	SEA
002	TAL	Runway extension at Fua'amotu airport	53.3	103,100	895,220	4.1	AIR
045	MEIDECC	Hihifo (TT) coastal area protection	48.9	38,000	933,220	5.0	COA

Key:		
	Group 1 (within likely funding)	TSDF Pillar 1: Economic institutions 1.0
	Group 2 (needs extra funding)	TSDF Pillar 2: Social institutions 2.0
	Group 3 (delay, and/or revise)	TSDF Pillar 3: Political (governance) institutions 3.0
*	See Sectors in Table 2-2	TSDF Pillar 4: Infrastructure & technology Inputs (transport) 4.1
		TSDF Pillar 4: Infrastructure & technology Inputs (utilities) 4.2
		TSDF Pillar 5: Natural resources and environmental inputs 5.0

HMAF=His Majesty's Armed Forces; TCL= Tonga Cable Limited; MDA = ministry, department, and/or agency; MAFF = Ministry of Agriculture, Food and Forestry; MET = Ministry of Education and Training; MEDIDECC= Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MoFi= Ministry of Fishery; MIA = Ministry of Internal Affairs; MOH = Ministry of Health; MOI=Ministry of Infrastructure; MJP = Ministry of Justice and Police; MPFS= Ministry of Police and Fire Services; OLA=Old Legislative Assembly; PAT=Ports Authority of Tonga; T$ = pa'anga; TAL=Tonga Airports Limited; PE = public enterprise; TPL = Tonga Power Limited; TT= Tongatapu

Source: Authors, based on Technical Working Committee and Taskforce Committee consultations.

5.3 Analysis of the Government Priority List

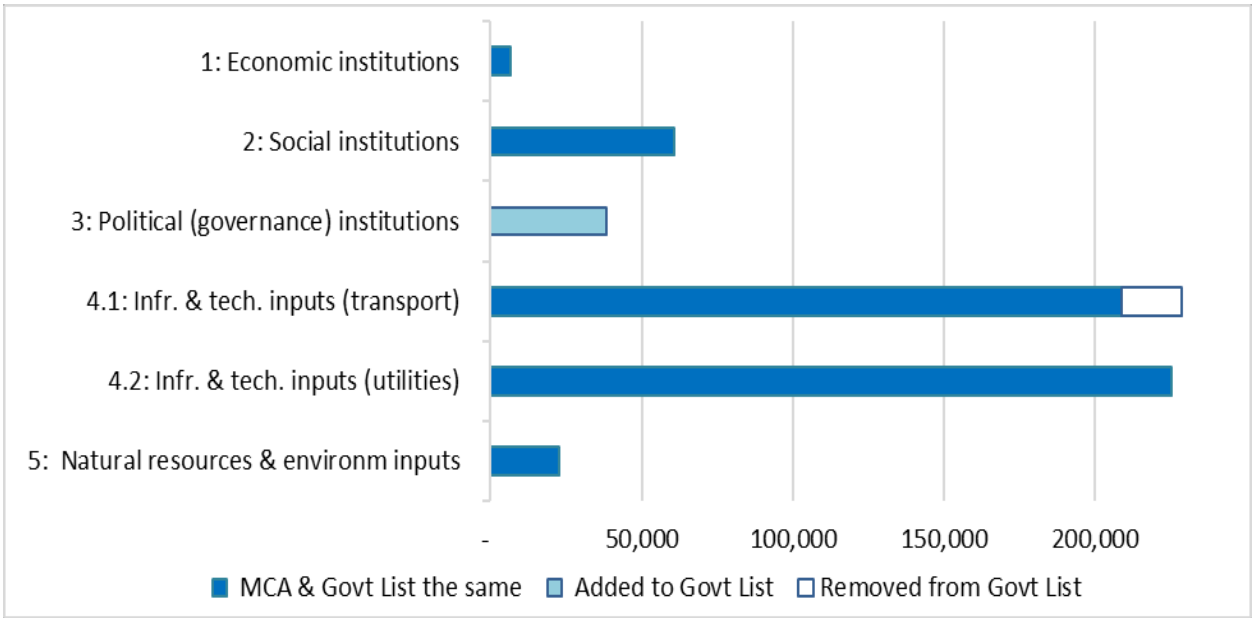
Government Priority Projects by Development Pillar

Compared to the MCA Priority List, two Pillar 3 projects moved from Group 3 to Group 1. Pillar 3 originally had no projects in the highest-priority grouping. Group 1 now has at least two projects from each pillar. An extra project under Pillar 4a was added to Group 2.

This shift in projects lowers Pillar 4's share of costs in Group 1 from 83% to 77%. The next largest, Pillar 2, accounts for 11% of the capital cost of Group 1 projects, while Pillar 3 now accounts for 7%.

Figure 5.1 illustrates the capital cost for each pillar, incorporating the changes from the MCA Priority List to the Government Priority List.

Figure 5.1: Capital Cost of Government Priority Projects in Group 1, by Development Pillar (T$ '000)



Note: Group 1 projects are sorted by pillars of the Tonga Strategic Development Framework II.

MCA = multicriteria assessment, T$ = pa'anga.

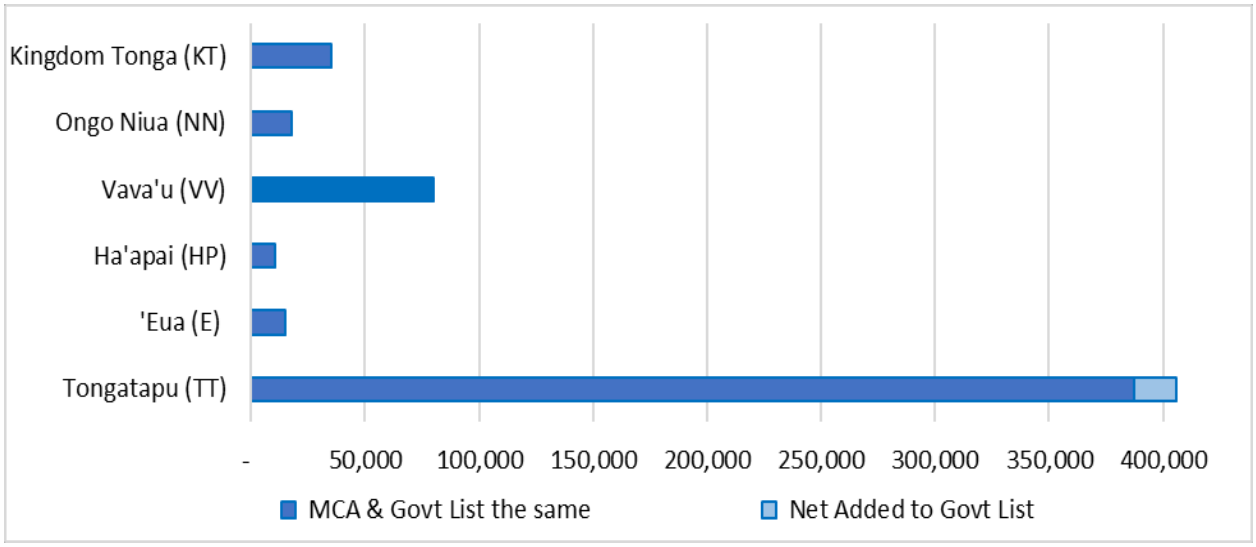
Source: Authors.

Government Priority Projects by Location

Compared to the MCA Priority List, the number of projects for Tongatapu increased by one. This additional project is in Group 2. Two projects for Tongatapu moved from Group 3 to Group 1. The numbers for all other island groupings remained the same.

Figure 5.2 illustrates the distribution of the capital cost of Group 1 projects by location, given the changes between the MCA Priority List and the Government Priority List. All of the net change is on Tongatapu, which increased its share of Group 1 cost by about 1 percentage point.

Figure 5.2: Capital Cost of Government Priority Projects in Group 1, by Location (T$ '000)

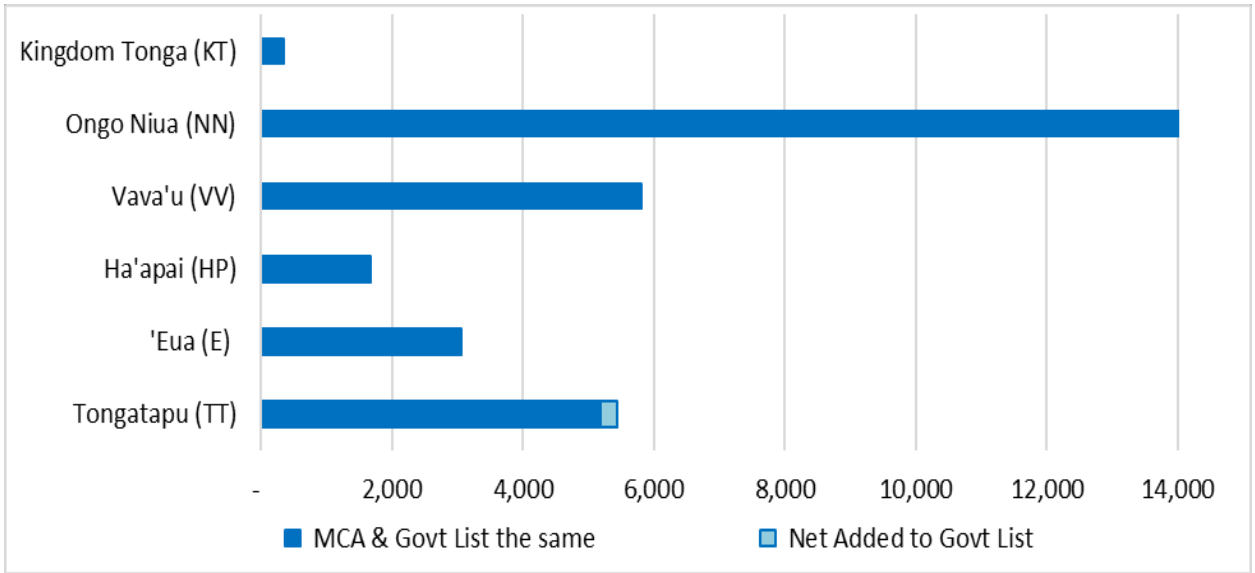


MCA = multicriteria assessment, T$ = pa'anga.

Source: Authors.

Figure 5.3 illustrates a comparison of capital costs in per capita terms, presenting a significantly different picture. Under this scenario, the order by island grouping is Ongo Niua, Vava'u, Tongatapu, 'Eua, Ha'apai, and nationwide projects. The per capita share to Tongatapu increased only marginally from the MCA Priority List to the Government Priority List.

Figure 5.3: Capital Cost of Government Priority Projects in Group 1, per Capita (T$ '000)



MCA = multicriteria assessment, T$ = pa'anga.

Source: Authors.

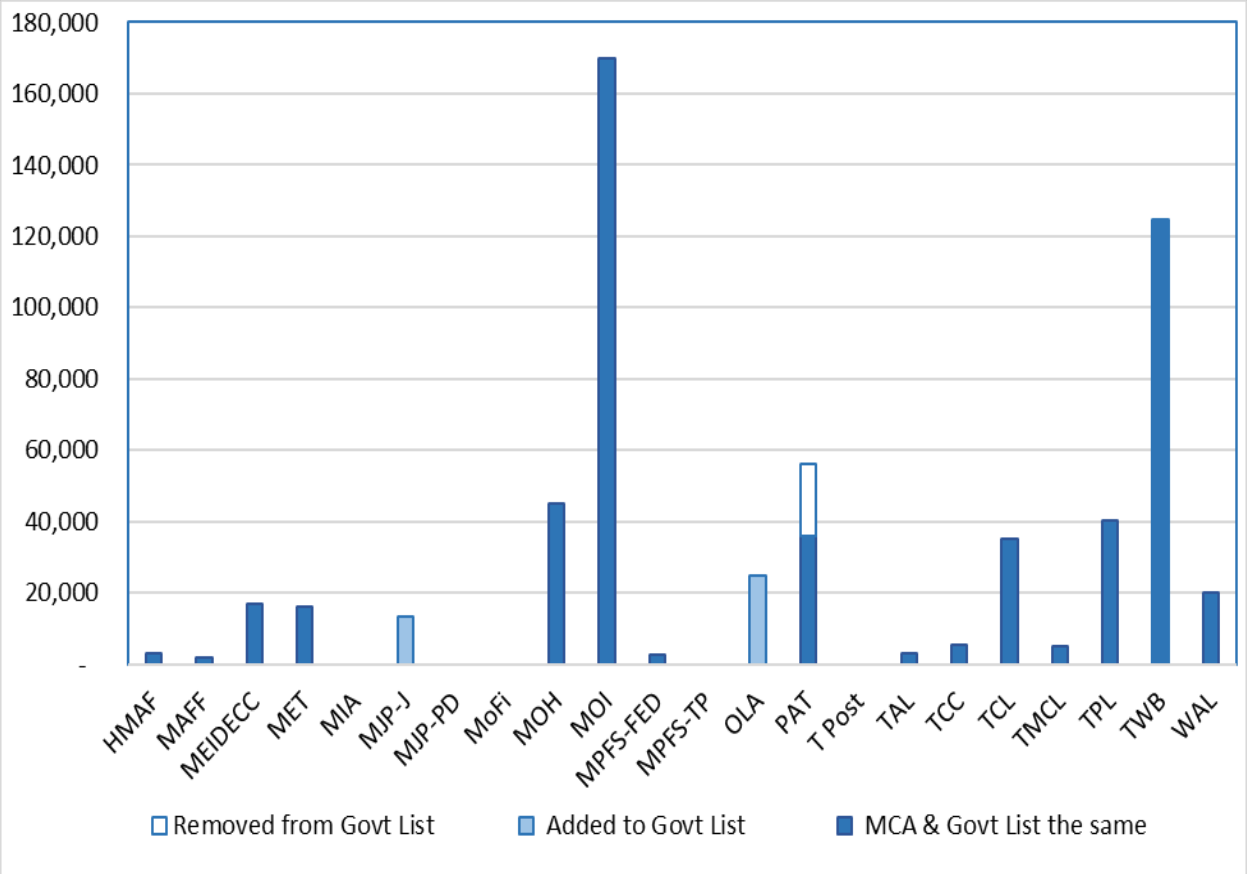
Government Priority Projects by Responsible Entity

Compared to the MCA Priority List, the Office of Legislative Assembly and the Ministry of Justice and Prisons now each have a project in Group 1 rather than Group 3. This increases the number of MDAs with Group 1 projects from 15 to 17. The Ports Authority of Tonga has one more project in Group 2.

Figure 5.4: Capital Cost of Government Priority Projects in Group 1, by Entity Responsible (T$ '000)

shows the distribution of capital cost of Group 1 projects by MDA or public enterprise, again showing clearly that MOI and Tonga Water Board projects account for a significant share, though falling slightly from 54% to 52% due to the marginal overall increase in Group 1 capital costs. As a combined share across the four entities, the MOH, Tonga Power Limited, Ports Authority of Tonga, and Tonga Cable Limited fell from 32% to 28%.

Figure 5.4: Capital Cost of Government Priority Projects in Group 1, by Entity Responsible (T$ '000)



HMAF = His Majesty's Armed Forces; MAFF = Ministry of Agriculture Forestry and Fisheries; MCA = multicriteria assessment; MET = Ministry of Education and Training; MEDIDECC= Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MIA = Ministry of Internal Affairs; MJP-J = Ministry of Justice and Police; MJP-PD = Ministry of Justice and Prisons; MOFi= Ministry of Fisheries; MOH = Ministry of Health; MPFS-FED= Ministry of Police and Fire Services, PAT = Ports Authority of

Tonga; T$ = pa'anga; TAL=Tonga Airports Limited; TCC = Tonga Communications Corporation; TCL=Tonga Cable Limited; TPL=Tonga Power Limited; T Post=Tonga Post; TMCL=Tonga Market Corporation Limited; TPL = Tonga Power Limited; TWB = Tonga Water Board; WAL = Waste Authority Limited.

Source: Authors.

Development Impact of Government Priority Projects

Table 5.3 considers the development impact of the 28 Government Priority List projects in Group 1, indicating the key TSDF outcome they support and specifying their key development impact.

Table 5.3: Development Impact of Government Priority Projects in Group 1

Project	Sector	Key TSDF Outcome	Key Development Impact
Nuku'alofa Power Network Upgrade Project Area 3, 4, and 5	ENE	OO4.1 – More reliable, safe, and affordable energy service	More efficient and resilient electricity supplies in Nuku'alofa, including port and other key facilities, and catering for expansion of renewable energy
Centralized Tonga Water Board and Village Water Supply Tongatapu	WAT	OO4.6 – More reliable, safe, and affordable water and sanitation services	Expansion in coverage and improvement in quality of water supplies on Tongatapu
Additional/Replacement Generators (Tongatapu, Vava'u, Ha'apai and 'Eua)	ENE	OO4.1 – More reliable, safe, and affordable energy service	More efficient and resilient electricity supplies on these islands
Multi-Hazard Early Warning & Emergency Operations Centre (Niuafo'ou and Niuatoputapu)	DRM	OO5.4 – Improved resilience to extreme natural events and impact of climate change	Improved early warning capacity and disaster preparedness for Ongo Niua, improving cyclone tracking for the whole country and region
Conversion dump sites into new structured landfill, Ha'apai (Foa) and 'Eua (Angaha)	SWA	OO5.3 – Cleaner environment with improved waste recycling	More sustainable management of solid waste on Ha'apai and 'Eua
Improved Water Supply System in Vava'u (Greater Neiafu)	WAT	OO4.6 – More reliable, safe, and affordable water and sanitation services	Expansion in coverage and improvement in quality of water supplies on Vava'u
New international secondary / redundancy internet cable	ICT	OO4.3 – More reliable, safe, and affordable ICT used in more innovative ways	Improved reliability of submarine fiber-optic cable connections, which provide the basis for internet and international telecommunications
Improved 'Eua Water Supply System	WAT	OO4.6 – More reliable, safe, and affordable water and sanitation services	Expansion in coverage and improvement in quality of water supplies in 'Eua
Upgrade and Expansion 'Eua Mobile and Fixed Networks	ICT	OO4.3 – More reliable, safe, and affordable ICT used in more innovative ways	Improving coverage and capacity of telecommunications services for 'Eua

Project	Sector	Key TSDF Outcome	Key Development Impact
Upgrade Touliki coastal protection structure	COA	OO5.4 – Improved resilience to extreme natural events and impact of climate change	Protecting vital fuel and gas pipelines in the vicinity of Nuku'alofa port, and facilitating recreational activity in the vicinity of the port
Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (VV) Market upgrade	TRA	OO1.3 – Strengthened business enabling environment	Facilitating the marketing of fresh produce to the communities on Tongatapu and Vava'u
Close (Kalaka) and establishing new landfill Vava'u (Leimatu'a and/or Toula)	SWA	OO5.3 – Cleaner environment with improved waste recycling	More sustainable management of solid waste in Vava'u
First New Tug boats	SEA	OO4.2 – More reliable, safe, affordable transport services	Maintain and improve efficiency and safety of international sport operations in Nuku'alofa and, when needed, outer islands
Upgrade and Expansion Niuas Mobile Networks	ICT	OO4.3 – More reliable, safe, and affordable ICT used in more innovative ways	Improving coverage and capacity of mobile telecommunications services for Ongo Niua
New Warehouses for NEMO (One for Vava'u and one for Eastern District Tongatapu)	DRM	OO5.4 – Improved resilience to extreme natural events and impact of climate change	Strengthened disaster preparedness in Tongatapu and Vava'u
Upgrade Fire Station 1, Nuku'alofa	FIR	OO5.4 – Improved resilience to extreme natural events and impact of climate change	Improved capacity in Nuku'alofa for response to fire and other emergencies, improves opportunities for women firefighters
Upgrading of a new Public health building (Tongatapu)	HTH	OO2.5 – Improved health care and delivery systems (universal health coverage)	Strengthening delivery of public health services in Tongatapu, including capacity to respond to pandemics
Overlay of Asphalt Concrete on Primary Roads in Tongatapu	LTD	OO4.2 – More reliable, safe, and affordable transport services	Maintaining and improving the capacity, efficiency, and safety of the road network in Tongatapu
Upgraded & expanded carpark & pedestrian access Fua'amotuAirports	AIR	OO4.2 – More reliable, safe, and affordable transport services	More efficient and customer-friendly facilities supporting the operation of the international airport
New Fire Tender Fua'amotu	AIR	OO4.2 – More reliable, safe, and affordable transport services	Maintain and improve efficiency and safety of operations at the main international airport
Upgrading of Vava'u Hospital (Prince Ngu Hospital)	HTH	OO2.5 – Improved health care and delivery systems (universal health coverage)	Strengthening delivery of health services in Vava'u, including capacity to respond to pandemics
Fanga'uta Evacuation Bridge and Roads	LTD	OO4.2 – More reliable, safe, and affordable transport services	Addressing a gap in Tongatapu's road network, providing an evacuation route in times of natural disaster, facilitating less vulnerable urban development

Project	Sector	Key TSDF Outcome	Key Development Impact
TIST and TMPI extension and upgraded building for more inclusive opportunities for students	EDU	OO2.4 – Improved education and training, providing lifetime learning	Strengthening national technical and vocational education, providing skills needed for local and international employment
New Wharfs for Small Outer Island	SEA	OO4.2 – More reliable, safe, and affordable transport services	Improved transport connectivity for isolated rural communities across the country
New Junior Campus for Tupou College	EDU	OO2.4 – Improved education and training, providing lifetime learning	Improved learning experiences of young students so they can become successful well-adjusted citizens
Improve existing & build new MAFF Packing Facilities (HACCP cert.)	AGR	OO1.3 – Strengthened business enabling environment	Greater processing capacity, more accessible to a greater range of farmers and exporters, better packed exports meeting the biosecurity and market requirements
New Law Court Complex (Supreme and Magistrate)	JLO	OO3.2 – Improved law and order and domestic security appropriately applied	Wider and more secure access by the public to justice, furthering confidence in the legal system
New Fale Alea (Parliament House and Office Complex)	CON	OO3.4 – Modern and appropriate constitution, laws, and regulations reflecting international standards of democratic processes	Strengthened parliamentary democracy, continuing to build parliamentary governance suitable to the customs and people of Tonga and evolving global conditions

Source: Authors

Preliminary Economic Assessment of Projects

The MCA is useful for rapid appraisal of projects and ranking them for further development. It does not establish the viability of projects. Projects are economically viable if, over the life of the project, the benefits derived for the wider society exceed the costs incurred. Benefits tend to be spread out over the project life, whereas costs are generally concentrated at the start.

Economic assessments calculate the annual level of net benefits (benefits minus costs) needed once the project is operational to generate a specified internal rate of return (IRR), using a simple discounted cashflow model and an assumed project life of 20 years. Only benefits that can be readily quantified and expressed in monetary terms tend to be included in this form of analysis. An IRR of 6% is commonly applied for social sector projects, poverty-targeting projects, and projects that primarily generate environmental benefits. An IRR of 9% is often applied for larger investment projects in sectors such as transport, energy, urban development,

and agriculture[17]. The lower rate is applied here, given, under the basic form of economic analysis, benefits tend to be underestimated.

Table 5.4 sets out the preliminary economic assessment of the 28 projects included in Group 1 of the Government Priority List. The table lists the annual net benefits needed to achieve the IRR of 6% in aggregate terms and in terms of the population served by the project. While neither figure translates directly into an indicator of economic viability, each helps put the concept of economic viability into perspective. These figures can be used to judge the likelihood of each project generating the required level of annual net benefits. For this example, the likelihood is rated as high, medium, or low.

[17] Asian Development Bank. 2017. *Guidelines for the Economic Analysis of Projects*. p. 52. Manila.

Table 5.4: Preliminary Economic Assessment of Government Priority Projects in Group 1

Proj. No.	Project	Cost (TOP'000)	Indicative annual net benefits required for viability[1] (TOP'000)	Population served[2]	Annual net benefits / population served (TOP)	Potential for economic viability[3]
001	Nuku'alofa Power Network Upgrade Project (NNUP) Area 3, 4 and 5	34,160	3,074	74,611	41	High
022	Centralized Tonga Water Board and Village Water Supply Tongatapu	103,389	9,305	74,611	125	High
055	Additional/Replacement Generators (TBU, Vv, Hp and 'Eua)	6,000	540	99,419	5	High
024	Multi-Hazard Early Warning/Emergency Operations Centre (Niuas)	15,000	1,350	1,232	1,096	Low
037	Convert dump sites to new structured landfill, Ha'apai & 'Eua	8,000	720	11,070	65	Medium
029	Improved Water Supply System in Vava'u (Greater Neiafu)	14,748	1,327	13,738	97	High
009	New international secondary / redundancy internet cable	35,000	3,150	100,651	31	Medium
020	Improved 'Eua Water Supply System	6,705	603	4,945	122	Medium
042	Upgrade and Expansion 'Eua Mobile and Fixed Networks	2,960	266	4,945	54	Medium
049	Upgrade Touliki coastal protection structure	3,000	270	74,611	4	Medium
054	Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (Vv) Market upgrade	5,000	450	88,349	5	High
011	Close (Kalaka) and establishing new landfill(s) Vava'u	12,000	1,080	13,738	79	Medium
013	First New Tug boat	20,022	1,802	74,611	24	High
041	Upgrade and Expansion Niuas Mobile Networks	2,627	236	1,232	192	Medium
050	New Warehouses for NEMO (one Vava'u, Eastern District, TT)	2,000	180	88,349	2	Low
058	Upgrade Fire Station 1, Nuku'alofa	2,630	237	74,611	3	Low
017	Upgrading of a new Public health building (Tongatapu)	5,000	450	74,611	6	Low
052	Overlay of Asphalt Concrete on Primary Roads in Tongatapu	20,000	1,800	74,611	24	High
004	Upgrade/expand carpark, pedestrian access Fua'amotu Airport	1,000	90	74,611	1	High
005	New Fire Tender Fua'amotu	2,100	189	74,611	3	High
014	Upgrading of Vava'u Hospital (Prince Ngu Hospital)	40,000	3,600	13,738	262	Low
019	Fanga'uta Evacuation Bridge and Roads	150,000	13,500	74,611	181	High
038	TIST & TMPI extension/upgrade building (more inclusive for students)	6,000	540	100,651	5	Low
027	New Wharfs for Small Outer Islands	16,000	1,440	26,040	55	Low
008	New Junior Campus for Tupou College	10,000	900	74,611	12	Low
021	Improve existing & build new MAFF Packing Facilities (HACCP cert.)	1,800	162	74,611	2	Medium
031	New Law Court Complex (Supreme and Magistrate)	13,500	1,215	100,651	12	Low
018	New Fale Alea (Parliament House and Office Complex)	25,000	2,250	100,651	22	Low
	Totals	563,641	50,728			

[1] Annual level of net benefits (benefits minus costs) needed once the project is operational to recover capital cost and generate an internal rate of return for the project of 6 percent, using a simple discounted cashflow model and an assumed project life of 20 years.

[2] The MCA collected information on the number of project beneficiaries, but this information suffered from some inconsistency in the approach to preparation. With this in mind, total populations of island groups are used for these calculations, and the national population for projects deemed as national in focus (2016 Census data). It is necessary to keep in mind that the level of benefit flowing to individual beneficiaries varies significantly from project to project.

[3] In the absence of more formal economic analysis of each project, these estimates of the potential for economic viability should be treated as preliminary.

HACCP=Hazard Analysis Critical Points; Hp=Ha'apai; MAFF=Ministry of Agriculture, Food and Forests; NEMO=National Emergency Management Office; NNUP=Nukualofa Network Upgrade Project; TBU=Tongatapu; TIST=Tonga Institute of Science and Technology; TMP=Tonga Maritime Polytechnic Institute; Vv=Vava'u - Source: Authors

The preliminary economic assessments have been conducted mainly with reference to the type of project and whether or not projects of this type generally lend themselves to economic viability. In the absence of more formal economic analysis, these economic assessments should be considered approximate and preliminary.

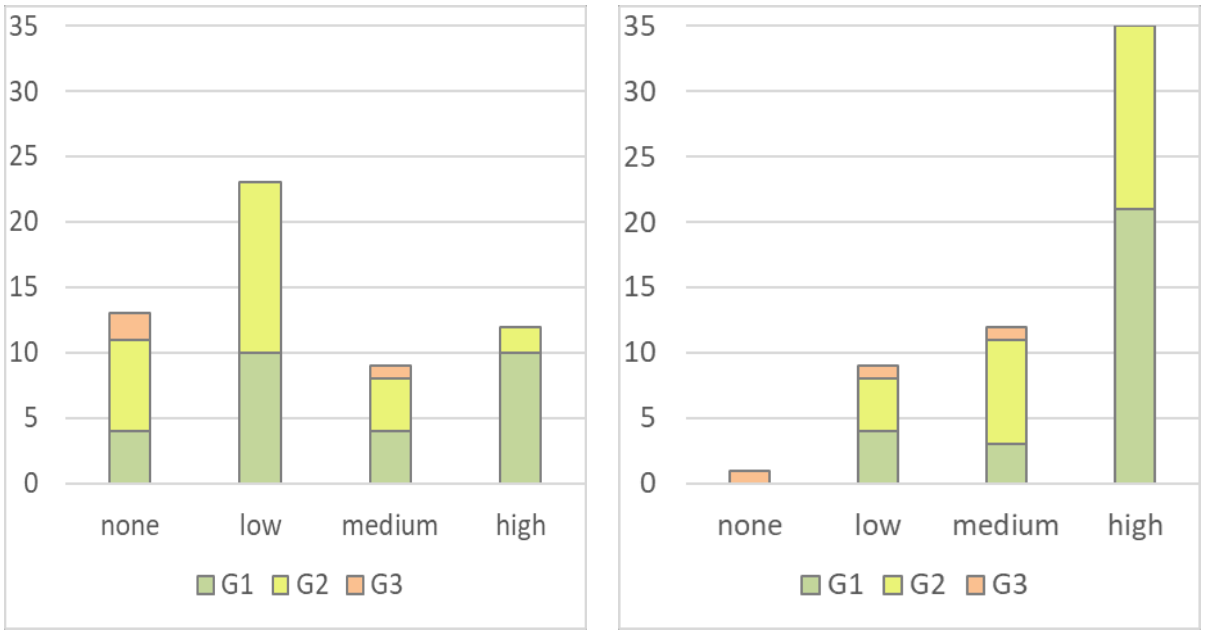
There were 10 projects, costing a total of T$356.4 million, judged to have a high likelihood of economic viability; 8 projects, costing T$72.1 million, a medium likelihood; and 10 projects, costing T$135.1 million, a low likelihood of economic viability. These last 10 projects may, however, involve benefits that are difficult to quantify but nonetheless important to the nation. In these cases, other forms of analysis, such as cost-effectiveness analysis, are often applied to determine whether or not to proceed with such projects.

Projects Related to Climate Change and Disaster Preparedness

Given the increased threat of climate change and environmental destruction, and the need to improve disaster preparedness in the face of increased extreme weather events, climate resilience and disaster risk management are important criteria for large infrastructure projects. Figure 5.4 scores projects in the three groupings of the Government Priority List for the following two MCA criterion: climate change mitigation and adaptation and environmental protection (criterion 3.1); and disaster risk management (criterion 3.2). Nearly 40% of the projects rank as “medium” to “high” for criterion 3.1, while over 80% of projects achieve the same rankings for criterion 3.2.

These results show that response to climate change and disaster preparedness are both important considerations in the projects identified as high priority using the MCA. The fact that disaster preparedness is a key consideration in a greater proportion of projects reflects (i) Tonga’s extensive exposure to natural disasters over recent decades, giving this issue greater immediacy in the minds of many; and (ii) a stronger influence from development partners to address disaster risk management to avoid costly infrastructure rehabilitation and reconstruction.

Figure 5.4. Government Priority Projects Rated for Climate and Disaster Management Criteria



G = group.

Note: Rankings cover 56 prioritized projects in the Government Priority List, and are based on criteria from the National Infrastructure Investment Plan multicriteria assessment process: criterion 3.1 on climate change mitigation and adaptation and environmental protection; and criterion 3.2 on disaster risk management.

Source: National Infrastructure Investment Plan Ranking Workbook.

6 Opportunities for the Financing of Infrastructure

6.1 Status of Projects with Respect to Funding

Most prioritized projects in the NIIP 3 have yet to receive approval for funding by the government. Most will take a little time to reach this stage. Given many are only at the concept stage, some reformulation may take place as they are developed further. However, given the interest generated during the trialing of the mainstreamed approach, there may be greater interest in completing the PPAs and submitting them to the MOF for approval to seek funding. The NPD will be monitoring the priority Group 1 list to encourage MDAs and public enterprises to move ahead. There is also a desire for a further prioritization in June 2022.

While improving the preparation of infrastructure needs is desirable, it is also important to gauge the status of sources of finance and thus the approximate size of project funding that can be anticipated. This will help to keep the prioritization process focused and avoid a long list of desired projects unlikely to be funded for some time.

To obtain a realistic estimate of the envelope of funding for NIIP projects, this chapter summarizes the status of public finances, the financial viability of public enterprises, and financing from the DPs who are major funders of infrastructure. Appendix 9 provides a more detailed assessment of this information.

6.2 Government Capacity to Finance Infrastructure

Tonga has for decades faced fiscal constraints. A number of fiscal anchors are used to facilitate fiscal stability. These have resulted in domestic revenue being sufficient to fund normal recurrent operations. Since the global financial crisis, budget support has been provided, permitting an appropriate level of government expenditure in the face of shortfalls in domestic revenues. This budget support has enabled Tonga to generate a Government Financial Statistics surplus in most years, enabling adequate reserves to be built up for debt repayment and provide emergency relief funds in the event of extreme natural events.

The 2020/21 Budget forecast a deficit equivalent to more than 3% of GDP, due to the impact of the COVID-19 pandemic. Additional grant funding, however, was sufficient to generate a likely surplus equivalent to approximately 2% of GDP.

Before the global financial crisis, Tonga borrowed on concessional terms for capital investment. As of 30 June 2020, total debt was 41.2% of GDP, with external public debt at 35.3% and domestic debt at 5.9%. While below the government's fiscal anchor for external debt (no more than 50% of GDP), the International Monetary Fund (IMF) recommends that this should be kept to 35% in case new grant funding were to be limited.

Since 2017, Tonga's IMF-assessed external debt distress rating rose from "moderate" to "high risk", given the large potential impact on economic growth and fiscal balances posed by future extreme natural disasters, and the upturn in debt repayments commencing in 2024 (particularly to the Exim Bank of China).

The government retains direct responsibility for some key infrastructure, including the road network, and is pursuing mechanisms for improving the financing of asset maintenance such as the Road Maintenance Fund. Other infrastructure is managed through public enterprises.

The government funds some limited capital expenditure on infrastructure from domestic revenue, budget support from development partners, and domestic borrowing. Funding for maintenance is also limited. Most capital expenditure is financed by grants from development partners (cash and in-kind) and potentially through concessional loans when borrowing is possible. This includes the direct capital needs of government as well as all the larger capital needs of the public enterprises.

6.3 Public Enterprises' Capacity to Fund Infrastructure

In FY2019, all public enterprises recorded profits, except for the Tonga Broadcasting Corporation and Tonga Asset Managers and Associates Limited, which recorded losses. The Tonga Broadcasting Corporation has a mix of commercial and social objectives, with its government policy obligations resulting in some financial support from the government.

The rate of return on equity for the profitable public enterprises ranged from 1.3% for Tonga Power Limited to 35.4% for the Waste Authority Limited. There was a rate of return on equity of 5.3% for the group as a whole.

However, performance deteriorated significantly in FY2020, due significantly to the combined impact of Tropical Cyclone Harold and the COVID-19 pandemic. Further deterioration is anticipated.

All public enterprises are making some capital investments, though the larger investments over the period are supported by development partners. Expenditures on repairs and maintenance over recent years have generally been low.

Table 6.1 provides an assessment of the capacity of Tonga's public enterprises to self-fund operations, maintenance, and capital expenditure (of small, medium, and large scale). The assessments are based on a medium-term perspective of the financial position of public enterprises, rather than focusing on the current difficult period.

Table 6.1: Capacity of Public Enterprises to Self-Fund Infrastructure Costs

	Operations	Maintenance	Small Capex	Medium Capex	Large Capex
Tonga Power Limited					
Ports Authority of Tonga					
Tonga Airports Limited					
Tonga Cable Limited					
Tonga Communications Corporation					
Tonga Broadcasting Corporation					
Tonga Post Limited					
Tonga Water Board					
Waste Authority Limited					
Tonga Market Authority Limited					
Tonga Asset Managers and Associates Ltd					

Capex = capital expenditure.

Note: The assessment rates the capacity of each public enterprise relative to its capital base: Green indicated "High" or a full capacity to self-fund without assistance; Yellow indicates "Medium" or a partial capacity by the enterprise to self-fund some needs, but a backlog will gradually accumulate; and red indicates "Low" or that the enterprise is unable to self-fund this activity.

Source: Authors.

Except for the two enterprises that incurred losses in FY2019, all public enterprises were assessed as having high capacity to meet the costs of operations and maintenance, and 8 of 11 were considered capable of self-funding smaller items of capital expenditure. Capacity to self-fund medium-scale and large-scale capital expenditure was generally assessed as low.

6.4 Development Partner Support to Tonga

Tonga's national budget integrates development expenditures financed by development partners (both cash and in-kind) with expenditures financed from the Government Fund, including budget support. The development support covers both NIIP and non-NIIP projects making up a significant proportion of the total government budget.

Since the NIIP focusses on hard infrastructure, this is the focus of the summary in this section. The government recognizes and appreciates the range of support received from its

development partners, especially the contributions they make in filling the country's fiscal gaps and permitting a higher level of well-being than would otherwise be possible.

In addition to budget support, the World Bank Group and the Asian Development Bank are the two largest sources of funding for hard infrastructure. Before Tonga's debt stress was raised to "high risk", this was through a mix of grants and long-term soft loans. Since the increase in stress level, support has been exclusively through grants. Both development partners also fund complementary soft infrastructure and technical assistance for reforms. They both support initiatives for new funding modalities relevant to the needs in Tonga.

Australia and New Zealand are major development partners with a diverse portfolio of support. This includes budget support and a flexible range of projects. This may sometimes include large infrastructure, but often it covers a range of needs. Australia and New Zealand are cofinancing the new Parliament House project. They also sometimes cofinance or complement large projects with the Asian Development Bank and other sources of funding.

Through its General Grant Aid, Japan (through the Japan International Cooperation Agency) funds one large infrastructure project every 1 to 2 years, in addition to a range of other development assistance. The People's Republic of China has provided loans for infrastructure when borrowing was possible. It now provides grants, sometimes for infrastructure.
Other development partners, including the European Union and various United Nations entities, provide a variety of assistance, seldom for NIIP-projects, but for a range of complementary non-NIIP projects.

Other new sources of funding for infrastructure include the United Nations Green Climate Fund (while Tonga's accreditation to the Green Climate Fund is being processed, the Asian Development Bank and the United Nations Development Programme are assisting Tonga with project proposals for the fund); the Australian Infrastructure Financing Facility for the Pacific, and the Asian Infrastructure Investment Bank when borrowing is possible.

6.5 Domestic Institutions and Groups

Tonga has three commercial banks as well as the Tonga Development Bank, established by the government to promote Tonga's economic and social advancement. These banks finance working capital for public enterprises and smaller infrastructure investments for these enterprises but are limited in how much they can lend to any one borrower.

The government and national pension funds maintain a solid financial position. They have started lending to public enterprises for infrastructure. The pension funds have the financial capacity to lend to viable projects developed by public enterprises or the private sector, and on more favorable terms than the commercial banks.

Tongan firms are involved in the design and construction of infrastructure assets, often in participation with international firms. Maintenance of roads is generally carried out by local contractors and the private sector provides a range of support services to public enterprises involved in infrastructure in a range of sectors.

The Ministry of Public Enterprises is developing a policy framework for public-private partnerships. Independent power producers are playing an emerging role in the energy sector, particularly in relation to renewable energy systems that can harness solar and wind energy. In

the telecommunications sector, the two service providers are the private firm Digicel operating in competition with the public enterprise Tonga Communications Corporation.

The Tongan diaspora is a source of funding for some infrastructure, through ex-student networks for school buildings and facilities, and other community networks for community facilities such as churches and private housing. Some churches fund and build facilities that meet a high cyclone rating and provide an important addition to available shelter in times of extreme weather events.

6.6 Estimated Funding Envelope for the Planning Period

The government's development budget, which attempts to capture both cash and in-kind assistance provided by all development partners, is the source of funding for most infrastructure investment in Tonga, both for government entities and public enterprises. From FY2017 to FY2023, development expenditure (actual, budgeted, and projected) is estimated at T$1,243.3 million or an average of T$178 million per year.

Development partners fund a range of projects from ongoing programs as well as providing additional support in times of emergency. While hard infrastructure investment accounts for a significant share, soft infrastructure and related activities (including capacity building and welfare) also require funding. For planning purposes, it is estimated that approximately 60% of the development assistance budget may be available for the funding of NIIP projects.

Ongoing and committed projects will account for a significant share of this funding in the first few years of the planned 5 years on the NIIP 3. Similarly, some funding for projects initiated towards the end of the planning period will spill over beyond that period.

Supplementing this financing from development partners are small potential contributions to the financing of infrastructure from the government (say T$2 million per year in addition to the smaller items of capital expenditure routinely financed by the government) along with public enterprises and others (say T$4 million per year in addition to the smaller items of capital expenditure routinely financed by public enterprises). These contributions from the government and public enterprises may need to await some recovery in the Tongan economy beyond the COVID-19 pandemic.

Data gathered on infrastructure project disbursements while preparing this NIIP 3 resulted in an estimate of T$138.5 million in disbursements per year between 2013 and 2018. This includes a significant level of disbursements for emergency response activities, and there is a need to leave capacity for similar activities in programming infrastructure investment in coming years (rather than saturating capacity with more routine projects).

This suggests that, in terms of financing capacity and other considerations[18], some T$110 million per year, or about T$550 million over a 5-year slice of the infrastructure planning period, is an appropriate estimate for planning purposes. This recognizes the need to leave some capacity for emergency response activities, and to cater for the likelihood of cost increases in projects as they are further developed and appraised.

Scheduling the implementation of priority projects in the NIIP 3 has not been attempted because of uncertainties in the timeframes required to further develop, appraise, and approve the projects and access funding for them.

6.7 Possible Funding Modalities for Projects

While most of the Group 1 projects have yet to receive formal approval by the government for funding, it is appropriate to consider the funding modalities that might be suitable for them, as shown in Table 6.2. Informal contacts with development partners do occur before projects are formally approved for funding, but formal requests await government approval.

Table 6.2: Possible Funding Modalities for Government Priority Projects in Group 1

Proj. No.	Project	Cost (T$ '000)	GOT	PEs	DPs	Private	Notes
001	Nuku'alofa Power Network Upgrade Project Area 3, 4, and 5	34,160					Under ADB consideration
022	Centralized Tonga Water Board and Village Water Supply Tongatapu	103,389					
055	Additional/Replacement Generators (TBU, VV, Hp, 'Eua)	6,000					
024	Multi-Hazard Early Warning/Emergency Operations Centre (Niuas)	15,000					
037	Convert dump sites to new structured landfill, Ha'apai and 'Eua	8,000					
029	Improved Water Supply System in Vava'u (Greater Neiafu)	14,748					
009	New international secondary/redundancy internet cable	35,000					

[18] In addition to financing capacity, implementation capacity (many infrastructure projects involve external contractors, but also draw on the domestic construction industry), capacity to maintain infrastructure assets, and absorption capacity in a macroeconomic sense, are additional considerations.

Proj. No.	Project	Cost (T$ '000)	GOT	PEs	DPs	Private	Notes
020	Improved 'Eua Water Supply System	6,705					
042	Upgrade and Expansion 'Eua Mobile and Fixed Networks	2,960					
049	Upgrade Touliki coastal protection structure	3,000					
054	Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (VV) Market upgrade	5,000					
011	Close (Kalaka) and establishing new landfill(s) Vava'u	12,000					
013	First new tug boat	20,022					
041	Upgrade and Expansion Niuas Mobile Networks	2,627					
050	New Warehouses for NEMO (one Vava'u, Eastern TT)	2,000					
058	Upgrade Fire Station 1, Nuku'alofa	2,630					
017	Upgrading of a new public health building (Tongatapu)	5,000					
052	Overlay of Asphalt Concrete on Primary Roads in TT	20,000					
004	Upgrade/expand carpark, pedestrian access Fua'amotu Airports	1,000					JICA airport survey
005	New Fire Tender Fua'amotu	2,100					
014	Upgrading of Vava'u Hospital (Prince Ngu Hospital)	40,000					
019	Fanga'uta Evacuation Bridge and Roads	150,000					ADB evaluating
038	TIST & TMPI extension/upgrade building (more inclusive for students)	6,000					
027	New Wharfs for Small Outer Islands	16,000					
008	New Junior Campus for Tupou College	10,000					
021	Improve existing & build new MAFF Packing Facilities (HACCP cert.)	1,800					
031	New Law Court Complex (Supreme and Magistrate)	13,500					

Proj. No.	Project	Cost (T$ '000)	GOT	PEs	DPs	Private	Notes
018	New Fale Alea (Parliament House and Office Complex)	25,000					Australia/NZ designing

HACCP=Hazard Analysis Critical Points; Hp=Haapai;TBU=Tongatapu; Vv=Vava'u

Key: minor contribution major contribution

NB: currently soft loans are not possible Private = business & community

Source: Authors.

Reliance will continue to be placed on grant finance from development partners to fund the bulk of infrastructure investment in Tonga over the 5-year planning period of the NIIP 3, and beyond, with some limited scope for contributions from the government, public enterprises, and the private sector or community groups as the economy recovers.

6.8 Maintenance Requirements and Funding

The need for new investments is sometimes driven by lack of maintenance. Better maintenance will, of course, lessen this need Table 6.3 considers the implications for annual maintenance funding, should the 28 projects identified in Group 1 of the Government Priority List all come on stream, recognizing that this may take some years.

Table 6.3: Annual Maintenance Implications of Government Priority Projects in Group 1

Proj. No.	Project	Cost (TOP'000)	Indicative annual maintenance cost[1] (TOP'000)	Responsibility for maintenance		Potential for cost recovery
				Government	Public enterprises	
001	Nuku'alofa Power Network Upgrade Project (NNUP) Area 3, 4 and 5	34,160	171		171	High
022	Centralized Tonga Water Board and Village Water Supply Tongatapu	103,389	1,551		1,551	Medium
055	Additional/Replacement Generators (TBU, Vv, Hp and 'Eua)	6,000	60		60	High
024	Multi-Hazard Early Warning/Emergency Operations Centre (Niuas)	15,000	300	300		Low
037	Convert dump sites to new structured landfill, Ha'apai & 'Eua	8,000	80		80	Low
029	Improved Water Supply System in Vava'u (Greater Neiafu)	14,748	221		221	Medium
009	New international secondary / redundancy internet cable	35,000	700		700	High
020	Improved 'Eua Water Supply System	6,705	101		101	Medium
042	Upgrade and Expansion 'Eua Mobile and Fixed Networks	2,960	44		44	Medium
049	Upgrade Touliki coastal protection structure	3,000	30	30		Low
054	Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (Vv) Market upgrade	5,000	25		25	High
011	Close (Kalaka) and establishing new landfill(s) Vava'u	12,000	240		240	Medium
013	First New Tug boat	20,022	400		400	Medium
041	Upgrade and Expansion Niuas Mobile Networks	2,627	39		39	Low
050	New Warehouses for NEMO (one Vava'u, Eastern District, TT)	2,000	40	40		Low
058	Upgrade Fire Station 1, Nuku'alofa	2,630	13	13		Low
017	Upgrading of a new Public health building (Tongatapu)	5,000	100	100		Low
052	Overlay of Asphalt Concrete on Primary Roads in Tongatapu	20,000	100	100		Low
004	Upgrade/expand carpark, pedestrian access Fua'amotu Airport	1,000	10		10	High
005	New Fire Tender Fua'amotu	2,100	42		42	Medium
014	Upgrading of Vava'u Hospital (Prince Ngu Hospital)	40,000	600	600		Low
019	Fanga'uta Evacuation Bridge and Roads	150,000	3,000	3,000		Low
038	TIST & TMPI extension/upgrade building (more inclusive for students)	6,000	60	60		Low
027	New Wharfs for Small Outer Islands	16,000	320	320		Low
008	New Junior Campus for Tupou College	10,000	200	200		Low
021	Improve existing & build new MAFF Packing Facilities (HACCP cert.)	1,800	27	27		Low
031	New Law Court Complex (Supreme and Magistrate)	13,500	270	270		Low
018	New Fale Alea (Parliament House and Office Complex)	25,000	500	500		Low
	Totals	563,641	9,245	5,560	3,685	

[1] an indicative annual maintenance requirement of 2 percent of capital cost for projects involving new infrastructure, with lower incremental requirements for projects involving renovation of existing infrastructure (which are already incurring maintenance expenditure)

Hp=Haapai; NNUP=Nukualofa Network Upgrade Project; TBU=Tongatapu; Vv=Vava'u

Source: Authors.

Total annual maintenance for the 28 projects is estimated at T$9.3 million: T$5.6 million assumed to be the responsibility of government, while T$3.7 million is assumed to be the responsibility of public enterprises. Higher maintenance requirements are assumed for projects involving new infrastructure than for projects involving renovation of existing infrastructure, because the latter are already incurring maintenance expenditure.

The government's FY2021 budget for expenditure on infrastructure maintenance and operations (excluding aid-financed expenditures other than budget support) is T$28.7 million. Public enterprises reported maintenance expenditures totaling T$8.4 million in FY2020, though these are likely to be underestimates. The additional maintenance requirements, if they are met, would require significant increases by the government and public enterprises.

The final column in Table 6.3 rates projects as having a high, medium, or low capacity for cost recovery related to maintenance costs, i.e., capacity to generate revenue through user charges or to have maintenance costs met through a dedicated funding mechanism, such as a road fund. There were five projects, with a total capital cost of T$81.2 million, showing a high potential for cost recovery; while seven projects, with a total capital cost of T$161.9 million, have medium potential for cost recovery. Public enterprises are responsible for the maintenance of all these projects. The remaining 16 projects, with a total capital cost of T$320.6 million, have low potential for cost recovery (all projects for which the government is responsible for maintenance fall into this category).

7 Road Map for Advancing Infrastructure Planning

To operate effectively, and as part of the mainstreamed Tongan system, the NIIP process needs to remain active on an ongoing basis. This requires implementation of the follow-up actions specified under the eight lessons outlined in section 2.2.

7.1 Establish a Working Subgroup of Existing Committees

Given the NIIP committees have been reactivated, they provide an appropriate vehicle for maintaining NIIP momentum and resolving any detailed issues that might arise from the implementation of this report.

It is recommended to also establish an NIIP working subgroup under the TWC to implement the NIIP3 report and ensure that the NIIP process remains an active part of the planning and project cycle in Tonga. Core membership shall be from the NPD (facilitator) and the Projects and Aid Management Division and Resilience Division within the MOF. the Public Services Commission or other members of the TWC can be added as required.

7.2 Deliverables from the Working Subgroup

The working subgroup would be responsible for:

(i) identifying any other support required by the TWG (this includes representatives of other MDAs and possible short-term technical assistance)
(ii) turning the follow-up actions into a simple road map with outputs, deadlines, and M&E guidelines
(iii) including in the road map actions to help plan for the next prioritization, proposed to take place in June 2022
(iv) supervising and monitoring the implementation of the road map
(v) ensuring the next prioritization takes place, taking account of the lessons from the NIIP3 prioritization and identifying any new lessons
(vi) reporting every 2 months to the TWC (this may or may not require them to actually meet)
(vii) reporting at least once annually to the PAD-CC and Cabinet on progress.

7.3 Full List of Further Actions

Section 2.2 identified lessons for mainstreaming the NIIP process into existing government planning and project processing systems, and for taking a truly cross-sectoral approach to prioritization. Below is a list of all further actions required under each of the eight lessons.

1a. review the list of sectors and made modify to ensure it covers all projects

2a. ensure guidance for sector plans has clear links to the crosscutting NIIP to improve infrastructure planning and management in sectors

3a. ensure future NIIP projects identified in various processes and documents are captured in the NIIP list

4a. circulate the revised project cycle guidance to all MDAs and public enterprises and ensure NIIP and non-NIIP projects follow the appropriate procedures

4b. in consultation with the Public Service Commission, ensure staff responsible for projects and planning have this clearly set out in their job descriptions and are required to participate in regular training related to these skills

4c. MoF and NPD to establish how the regular training is to take place and build it into their respective work plans

4d. ensure other relevant guidance is updated to capture this modified project cycle and the enhanced documentation, for example, how the corporate plans and annual reports can support the NIIP process

4e. have MDAs use the government's NIIP priority list to guide PPA preparation for funding and have the MoF use the list to seek funding

4f. MOF and Ministry of Foreign Affairs share the NIIP report with development partners and invite them to use it in their development programming with Tonga

4g. Head of the NPD to attend PAD-CC meetings as an advisor to the CSSC

5a. consider the additional lessons for further improving the MCA and how to apply them for the next prioritization

6a. plan the approach for the next prioritization to take place, once the various follow-up actions have been conducted

8a. while the new project database is being developed, establish the temporary NIIP database with the basic functionality required to track the status of NIIP projects through the project cycle (ready to merge into the new IFMIS database when up and running)

8b. design a simple format for annual reporting on the status of NIIP projects, consistent with the overall reporting on project status, including updates on other enhancements to NIIP processes, such as improved asset registers and infrastructure KPIs

8c. ensure the implementation of the project database component of the new IFMIS fully captures all requirements for an effective project cycle, including the NIIP projects.

7.4 Next Prioritization

The government wishes to undertake the next prioritization by June 2022 to further embed the NIIP process and test the enhanced MCA (with some additional modifications as noted above) to be applied by NPD staff with improved robustness and only limited consultancy backstopping. This will require many of the steps in section 7.3 to have first been put in place.

Appendix 1: Participants in Tonga NIIP Network

A1.1 National Support Staff

National Support Staff for the Tonga National Infrastructure Investment Plan (NIIP) 3 include staff from the National Planning Division of the Prime Minister's Office (PMO) and the two key ministries in charge of infrastructure investment and related finance; the Ministry of Finance (MOF) and the Ministry of Infrastructure (MOI) as shown in Table A1.1.

The main role of National Support Staff is to liaise and coordinate between the Consulting Team; ministries, departments, and agencies (MDAs); and private enterprises to ensure smooth and complete information sharing and exchange at the various steps of the NIIP 3 development process. The main responsibilities include:

(i) proactively support the collection, exchange, and sharing of data and information during the data collection phase to ensure timely transfer of all information needed by the CT;

(ii) participate in the development of the upgraded multicriteria assessment (MCA) methodology based on experience with the NIIP 2 (Phase 2) process.

(iii) support the training of MDAs in using the upgraded MCA tools and templates, ensuring facilities and equipment are provided;

(iv) endorse any technical modifications to upgrading the MCA template and tools to ensure they are consistent with existing procedures, and recommend to the chief executive officers (CEOs) of the PMO, MOF, and MOI for approval (as a procedural matter it is suggested that this does not need Cabinet approval, and so will save time);

(v) collect, validate, and pass to the CT for processing the Project Profile Documents (PPDs) completed by the MDAs based on the upgraded MCA template and tools; and

(vi) support the development of the NIIP 3 project pipeline consistent with the existing government project pipeline.

Table A1.1: Key Personnel within the National Support Staff

First Name /Last Name	Position	Division	Ministry	Email
Ma'u Alipate	Deputy Secretary	National Planning	PMO	mau.alipate@gmail.com
Lupe Fe'iloaki	Principal Economist	National Planning	PMO	ltfeiloaki@gmail.com
Hon. Fatafehi Tuita	Senior Economist	National Planning	PMO	
Ma'ata Mafi	Senior Economist	National Planning	PMO	laluini@gmail.com
Elizabeth Baker	Deputy	Project, Aid Management Division	MOF	ebaker@finance.gov.to

First Name /Last Name	Position	Division	Ministry	Email
Nick Lavemaau	Principal Economist	Project, Aid Management Division	MOF	
Saane Lolo	Chief Economist	Resilient Unit	MOF	
Lopeti Heimuli	Acting Chief Executive Officer	Building	MOI	heimuli@gmail.com
Victorina	Principal engineering	Resilient Unit	MOI	
Tevita Lavemai	Deputy	Roads infrastructure	MOI	

MOF = Ministry of Finance, MOI = Ministry of Infrastructure, PMO = Prime Minister's Office.

Source: Prime Minister's Office 2020

A1.2 Technical Working Committee Members

The NIIP Technical Working Committee, being reestablished under the NIIP 3, is composed of at least one staff member from each MDA and private enterprise managing and/or operating public infrastructure as listed in Table A1.2. They assist the National Support Staff and CT by:

(i) ensuring all documents, information, and data necessary for the review of current activities of the sectors are provided;
(ii) participating in the training for the PPD preparation and MCA and ensuring that at least one other staff member from their organization attends;
(iii) ensuring the PPDs developed by the MDA are swiftly completed, approved by their CEO, and transmitted to the PMO for processing and validation;
(iv) participating in the meeting of all MDAs and private enterprises to review the PPDs and establish their proposed priorities;
(v) conveying any comments or recommendations back to the National Support Staff and the CT on improvements to the process; and
(vi) providing any further input requested from their CEO to help the CEO in the Taskforce Committee work.

Table A1.2: Key Personnel within the Technical Working Committee

Names	Title in the NIIP-TWC	Title in Organization	Organization	Email	Phone
Lola Lia'ava'a	Member	WAL	WAL	malakaisika@gmail.com	27826
Tevita Tukunga	Member	CEO TERM	MEIDECC	ttukunga@gmail.com	20113
Viliami Ongosia	Member	NUP	TPL	vongosia@tongapower.to	21400

Names	Title in the NIIP-TWC	Title in Organization	Organization	Email	Phone
Elizabeth Baker	Member (Deputy Chair)	PAMD	MOF	ebaker@finance.gov.to	7400700
Tukua Tonga	Member	CEO PUMA	PUMA	tukuatonga@gmail.com	22552
Alo Maileseni	Member	CFO	Port Authority (PAT)	amaileseni@portsauthoritytonga.com	26270
Lopeti Heimuli	Member (Chair)	Acting CEO	MOI	heimuli@gmail.com	21300
Tevita Lavemai	Member	Deputy CEO	MOI (Road)	tlavemai@infrastructure.gov.to	21300
Mandie Finau	Member	Deputy CEO	MOI (Planning)	dyfinau06@gmail.com	21300
Ponepate Taunisila	Member	Deputy Director	MET	ptaunisila@gmail.com	23511
Semisi Fukofuka	Member	Corporate Services Head	MOH	otuangaofa@yahoo.com	23200
Quddus Fielea	Member	Engineering Manager	TWB	qfielea@gmail.com	7749613
Timote Laume	Member	Senior Accountant	TCL	timote.laume@TONGACABLE.TO	21616
Timote Katoanga	Member	CEO	TCC	timote.katoanga@tcc.to	20000
Pita Ha'angana	Member	Accountant	TAL	Phaangana@tongaairports.com	22602
Finau Moa	Member	Deputy CEO	MPE	fmoa@mpe.gov.to	28144
Onetoto Anisi	Member	Deputy Director	MIA	oanisi@mia.gov.to	23977
Ma'u Leha	Secretariat	National Planning	PMO	mau.alipate@gmail.com	7401389

MET=Ministry of Education and Training; MEIDECC=Ministry of Meteorology, Energy, Information, Disaster Management, Environment and Climate Change; MIA=Ministry of Internal Affairs; MOH=Ministry of Health; MPE=Ministry of Public Enterprises; PUMA= Planning and Management Agency; TAL=Tonga Airport Limited; TCC=Tonga Communications Corporation; TCL=Tonga Cable Limited; TWB=Tonga Water Board; TPL=Tonga Power Limited; WAL=Waste Authority Limited.

Source: Prime Minister's Office, 2020

A1.3: Taskforce Committee Members

The NIIP Taskforce Committee (NIIP-TC) is composed of the CEOs of the PMO, MOF, and MOI as full members. They are assisted by CEOs from all other MDAs and private enterprises managing and/or operating public infrastructure (Table A1.3). The NIIP-TC has two roles:

(i) The three full members review and endorse the MCA, seeking comment from other CEOs if they wish.

(ii) The whole group reviews the NIIP 3 and its recommendations, then comment (and if necessary, seek clarification from the CT), then recommend the NIIP 3 for consideration and approval by Project & Aid Development Coordination Committee for final approval by Cabinet.

Table A1.3: Key Personnel within the Taskforce Committee

Name	Title in the NIIP Taskforce Committee	Title in the organization	Organization	email	phone
Edgar Cocker	Member (Chair)	CSSC	PMO	edgarc047@yahoo.com	24644
Balwyn Fa'otusia	Member (Deputy Chair)	CEO	MOF	bfaotusia@finance.gov.to	7400700
Malakai Sika	Member	CEO	WAL	malakaisika@gmail.com	27826
Paula Ma'u	Member	CEO	MEIDECC	pmau@mic.gov.to	28170
Seti Chen	Member	CEO	TPL	schen@tongapowers.to	27390/ 28311/ 21400
Tukua Tonga	Member	CEO PUMA	PUMA, MLNR	tukuatonga@gmail.com	22552
Mosese Lavemai	Member	CEO	Port Authority (PAT)	mlavemai@portsauthoritytonga.com	23168
Lopeti Heimuli	Member	Acting CEO	MOI	heimuli@gmail.com	23201/ 23479/ 23100
Tangikina Steen	Member	CEO	MET	claudetupou@gmail.com	23511
Siale 'Akau'ola	Member	CEO	MOH	sakauola@health.gov.to	23833
Semisi Panuve	Member	CEO	TCL	semisi.panuve@tongacable.to	21616
Timote Katoanga	Member	CEO	TCC	tkatoanga@tcc.to	20006

Name	Title in the NIIP Taskforce Committee	Title in the organization	Organization	email	phone
Viliami Ma'ake	Member	Director	TAL	Vmaake@tongaairports.com	21888
Sione 'Akau'ola	Member	CEO	MPE	sakauola@mpe.gov.to	28144
Mau Alipate	Secretariat	Deputy Secretary	PMO	mau.alipate@gmail.com	23654

MET=Ministry of Education and Training; MEIDECC=Ministry of Meteorology, Energy, Information, Disaster Management, Environment and Climate Change; MIA=Ministry of Internal Affairs; MOH=Ministry of Health; MPE=Ministry of Public Enterprises; PUMA= Planning and Management Agency; TAL=Tonga Airport Limited; TCC=Tonga Communications Corporation; TCL=Tonga Cable Limited; TWB=Tonga Water Board; TPL=Tonga Power Limited; WAL=Waste Authority Limited.

Source: Prime Minister's Office, 2020

Appendix 2: Project Pipeline under the National Infrastructure Investment Plan 2

Table A2.1: Projects by Sector under National Infrastructure Investment Plan 2

Project Nr. NIIP2+	Sector	Project Name	Status 2015	Status 2020
Aviation	**AVI**			
A12	AVI	Control Tower for Fua'amotu	P (HP)	CP
A13	AVI	New Aircraft Hangar at Fua'amotu	P	P
A14-2015	AVI	Cargo Facility Fua'amotu	P (HP)	CP
A15-2015	AVI	Rainwater Collection and Disposal Fua'amotu	P	CP
A16-2015	AVI	Cargo x-ray screening	P	C
A17-2015	AVI	Runway Sweeper	P	N
A18-2015	AVI	Rainwater Collection and Disposal Vava'u	P	D
A10	AVI	Resurfacing of Vava'u runway, apron, taxiway (TAIP)	C	CP
A11	AVI	Resurfacing Ha'apai runway, apron, taxiway	P (HP)	U
A19-2015	AVI	Passenger Transit Accommodation Fua'amotu	P	C
A4	AVI	Upgraded Departure area (Fua'amotu); (TSCP Aviation)	U	CP
A5	AVI	New fire station at Fua'amotu airport; (TSCP Aviation)	U	CP
A6	AVI	Upgraded Arrivals area (Fua'amotu); (TAIP)	C	CP
A7	AVI	Additional Fire Tender (Vava'u)	P	P
A8	AVI	Resurfacing of Fua'amotu runway, apron, taxiway (TAIP)	U	CP
A9	AVI	Expand apron area at Fua'amotu	P (HP)	CP
Energy	ENE			
E15	ENE	Biomass Generation ('Eua)	P (HP)	P
E16	ENE	Outer Islands On-Grid Renewable Energy Project (OIREP)	U	U
E17	ENE	Upgrade/ Relocate Tongatapu Power Station and Tank Farm	P	P
E18	ENE	Relocate Critical Power Lines Underground	P	U
E19	ENE	Upgrade of Nuku'alofa Electricity Network	P (HP)	U
E1	ENE	Distribution network improvements (multi-year)	U	U

Project Nr. NIIP2+	Sector	Project Name	Status 2015	Status 2020
E12	ENE	Renewable energy pilots (Coconut Oil/land fill gas)	P	P
E13	ENE	Energy Roadmap TGIF Projects	P	D
E-2015-1	ENE	Smart Metering and Prepayment Procedures	P (HP)	U
E-2015-2	ENE	Tongatapu Wind (2+2 MW)	P	CP
E-2015-3	ENE	Ha'apai Micro-Wind Project (11 kW)	U	CP
E-2015-4	ENE	Outer Islands On-Grid Energy Efficiency Project (OIEEP)	P	U
E-2015-5	ENE	Energy Storage	P	U
E-2015-6	ENE	Promoting Energy Efficiency Through the Pacific Phase II	P	D
E-2015-7	ENE	EU Energy Program	P	D
E3	ENE	Additional/ replacement generators (Vava'u)	C	C
E4	ENE	Additional/replacement generators (Ha'apai)	C	C
E5	ENE	Additional/ replacement generators ('Eua)	C	C
E6	ENE	Village networks (electricity pole replacement) (part of E1)	U	U
E8	ENE	Improved street lighting	U	U
Education	EDU			
Ed-2015-1	EDU	Refurbishment of schools' toilets	P	P
Ed-2015-2	EDU	Pacific Games Village (THS) (16th PG)	P (HP)	D
Ed-2015-3	EDU	Pacific Games Village (TCA) (16th PG)	P (HP)	D
Ed-2015-4	EDU	Structural Improvement of High-Risk Building	P (HP)	P
Ed-2015-5	EDU	School Ground Development for Resilience	P (HP)	P
Health	HSE			
H-2015-1	HSE	Replacing Asbestos Roofing at Vava'u Hospital	P (HP)	D
H-2015-2	HSE	Eua Hospital (Niu'eiki) Perimeter fence	P	CP
Environment	ENV			
M-2015-1	ENV	Outer Islands resilience (Vava'u, Eua and the Niuas)	P	U
M-2015-2	ENV	Upgrade of Teufaiva Stadium (16th PG)	P	CP

Project Nr. NIIP2+	Sector	Project Name	Status 2015	Status 2020
M-2015-3	ENV	GEF6 Climate Change Mitigation Project	P	U
M3	ENV	Climate Resilience Sector Project (CRSP)	C	CP
M4	ENV	Disaster response & evacuation infrastructure (part of CRSP)	C	CP
M5	ENV	Ha'apai community resilience project	P (HP)	CP
M6	ENV	Western Tongatapu resilience project	P	U
M7	ENV	Pacific (Regional) Resilience Program (PREP)	C	U
Marine	MAR			
P16	MAR	Nafanua ('Eua) Port Upgrade (now under TSCP2)	P	U
P-2015-1	MAR	TSCP2 (Nav Aids, Vessels, Ports Repairs) Niuas, Eu'a & Ha'apai	P	U
P-2015-2	MAR	Nav Aids Spares	P	C
P-2015-3	MAR	New Domestic Wharf	C	D
P10	MAR	Vuna Wharf (Stage 2 Marina)	P	P
P12	MAR	Yellow Pier Upgrade	P	P
P13	MAR	Slipway for Ferries at Sopu	P	P
P14	MAR	Barge for Deep Water Dredging	P	CP
P15	MAR	Upgrade of Vava'u port (terminal, storage, forklift etc.)	P	CP
P-2015-4	MAR	Ha'apai (Pangai) Wharf Improvements	P	P
P-2015-5	MAR	Outer Islands Dredging	P	P
P-2015-6	MAR	Ta'anuka International Port Phase 1	P	P
P-2015-7	MAR	Ha'afeva Wharf Rehabilitation (Relocation)	P	P
P-2015-8	MAR	Water Front Development (16th Pacific Games)	P	P
P3	MAR	Reseal Queen Salote Wharf (QSW Int. and Dom.)	U	C
P5	MAR	Upgrade Container Handling (Forklift) for QSW (30% before 12/13)	U	U
Road	RDS			
R10	RDS	Outer Islands Roads Upgrading Program	P (HP)	P
R9	RDS	Overlay of AC Road in Tongatapu	P (HP)	P

Project Nr. NIIP2+	Sector	Project Name	Status 2015	Status 2020
R-2015-1	RDS	Backlog Road Maintenance Program (TSCP 2)	P (HP)	U
R-2015-2	RDS	Tonga Public Transport System Upgrading	P (HP)	P
R3	RDS	Transport Sector Consolidation Project (TSCP Roads)	U	CP
R6	RDS	Agricultural Road Program	P (HP)	U
R7	RDS	Upgrading of Toula Causeway (Vava'u)	P	P
R8	RDS	New road link to southern side of Fanga'uta Lagoon	P (HP)	P
Solid Waste	SWA			
S1	SWA	Additional Capacity Solid Waste and Sanitation (NUDSP)	U	U
S6	SWA	New Landfill or Transfer Station on Ha'apai	P (HP)	P
Communication	ITC			
T10	ITC	Communications for Early Warning and Disaster Recovery	P	CP
T-2015-1	ITC	Mobile Health	P	U
T-2015-2	ITC	Tele Centra (Internet Rural Areas)	P	U
T-2015-3	ITC	3G Upgrade for Outer Islands	P (HP)	CP
T4	ITC	Outreach – Expanding Services to Small Islands (After Sea line Access T9)	C	N
T7	ITC	Local Reticulation of High-Speed Internet	P	N
T8	ITC	International Fiber-Optic Cable	P (HP)	CP
T9	ITC	Fiber-Optic Cable to Ha'apai, Vava'u etc.	P (HP)	CP
Water Supply	WAT			
W2	WAT	Rehabilitate the Nuku'alofa water system (NUDSP)	U	CP
W3	WAT	Upgrade Neiafu Island mamao water supply (wells, distribution)	P	P
W4	WAT	Expand Nuku'alofa system to growth areas	P	P
W5	WAT	Development of a new Tongatapu well field (NUDSP)	U	U

AVI =Aviation; EDU=Education; ENE=Energy; ENV=Environment ; HSE Health; ITC=Information Technology and Communication; MAR=Maritime; RDS=Road; SWA= Solid waste; WAT=Water supply and sanitation; C= committed; CP= completed; P= proposed; U=under implementation)

Source: NIIP 2 Report

Appendix 3: Main Projects and Programs Implemented from the National Infrastructure Investment Plan 2

The tables in this appendix have been compiled based on the dataset received from the Ministry of Finance's Projects and Aid Management Division. They focus on the main project and programs monitored by the division.

Table A3.1: Land Transport

MOI (Land Transport Division -LTD)					
Project Name	**Managing Agency**	**Development Partner**	**Total Cost** (T$ million)	**Project Start Year**	**Project End Year**
Transport Sector Consolidation Project	MOI	WB (IDA)	57.50	2008	2018
Nuku'alofa Sidewalks Upgrade	MOI/CCECC	GOT, PRC	5.5	2018	2020
Integrated Urban Development Sector Program	MLNR	ADB	42.64	2019	2024
Agricultural Road Program	MOI	WB IDA 19	38.00	2021	2025
Tonga Climate Resilience Transport Project	MOI	WB (IDA)	63.34	2019	2024
Mala'ekula Royal Tomb Upgrade	MOI	GOT, PRC	10.00	2020	2022
Transport Sector (agreed, to be finalized and signed) (Aviation and roads etc.)	MOI	WB IDA 19	80.50	2021	2025

CCEC=China Engineering and Construction Company; GOT=Government of Tonga; MOI=Ministry of Infrastructure; MLNR=Ministry of Lands and Natural Resources; PRC=People's Republic of China; WB/IDA=World Bank, International Development Association

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020

Table A3.2: Sea Transport

Project Name	**Managing Agency**	**Development Partner**	**Currency of Development Partner**	**Total Cost** (T$ million)	**Project Start Year**	**Project End Year**
MOI (Marine and Port Division - MPD)						
Upgrade of Vava'u port (terminal, storage, forklift etc.)	MOI	WB	$	1.70	2015	2017
Nafanua ('Eua) Port Upgrade (now under TSCP2)	MOI	WB	$	3.00	2019	2020
TSCP2 (Nav Aids, Vessels, Ports Repairs) Ongo Niua, Eu'a & Ha'apai	MOI	WB	$	2.00	2016	2018
Nav Aids Spares	MOI	WB	$	0.35	2016	2018

Project Name	Managing Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
PAT (Marine)						
Barge for Deep Water Dredging	PAT	ADB	$	5.00	2016	2017
Tug boat (second hand)	PAT	ADB	$	17.00	2016	2019
Inter-island port/ domestic terminal (CC Resilience upgrades)	PAT	JICA	¥	56.00	2017	2019
QSW Upgrade	PAT	ADB	$	90.00	2020	2025

ADB=Asian Development Bank; JICA=Japan International Cooperation Agency; MOI=Ministry of Infrastructure; PAT=Ports Authority of Tonga; Tonga Transport Sector Consolidation Project

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.3: Air Transport

Project Name	Managing Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
MOI (Civil Aviation Division- CAD)						
Tonga Climate Resilience Transport Project (TCRTP Aviation)	MOI	WB	$	11.50	2019	2024
Transport Project (new Project Transport, possibly also under TAL	MOI	WB IDA 19	$	??	2022	2027
TAL (Aviation)						
Rainwater Collection and Disposal Fua'amotu	TAL			0.90	2015	2017
Tonga Aviation Investment Project (TAIP)	TAL	WB(IDA), PRIF	$	42.24	2012	2018
Resurfacing Ha'apai runway, apron, taxiway (TCRTP)	TAL	WB	$	9.00	2020	2024
Cargo x-ray screening	MORC	PRC		0.72	2015	2018

MOI=Ministry of Infrastructure; MORC= Ministry of Revenue and Customs; PRC= The People's Republic of China; TAIP=Tonga Aviation Investment Project; TAL=Tonga Airport Limited; TCRTP=Tonga Climate Resilient Transport Project; WB=World Bank.

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.4: Electrical Energy

Project Name	Managing Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
MEIDECC (Energy Department)						
Department of Energy/ Pacific Centre for Renewable Energy and Energy Efficiency's Green Office Building	MEIDECC	Various	Mixed	9.50	2017	2018
Promoting Energy Efficiency Through the Pacific Phase II	MEIDECC	ADB	$	3.50	2015	2016
TPL						
Tongatapu Wind (1.3 MW)	TPL	JICA + NZ-MFAT	mixed	43.00	2016	2018
Ha'apai Micro-Wind Project (11 kW)	TPL			0.30	2015	2015
Cyclone Gita Recovery Project, Nuku'alofa Network Upgrade - Area 1	TPL	NZ-MFAT	NZ$	18.48	2018	2020
Cyclone Gita Recovery Project, Nuku'alofa Network Upgrade - Area 2	TPL	ADB	$	18.92	2019	2020
Outer Islands On-Grid Energy Efficiency Project	TPL	ADB, DFAT, EU, SDCF, GEF	$	44.06	2014	2023
Outer Island Renewable Energy Project; Additional Funding	TPL	DFAT	$	3.80	2020	2023
Tonga Renewable Energy Project	TPL	DFAT, ADB, GCF	$	105.90	2019	2022
China wind power	TPL	PRC	$	12.00	2021	2022

Project Name	Managing Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
Smart Metering and Prepayment Procedures	TPL	NZ-MFAT	NZ$	8.00	2015	2017
Improved street lighting	TPL	TOP/ TPL		0.80	2013	2016

ADB=Asian Development Bank; DFAT=Department of Foreign Affairs and Trade; GCF=Green Climate Fund; TPL=Tonga Power Limited; NZMFAT=New Zealand Ministry of Foreign Affairs and Trade; PRC=The People's Republic of China

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.5: Information and Communication Technology

Project Name	Managing Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
MEIDECC						
Tonga Digital Government Support Project, includes MOJ, MEIDDEC, and MOF	MOF	WB	$	9.50	2019	2024
National Early Warning System	MEIDECC	JICA	¥	50.00	2015	2018
Tele Centra (Internet Rural Areas)	MEIDECC	ITU	$	0.30	2015	2016
E-Government (Pacific Islands Regional Connectivity Program) (includes Tonga Cable)	MEIDECC	ADB/WB	$	40.00	2015	2018
Mobile Health	MOH	ADB	$	0.30	2015	2016
TCC						
TCC Mobile Phone Next Gen. Net. (including NIIP2 T1,T2, T3 projects)	MEIDECC	WB	$	28.00	2015	2018
Expanding Services to Small Islands (After Sea line Access T9)	TCC	TCC		4.00	2016	2018
TCL						
Fiber-Optic Cable to Ha'apai, Vava'u etc.	TCL	WB	$	25.00	2015	2016

ADB=Asian Development Bank; JICA=Japan International Cooperation Agency; ITU=International Telecommunication Union; MEIDECC=Ministry of Meteorology, Energy, Information, Disaster, Environment, Climate Change and Communications; MOF=Ministry of Finance; TCC=Tonga Communications Corporation; WB=World Bank

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.6: Water Supply

Project Name	Operating Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
TWB						
Rehabilitate the Nuku'alofa water system (NUDSP)	TWB	ADB-DFAT	$	9.14	2013	2017
National Water Tank Project (7,000 total for Tongatapu)	MEIDECC	CCFT	$	1.40	2019	2021
Expand Nuku'alofa water system to growth areas	TWB	ADB-DFAT	$	11.40	2018	2018

ADB=Asian Development Bank; DFAT=Department of Foreign Affairs and Trade, Australia; MEIDECC=Ministry of Meteorology, Energy, Information, Disaster, Environment and Climate Change; TWB=Tonga Water Board

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.7: Solid Waste Management

Project Name	Operating Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
WAL						
Nuku'alofa Urban Development e Sector Project	WAL	ADB, DFAT	$	33.72	2012	2019

ADB=Asian Development; DFAT=Department of Foreign Affairs and Trade; WAL= Waste Authority Limited

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.8: Environment and Climate Change

Project Name	Operating Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
MEIDECC (Disaster Risk Management Department)						
Climate Resilience Sector Project	MEIDECC	ADB	$	45.00	2015	2019
Pacific (Regional) Resilience Program	MEIDECC	WB/IDA	$	30.00	2015	2021

MEIDECC=Ministry of Meteorology, Energy, Information, Disaster, Environment and Climate Change; WB/IDA= World Bank, International Development Association

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.9: Education

Project Name	Operating Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
MET						
Tonga College Multi-Purpose Hall	MET	Tonga College Ex Students		0.14	2016	2016
Pacific Resilience Project (PREP Tonga) School Reconstructions	MET	WB (Crisis Recovery Window)	$	28.00	2018	2021

MET=Ministry of Education and Training

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.10: Health

Project Name	Operating Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
MOH (Health)						
Eua Hospital (Niu'eiki) Perimeter fence	MOH	GOT		0.22	2016	2017
Likamonu Hospital Building, Niuatoputapu	MOH	EU	€	8.70	2016	2016

Niu'ui Hospital Building, Ha'apai (CRSP)	MOH	ADB	$	19.00	2016	2019
COVID-19 infrastructure needs	MOH	Pooled Funds	T$	4.00	2020	2020
Health Centre Staff Quarters (CRSP)	MOH	ADB	$	10.00	2019	2020
Mental Health Facility, Tolitoli Prison	MOH	GoT	T$	0.65	2017	2018
Introducing E-Government through Digital (HIS)	MoH	ADB	$	15.00	2019	2024
Replacing Asbestos Roofing at Vava'u Hospital	MOH	WB	$	0.02	2017	2018
New Storage Facility for Vaiola Hospital	MOH	GoT		0.60	2017	2018

ADB=Asian Development Bank; EU=European Union; GoT=Government of Tonga; MOH=Ministry of Health; WB=World Bank

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Table A3.11: Agriculture

Project Name	Operating Agency	Development Partner	Currency of Development Partner	Total Cost (T$ million)	Project Start Year	Project End Year
MAFF						
China-Aid Agro-Tech. Cooperation Project to Tonga (Phase V)	MAFF	PRC	T$	8.40	2018	2021
Integrated Land Agro-Ecosystem Management Systems	MAFF	GEF, FAO	$	4.68	2016	2020

FAO=Food Agricultural Organization; GEF=Global Environment Facility; MAFF=Ministry of Agriculture, Food and Forest, PRC=The People's Republic of China.

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Dataset received in December 2020.

Appendix 4: Basic Economic Analysis of Projects

A multicriteria analysis is a useful aid to project development because it establishes a ranking of projects. It does not, however, establish the viability of projects. In order to shed some light on the viability of projects, it is useful to apply basic economic analysis on a selective basis during appraisal when projects are developed to the application stage.

It is recognized that development partners will, in many cases, carry out prefeasibility or feasibility studies of larger projects in the course of project preparation. However, it is desirable for the Government of Tonga to make some assessment of project viability before development partners are formally engaged, so that there can be more confidence that projects being advanced for funding have merit.

A tool has been developed under the National Infrastructure Investment Plan (NIIP) technical assistance for the basic economic analysis of projects, applying a discounted cashflow model which leads to the calculation of indicators of viability: Net Present Value (NPV) and Internal Rate of Return (IRR). As set up, the tool considers project costs and benefits over an assumed project life of 20 years and includes a mix of financial and economic analysis. It recognizes most costs in financial terms without shadow-pricing, but also allows for the estimation of broader economic costs to the nation as a whole. Similarly, any benefits in financial terms are taken up without shadow-pricing, and there is provision to include estimates of economic benefits for the nation as a whole.

The basic economic analysis tool has been trialed with National Support Staff, through selected case studies. The first case study has been developed in relation to the Fanga'uta Evacuation Bridge and Roads Project, commencing with consideration of key assumptions for the analysis and moving on to the preparation of a discounted cashflow for the project. This is a practical approach to capacity building.

There follows an outline of the key steps involved in preparing a basic economic analysis of a project (Table A4.1 shows how the analysis can be set up in a simple spreadsheet):

- List key assumptions made in the analysis. These will vary depending on the type of project. The assumptions will often relate to the estimation of demand for the output of the project, be it *incremental* (new demand) or *non-incremental* (diverted demand). As an example, a roads project might need assumptions about the level of traffic on the road by type of vehicle. It might also need assumptions about how to value savings in vehicle operating costs or time saved by road users (two of the benefits often associated with investment in improvements to roads). The analysis can be refined over time by refining the assumptions. It is likely to take a number of iterations, involving broad consultation, to arrive at a satisfactory set of assumptions for the analysis.

- In estimating costs and benefits, the basic economic analysis attempts to make a comparison between the situation *with the project* and the situation *without the project* in order to clearly define the impact of the project. This *without* project situation is also known as the counterfactual. For example, if the road is not fixed, it may continue to deteriorate, so the net benefits from the project are even greater than if just compared to the current level of service provided by the infrastructure.

- The next step is to set up a cashflow table of project costs and benefits over the estimated life of the project, using formulae linked to the key assumptions.
- Costs include the initial capital cost of the project, and ongoing costs during the life of the project, including the cost of maintenance (both routine maintenance undertaken continuously every year and more substantial periodic maintenance undertaken less frequently).
- Specifying benefits is perhaps the most challenging aspect of the analysis. Only benefits directly attributable to the project, which can be quantified in money terms, should be included (benefits which might spin-off from a project often require additional capital investments, which should be subject to basic economic analyses of their own). It is possible to document other benefits which cannot be readily quantified, in support of the basic economic analysis.
- It is sometimes appropriate to include a residual figure for the project at the end of the project life. This could be a cost if there are costs involved in closing the project, or a benefit if the project retains a residual value at the end of the project life.
- The spreadsheet calculates net project benefits (total project benefits minus total project costs) for the cashflow.
- The spreadsheet then uses discounting (accounting for the time value of money) to calculate indicators of viability: NPV and IRR, drawing on the flow of net project benefits. In this way future benefits and costs are brought back to present day values. NPV is calculated for a selected discount rate and is the difference between the discounted (present day) value of the stream of benefits over the life of the project and the discounted value of the stream of costs. IRR is the discount rate for which the NPV of the project is zero (i.e., discounted benefits equal discounted costs).
- More advanced analysis requires prices to be adjusted to remove distortions, e.g., in exchange rates and labor rates, and as a result of taxes and subsidies. The basic economic analysis model considered here does not make these more technically advanced adjustments.
- Accessing case studies of similar projects in similar contexts is a good way to get ideas about how your project could be analyzed.
- Sensitivity analysis can be undertaken by varying key assumptions and seeing the impact on the NPV and IRR results. This might involve tracing the impact of an increase in capital cost, a delay or reduction in the realization of benefits, etc.

A template for the basic economic analysis of projects is shown in Table A4.1. It is to be noted that the key assumptions and discounted cashflow model need to be tailored individually to the project under consideration. While this involves a basic level of economic analysis of a project, the process of preparing and critiquing the basic economic analysis is a great way to develop a deeper understanding of the project and its contribution to national development.

Table A4.1: Example of Basic Economic Analysis of an Infrastructure Project

Provided also separately as an excel file to PMO – Source: Authors

Example of Basic Economic Analysis																						
						How does economic analysis work?																
						- list key assumptions made in the analysis (the analysis can be refined over time by refining the assumptions)																
Sector: xx						- set up a cash flow table of project costs and benefits over the estimated life of the project, using formulae linked to the key assumptions																
Project: aa						- the spreadsheet calculates net project benefits (total project benefits minus total project costs) for the cash flow																
						- the spreadsheet uses discounting (accounting for the time value of money) to calculate indicators such as Net Present Value (NPV) and Internal Rate of Return (IRR)																
						- specifying benefits is perhaps the most challenging aspect of the analysis (only benefits attributable to the project should be included)																
						- more advanced analysis requires prices to be adjusted to remove distortions e.g. in exchange rates and labour rates, and as a result of taxes and subsidies																
						- accessing case studies of similar projects in similar contexts is a good way to get ideas about how your project could be analysed																
						- sensitivity analysis can be undertaken by varying key assumptions and seeing the impact on the NPV and IRR results																
Key assumptions behind the economic analysis:																						
(indicative examples)	Assumptions/baselines	Capital cost	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
		(T'000)																				
Assumptions re costs																						
Phasing of project construction		10,000	50%	50%																		
Periodic refurbishment (% of initial cost)	10%																					
O&M begins year 3 (% of capital cost)	5%																					
End of life costs in final year (% of initial cost)	10%																					
Other economic costs (if any)																						
Assumptions re benefits																						
Benefit 1 (e.g linked to population)																						
- population growth rate	1%																					
- population	106,000																					
- benefit per head ($T)	$10.00																					
Benefit 2 (e.g. linked to traffic)																						
- traffic growth rate	1.5%																					
- annual traffic (baseline 100 vehicles per day)	36,500																					
- vehicle cost saving (av. $T per trip)	$5.00																					
Benefit 3 (e.g. linked to quality of supply)																						
- households receiving improved service	1,200																					
- value to household ($T per week)	$5.00																					
Other economic benefits (if any)																						
Cash Flow			**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**	**Year 19**	**Year 20**
			(T'000)	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**	**(T'000)**
Project costs																						
Capital costs			5,000	5,000									1,000									
Operating and maintenance costs					500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
End of project life costs (net)																						1,000
Total project costs			**5,000**	**5,000**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**1,500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**500**	**1,500**
Project benefits																						
Benefit 1					1,060	1,071	1,081	1,092	1,103	1,114	1,125	1,136	1,148	1,159	1,171	1,183	1,194	1,206	1,218	1,231	1,243	1,255
Benefit 2					183	185	188	191	194	197	200	203	206	209	212	215	218	221	225	228	232	235
Benefit 3					312	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312	312
Total project benefits			**0**	**0**	**1,555**	**1,568**	**1,581**	**1,595**	**1,609**	**1,623**	**1,637**	**1,651**	**1,665**	**1,680**	**1,695**	**1,710**	**1,725**	**1,740**	**1,755**	**1,771**	**1,787**	**1,802**
Net project benefits			**-5,000**	**-5,000**	**1,055**	**1,068**	**1,081**	**1,095**	**1,109**	**1,123**	**1,137**	**1,151**	**165**	**1,180**	**1,195**	**1,210**	**1,225**	**1,240**	**1,255**	**1,271**	**1,287**	**302**
Discounted Cash Flow																						
Net present value (NPV)																						
@ 9% discount rate			-942																			
@ 6% discount rate			1,100																			
Internal rate of return (IRR)			7%																			

Appendix 5: Outcomes in the Infrastructure Sector

This appendix covers desired organizational outcomes associated with Pillar 4 and Pillar 5 of the Tonga Strategic Development Framework (TSDF) II.

A5.1 Pillar 4: Infrastructure and Technology Inputs

A5.1.1 Description and Linkages to Other Pillars

Infrastructure consists of the human-made physical and organization structures and facilities—such as buildings, roads, air and marine ports, utilities, sports facilities, schools, hospitals, etc.—that are needed for a society or economy to function. How we build, use, and maintain our infrastructure depends on our technology and human capacities. Technology consists of the collection of tools, machinery, arrangements, and procedures at our disposal and how we use them to organize our institutions and human activities in an inclusive and sustainable manner.

Technology and infrastructure interact with our human capacities to determine how we can use our natural resources and environment in an inclusive and sustainable manner. The type of technology and infrastructure we choose and where we place them has important consequences for supporting inclusive and sustainable institutions. This is particularly important in Tonga, where we have many small communities dispersed across many islands. If we disperse our infrastructure too widely, we will not be able to build up sufficient linkages to promote sustainable growth. On the other hand, if we concentrate our infrastructure too much, to create growth hubs in the key centers, we are limiting opportunities elsewhere. For example, we cannot provide airports on all islands, but we must provide jetties and/or wharves for basic access by sea. Inclusive development thus requires a minimum standard of infrastructure. Technological change is opening up opportunities for supporting smaller communities in more cost-effective ways that enhance inclusion and participation. Examples include the provision of distance education and health services through new communications technology, and the development of smaller-scale alternative energy systems.

We are not unique in this balancing act. Steady migration from outer islands to the rural areas and urban center on Tongatapu is ongoing, as in most of the rest of the world. This movement is driven by the reality of limited opportunities in small communities, and in turn has consequences for decisions on where to put new infrastructure to meet changing population pressures.

The more expansive our world view, the more willing we will be experiment and apply the scientific method to problem-solving. The more willing we are to apply new technological and infrastructure solutions, the greater the range of institutional arrangements we can develop. This will then increase the range of goods, services, and other benefits we can generate for everyone. This is only possible, however, if we chose values that allow us to develop the skills, attitudes, and behaviors in a more inclusive manner.

It is not all a one-way process, however. Technology and infrastructure can be costly to put in place and maintain. They may require skills that we do not have. If used inappropriately infrastructure development can damage fragile environments and impact negatively on human wellbeing. Such concerns need particular attention in small, fragile islands such as Tonga. The Tonga Strategic Development Framework (TSDF) is built on the understanding of both the benefits and costs of different knowledge, attitudes, technologies, and infrastructure.

To ensure more inclusive and sustainable growth and development, Pillar 4 organizational outcomes require supporting government outputs to place greater focus on ensuring that infrastructure and technology is made more widely available to all groups throughout Tonga, within the constraints of cost and size.

A5.1.2 Pillar 4 Organizational Outcomes

Organizational Outcome 4.1: More reliable, safe, and affordable energy services

Energy is a fundamental requirement for developing a progressive and dynamic economy. It is a prerequisite for an improved quality of life. It helps to improve access to clean water, effective education and health services, food security, and entertainment. It also helps improve communications and eases the movement of goods, services, and people across our dispersed archipelago. Universal access to modern energy sources, including decreased dependence on fossil fuels and increased utilization of feasible renewable energy technologies and improved energy efficiency, is critical for our vision.

> *TSDF Organizational Outcome 4.1:* More reliable, safe, affordable, and widely available energy services built on an appropriate energy mix moving towards increased use of renewable energy.

Organizational Outcome 4.2: More reliable, safe, and affordable transport services.

Accessible, safe, and reliable transport services based on good infrastructure and competitive services are important for more dynamic and inclusive growth across the country. Good transport improves links within Tonga and between Tonga and the outside world. It facilitates the movement of people for business and pleasure. When designed to address the needs of vulnerable groups it can help improve their participation and inclusion. It helps lower the cost of goods and increases opportunities for tourists and the export of goods and services. As recent experience has shown, it is important that these services are also safe.

> *TSDF Organizational Outcome 4.2:* More reliable, safe, and affordable transport services on each island, connecting islands and connecting Tonga with the rest of the world by sea and air, to improve the movement of people and goods.

Organizational Outcome 4.3: More reliable, safe, and affordable information and communication technology (ICT) used in more innovative ways.

Modern ICT is of particular importance to a progressive Tonga. It can make a major contribution to mitigating the difficulties of remoteness and distance by providing accessible communication formats that enhance the engagement of vulnerable and excluded groups. It can help improve knowledge, services delivery, and trade. In times of disaster, reliable communications can play a critical role both before and after. The rapidly falling costs of ICT and the increasingly small scale at which it can operate, is particularly important for addressing our small economies of scale and the need for inclusive communications and access to the internet.

> *TSDF Organizational Outcome 4.3:* More reliable, safe, and affordable information and communication technology used in more innovative and inclusive ways, linking people

across Tonga and with the rest of the world, delivering key services by government and business, and drawing communities more closely together.

Organizational Outcome 4.4: More reliable, safe, and affordable buildings and other structures.

Structures that make greater use of safe and appropriate construction technology will improve the services provided by those structures, help to lessen maintenance, save on energy usage, and increase resilience to disasters. It is best to build these improvements in from the start, however, interventions such as retrofitting homes and other infrastructure can play an important part. Updated building codes, with stronger compliance and awareness, are also essential. More resilient and accessible building will help groups with special needs, as well as generally supporting more inclusive growth and development and quicker recovery after disasters.

> *TSDF Organizational Outcome 4.4:* More reliable, safe, and affordable buildings and other structures, taking greater account of local conditions, helping to lower construction, maintenance and operating costs, increase resilience to disasters, improve the quality of services provided, and facilitate increased access.

Organizational Outcome 4.5: Improved use of research and development focusing on priority needs based on stronger foresight.

There is limited benefit from us engaging in our own high-level research and development when it is already undertaken by many others and generally available to us. However, we must become more willing to try new ideas, to test them under local conditions and to engage with others in the region and beyond with similar interests to us. This is a central part of becoming more innovative within a progressive Tonga. Greater and inclusive access to the resulting knowledge is important.

> *TSDF Organizational Outcome 4.5:* Improved use of relevant research and development that focuses on our priority needs, drawing on improved foresight, helping to solve technical and other constraints to facilitate more rapid improvements to our institutions and better use of our resources and environment, so that we may progress more rapidly and be more resilient in the face of future risks.

The following was added in a 2017 review:

> *TSDF Organizational Outcome 4.6:* More reliable, safe, affordable, and available water supply and control, and sanitation services meeting the needs of everyone, managed in a sustainable manner, taking account of impacts of climate change.

A5.2 Pillar 5: Natural Resources and Environment Inputs

A5.2.1 Description and Linkages to Other Pillars

Our wider natural environment provides the inputs we require for our growth and development. There are many such resources, including land or soil, sea, reefs, fresh water, air, minerals, flora, and fauna. These include geographic conditions such as the types of land formation, the distribution and size of our islands, the distance from larger land masses, in addition to the local weather and wider climatic conditions. While land may be considered part

of the natural resource environment, land holds a particular and important cultural role within Tongan tradition. Our unique land tenure system is integral to our culture and to access to land.

With the right skills, technology, and infrastructure, we can greatly enhance the contribution natural resources make to inclusive development and the TSDF Vision for Tonga. Appropriate management of our natural resources and our environment can help protect them and ensure that they provide benefits to current and future generations and ensure that we pass on our inheritance well preserved and improved. Part of this management involves limiting the damage from extreme natural events such as cyclones, earthquakes, tidal waves, other flooding, and droughts. Particular attention must also be made to the increased risks resulting from climate change.

Without a minimum of natural resources, and a reasonably stable environment, it would be impossible for us to make a basic livelihood let alone pursue long-term inclusive and sustainable development. To move beyond a basic level of material consumption, the appropriate use, access, protection, and management of our natural resources and environment are essential. This is true for all countries, but is particularly the case for those of us living on small, dispersed islands with limited resources, prone to a range of extreme natural events that can severely undermine the effectiveness of the TSDF's other four pillars.

Our limited resource base and sensitive environment require people with the right skills and attitude to manage and protect them. This includes limiting corruption and a willingness to apply prudent rules and regulations in a transparent and honest manner. These requirements will be particularly important if the potential for seabed mining comes to fruition. In this case, a massive boost in earnings could threaten the sustainability of our institutions and future progress.

We also need access to appropriate technologies and infrastructure that support rather than threaten our sensitive environment while providing greater access. The right skills are essential for choosing these and ensuring that they are used properly. Because of our conditions, technology and infrastructure from larger more resource-rich countries may not always be completely appropriate. These need to be adapted to our conditions. Lack of skills and appropriate attitudes also mean that we may not manage the resources and environment properly through a mix of short sightedness and greed. This will limit access and undermine our vision.

To ensure more inclusive and sustainable access to well-maintained and protected resources, organizational outcomes under Pillar 5 require supporting government outputs to place greater focus on ensuring that their services better address the environmental, disaster management, and other needs across the whole of Tonga.

A5.2.2 Pillar 5 Organizational Outcomes

Organizational Outcome 5.1: Improved land use planning, management, and administration for private and public spaces.

Tonga has a complex land system, designed by Tupou I to provide wide access to land and protect families from poverty. This system has many strengths, including avoiding the permanent loss of access to land services. Many countries have made significant economic progress with a land lease system: freehold is not a necessary requirement for development. On the other hand, an effective lease system and efficient land management and planning for the allocation of public faculties, transport, and other needs is required. The lack of such

planning and management, combined with inefficient administration of land laws and regulations in Tonga, is resulting in inefficient urban and rural development and lack of space for important public spaces and infrastructure. It is also slowing development. Increased monetization of traditional land practices is also undermining the design of the land access system.

> *TSDF Organizational Outcome 5.1:* Improved land use planning, management, and administration with stronger and appropriate enforcement, which ensures the better provision of public spaces as well as private spaces, ensures more appropriate placement of infrastructure, better protects the environment and limits risks, so as to improve safety conditions both for communities and business, working in harmony with a better application of the traditional land management system.

Organizational Outcome 5.2: Improved use of natural resources for long-term flow of benefits.

It is easy to overexploit resources to promote quick incomes and gross domestic product growth, as we have seen many times before, mostly recently with the over exploitation of sandalwood and sea cucumber stocks. We know this is not sustainable, though the temptation for a quick profit is great.

Careful husbandry of these renewable stocks would help generate long-term, sustainable, and widely dispersed income-earning opportunities for the Tongan people. Careful use, planning, and management of our fragile land, lagoons, and reefs are central to ensure that these resources contribute to sustainable growth and services to our people. This includes ensuring that the negative impacts of development on the environment are kept to a minimum by long-term planning, compliance with national legislation, and providing the necessary management tools to all stakeholders. Protection of national assets, such as mangroves and coral reefs, also plays a key role in mitigating the impact of extreme natural events. Seabed minerals have been identified in our waters. Currently, these are not economically viable to mine, but the day when they are may not be far off. We are only too aware of the "resource curse" that this could bring, as seen both within our region and across many parts of the world. This "curse" can completely undermine all of our institutions and the inclusive and sustainable growth that we seek.

> *TSDF Organizational Outcome 5.2:* More equitable, inclusive, sustainable, and appropriate management of the use of renewable and nonrenewable natural resources to maintain a steady long-term flow of benefits, rather than booms followed by busts and long recovery periods.

Organizational Outcome 5.3: Cleaner environments with improved waste recycling.

Traditional societies produced limited waste and pollution, most of which was biodegradable. Modern trade and consumption generate vast amounts of waste that can easily lead to the pollution of our sensitive environment. There is a serious lack of commitment to managing waste disposal with wide dumping of waste in inappropriate and unsightly ways. Poor waste management also creates conditions which increases the risk of communicable disease. Opportunities for landfill are limited. Efficient management, minimization, and recycling of waste are essential.

> *TSDF Organizational Outcome 5.3:* Cleaner environments and less pollution from household and business activities building on improved waste management, minimization

and recycling, making conditions safer, healthier and more pleasant for residents and visitors.

Organizational Outcome 5.4: Improved resilience to extreme natural events and impacts of climate change.

Tonga is one of the most vulnerable countries in the world with respect to natural disasters in the form of earthquakes, tsunamis, cyclones, and general flooding. Climate change is only likely to make some of these events more serious. The potential for damage can be lessened by the application of better technologies, improved communications, more education on dealing with disaster and response awareness, and more appropriate infrastructure, in addition to limiting building on more disaster-prone areas. Once a natural disaster has happened, it is necessary to be able to move quickly into action to help communities avoid further death, ill health, and damage. These services are particularly important in more vulnerable and isolated groups.

TSDF Organizational Outcome 5.4: Improved national and community resilience to the potential disruption and damage to well-being, growth, and development from extreme natural events and climate change, including extreme weather, climate and ocean events, with a particular focus on the likely increase in such events due to climate change.

Mapping ministries, departments, and/or agencies (MDAs) and private enterprises to organizational outcomes in the TSDF pillars is shown in Table A5.1. MDAs and private enterprises may map across a number of pillars and underlying sectors. It is thus not possible to put each MDA into one sector, or even one pillar. As a result, MDAs may have projects in more than one sector and/or more than one pillar.

Table A5.1: Organizational Outcomes Showing Degree of Support from Organizations

Pillars		Organizational outcomes	Government Ministries, Departments and Agencies																										Other				
			Palace Of	LA	Audit	CPR	MFAT	HMAF	PMO	MFNP	MRC	MPE & PE	MCTL	MOJ	AGO	MPPF	MOH	MET	MIA	MAFFF	MOI	MLNR	PSC	STATS	MEIDECC	NRBT	business	community	CSOs *	Churches
1. Economic Institutions	1.1	Improved macroeconomic management & stability with deeper financial markets																															
	1.2	Closer public/private partnership for economic growth																															
	1.3	Strengthened business enabling environment																															
	1.4	Improved public enterprise performance																															
	1.5	Better access to, and use of, overseas trade & employment, and foreign investment																															
2. Social Institutions	2.1	Improved collaboration with & support to civil society organizations and community groups																															
	2.2	Closer partnership between government, churches & other stakeholders for community development																															
	2.3	More appropriate social & cultural practices																															
	2.4	Improved education & training providing life time learning																															
	2.5	Improved health care and delivery systems (universal health coverage)																															
	2.6	Stronger integrated approaches to address both communicable & non-communicable diseases																															
	2.7	Better care & support for vulnerable people, in particular the disabled																															
	2.8	Improved collaboration with the Tongan diaspora																															
3. Political Institutions	3.1	More efficient, effective, affordable, honest, transparent & apolitical public service focussed on clear priorities																															
	3.2	Improved law & order and domestic security appropriately applied																															
	3.3	Appropriate decentralization of government admin with better scope for engagement with the public																															
	3.4	Modern & appropriate Constitution, laws & regulations reflecting international standards of democratic processes																															
	3.5	Improved working relations & coordination between Privy Council, executive, legislative & judiciary																															
	3.6	Improved collaboration with development partners ensuring programs better aligned behind gov't priorities																															
	3.7	Improved political and defence engagement within the Pacific & the rest of the world																															
4. Infrastructure & Technology Inputs	4.1	More reliable, safe and affordable energy services																															
	4.2	More reliable, safe, affordable transport services																															
	4.3	More reliable, safe and affordable information & communication technology (ICT) used in more innovative ways																															
	4.4	More reliable, safe and affordable buildings and other structures																															
	4.5	Improved use of research & development focussing on priority needs based on stronger foresight																															
5. National Resources & Environment Inputs	5.1	Improved land use planning, administation & management for private & public spaces																															
	5.2	Improved use of natural resources for long term flow of benefits																															
	5.3	Cleaner environment with improved waste recycling																															
	5.4	Improved resilience to extreme natural events and impact of climate change																															

Level of institutional responsibility for Organizational Outcome to include in organizational outputs: significant | moderate | partial | none

* Tonga Health Promotion Foundation leads on coordination for National NCD Committeed covering government and non-government

HMAF = His Majesty's Armed Forces; MAFF = Ministry of Agriculture Forestry and Fisheries; MCA = multicriteria assessment; MET = Ministry of Education and Training; MEDIDECC= Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MIA = Ministry of Internal Affairs; MJP-J = Ministry of Justice and Police; MJP-PD = Ministry of Justice and Prisons; MOFi= Ministry of Fisheries; MOH = Ministry of Health; MPFS-FED= Ministry of Police and Fire Services, PAT = Ports Authority of Tonga; T$ = pa'anga; TAL=Tonga Airports Limited; TCC = Tonga Communications Corporation; TCL=Tonga Cable Limited; TPL=Tonga Power Limited; T Post=Tonga Post; TMCL=Tonga Market Corporation Limited; TPL = Tonga Power Limited; TWB = Tonga Water Board; WAL = Waste Authority Limited.

Source: Consulting team exploratory estimation

Appendix 6: Guidance for an Asset Management Plan

Ministries, departments, and/or agencies (MDAs), private enterprises, and the Ministry of Finance (MOF) in Tonga are tasked with keeping a fixed asset inventory of public infrastructure. It is documented in section 79 of the Treasury instructions of the Public Finance Management Act 2010.

The asset register covered by the MOF instruction has, however, essentially an accounting and financial function to document the fair value of operated public infrastructure. It is not aimed at managing and optimizing the functionalities and operability of the infrastructure.

This appendix focuses on recommendations on how to improve infrastructure asset management with the help of an asset management plan (AMP). The objective of an AMP is to strengthen the asset registers currently under implementation by many MDAs and private enterprises, to optimize the development, use, and maintenance of infrastructural capital investment through their entire life cycle, from inception to retirement. This allows the entities managing these infrastructures to achieve highest stakeholder satisfaction at least cost for all over the life of the assets.

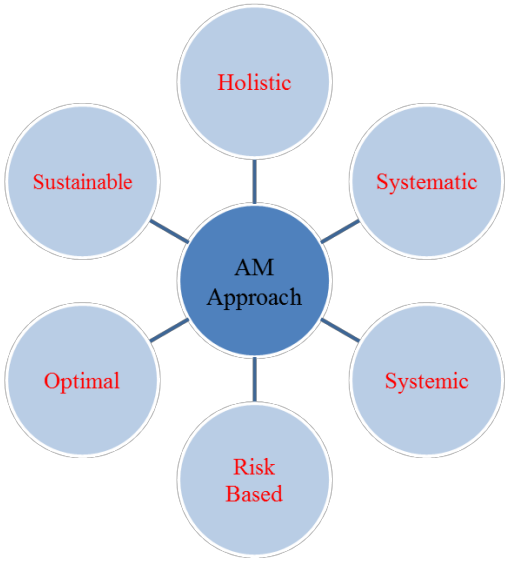
The benefits of implementing an infrastructure AMP at the MDA level and nationally in Tonga would have the following advantages:

(i) improvement in service provided by assets, which will result in enhanced public satisfaction;
(ii) reduction in asset failures in service, which will result in improved public health and safety and reduce the risk of adverse environmental impacts;
(iii) reduced asset life cycle costs, through optimization of operations and improved economic and financial returns on investment;
(iv) rational and objective investment decisions, allowing demonstration to all stakeholders that the investments produce the best value for money;
(v) prioritization of investments based on the risk of assets' failure, thus assuring economic efficiency of investments; and
(vi) sustainable asset performance and service levels.

Ideally, asset management systems applied in Tonga should follow and be compliant with principles of internationally accepted asset management standards PAS-55[19] or International Organization for Standardization (ISO) 55001. Figure A6.1 summarizes the key elements of a PAS-55 compliant asset management framework.

[19] "PAS-55: Asset Management - Specification for the Optimized Management of Infrastructure Assets" - BSI

Figure A6.1: Key Elements of a Compliant Asset Management Framework



AM = Asset Management

Source: Asset Management - Specification for the Optimized Management of Infrastructure Assets" - BSI

In this context, the infrastructure AMP recommended to be implemented in Tonga should preferably

(i) build sufficient resilience in assets' design to cope with the operating environment and climate change risks at the time of initial procurement;
(ii) monitor asset condition through simple, practical, and low-cost techniques and taking prompt corrective action when needed, to prevent asset impairment;
(iii) replace the current reactive maintenance strategy with a planned preventative maintenance program, to avoid asset failures in service, thus extending asset life;
(iv) maintain adequate records to allow benchmarking of assets' performance and creating institutional memory;
(v) strengthen institutional capacities for asset management and asset maintenance;
(vi) adopt an objective, risk-based approach for determining assets' end of life, so the investments into asset renewal and replacement could be prioritized through rational and objective criteria; and
(vii) include public feedback on the quality of service provided by infrastructure assets, and consider this in asset management and investment decisions.

Ideally the AMP framework to be developed and applied in Tonga for public infrastructure would include the following elements:

(i) a revised asset management policy beyond financial management,
(ii) a sectoral asset management register and procedures,
(iii) a sectoral asset condition assessment guide,
(iv) an asset maintenance guide, and
(v) an asset climate change resiliency guide.

It is not possible, within this short guidance, to cover all these elements in detail. The subsequent sections therefore briefly address (i) what should be the preferable content of an

infrastructure asset register, (ii) how to estimate the remaining service potential of an infrastructure asset, (iii) what are some basic elements and typical costs of asset maintenance, and (iv) how to build climate change resilience.

A6.1 Asset Register

To be useful and effective, an asset register should include a series of columns covering assets attributes to be filled and updated periodically (at least once a year) to keep track on the status of the assets.

The four first columns should cover basic information defining the assets themselves including at least two levels of asset classes. Tables A6.1 to A6.4 exemplify for a few subsectors (within the transportation sector) the type of information to be shown under the asset class category.

Table A6.1: Level 1—Infrastructure Asset Classes and Management Responsibilities

Asset Class	Abbreviation	MDA or Private Enterprise	Abbreviation
Transportation Road	RDS	Ministry of Infrastructure	MOI-LTD
Transportation Marine	MAR	Ports Authority Tonga/ Ministry of Infrastructure	PAT/ MOI-MPD
Transportation Aviation	AVI	Tonga Airports Limited	TAL/ MOI-CAD
Water & Sanitation	WAT	Tonga Water Board	TWB
Electricity	ENE	Tonga Power Limited	TPL
Internet Cable	ICT	Tonga Cable Limited	TCL
Communication	ICT	Tonga Communication Corporation	TCC
Solid Waste	SWA	Waste Authority Limited	WAL
Education	EDU	Ministry of Education and Training	MET
Health	HSE	Ministry of Health	MOH
Fire and Emergency	FIE	Ministry of Police and Fire Services	MPFS-TFES
Youth & Sport	SPR	Ministry of Internal Affairs	MIA
Postal services	POS	Tonga Post Ltd.	TPost

Asset Class	Abbreviation	MDA or Private Enterprise	Abbreviation
Environment	ENV	MEIDECC20	MEIDECC-Env.D
Disaster Risk Management	DRM	MEIDECC	MEIDECC-DRMD
Coastal Protection	COA	MEIDECC	MEIDECC-CCD
Meteorology	MET	MEIDECC	MEIDECC-MET
Constitutional	CON	Legislative Assembly	OLA
Justice Law & Order	JLO	Ministry of Justice & Prisons - Justice	MJP-J
	JLO	Ministry of Justice & Prisons - Prison Service	MJP-PS
	JLO	Ministry of Police, Fire & Services - Tonga Police	MPFS-TP
Other HQ Central Govt	HQCG	[any ministry HQ not included elsewhere)	
Local Govt Admin	LGO	Ministry of Internal Affairs - LGA (moving to PMO in 2021) - and other central government offices on outer islands	MIA, PMO, other national MDAs
CERT/E-governance	ICT	MEIDECC	MEIDECC-CERT
Fire and Emergency	FIE	Ministry of Police and Fire Services - Fire & Emergency Services	MPFS-TFES
Defence	DEF	His Majesty's Armed Forces	HMAF
Agriculture and Forestry	AGR	Ministry of Agriculture, Food, Forestry	MAFF
Fisheries	FIS	Ministry of Fisheries	MOFi
Market & retail	MKT	MKT	

[20] Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications

Asset Class	Abbreviation	MDA or Private Enterprise	Abbreviation
Tourism	TOU	Ministry of Tourism	MOT

HMAF = His Majesty's Armed Forces; MAFF = Ministry of Agriculture Forestry and Fisheries; MCA = multicriteria assessment; MET = Ministry of Education and Training; MEDIDECC= Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MIA = Ministry of Internal Affairs; MJP-J = Ministry of Justice and Police; MJP-PD = Ministry of Justice and Prisons; MOFi= Ministry of Fisheries; MOH = Ministry of Health; MPFS-FED= Ministry of Police and Fire Services, PAT = Ports Authority of Tonga; T$ = pa'anga; TAL=Tonga Airports Limited; TCC = Tonga Communications Corporation; TCL=Tonga Cable Limited; TPL=Tonga Power Limited; T Post=Tonga Post; TMCL=Tonga Market Corporation Limited; TPL = Tonga Power Limited; TWB = Tonga Water Board; WAL = Waste Authority Limited.

Source: Authors, 2021

Table A6.2: Level 2—Typical Asset Location

Island Groups Where the Assets are Located	District or Community Where the Asset is Located	Location Code (to be defined)
Tongatapu	.....	TT- 01
	.....	TT-02
	.....	.....
Vava'u	.....	VV-01
	.....	VV-02
	.....	.....
Ha'apai	.....	HP-01
	.....	HP-02
	.....	.....
Eua	.....	EA-01
	.....	EA-02
	.....	.....
Ongo Niua	.....	NI-01
	.....	NI-02
	.....	.....

Source: Consulting team recommended template, 2021

Table A6.3: Level 3—Typical Facility and Function Asset Class

Facility	Asset Class (parent asset)	Code (to be defined)
Airport	Building	.....
	Runway	.....
	Taxiway	.....
	Aircraft navigation equipment	.....
	Fire and rescue equipment	.....
	.....	.....
Road Transport	Ring road	.....
	Secondary sealed roads	.....
	Unsealed mining roads	.....
	Machinery and equipment	.....
	Motor vehicles (transport buses)	.....
	.....	.....
Marine Port	Building	.....
	Wharves	.....
	Harbor without berthing facilities	.....
	Offshore mooring buoy	.....
	Cranes	.....
	Forklifts	.....
	Container storage	.....
	Jetties	.....
	.....	.....
.....	.....	.....

Source: Consulting team recommended indicative template

Table A6.4: Level 4—Typical Asset Components

Component	Asset Class (subsidiary asset)	Code (to be defined)
Buildings	Foundation	.....
	Exterior cladding	.....
	Roof	.....
	Windows and doors	.....
	Interior walls and flooring	.....
	Air conditioning	.....
	Plumbing	.....
	Electrical	.....
	.....	.....
Runway, Taxiways	Road base	.....
	Sealed pavement	.....
	Drainage gutters	.....
	Markings	.....
	Security fences	.....
	.....	.....
Sealed Roads	Road base	.....
	Sealed pavement	.....
	Curbs and drainage gutters	.....
	Markings	.....
	Bridges	.....
	.....	.....
Navigation Equipment	Nav-aid Equipment	.....
	Mounting Bases or Towers	.....
	....	.....
Harbor/Wharf	Structural supports	.....
	Decking and padding	.....

Component	Asset Class (subsidiary asset)	Code (to be defined)
	Mooring systems	.....
	Approach channels	.....
	.....	.....
Offshore mooring buoy	Buoy body	.....
	Buoy anchor	.....
	Freight transfer system	.....
	.....	.....
Cranes	Boom	.....
	Girder	.....
	Motors	.....
	Controls	.....
	.....	.....

Source: Consulting team recommended indicative template, 2021

A6.2 Asset Health Index and Remaining Service Potential

Table A6.5 provides a sample list of possible attributes to be shown in the rows of an asset register to allow an adequate management and oversight of the assets. It also provides some simplified guidance on how to estimate the health index and the remaining service potential of an asset.

Table A6.5: Possible Attributes to be Recorded in an Asset Register

Row	Asset Attributes to be Recorded in Asset Register	Purpose
1	Public sector entity responsible for managing the asset	Owner/manager
2	Code for location of the asset	Location
3	Name of facility (parent asset)	Asset
4	Asset class (subsidiary asset)	Description
5	Asset identification	Asset identifier
6	Make, model, type of asset	Description
7	Other key characteristics of assets (size, rating, capacity)	Description

Row	Asset Attributes to be Recorded in Asset Register	Purpose
8	Year of manufacture	Description
9	Year when placed in service	Description
10	Climate change and DRM resilience index	Climate change and DRM resilience management
11	Accounting life (years)	Finance management
12	Depreciation rate	Finance management
13	Initial book value of asset	Finance management
14	Accumulated depreciation at the end of last year	Finance management
15	Book value at the beginning of current year	Finance management
16	Depreciation allowance for current year	Finance management
17	Estimated asset replacement cost during current year	Finance management
18	Estimated maintenance cost during current year	Maintenance management
19	Physical condition rating	Maintenance management
20	Asset functional obsolescence rating	Maintenance management
21	Asset maintenance history rating	Maintenance management
22	Asset health index (%)	Maintenance management
23	Asset remaining service potential (year)	Maintenance management
24	Investment needs for repair/ renewal or replacement	Maintenance management
.....	.....	
....	Additional columns for PCRAFI asset data attribute	
....	.....	

Source: PRIF Asset Condition Assessment Methodology, 2021

Tables A6.6 to A6.8 describe how the various attributes mentioned for rows 19 to 21 can be scored from 1 to 5, based on relatively simple definitions, to arrive at an estimation of the health index and remaining service potential of an asset.

The asset health index is the percentage of the sum of the observed scores for the three attributes (physical condition, functional obsolescence, and maintenance history) over the sum of the maximum scores for the three attributes. The estimated remaining service potential is the multiplication of the health index by a typical useful life (in years) of the asset when newly installed (Table A6.9).

Table A6.6: Asset or Asset Component's Physical Condition Rating

Asset or Asset Component's Operating Condition	Condition Rating
Asset or asset component is in "brand new" condition, with no defects and no impairment; excellent operating condition, meeting or exceeding the service level requirements. Only routine maintenance is needed	5
Asset in "like-new" condition, with no defects and no impairment; good operating condition, meeting the service level requirements. Only routine maintenance is needed	4
Asset or asset component shows minor age-related wear, with minor defects and/or minor degradation in operating performance; the lower threshold of required service level is still being met .	3
Asset or asset component has worn out to a stage where its performance no longer meets acceptable performance level . However, through refurbishment and/or renewal it is possible to improve the asset's performance to acceptable levels.	2
Asset or asset component has degraded to a stage that its performance cannot be restored to acceptable levels through renewal and asset must be replaced.	1
Asset or asset component has failed in service or it poses the risk of catastrophic failure in service, posing serious public safety risks, and must be retired immediately and replaced.	0

Source: PRIF Asset Condition Assessment Methodology, 2021

Table A6.7: Asset or Asset Component's Functional Obsolescence Rating

Degree of Functional Obsolescence	Condition Rating
Asset design and construction fully meet the functional requirements, conform to the applicable standards and regulations, and are the most economically efficient option available.	5
Asset design and construction fully meet the functional requirements, conform to the applicable standards and regulations, and represent one of the economically efficient options.	4
Asset design and construction fully meet the functional requirements, conform to the applicable standards and regulations, but other options offering greater economic efficiency are available.	3
Asset design or construction do not meet the full functional requirements and are not economically efficient; original suppliers no longer manufacture the product.	2

Asset design or construction do not meet the full functional and regulatory requirements and are not economically efficient; original suppliers no longer manufacture spare parts.	1
Asset or asset component has failed in service or poses the risk of catastrophic failure in service, posing serious public safety risks, and must be retired immediately and replaced.	0

Source: PRIF Asset Condition Assessment Methodology

Table A6.8: Asset or Asset Component's Maintenance History Rating

Asset's Maintenance History	Condition Rating
Asset maintained in accordance with the maintenance strategy throughout its service life, with adequate funding available for maintenance.	5
Asset maintained in accordance with the maintenance strategy during most of its service life, with adequate funding available for maintenance.	4
Asset maintained in accordance with the maintenance strategy since last renewal, with adequate funding available for maintenance.	3
Asset has not been maintained in accordance with the maintenance strategy during most of its service life, which has resulted in significant impairment of asset condition.	2
Asset has not been maintained in accordance with the maintenance strategy during most of its service life, which has resulted in major impairment of asset condition.	1
Asset has not been maintained in accordance with the maintenance strategy during most of its service life, which has resulted in major impairment of asset condition and asset is at end of its service life.	0

Source: PRIF Asset Condition Assessment Methodology, 2021

Table A6.9: Typical Useful Life of Infrastructure Assets

Asset Class	Typical Useful Life (years)
Residential type of building (standard)	40
Office/institution building (superior)	60
Sealed road - base pavement	45
Sealed road – road surface	15
Unsealed road	10

Runway, taxiway – base pavement	90
Runway, air strip surface – moderate use	45
Navigation aids, fences	25
Wharf and jetties	80
Mooring buoys	20
Water supply distribution system	20–40
Electrical fossil fuel generators	10
Heavy-duty motor vehicle and machinery	10
Photovoltaic solar	25
Wind turbine	15
Electricity distribution	30–50
Telecommunications; information and communication technology	20–30
Coastal protection assets	30–60

Source: PRIF Asset Condition Assessment Methodology

A6.3 Asset Maintenance

To achieve safe, reliable, and economically efficient operation of infrastructure, all infrastructure assets require a maintenance plan. A large proportion of the infrastructure assets in Tonga consist of engineered structures and complex equipment and require subject matter expertise for development of maintenance plans. It is recommended that, for engineered structures and complex equipment, a maintenance plan be developed as part of the engineering scope, during procurement of equipment and construction, and installation of assets. The maintenance guidelines provided below are very general and generic and will need to be tailored to meet an asset's specific requirements.

All infrastructure assets require the following maintenance activities:

(i) **Scheduled inspections and minor maintenance.** Scheduled inspections and minor maintenance at regularly scheduled intervals is required to perform minor repairs and/or replacement of degraded parts identified through inspections, to avoid more serious damage and asset impairment. The scope and frequency of minor maintenance varies depending on the asset. The minor maintenance activities are covered through operation and maintenance (O&M) budgets.

(ii) **Reactive maintenance.** This involves repairing or replacing asset components when they have failed in service in order to maintain asset functionality, meet the required service levels, and prevent further asset impairment. The reactive maintenance is generally covered through O&M budgets, but may occasionally involve capital expenditure, depending on the scope of required repairs.

(iii) **Planned condition assessment.** This is carried out by subject matter experts and is performed less frequently than scheduled inspections. It involves comprehensive assessment of all assets and their components to determine their physical condition and to reveal the need for major repairs or refurbishment, or replacement of components, and their timings (i.e., determining the need for roof replacement of a building).

(iv) **Planned major repairs and refurbishment.** These maintenance activities are performed in response to the repair and/or refurbishment needs identified through planned condition assessment and are generally covered through capital budgets. When repairs or refurbishment of an asset are not considered economically efficient, the asset is retired from service and replaced.

The scope of maintenance activities varies significantly for different asset types, to achieve the desired objectives of (i) preventing premature asset impairment, (ii) reducing the risk of in-service asset failures, and (iii) providing economically efficient asset operations throughout the asset's life cycle.

The level of optimal maintenance required by an asset depends on a variety of factors. As a general trend, assets that employ a large number of moving parts for their operation, experience a higher degree of wear and tear and therefore require more frequent and more extensive maintenance. Similarly, those assets that are routinely exposed to corrosive environments, experience accelerated degradation of metal surfaces due to oxidation and therefore require more extensive maintenance to restore the condition of corroded surfaces. The maintenance effort required for an asset also increases with its service age. As assets age and approach the end of their typical useful life, they require significantly greater maintenance effort in comparison to brand-new assets.

Based on the scope of maintenance activities required for different assets classes, the annual maintenance budget requirements can be calculated as a percentage of the gross replacement cost of the assets, as indicated in Table A6.10. The indicated cost percentages are for routine maintenance, inspections, and minor emergency repairs and do not cover the cost of major component renewal.

Table A6.10: Estimation of Average Maintenance Cost for Different Types of Assets

Asset Class	Average Annual Maintenance Cost as % of Asset's Gross Replacement Cost
Residential type of building	1.0%
Office/institution building	1.0%
Sealed roads – surface maintenance	1.5%
Runway - surface maintenance – moderate use	1.5%
Wharf and jetties	1.5%
Water supply infrastructure	2.0%
Electrical fossil fuel generators	4.0%

Heavy duty motor vehicle and machinery	3.0%
Photovoltaic solar	1.5%
Wind turbine	2.5%
Electricity distribution assets	2.0%
Telecommunications; information and communication technology	2.0%
Coastal protection assets	2.0%
Other miscellaneous assets	2.0%

Source: PRIF Asset Condition Assessment Methodology, 2021

A6.4 Climate Change Resilience

Given the vulnerability of Tonga to natural disasters, especially those that may be exacerbated by climate change, such as tropical cyclones and storm surges, this section provides some guidance for (i) assessing vulnerability of assets to extreme climate events and (ii) improving the resiliency of assets to climate change through initiatives that could be implemented during asset renewal as well as during planned asset maintenance.

These factors can help in calculating an asset's score for vulnerability to extreme climate events and its climate resiliency index, which is required for calculating the asset's health index.

Asset Vulnerability to Extreme Climate Events

Infrastructure assets in Tonga are vulnerable to impairment from exposure to extreme climate events in five main categories:

(i) coastal storm surges or flooding,
(ii) wind storms,
(iii) extreme temperatures,
(iv) drought,
(v) earthquakes and tsunamis.

To assess the vulnerability score of an asset it is necessary to consider (i) the likelihood of the asset's exposure to an extreme event, and (ii) the likely impairment that would result from such an event.

The climate event vulnerability rating of an asset is then the multiplication of the likely exposure by the likely impairment.

It is possible to structure a simple matrix to calculate the vulnerability rating of an asset by allocating different scores for likely exposure and likely impairment for each of the five categories of extreme events.

For the degree of exposure to and impairment from extreme events, scores from 1 to 5 can be allocated as shown in Table A6.11.

Table A6.11: Extreme Climate Event Exposure and Impairment Scorecard

Likely Exposure	Score	Likely Impairment	Score
No exposure	1	No impairment	1
Low exposure	2	Low impairment	2
Moderate exposure	3	Moderate impairment	3
High exposure	4	High impairment	4
Extreme exposure	5	Extreme impairment	5

Source: Authors, 2021

The definitions for the degree of exposure and impairment are shown in Table A6.12.

Table A6.12: Extreme Climate Event Exposure and Impairment Definitions

Likelihood of Asset's Exposure to Extreme Climate Event	Score		Likely Extent of Asset Impairment that Would Result from Extreme Climate Event	Score
Virtually certain	5		Extremely high damage – asset failure requiring replacement	5
Very likely	4		High damage – requiring repairs costing more than 25 % of the asset replacement cost	4
Likely	3		Significant damage – requiring repairs costing 5 % to 25 % of the asset replacement cost	3
Not likely	2		Minor damage – requiring repairs costing less than 5 % of the asset replacement cost	2
Certainly not	1		Asset is well protected – no damage expected	1

Source: Consulting team recommended methodology, 2021

Figure A6.2 reflects the matrix to calculate the vulnerability rating of an asset, structured as a simple excel worksheet with option menus for the most likely scores of exposure and likely impairment.

Figure A6.2: Matrix to Calculate the Vulnerability of an Asset to Extreme Events

	Likelihood of asset's Exposure to Extreme CC & DRM Event		Likely Damage that would result from CC ot DRM event
Potential Asset Impairment due to Storm, Surge or Flooding	5 Extreme Exposure		5 Extreme Damage
Potential Asset Impairment due to Wind Storm	5 Extreme Exposure		5 Extreme Damage
Potential Asset Impairment due to Extreme Temperature Event	5 Extreme Exposure		5 Extreme Damage
Potential Asset Impairment due to Drought	5 Extreme Exposure		5 Extreme Damage
Potential Asset Impairment due to Earthquake & Tsunami	5 Extreme Exposure		5 Extreme Damage
Asset / Project Vulnerability Score to CC & DRM			
Asset/ Project Vulnerability due to Storm, Surge or Flooding	25		
Asset/ Project Vulnerability due to Wind Storm	25		
Asset/ Project Vulnerability due to Extreme Temperature Event	25		
Asset/ Project Vulnerability due to Drought	25		
Asset/Project Vulnerability due to Earthquake & Tsunami	25		
Overall CC & CDM Vulnerability score of Asset	125		

Source: Authors, 2021

A6.4.2 Climate Change and Disaster Risk Management Resiliency Index

Using the output from the calculation of the vulnerability rating, it is then possible to calculate the resulting climate change and disaster risk management resilience index of the asset, with a high score meaning good resilience and a low score poor resilience (Table A6.13). The climate change and disaster risk management resilience index can be included in the asset register (row 10 in Table A6.5).

Table A6.13: Asset Resilience Index

Asset Vulnerability Rating	Asset Resilience Index
5 to 24	5
25 to 49	4
50 to 74	3
75 to 99	2
100 to 125	1

Source: Authors, 2021

A6.4.3 Improving Assets Resilience to Extreme Climate Events

An asset's resilience to extreme climate events can be improved through a variety of initiatives and by adopting appropriate specifications and standards to mitigate the anticipated risks of asset impairment caused by extreme climate events: a few particularly relevant to Tonga are discussed in this subsection.

Buildings

In the harsh and salty environment prevailing in Tonga, especially in low-lying coastal areas, all buildings are vulnerable to rapid deterioration and impairment in case of extreme event. The following measures can help improve the resilience index of buildings:

(i) **Metal joints and screws.** Metal joints and screws exposed to building exteriors, i.e., used for securing sidings and roofs, should be treated with anticorrosion coatings.
(ii) **Roofs.** Typical galvanized-iron roofs in Tuvalu provide a service life of 5–10 years and corrode quickly. Colorbond roofs provide a service life of about 20 years and the roof failure occurs when the screws attaching the roof to the building frame corrode. Aluminum roofs are reported to be even more durable, but are more expensive.
(iii) **Windows.** Moving parts on panel windows and louvres corrode quickly, reducing the life of the windows. Anticorrosive treatment for these parts is an effective solution. Windows should be equipped will removable protection panels to be fixed on the window aperture on the outside of the buildings to prevent the intrusion of flying debris in the event of strong winds.

(iv) **Foundations.** Building foundations are vulnerable to damage from flooding. To prevent impairment of the building, foundations must be inspected and repaired when damage is noticed, to prevent more serious damage to other components of the building.
(v) **Lumber.** Because of flood threats, preservative-treated or naturally durable wood should be used.
(vi) **Concrete.** The sand used in building concrete should be free of salt.
(vii) **Electrical wiring outlets.** These should use waterproof enclosures and be located at sufficiently high elevation to protect against being submerged in water during flooding events.

Airstrips and Roads

Airstrips and roads should be inspected periodically and any cracks and soft spots should be promptly repaired and sealed to prevent further damage to the base.

Telecommunications

Climate-proofing measures need to be introduced to protect Tonga's critical telecommunications assets. Resilience measures for telecommunications equipment include anticorrosion treatment of steel, stronger foundations to support the towers, and functioning backup equipment.

Assets on Outer Islands

Assets on Tonga's outer islands include buildings, communications equipment, jetties, unsealed roads, water tanks, and vehicles. These assets are vulnerable to wave overtopping, flooding, and high winds. Resilience measures include ensuring there are backup systems in place and a supply of water that cannot be contaminated. Emergency warning and disaster risk reduction systems can improve the resilience of these assets.

Appendix 7: Analysis of Key Infrastructure Sectors

As noted in the main report, infrastructure needs for sectors are derived from the more detailed analysis in sector, corporate, business, and district plans of ministries, departments, and/or agencies (MDAs) and private enterprises, along with other strategic and policy documents. Good analysis of these plans requires a clear understanding of the sector responsibilities; sound key performance indicators (KPIs) to measure performance and inputs; and, for infrastructure, well-maintained asset registries to guide infrastructure maintenance and replacement.

This appendix details the information that was provided by MDAs and private enterprises. As can be seen, there are many gaps, and the information is inadequate to guide project identification as required by good sector planning. However, the information has been included because it highlights what MDAs and private enterprises should be striving to collect and maintain as part of their improved planning for all projects, as related to infrastructure needs for inclusion in the National Infrastructure Investment Plan (NIIP).

The grouping of the sectors follows the order of the Tonga Strategic Development Framework (TSDF) pillars. Given the infrastructure heavy nature of Pillar 4, it has been divided into 4a for transport and 4b for utilities. Some sectors have been grouped where they have limited infrastructure.

A7.1 Pillar 1: Economic Institutions

A7.1.1 Agriculture

Entity Responsible and Infrastructure Overview

The MDA responsible for agriculture is the Ministry for Agriculture, Food and Forestry (MAFF).

Table A7.1 summarizes key infrastructure managed by the MAFF in the agriculture and forestry sectors.

Table A7.1: Main Agriculture and Forestry Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Forested areas	ha	ha	ha	ha	ha
Surface afforested	619	1,133	2,450	1,454	802
Agriculture nurseries	#	#	#	#	#
Number of agricultural nurseries	2	1	1	1	1
Animal farms	#	#	#	#	#
Number of animal farms	1	1			
Buildings	#	#	#	#	#
	around 20	Around 10	5	3	4

ha = Hectare

Source: Government of Tonga, Ministry for Agriculture, Food and Forestry. Dataset received in December 2020.

Current Projects under Implementation

Table A3.11 in Appendix 3 summarizes the main agriculture projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding for infrastructure of the MAFF during 2015–2020 was around T$1.8 million.

Asset Management Situation

According to the financial data extracted from the chart of account of the Ministry of Finance (MOF) for fiscal year (FY) 2020 (ended 30 June 2020), the ratio of maintenance expenditure over fair asset value (T$1.09 million) for the MAFF amounts to 0.74 %. This is a relatively low percentage, which may signal insufficient funding for infrastructure and equipment maintenance.

Main Deficiencies and Gaps

A gap is reflected in the constituencies reports 2020 and the needs expressed in the community development plans: 37 communities expressed the need for (i) tractors for villages and schools, (ii) market stands for farmers at bus stops or schools, (iii) “misni fahi papa” and “misini kini” in villages, and (iv) subsistence fishing gear.

Main Drivers for Infrastructure Development

The following initiatives are programmed under the Corporate Plan 2020–2022 to drive future infrastructural investment: (i) new lab benches and/or storage space and procurement of chemicals (agar), lab equipment, and materials; (ii) rehabilitation of ‘Eua Watershed catchment area; (iii) upgrade and/or repair of nurseries in Tokomololo; (iv) reconstruction and upgrading of pack house and procurement of packing equipment; and (v) construction of new MAFF extension center.

A7.1.2 Fisheries

Entity Responsible and Infrastructure Overview

The MDA responsible for the fisheries sector is the Ministry of Fisheries (MOFi). Its main responsibility is to deliver appropriate management of the country’s marine natural resources and environment to provide benefits to current and future generations and ensure these resources are passed to future generations well preserved and improved.

Table A7.2 summarizes key infrastructure managed by the MOFi in the fisheries sector.

Table A7.2: Main Fisheries Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Vessels and boats	#	#	#	#	#
Number of registered boats	176	154	149	36	10
Markets	#	#	#	#	#
Number of fish markets	3	1	1	1	0
Buildings	#	#	#	#	#
Number of building or facilities	15	6	6	1	1
Fish nurseries	#	#	#	#	#
Number of fish hatcheries	2	0	0	0	0

Source: Government of Tonga, Ministry of Fisheries. Dataset received in December 2020.

Current Projects under Implementation

In July 2016, the Cabinet approved the Tonga Fisheries Sector Plan. The review of stakeholder engagement was conducted by the Forum Fisheries Agency and the report has been approved by the Minister. New Zealand supported the development of the National Fisheries Policy and public consultation occurred during the second quarter of 2018. The National Fisheries Policy was well received and formally announced in December 2018. A $10 million grant from the World Bank is supporting implementation of the sector plan over 6 years from July 2019 through the Halafononga Ki Ha Ngatai Tu'uloa—Pathway to Sustainable Oceans (Tonga Fish Pathway) Project.

The Tonga Fish Pathway Project has four components, with the third component aiming at investing in sustainable fisheries management and development (national IDA at $1.22 million and regional IDA at $500,000).

Asset Management Situation

According to the financial data extracted from the chart of account of the MOF for FY2020, the ratio of maintenance expenditure over fair asset value (T$12.8 million) for the MOFi amounts to 1.68%. This is a relatively low percentage, which may signal insufficient funding for maintaining infrastructure and equipment that are heavily used

Main Deficiencies and Gaps

A gap is reflected in the constituencies reports 2020 and the needs expressed in the community development plans: 37 communities expressed the need for subsistence fishing gear.

Main Drivers for Infrastructure Development

The MOFi identified 10 priorities for FY2020 to FY2022. The following are relevant from an infrastructure perspective: (i) implementation of the Tonga Fisheries Sector Plan, e.g., expansion of the Special Management Area program; (ii) promotion and development of aquaculture—farming of pearl, giant clams, sea cucumber, tilapia, mud crab, seaweed, and prawns; and (iii) planning of a fishing port and onshore infrastructure.

A7.1.3 Tourism

Entity Responsible and Infrastructure Overview

The entity responsible for tourism in Tonga is the Ministry of Tourism (MOT). Its aim is to promote the overall development of tourism in Tonga, covering the sector's industry and infrastructure. In this context, culture and heritage is a major focus area for tourism development—besides contributing to the preservation of Tongan culture and heritage to support the historical identity of the nation in the long term.

Table A7.3 summarizes key existing infrastructure and historical sites managed by the MOT.

Table A7.3: Main Tourism Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Buildings and cultural sites	#	#	#	#	#
Number of buildings	6	3	1	Rental	
Number of historical sites	20	17	10	15	

Source: Government of Tonga, Ministry of Tourism. Dataset received in December 2020.

Main Drivers for Infrastructure Development

The Tonga Tourism Roadmap 2014–2018 was revised, in conjunction with the Office of the Prime Minister and the Ministry of Finance and National Planning, for 2018–2023. Several programs of the road map have linkages to infrastructure. The following are noteworthy and will act as drivers for infrastructure improvement:

(i) increased number of sustainable tourism destination infrastructure (a) in national parks and recreational areas, historical sites, and outer islands; and (b) around Niutao Beach (Hahake), Veitongo & Ha'ateiho Beach (Vahe Loto), and hite Sand Beach Resort (Hihifo);
(ii) better organization of cruise ship arrival and departure points, including modernized wharf facilities (install public facilities, toilets, etc.);
(iii) tsunami rock development (landscaping, beautification, public conveniences);
(iv) tourism site development at "Nukunuku Kolo Hufanga ko HULE";
(v) tourism site development at "Ha'amonga 'a Maui";
(vi) tourism site development at Eua and Vava'u, including upgrades to access roads, directional and interpretational signage, and new safety measures.

According to the Ministry of Infrastructure (MOI) corporate plan FY2021 and FY2023, the MOI is to support the MOT to (i) build international tourism wharves in Mui'i Talau, Vava'u, Pangai, and Ha'apai; and (ii) build national mini-sport stadiums and/or rugby fields in Vava'u, Ha'apai, and 'Eua.

A7.2 Pillar 2: Social Institutions

A7.2.1 Education

Entity Responsible and Infrastructure Overview

The MDA in charge of education is the Ministry of Education and Training (MET).

Table A7.4 summarizes key infrastructure managed by the MET in the education sector.

Table A7.4: Main Education Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Primary schools	#	#	#	#	#
Number of schools	63 (47)	35 (31)	22 (19)	(6)	(5)
Number of classes	(444)	(119)	(92)	(71)	(20)
Number of pupils (2020)	12430 (9624)	2401 (2281)	1075 (955)	(940)	(210)
Secondary schools	#	#	#	#	#
Number of schools	33 (2)	9 (1)	8 (1)	3 (1)	(2)
Number of classes	(99)	(30)	(28)	(28)	(20)
Number of students (2020)	10671 (2941)	2261 (830)	678 (294)	684 (452)	(207)
Tonga Institute of Education	#	#	#	#	#
Number of classes	3 (programs)				
Number of students (2020)	186				
Tonga Institute of Higher Education	#	#	#	#	#
Number of classes	5 (programs)				
Number of students (2019/20)	517				
Tonga Institute of Science and Technology	#	#	#	#	#
Number of classes	6 (programs)				

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Number of students (2019/20)	645				
Tonga Maritime Polytechnic Institute	#	#	#	#	#
Number of classes	2				
Number of students (2019/20)	69				
Tonga facility for people with disabilities	#	#	#	#	#
Number of classes	ndr				
Number of students (2019/20)	ndr				

= number , ndr = no data received

Note: Numbers in brackets represent figures for government schools

Source: Government of Tonga, Ministry of Education and Training. Dataset received in December 2020.

Select Key Performance Indicators

Table A7.5 summarizes select KPIs for the education sector.

Table A7.5: Sectoral Key Performance Indicators for Education

Indicator	Unit	Value in 2011	Value in 2013/2014	Value 2019/20
Source of data			MET data	
Access: Number of primary schools/ classrooms	#/ #	47	47	47
Access: Number of secondary schools/ /classrooms	# / #	2	2	2
Quality: Number of students in TVET schools	#	125	168	216
Sustainability: Yearly maintenance expenditure over MET buildings asset replacement value (%)	%			1.70 %

MET = Ministry of Education and Training, TVET = technical and vocational education and training.

Source: Government of Tonga, Ministry of Education and Training. Dataset received in December 2020.

An increase in the number of students undertaking technical and vocational education and training is a welcome development and helps build the technical skills and competences of the local population.

Current Projects under Implementation

Table A3.9 in Appendix 3 summarizes the main education projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding of infrastructure of the MET during 2015–2020 was around T$5.9 million per year.

Progress Since 2015

The NIIP 2 (2015) project pipeline included five education projects (all proposed). By 2020, no projects had been completed and none had been advanced to implementation, while two projects were discarded. From the five proposed projects in 2015, three remained at the proposal stage in 2020.

The most significant changes have been the rehabilitation and renovation of schools following the damage caused by Tropical Cyclone Gita. No new schools or new classes in existing schools were developed.

Asset Management Situation

According to financial data received from the Auditor General for FY2020, the ratio of maintenance expenditure over fair asset value (T$204.1 million) for the MET amounts to 1.73%. This is a relatively low percentage for heavily used assets such as schools and classrooms. It signals insufficient funding for infrastructure and equipment maintenance.

Main Deficiencies and Gaps

The most common deficiencies observed in schools include poor quality of construction and, more significantly, the lack of effective maintenance of assets after commissioning, which leads to accelerated deterioration of assets.

The most common problems appear to be the roofs and roof structures, which are the most vulnerable elements in case of disaster events. Other structural problems often documented in reports include inadequate foundations and foundation bracing, cracked floors, and earthquake damage to floors and walls.

In terms of sanitation and water supplies, several schools are still deficient with regard to access to a dependable water supply all year round, whether they receive water from a town water supply network or rainwater storage tanks. Large numbers of primary schools have either no toilets or insufficient numbers of functioning toilets. Several schools have flush toilets not connected to a constant water supply.

Another gap is reflected in the constituencies reports 2020 and the needs expressed in the community development plans: eight communities expressed the need for (i) transport (buses) for children to get to school from home, (ii) school building renovations, (iii) preschool and kindergarten for young children, (iv) landscaping for sports fields, and (v) sports development equipment and gear.

Main Drivers for Infrastructure Development

Under the Budget Strategy 2019–2022, the corporate plan highlights recovery and reconstruction from Tropical Cyclone Gita, which should continue to be largely supported from the development budget.

The corporate plan mentions the need to improve the quality of schools' environment to facilitate learning. As a KPI, it is required to (i) develop a database of infrastructure status and school environments in relation to learning; (ii) develop a database to record the status of infrastructure within schools; (iii) maintain an asset count for schools, especially for infrastructure; and (iv) ensure any additional building within schools abides by MOI standards.

The People's Republic of China has signaled its willingness to fund the Tonga High School Sports Complex. This process was delayed due to changes in plans around the hosting of the Pacific Games.

According to the MOI Corporate Plan FY2021 and FY2023, the MOI is to support the MET to rebuild and renovate for safety in school classrooms.

A7.2.2 Health Services

Entity Responsible and Infrastructure Overview

The MDA responsible for health services is the Ministry of Health (MOH).

Table A7.6 summarizes key infrastructure managed by the MOH in the health sector.

Table A7.6: Main Health Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Hospitals	#	#	#	#	#
Number of hospital buildings	1	1	1	1	1
Number of hospital beds	207	60	23 - 26	16	7
Number of rural dispensaries	#	#	#	#	#
Number of dispensaries	9	1	3	1	2

Notes:

1. "Hospital buildings" in this regard do not include community health centers and health clinics, but do include tertiary and/or secondary health care providers.

2. In Tongatapu and outer islands, "beds" in this regard are hospital beds or such that are used for admissions only. Beds that used for examinations and consultations only and are not used for an overnight admission are omitted, e.g., radiology bed, therapy bed etc.

3. The dispensaries indicated are only for the government or public health systems, which dispense drugs either by a pharmacist, assistant, NP, HO, or MO. Some island groups have changed their modus operandi, such as in Vava'u, which has centralized dispensary.

Source: Government of Tonga, Ministry of Health. Dataset received in December 2020.

The total estimated value of the MOH's buildings is around T$103 million. The MOH maintenance budget is T$1.11 million, which is an increase of T$110,000 from the FY2016 budget, and 13% of the ministry's operation budget has been allocated to the maintenance of buildings, which focuses on the urgent repair and maintenance only. A condition of Japan International Cooperation Agency funding for the renovation of Vaiola hospital was the provision of adequate maintenance. The MOF notes that the MOH tends to transfer its maintenance funds to cover staff overtime costs. The MOH is looking at increasing its maintenance budget in the next 3 years to cover the value of depreciation of the assets and to ensure that the ministry remains able to deliver quality services to patients throughout Tonga.

Select Key Performance Indicators

Table A7.8 summarizes select KPIs for the health sector.

Table A7.8: Sectoral Key Performance Indicators for Health Services

Indicator	Unit	Value in 2011	Value in 2013/2014	Value 2019/20
Source of data			MOH Data	MOH Data
Access: Number of hospital beds country wide.	# per 1,000 population		4.41	# = 2.73 [a]
Access: Number of health clinics and centers in Tongatapu	# per 10,000 population		2.57	# = 2.13 [b]
Access: Number of health clinics and centers in all outer islands	# per 10,000 population		2.45	# = 3.87 [c]
Quality: Average annual hospital occupancy ratio of hospital beds	%		tbd	Data not available [d]
Efficiency: Health services operational cost per year and inhabitant	T$ per population, year		tbd	<30% of the total budget goes to Operational Cost [e]
Sustainability: Yearly maintenance expenditure over MOH buildings assets replacement value (%)	%		tbd	1.01%

MOH = Ministry of Health, T$ = pa'anga

a. The 290 hospital beds are based on hospital beds used for overnight admissions in a secondary or tertiary hospital. Some areas such as community health centers have beds, but these are not utilized for overnight admission and monitoring. Calculation based on 290 beds for a Tongatapu population of around 75,000.

b. The figure of 16 health clinics and centers is based on facility count. If service delivery points are counted, the number of health clinics and centers increases to 23.

c. Similar to footnote b.

d. This requires an overall average, since some occupancy ratio ranges from 20%–80% depending on the ward.

e. Each year, the estimates are that less than 30% of the budget goes to operational costs, which roughly equates to T$1 million.

Source: Government of Tonga, Ministry of Health. Dataset received in December 2020.

Current Projects under Implementation

Table A3.10 in Appendix 3 summarizes the main health projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding of infrastructure of the MOH during 2015–2020 was around T$8.0 million per year.

Progress Since 2015

The NIIP 2 (2015) project pipeline included two health services projects (both proposed). By 2020, one project had been completed and the other project had not advanced to implementation because it was discarded. From the two proposed projects in 2015, one remained at the proposal stage in 2020.

Major improvements included the completion of the new hospital in Ha'apai with support from the Asian Development Bank, the improvement of health center staff quarters under the Climate Resilience Sector Project, and support from the European Union to improve the hospital at Niuatoputapu.

Asset Management Situation

According to the financial data extracted from the chart of account of the MOF for FY2020, or received from the MOH for this report, the ratio of maintenance expenditure over fair asset value for the MOH amounts to 1.01 %. This is a relatively low percentage, which signals insufficient funding for infrastructure and equipment maintenance.

Main Deficiencies and Gaps

The decreasing availability of beds nationwide may be linked to a different calculation mode in 2015. The decreasing availability of clinical services in Tongatapu and the increasing trend in the outer islands is at least partially linked to the progressing migration of population from outer islands to Tongatapu.

Another gap is reflected in the constituencies reports 2020 and the needs expressed in the community development plans: eight communities expressed the need for increased cemetery space and health centers or clinics in rural villages.

Main Drivers for Infrastructure Development

Upcoming projects listed in the MOH's Corporate Plan 2020–2021, as shown in Table A7.9, are expected to drive project development in the coming years.

Table A7.9: Upcoming Projects under the Ministry of Health Corporate Plan 2020–2021

No.	Project Name	Development Partner	Status	Estimated Cost (T$)
1	Niuatoputapu Hospital	European Union	Committed	2.3 million
2	Haapai Hospital	ADB	Committed	1.9 million
3	Vava'u Hospital, Removal of Asbestos roof	Government of Tonga/World Bank	Committed	1.45 million
4	Renovation of Old Vaiola Hospital building (Dental Wing)	DFAT	Proposed	196,000
5	Mental Health Facility, Hu'atolitoli Prison	Government of Tonga	Design	285,310
6	Extension of CT Scanner Facilities	China Aid	Committed	101,000
7	Relocation of Laundry Facilities	Government of Tonga	Committed	Approx. 150,000

ADB = Asian Development Bank, DFAT = Australia's Department of Foreign Affairs and Trade, T$ = pa'anga.

Source: Government of Tonga, Ministry of Health. Corporate Plan 2020–2021.

According to the MOI's Corporate Plan FY2021 and FY2023, the MOI is to support the MOH to (i) rebuild the Vava'u Hospital and Village Clinic in Vava'u and Tongatapu, and (ii) establish a clinic for dialysis in Tongatapu.

A7.3 Pillar 3: Political and/or Governance Institutions

A7.3.1 Administrative and Government Buildings

Entities Responsible and Infrastructure Overview

Two divisions of the MOI—the Building Services Division (BSD) and the Building Control Division (BCD)—are developing and managing public buildings in Tonga, with the geographic coverage as shown in Table A7.10.

Table A7.10: Management of Government Buildings, by Geographic Area

Sector	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Public Buildings	MOI	Building Services Division	BSD	X	X	X	X	X
Public Housing	MOI	Building Control Division	BCD	X	X	X	X	X

MOI = Ministry of Infrastructure, O&M = operation and maintenance.

Source: Data from Ministry of Infrastructure

The BSD is responsible for managing, inspecting, and maintaining several public buildings, hosting a wide diversity of entities, government offices, and MDAs.

Table A7.11 summarizes key public buildings managed by the MOI (as documented by relevant MDAs).

Table A7.11: Main Public Buildings in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua	Overseas Mission	Total
MDA/ Number buildings	224	26	17	12	8	2	289
Palace	4			1			5
PMO	6	2	2		4		14
MOF	2	3	1	1			7
MIA	1						1
MFA	1					2	3
MOI	42	4	3	5			54
MEIDECC	7						7
MLNR	10						10
MPE	1						1
MTED	11	2	1				14
Tonga police	23	3	5	2	4		37

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua	Overseas Mission	Total
HMAF	49	5	2	2			58
Prisons	47						47
MOJ	9	6	2	1	0		18
Custom	1						1
Fire station	6	1	1				8
Legislative assembly	2						2
Tonga electrical commission	2						2

HMAF=His Majesty's Armed Forces; MOJ=Ministry of Justice; MPE=Ministry of Public Enterprises, MEIDECC-Ministry of Meteorology, Energy, Information Disaster Environment and Climate Change, MLNR=Ministry of Lands and Natural Resources, MTED=Ministry of Trade and Economic Development,;

Source: Data collected from relevant Tongan ministries, departments, and agencies.

The BCD is responsible for assisting with Government of Tonga grants provided to poor private homeowners, to improve their basic water and sanitation infrastructure and to compensate house owners who suffer from extreme natural events.

Current Projects under Implementation

The MOI, BSD, and BCD are mainly servicing the public buildings that are programmed and financed by other entities under the respective MDAs infrastructure plans. They are also tasked with the rehabilitation and renovation of public buildings for most MDAs under response and recovery programs orchestrated by the government and development partners following disasters resulting from extreme events such as Tropical cyclone Gita.

Main Deficiencies and Gaps

The main vulnerability of buildings in Tonga is against tropical cyclones and earthquakes. Based on the findings of post-disaster rapid assessment reports developed by the government after major disasters, such as Tropical Cyclone Gita in 2018, the following weaknesses were found to be prevalent in public and private buildings:

(i) poor ground and soil conditions,
(ii) inadequate opening positioning and size,
(iii) insufficient rigidity and ductility of building frame to absorb shock,
(iv) poor quality of construction workmanship,
(v) insufficient strapping of roofs onto supporting frames,
(vi) poor materials and fixation of walls and roofs, and
(vii) shortness of poles anchoring buildings into the ground.

Interestingly, traditional house design in Tonga tends to be more resilient, simpler, and faster to rehabilitate than concrete block buildings.

Addressing these deficiencies requires improved building codes and, more importantly, strengthening the building inspectorate in charge of periodically controlling the adequacy of the structural elements of buildings and the adequacy of preventive maintenance works for public buildings.

Main Drivers for Infrastructure Development

According to the corporate plan of the Public Service Commission for FY2021, the focus of attention in 2021 is on "the development of a public administration sector plan with the objective to strengthen the TSDF II's outcomes and impacts, especially in progressing and coordinating current 'whole of government' approach for greater efficiency, value for money and accountability."

In this context, the BSD and BCD have been requested to review Tonga's Building Code and its supplementary notes to make buildings in the country more resilient to disaster risks and capable of withstanding without serious damage in the event of a category 5 tropical cyclone.

A7.3.2 Local Communities' Infrastructure

Entity Responsible and Infrastructure Overview

The MDA currently in charge of coordinating and managing the development of community and/or village infrastructure is the Local Government Division of the Ministry of Internal Affairs. The process of transferring this division back to the Prime Minister's Office is likely to be completed in 2021.

Table A7.12 summarizes the districts of Tonga and the approximately 130 villages with a population of more than 100 people (according to the 2016 census). Around 35 smaller hamlets are also taken into account.

Basic public infrastructure commonly needed in dispersed communities, according to the constituencies report 2020, include essentially (i) community halls, (ii) village health clinics or dispensaries, (iii) emergency shelter halls, and (iv) public road lighting.

Table A7.12: Constituencies and Villages in Tonga

Tongatapu		Vava'u		Ha'apai		'Eua		Ongo Niua	
District	Number of Villages	District	Number of Villages	District	Number of Villages	District	Number of Villages	District	Number of Villages
Kolofo'ou	4	Neiafu	6	Pangai	4	'Eua Motu'a	6	Niuatoputapu	3
Kolomotu'a	6	Pangaimotu	4	Foa	5	'Eua fo'ou	9	Niuafo'ou	2
Vaini	9	Hahake	8	Lulunga	5				

Tatakamotonga	9	Leimatu'a	4	Mu'omu'a	1				
Lapaha	11	Hihifo	5	Ha'ano	2				
Nukunuku	10	Motu	1	Uiha	3				
Kolovai	12								
Total	61		28		20		15		5

Source: Tonga Statistics Department. Dataset received in December 2020.

Main Deficiencies and Gaps

The last consolidated constituency and community plans were presented by the National Planning Division to the Parliament in 2019. The following community level public infrastructure needs were identified:

(i) fix potholes and unleveled roads within villages
(ii) create sidewalks for school children
(iii) install speed bumps at hazardous road locations
(iv) install signage limiting big trucks driving on village inner roads
(v) install street lighting on village inner roads
(vi) build health centers in outer villages
(vii) build new community halls for disaster evacuations, town meetings, and sale of women handicraft works
(viii) build small wharves or jetties for coastal villages
(ix) improve water storage facilities
(x) improved public water supply
(xi) improved latrines
(xii) renovation old and damaged community halls
(xiii) build evacuation centers in case of natural disasters
(xiv) build or enhance church buildings.

Main Drivers for Infrastructure Development

The second amendment to the overall Government Premier Priority Community Projects to be the government's Top National Priority Projects was approved in Cabinet in January 2020 (ref. CD No. 38). This requires all line ministries to revisit their corporate plans and medium-term budgets to be in line with six priority projects retained for FY2022. The priority projects include:

(i) construct and complete all roads in all forms (main, agriculture, community, and village roads) with village lights and traffic lights, household post office addresses, and beautification programs and festivals
(ii) complete household flush toilets to replace and ban underground toilets
(iii) ensure household water tanks offer sufficient water storage and village water supply can operate 24 hours

(iv) build packing houses for agricultural and handicraft export products
(v) build women's weaving centers as an enabling environment to increase handicraft processing
(vi) build student bus stops for each village and main road in Tonga.

The Ministry of Internal Affairs has also developed a program to focus on maintaining roads classified as minor roads or community roads

A7.4 Pillar 4a: Transport Infrastructure and Technology

A7.4.1 Land Transport

Entity Responsible and Infrastructure Overview

The MDA in charge of land transport is the Land Transport Division (LTD) under the MOI, with geographic coverage as shown in Table A7.13.

Table A7.13: Management of Land Transport, by Geographic Area

Road Sector/ Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Management O&M Management O&M	MOI MIA	Land Transportation Division Villages	LTD	X Unlined rural roads	X Unlined rural roads	X Unlined rural roads	X Unlined rural roads	X Unlined rural roads

MIA = Ministry of Internal Affairs, MOI = Ministry of Infrastructure, O&M = operation and maintenance.

Source: Data from Ministry of Internal Affairs, Ministry of Infrastructure

The LTD is responsible for primary and secondary paved and unpaved roads and bridges in Tongatapu and in all outer islands and rural roads. Village roadways and some rural roads are the responsibility of the respective communities.

Select Key Performance Indicators

Table A7.14 summarizes the KPIs for the land transport sector received from the MOI.

Table A7.14: Sectoral Key Performance Indicators for Land Transport

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			MOI Road data	PIPIs 2016	MOI -LTD Data
Access: Total Road Network	km	X	930		1098.8
Access: Paved (sealed)_Roads	km	X	560		582.2
Access: Unpaved (unsealed) Roads	km	X	370		516.6
Access: Road Density	km/ km^2		1.2		1.74
Quality: Paved Roads as % of Total Road	%		60		62%
Quality: % of primary roads in good condition or above[21]	% of road network length	X	95%		100%

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Rating	Condition	Description
1	Very Good	Pavement surface in very good condition, no cracking, no patching, and no deformation with excellent ride qualities
2	Good	Pavement surface in good condition, minor cracking, minor patching, and some minor deformation evident with very good ride qualities
3	Fair	Pavement surface in fair condition, cracking is easier to detect, patched but not excessively, deformation more pronounced and easily noticed with ride qualities of good to acceptable.
4	Poor	Pavement surface in poor condition, large crack patterns, heavy and numerous patches, deformation very noticeable, and ride qualities range from acceptable to poor.
5	Very Poor	Pavement surface in very poor condition, majority of section showing significant failures affecting performance, ride quality is unacceptable (need to travel at very low speeds to avoid damage).

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			MOI Road data	PIPIs 2016	MOI -LTD Data
Quality: % of secondary roads in good condition or above [16]	% of road network length	X	90%		91%
Quality: % of tertiary roads in good condition or above [16, 2)]	% of road network length	X	34%		40%
Efficiency: % of road network receiving regular routine maintenance	%	X		57%	62%
Safety: Number of road accident with personal injury	#/year and 10.000 registered vehicles	X			Fatalities 3

MOI=Ministry of Infrastructure; LTD= Land Transport Division,

a. The length and percentage mentioned was only for roads on Tongatapu, currently a sum of 369 km, which is about 45% of the total length of roads that the Land Transport Division is operating and maintaining in all of Tonga.
b. Data for other islands to be added as they become available.

Source: Government of Tonga, Ministry of Infrastructure, Land Transport Division. Dataset received in December 2020.

Table A7.14 indicates a slight improvement in terms of the percentage of paved roads and the estimated quality of the primary and tertiary road network. Marginal changes have occurred in the secondary road network.

Current Projects under Implementation

Table A7.15 documents the list of projects completed, advanced, or committed with a contract signed in the sector since the completion of the NIIP 2015 report. The absorption capacity for funding for infrastructure of the LTD during 2015–2020 was around T$10.8 million per year.

Table A7.15: Projects Implemented by the Land Transport Division since 2015

MOI (Land Transport Division -LTD)						
Project Name	**Managing Agency**	**Development Partner**	**Currency of Development partner**	**Total Cost (T$ million)**	**Project Start Year**	**Project End Year**
Transport Sector Consolidation Project (TSCP)	MOI	WB(IDA)	$	57.50	2008	2018
Nuku'alofa Sidewalks Upgrade	MOI/CCECC	GOT, PRC		5.5	2018	2020
Integrated Urban Development Sector Program (IUDSP)	MLNR	ADB	$	42.64	2019	2024
Agricultural Road Program	MOI	WB IDA 19	$	38.00	2021	2025
Tonga Climate Resilience Transport Project (TCRTP)	MOI	WB(IDA)	$	63.34	2019	2024
Mala'ekula Royal Tomb Upgrade	MOI	GOT, PRC	CNY	10.00	2020	2022
Transport Sector (agreed, to be finalized and signed) (Aviation and roads etc.)	MOI	WB IDA 19	$	80.50	2021	2025

CCECC=China Engineering and Construction Company; MOI=Ministry of Infrastructure; GOT=Government of Tonga; MLNR=Ministry of Lands and Natural Resources; WB IDA=World Bank, International Development Association; PRF=The People's Republic of China;

Source: Government of Tonga, Ministry of Finance, Projects and Aid Management Division. Aggregated data.

Progress Since 2015

The NIIP 2 (2015) project pipeline included eight land transport projects (one under implementation and seven proposed). By 2020, one project had been completed, two were under implementation, and five remained at the proposal stage. Table A3.1 in Appendix 3 summarizes the main land transport projects and programs advanced between NIIP 2 and NIIP 3.

The main progress made has been in the roadways in Nuku'alofa under the Transport Sector Consolidation Project and the Integrated Urban Development Sector Project. Some limited improvements were also made with the agricultural road program and under the Tonga Climate Resilient Transport Project (supported by the World Bank) for road segments particularly vulnerable to climate change disaster risks.

A road maintenance fund has also been setup and the division in charge is in the process of securing various sources of funding (government and development partners) to implement repair and maintenance works that have been weakly implemented in the past.

Asset Management Situation

According to the financial data extracted from the chart of account of the MOF for FY2020, the maintenance budget for road (item 1327 of the national chart of account) hovered around T$6 million to T$8 million per year in the previous 3 fiscal years. According to data received from the LTD, the current asset value of the road assets is around T$366.78[22] million. This corresponds to a maintenance ratio of around 2.5 %, which may be reasonable for general maintenance, but is insufficient for the heavy routine and rehabilitation maintenance that may be needed for some heavily used roads and highways segments.

Main Deficiencies and Gaps

The most important deficiency, as highlighted above, is the continuing deterioration of several public roads, both paved and unpaved, due to insufficient maintenance. This shows in the form of increasing roughness of road pavement, excessive deflection of the road surface, and the multiplication of potholes that threaten road safety and the structural integrity of the road network.

Another gap is the need to upgrade rural and agricultural unpaved roads and adequately rehabilitate and maintain bridges and causeways, as asked by 32 communities according to the constituencies reports 2020.

Main Drivers for Infrastructure Development

The following drivers are noteworthy for the next 5 to 10 years in the land transport sector:

(i) reducing the rate of fatalities (currently 20 per year) caused by deficiencies on road infrastructure and vehicle safety standards;

(ii) developing and reviewing the existing national road safety strategy;
(iii) development of the new Fanga'uta Bridge, causeways in Vava'u, and upgrade to agriculture and tourism roads in Vava'u;
(iv) reconstruction and construction of new footpath/sidewalks in the Nuku'alofa area;
(v) building bridges in Tongatapu, 'Eua, Ha'apai, and Vava'u to allow better flow of tidal seawater; and
(vi) building the Patangata-Makaunga bridges.

Capacity development in terms of process will require that the LTD create appropriate road codes and vehicle inspection standards and specifications, and review current road maintenance standards. Human capacity also needs to be improved to accommodate

[22] Current assets values:(i) paved road 293,955,300 TOP, (ii) unpaved roads 72,828,450 TOP

anticipated absorption of enforcement capacities and an increase in the scope of road maintenance works in the future.

Another planned initiative will be to support the pavement of community roads as well as some agriculture roads in the coming 3 years, as documented in the constituencies report 2020.

A7.4.2 Sea Transport

Entities Responsible and Infrastructure Overview

Two entities are sharing responsibility for the sea transport sector, the Marine and Ports Division (MPD) of the MOI and the Port Authority of Tonga (PAT) under the Ministry of Public Enterprises, with the geographic coverage as shown in Table A7.16.

Table A7.16: Management of Sea Transport, by Geographic Area

Marine Sector / Responsibility	Ministry Responsible	Entity	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Management O&M	MPE	Port Authority of Tonga	PAT	X				
Management O&M / Regulator	MOI	Marine & Ports Division	MPD		X	X	X	X

MPE = Ministry of Public Enterprises, MOI = Ministry of Infrastructure, O&M = operation and maintenance.

Source: Data from Ministry of Public Enterprises, Ministry of Infrastructure

Table A7.17 summarizes key infrastructure managed by the MPD and PAT in the sea transport sector.

Table A7.17: Main Sea Transport Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Marine infrastructure	#	#	#	#	#
Number of Ports	1	1	1	1	2
Number of wharves	8	3	2	2	2
Number of jetties	1	9	5	1	0
Number of vessels/boats	85	55	22	2	-

Source: Government of Tonga, Ministry of Infrastructure, Marine and Ports Division; and Ministry of Public Enterprises, Ports Authority of Tonga. Dataset received in December 2020

Select Key Performance Indicators

Table A7.18 summarizes the KPIs for the sea transport sector as received from the Ports Authority Tonga.

Table A7.18 : Sectoral Key Performance Indicators for Sea Transport

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			PAT data	PIPIs 2016	PAT
Access: No. of Main Ports	#	X	3	3	3
Quality: Trade	Tons/ year		250,664		361,732
Quality: Containers Throughput	TEUs/ year		14,751		23,206
Quality: Vessel Arrivals	#		161		193
Efficiency/Productivity: Cargo Handling Equipment			Forklifts		Forklifts Tow trucks
Efficiency: Private Ownership of Port Terminal			PE		no
Efficiency: Private Participation Ground Handling			PE		Yes[23]
Sustainability: Yearly maintenance expenditure over PAT infrastructure assets replacement value (%)	%		No data		1.50 %

[23] from ship to Shore - Private Stevedoring Companies, from apron to stacking and outside delivery for inspection is done by PAT; Crane efficiency Average 23 move per hours

Safety: No. of maritime incidents per annum	#	X		No data	

PAT=Ports Authority Tonga; TEU=Twenty-foot equivalent.

Source : Government of Tonga, Ministry of Public Enterprises, Ports Authority of Tonga. Dataset received in December 2020.

Vessel arrivals and container throughput have increased since the NIIP 2015, essentially linked to the advancing socioeconomic development of Tonga.

Current Projects under Implementation

Table A3.2 in Appendix 3 summarizes main sea transport projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding for infrastructure of the MPD and PAT during 2015–2020 was around T$1.2 million per year for the MPD and T$15.5 million per year for the PAT.

Progress Since 2015

The NIIP 2 (2015) project pipeline included 16 sea transport projects (2 under implementation, 1 committed, and 13 proposed). By 2020, 2 projects had been completed and 4 were under implementation. From the 13 proposed projects in 2015, 8 remained at the proposal stage in 2020.

The main progress made has been limited to the light upgrade of facilities, equipment, and navigational aids under the Transport Sector Consolidation Project 2 in Tongatapu and in outer island ports.

Asset Management Situation

According to data extracted from PAT annual reports, the ratio of maintenance expenditure over fair asset value for PAT operations for FY2019 was 1.41 %. This is a relatively low percentage, which signals insufficient funding for ports infrastructure and equipment maintenance.

Main Deficiencies and Gaps

The maritime sector remains fragmented between the PAT, the private enterprise in charge of the Queen Salote International and Domestic Wharves at Nuku'alofa, and the MPD, which is in charge of all the other ports and facilities in Tongatapu and in the outer islands.

Although the Nuku'alofa port system meets basic needs for coverage, capacity, and compliance with regulation, the standard of infrastructure has suffered from a lack of investment in core infrastructure and facilities and insufficient emphasis on maintenance.

Main weaknesses include (i) ageing infrastructure, facilities, and navigational aids; (ii) limited channels' depth and wharves capacity to accommodate larger vessels; and (iii) vulnerability to climate change and natural disaster risks.

Another important gap is the need to build resilience to the impacts of climate change and natural disasters. With sea levels predicted to rise and cyclones expected to become more intense, ports and jetties are especially at risk. Ensuring that ports can withstand these impacts to secure continuity of shipping services is a high priority task.

Another major priority for the maritime sector is to update institutional arrangements for managing, maintaining, and financing the outer island ports. As noted above, responsibility for outer islands port operations is with the MOI, but this is inconsistent with the MOI's regulatory role in the sea transport sector.

Discussions have been initiated to transfer the operation of the Ha'apai and 'Eua wharves to the PAT, which has accumulated good experience and track record with the management of the port services and wharfs in Tongatapu. Consideration is being given to the transfer of other wharfs if agreement can be reached between all stakeholders. It is important that these institutional issues are quickly resolved for the smooth operation of the section.

Main Drivers for Infrastructure Development

The following drivers are noteworthy for the next 5 to 10 years in the sea transport sector:

(i) upgrades to all outer island wharfs (Vava'u, Ha'apai, 'Eua, Ongo Niua);
(ii) maintenance of navigational aids;
(iii) development of Vava'u new international wharf;
(iv) development of small wharves or jetties for coastal villages as asked by several communities according to the constituencies reports 2020;
(v) renovations of wharves and/or jetties for Tongatapu, Eua, Ha'apai, Vava'u, and Ongo Niua, especially those vulnerable to tropical cyclones;
(vi) management of environmental hazards and risks, including requirements under the green ports international initiative;
(vii) addressing risks of global pandemic; and
(viii) developing or improving post-harvest facilities (handling, storage, and processing) at ports so that fishing and agricultural produce can be processed and stored for export markets.

A7.4.3 Air Transport

Entities Responsible and Infrastructure Overview

Two entities share responsibility for the air transport sector: the Civil Aviation Division (CAD) of the MOI and Tonga Airports Limited (TAL) under the Ministry of Public Enterprises, with geographic coverage as shown in Table A7.19.

Table A7.19: Management of Air Transport, by Geographic Area

Aviation Sector/ Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Management O&M	MPE	Tonga Airports Limited	TAL	X	X	X	X	X

Aviation Sector/ Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
				Operation	Operation	Operation	Operation	Operation
Regulator	MOI	Civil Aviation Division	CAD	X Regulation	X Regulation	X Regulation	X Regulation	X Regulation

MOI = Ministry of Infrastructure, O&M = operation and maintenance; MPE = Ministry of Public Enterprises,

Source: Data from Ministry of Public Enterprises, Ministry of Infrastructure, Dataset received in December 2020

Table A7.20 summarizes key infrastructure managed by the CAD and TAL in the air transport sector (as provided by TAL).

Table A7.20: Main Air Transport Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Aviation infrastructure	**#**	**#**	**#**	**#**	**#**
Number of paved airfields	1	1	1	1	0
Number of unpaved airfields	1	0	0	0	2
International terminal facilities	1	1	0	0	0

Source: Government of Tonga, Ministry of Public Enterprises, Tonga Airports Limited. Dataset received in December 2020 .

Select Key Performance Indicators

Table A7.21 summarizes the KPIs for the air transport sector.

Table A7.21: Sectoral Key Performance Indicators for Air Transport

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			TAL data	PIPIs 2016	
Access: Number of Operational Airports (Paved)	#	X	4	No data	4
Access:	#	X	2	No data	2

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Number of Operational Airports (Unpaved)					
Quality: Inbound Seats per Week	International seats/ week	X	2200	No data	223
Quality: National Airlines Carrier			no		Lulutai Airlines
Efficiency: Private Ownership of Airport			no		No
Efficiency: Private Ownership of Terminal			no		No
Efficiency: Private Participation Ground Handling			yes		Yes
Sustainability: Yearly maintenance expenditure over TAL infrastructure assets replacement value (%)	%		No data		$375K or 0.5%
Safety: No. of aviation incidents per annum		X		No data	0

PIPIs=Pacific Infrastructure Performance Indicators; PRIF CO=Pacific Region Infrastructure Facility Coordination Office; TAL=Tonga Airport Limited.

Source: Government of Tonga, Ministry of Public Enterprises, Tonga Airports Limited. Dataset received in December 2020

Current Projects under Implementation

Table A3.3 in Appendix 3 summarizes the main air transport projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding for infrastructure of the CAD and TAL during 2015–2020 was around T$0.64 million per year for the CAD and T$4.70 million per year for TAL.

Progress Since 2015

The NIIP 2 (2015) project pipeline included 16 air transport projects (3 under implementation, 2 committed , and 11 proposed) . By 2020, 9 projects had been completed and 9 were under implementation, with 2 projects discarded. From the 16 proposed projects in 2015, 2 remained at the proposal stage in 2020.

Progress since the NIIP2 review has essentially been linked to actions to maintain existing infrastructure and improve climate change vulnerability under the Tonga Climate Resilient Transport Project and the Tonga Aviation Investment Project. Resurfacing of main runways has not taken place, although the one in Ha'apai is foreseen in the coming years.

Asset Management Situation

According to the data extracted from TAL annual reports, the ratio of maintenance expenditure over fair asset value for TAL operations for FY2019 was 0.33 %. This is a low percentage, which indicates insufficient funding for airport infrastructure and equipment maintenance.

Main Deficiencies and Gaps

Main deficiencies, according to the analysis of TAL operations under the Business Plan 2020–2021, include (i) land availability issues for extension, (ii) limited terminal size, (iii) limited aircraft parking space, (iv) insufficient outer island airports maintenance and passenger facilities, and (v) resources needed for keeping up with technological developments.

Main Drivers for Infrastructure Development

Safety, security, and continuity of service are key imperatives driving investment and reform in the sector. In the medium to longer term, additional investments will be required to maintain compliance with increasingly stringent industry safety and security requirements, to ensure that current aircraft types and new international and domestic aircraft likely to be used on Tonga services can operate safely and without weight restrictions.

The following drivers are noteworthy in the MOI Corporate Plan 2020–2021 for the CAD:

(i) implementing repair and maintenance works at the Vava'u, Ha'apai, and 'Eua airports and/or air strips;
(ii) advancing the extension and refurbishment of the existing terminal at the Fua'amotu International Terminal;
(iii) resurfacing the Ha'apai Airport runway, apron, and taxiway (T$9 million);
(iv) completing a new control tower at Fua'amotu International Airport (T$7 million);
(v) upgrading the terminal and runway extension at Vava'u Airport; and
(vi) developing cargo sheds and chilling facilities to maintain the quality of perishable exports.

A7.5 Pillar 4b: Utilities Infrastructure and Technology

A7.5.1 Power

Entities Responsible and Infrastructure Overview

The two entities sharing responsibility for the power sector are the Energy Department of the Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication (MEIDECC) and Tonga Power Limited (TPL) under the Ministry of Public Enterprises, with geographic coverage as shown in Table A7.22.

Table A7.22: Management of Power Infrastructure, by Geographic Area

Power Sector / Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Electrical power supply	MPE	Tonga Power Limited	TPL	X	X Except off-grid supply	X Except off-grid supply	X Except off-grid supply	
Renewable energy investor and regulator	MEIDECC	MEIDECC Energy Department	N/A	X	X	X	X	X

MEIDECC = Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication, MPE = Ministry of Public Enterprises, O&M = operation and maintenance.

Source: Data from Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication, Ministry of Public Enterprises

The Energy Department is essentially in charge of providing renewable energy solutions in Tonga, while acting as regulator of the power sector. The Tonga Electricity Commission is the regulator for determining electricity tariffs.

TPL owns and operate most electrical power infrastructure (renewable or not) in the country, except for the infrastructure in Ongo Niua. The Energy Department is currently in charge of the equipment on those islands.

Table A7.23 summarizes key infrastructure managed by TPL in the power sector.

Table A7.23: Main Electrical Power Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Installed Electrical Power Capacity	MW	MW	MW	MW	MW
Fossil fuel	15	1.9	0.69	0.79	
Solar Photovoltaic	2.4 (TPL), 2 (IPP), 1.7 (private)	0.42 (TPL), 0.03 (private)	0.550	0.2	
Wind	1.375				
Geothermal					
Biogas					
Battery system (BESS)	5				
Capacity under construction					

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Fossil fuel (back-up only)			0.21		
Solar	6 (IPP)		0.921		0.25
Battery system (BESS)			3.377		2.552
Grid length	Km	km	km	km	km
Distribution network 11 kV	207.8	69	14.5	12.4	
Low voltage	576	97	38	42	
Underground cable	9	2	2		
Transformers	#	#	#	#	#
Number of transformers	375	75	17	13	

kV=Kilowatt; MW=Megawatt; TPL=Tonga Power Limited; IPP

Source: Government of Tonga, Ministry of Public Enterprises, Tonga Power Limited. Dataset received in December 2020.

The grid configuration of Tonga is separated into four parts, one for each of the major island groups: Tongatapu, Vava'u, Ha'apai, and 'Eua. While TPL provides electricity to these major grids, the outer islands are looked after by the Energy Department.

Select Key Performance Indicators

Table A7.24 summarizes the KPIs for the electrical power sector.

Table A7.24: Sectoral Key Performance Indicators for Electrical Power

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/ 2014	Value 2015/16	Value 2019/20
Sources of data			TPL Figures	PIPIs 2016	TPL Figures
Access: Installed Capacity	MW	X	16.6	No data	27
Access: Length of Distribution Network	Km		186		Tongatapu: 207 Vava'u: 67 Ha'apai 14.5 Eua:12.4
Access: Number of Customers	#		15195		24,054 = 19,281 + 4,763

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/ 2014	Value 2015/16	Value 2019/20
Sources of data			TPL Figures	PIPIs 2016	TPL Figures
Quality: SAIFI – System Average Interruption Frequency Index – mins per customer per year		X		No data	Tongatapu; 7.976
Quality: SAIDI – System Average Interruption Duration Index – mins per customer per years		X		No data	Tongatapu 734.104
Quality: % of reserve capacity					N-1 security of supply
Efficiency: Electricity Sold: Household	GWh/ year		19.8		35,690
Efficiency: Distribution Losses	% (target 5%)	X	9.64	No data	Tongatapu: 7.93 Vava'u: 7.50 Ha'apai: 6.58 Eua: 2.788
Efficiency: Fuel Consumption	KWh/ liter		4.28		Tongatapu: 4.01 Vava'u: 3.62 Ha'apai:3.48 Eua: 3.34
Efficiency: Number of Employees	#		135		265
Affordability: End Use electricity Tariff residential	US cents/ KWh; TOP/ KWh	X	91 TOP	No data	0.63 TOP
Sustainability: Energy Use: Renewable Share	% of Energy Use	X	5% (2015: 7.5%)	No data	13 %

MW=Megawatt; KWh=XXX; PIPIs=Pacific Infrastructure Performance Indicators; TOP=Tongan paanga; TPL=Tonga Power Limited

Source: Government of Tonga, Ministry of Public Enterprises, Tonga Power Limited. Dataset received in December 2020.

The share of renewable energy sources is increasing, although the country will need a few more years to reach the aspirational target of 50 % renewable energy generation by 2020. Reliability expressed by the System Average Interruption Duration Index and the System Average Interruption Frequency Index have improved in the recent years. Further improvement would be desirable to reach international good practice.

Current Projects under Implementation

Table A3.4 in Appendix 3 summarizes the main power projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding for infrastructure of the Energy Department and TPL during 2015–2020 was around T$ 2.72 million per year for the Energy Department and T$28.2 million per year for TPL.

Progress Since 2015

The NIIP 2 (2015) project pipeline included 20 power projects (5 under implementation, 3 committed, and 12 proposed). By 2020, 2 projects had been completed and 6 were under implementation, with 3 projects discarded. From the 12 proposed projects in 2015, 3 remained at the proposal stage in 2020.

The main development in the sector has been to advance the implementation of the Tonga Energy Road Map 2010–2020.

Major progress has been the development of renewable energy related projects to raise the percentage of renewables in the electricity mix of the country. This has been supported by the Asian Development Bank's Outer Island Renewable Energy Project and the Green Climate Fund's Tonga Renewable Energy Project ($53.2 million) for the Nuku'alofa network upgrade that had commenced in FY2020. Equally significant is the emergence of independent power producers from the People's Republic of China and New Zealand.

A new electricity bill to establish a new ministry responsible for energy has been developed to include wider energy subsectors including electricity, petroleum, gas, and renewable energy. This new ministry has yet to be established.

Asset Management Situation

According to the data extracted from Ministry of Public Enterprises annual reports, the ratio of maintenance expenditure over fair asset value for TPL operations for FY2019 was 1.26 %. This is a low percentage, which indicates insufficient funding for infrastructure and equipment maintenance and upkeep.

Main Deficiencies and Gaps

Deficiencies include the radial nature of most grids, which make them vulnerable to breakdowns when disasters flatten grid poles or destroy transformers. The only area where there is scope for interconnection and sectionalization of feeders is in and around Nuku'alofa.

Another weakness is the continuing losses in Tonga's distribution systems. The regulatory target for system losses is 10%. The overall system losses for all four island grid systems have decreased from 16.01% in 2011 to 10.12% as at the end of June 2019, largely reflecting the continuous improvements to the networks.

The age and deterioration of sections in TPL's distribution network, mainly in Nuku'alofa, is also cause of breaches in voltage standards.

Another gap is documented in the constituencies reports 2020 and the needs expressed in the community development plans: six communities from five TBUs expressed a need for solar lights for street lighting and at schools.

Main Drivers for Infrastructure Development

Besides increasing further, the share of renewable energy toward and beyond the Tonga Energy Road Map targets, the main drivers include the upgrade of the supply system (generation and distribution) to reduce losses and possibly open the way to a reduction in the tariff for customers. This also includes the installation of battery energy storage systems, which stabilize the grids and can sustain distribution during periods when renewable sources produce weakly or not at all.

Complementary measures may be desirable to explore the feasibility of further alternative of renewable energy (biomass, coconut oil, tidal waves, etc.). TPL has outlined concepts for a biomass project in 'Eua using coconut oil. More in-depth feasibility studies are necessary.

The continuing development of independent power production is another avenue for development that can help lower TPL capital and operational costs and improve maintenance and reliability of the grid. Besides the 1.3-megawatt (MW) wind farm already installed by Japan, several new projects are under development, including a 3.8 MW independent power wind farm for which TPL is seeking a suitable partner that would design, build, and operate the farm and sell electricity to TPL. A 2.25 MW wind farm with the People's Republic of China support is also under consideration.

A7.5.2 Information and Communication Technology

Entities Responsible and Infrastructure Overview

Several MDAs and private enterprises are actively involved in the information and communication technology (ICT) sector, with geographic coverage as shown in Table A7.25.

Table A7.25: Management of Information and Communication Technology, by Geographic Area

ICT Sector / Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Internet cable	MEIDECC	Tonga Cable Limited	TCL	X	X	X	X	
Communication services	MPE	Tonga Communication Corporation	TCC	X	X	X	X	X
Regulator	MEIDECC	MEIDECC Communications Department	N/A	X	X	X	X	X
Information	MEIDECC	MEIDECC – Information Department	N/A	X	X	X	X	X

ICT Sector / Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
E-services	MEIDECC	MEIDECC – Computer Emergency Response Team	N/A	X	X	X	X	X

CERT = Computer Emergency Response Team, ICT = information and communication technology, MEIDECC = Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MPE = Ministry of Public Enterprises.

Source: Data from Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication, Ministry of Public Enterprises, 2021

In addition to this government-linked list of entities, Tonga has several private service providers, in particular Digicel Tonga Limited, which has around 49% of the Tongan market for mobile communication (voice and data over satellites, mobile connection, and the internet), and Oceancel, which has 2% of the market in mobile internet. Digicel Tonga may transfer ownership in line with Digicel's wider plans.

Table A7.26 summarizes key infrastructure managed by Tonga Cable Limited (TCL), the Tonga Communications Corporation (TCC), and other actors in the ICT sector (as provided by TCL and the TCC).

Table A7.26: Main Information and Communication Technology Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua	Others
Internet cable	km	km	km	km	km	
Marine cable	823	348	251	0	0	Ha'pai land station is 53 km from branching unit inclusive
Inland cable (fiber optic)	117.4	13.2	1.7	8..1	0	
Communication towers	#	#	#	#	#	(roof attached radio-communication equipment)
Number of towers	62 TCC (26)	15 TCC (8)	9 TCC (6)	6 TCC (3)	TCC (2)	5

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua	Others
Servers farms and data centers	#	#	#	#	#	
Number of data centers	1	0	0	0	0	

km = kilometer, TCC = Tonga Communications Corporation

Source: Data from Tonga Cable Limited and Tonga Communications Corporation.

Select Key Performance Indicators

Table A7.27 summarizes the KPIs for the ICT sector.

Table A7.27: Sectoral Key Performance Indicators for Information and Communication Technology

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/ 2014	Value 2015/16	Value 2019/20
Sources of data			TPL Figures	PIPIs 2016	TCL/ TCC Figures
Access: Fixed Lines	#/ 100 people	X	28.6	14	15.46
Access: Mobile Subscriptions	#/ 100 people	X	53.4	57.66	62.80
Access: Fixed Broadband Subscribers	#/ 100 people	X	1.4	2.90	3.44
Access: % of population covered by a mobile cellular network	%	X		96%	98%
Access: % of population covered by at least a 3G mobile network	%	X		96%	98%
Access: % of population covered by a 4G mobile network	%	X		20%	70%
Quality: International internet bandwidth (bit/s per person)	Mbps/population Bits/s/person	X	555/101,028 5.5bps/person	933/101,133 9.2bps/person	12,510/ 105,695 118.4bps/person

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/ 2014	Value 2015/16	Value 2019/20
Sources of data			TPL Figures	PIPIs 2016	TCL/ TCC Figures
Affordability: Mobile-cellular prepaid - price of 1 min local call (off-peak, on-net)	T$	X		T$0.15	T$0.20
Affordability: Price of 1 min call to major market destinations (Sydney and San Francisco) – peak business time	T$	X		T$0.60	T$0.84
Affordability: Price of 3G data bundles	T$	X		T$5.00/GB	T$2.00/GB
Affordability: Price of monthly ADSL	T$	X		T$29.50/GB	T$5.50/GB
Competition: Number of Service Providers	#		2		3
Sustainability: Yearly maintenance expenditure over infrastructure assets replacement value (%)	%		1.7% (TCC)	2.7% (TCC)	1.4% (TCC)

ADSL= GB=gigabyte; Mbps=megabits per second; PIPIs=Pacific Infrastructure Performance Indicators; PRIFCO=PRIF Coordination Office; TCC=Tonga Communications Corporation; TCL=Tonga Cable Limited; TPL=Tonga Power Limited

Source: Data from Tonga Cable Limited and Tonga Communications Corporation.

Current Projects under Implementation

Table A3.5 in Appendix 3 summarizes the main ICT projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding of infrastructure during 2015–2020 was around T$20.3 million per year for the MEIDECC Communications Department, T$4.8 million for TCL, and T$700,000 for the TCC.

Progress Since 2015

The NIIP 2 (2015) project pipeline included eight ICT projects (one committed and seven proposed). By 2020, four projects had been completed and three were under implementation. One project was discarded. From the eight proposed projects in 2015, none remained at the proposal stage in 2020.

The main development has been to complete and capitalize on submarine cable system sponsored by the World Bank and the Asian Development Bank. The system now provides the cable linking Nuku'alofa in Sopu (Tonga) with Suva (Fiji). The cable connects to the existing South Cross Cable Network landing station in Suva, which connects Fiji with Australia and the Hawaii (United States). Extensions are being developed to reach out to the outer islands and also to extend the inland wired links in Tongatapu, especially in Nuku 'alofa with the help of the Tonga Digital Government Support Project.

Asset Management Situation

According to the data extracted from TCL annual reports, the ratio of maintenance expenditure over fair asset value for TCL operations for FY2019 was 1.52 %. For the TCC, the comparable figure was 0.49 %. These represent low percentages, especially considering the short economic life and rapid obsolescence of connecting equipment. This may signal insufficient funding for infrastructure and equipment maintenance and upkeep.

Main Deficiencies and Gaps

Main ICT infrastructure deficiencies and weaknesses are the continued deterioration of the copper network for the fixed-line network and limited affordable internet access to remote outer islands.

The traffic migration from voice to data is lowering the barrier to entry for services providers pushing down revenues for all competitors and the potential of full cost recovery for the providers of ICT services. This may lower the capacity of the TCC to sustainably maintain its infrastructure which is already below par.

The vulnerability to extreme natural events, in particular tropical cyclones, and their potential impacts on physical infrastructure (aerial wires, transmission tower) can impact on the capacity to sustain services following such events.

Another gap is documented in the constituencies reports 2020 and the needs expressed in the community development plans: eight communities expressed the need for (i) improved telephone lines and network coverage, and (ii) internet access in the outer villages under the TBU10.

Main Drivers for Infrastructure Development

The submarine cable to Vava'u and Ha'apai will open opportunities for capacity, capability, and quality of service improvement in the outer islands. Rapidly advancing technological development also opens opportunities for new services and value-added services. The growing technical literacy of the population is expected to fuel demand for internet based new services that can be opportunities for the TCC.

Besides the internet, radio communication can play an important role to send messages to distant outer islands communities, especially in connection with disaster risk management. Some of the infrastructure supporting this role is currently in locations facing high risks from extreme natural events, in particular flooding.

A challenge is therefore to secure the continuation of reliable radio coverage throughout the country under all conditions and the strengthening of climate change adaptation and disaster risk management in this context.

Through the MEIDECC's program on communication, the Communications Department is tasked with providing modern and technological communication infrastructure to assist with the restructuring of Tonga's service delivery and affordable and reliable network for ICT. The current focus of the program is the development of the National Early Warning System Project.

The MEIDECC program on the Computer Emergency Response Team and e-government aims at (i) engaging with domestic, regional, and international committees and organizations to improve cybersecurity and safety; (ii) providing proactive services; (iii) reactive services; and (iv) offering digital forensic services.

A7.5.3 Water Supply

Entity Responsible and Infrastructure Overview

The public enterprise in charge of the water supply sector is the Tonga Water Board (TWB), with geographic coverage as shown in Table A7.28.

Table A7.28: Management of Water Supply Infrastructure, by Geographic Area

Water Supply Sector/ Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Management O&M	MPE	Tonga Water Board	TWB	X	Partially Neiafu	Partially Pangai	Partially Ohonua	
Health regulator	MOH	Public Health Division	PHD		X	X	X	X

MOH = Ministry of Health, MPE = Ministry of Public Enterprises, O&M = operation and maintenance.

Source: Data from Ministry of Health, and Ministry of Public Enterprises

The Public Health Division of the Ministry of Health is responsible for checking the healthiness of the water quality distributed by the TWB. The Ministry of Lands & Natural Resources also has an oversite role related to the protection of water sources as a natural resource. Some smaller local community water supply systems are managed by the community or private users themselves.

Table A7.29 summarizes key public infrastructure managed by the TWB in the water supply sector.

Table A7.29: Main Public Water Supply Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Wells fields capacity	m^3/d; #	m^3/d, #	m^3/d, #	m^3/d, #	m^3/d, #

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Wells capacity	12326	1987	559	1255	544
Number of wells	52	10	5	4	3
Desalination plant	m^3/d	m^3/d	m^3/d	m^3/d	m^3/d
Capacity of plants	18	0	0	0	0
Distribution network	km	km	km	km	km
Distribution pipes length	177.9	27.3	14.99	36.6	6.19
Water distribution trucks	#	#	#	#	#
Number of trucks	0	0	0	0	0
Local public water tanks	#	#	#	#	#
Number of water tanks	7	3	5	6	3

d = day, , km = kilometer, m^3 = cubic meter.

Source: Government of Tonga, Ministry of Public Enterprises, Tonga Water Board. Dataset received in December 2020..

Many Tongans use a mix of rainwater harvesting and piped water supply from the TWB public network. All Tongans have access to reasonably clean drinking water and around 95% of households in urban areas have reliable and continuous public piped water supply.

In villages not covered by TWB services, especially in isolated islands, water supply is arranged by village authorities or community groups. The TWB provides technical advice and support on a case-by-case basis.

Wastewater management for the collection and treatment of septage (sludge extracted from individual septic tanks) is under the responsibility of the Waste Authority Limited.

Select Key Performance Indicators

Table A7.30 summarizes the KPIs for the water supply sector.

Table A7.30: Sectoral Key Performance Indicators for Water Supply

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			PWWA 2013	PIPIs 2016	TWB Data
Access: Number of Water Connection	#		11,315	11,705	12,113
Access: Population served	#		62,338	42,676	N/A
Access: Number of schemes	#		5	4	4
Access: Length of pipes	km		165	257	260.1
Access: Volume Produced	1000 m^3/year		3947	4,307	4,572
Access: Outreach % population connected to safe water network	% of population		tbd	98.6	99.1
Quality: Availability of water supply in piped water supply systems	average hours per day	X		24	24
Quality: Number of metered connections	%	X		100%	100%
Quality: Incidence of waterborne diseases	#/ 1000 people		tbd	0	0
Quality: Number of drinking water safety plan in use	number		5	4	4
Quality: Customer complaints	number/year		986	1561	900
Quality: Volume of water sold (i.e., billed)	L/capita/day		135	131	187
Quality: Volume of treated sewage produced	L/capita/day		none	None	None

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			PWWA 2013	PIPIs 2016	TWB Data
Quality: Continuity of water supply service (hours available)	hours/day		22	24	24
Quality: Customer complaints per 1,000 connections	number/1000 connections		87	11	12
Efficiency: Volume of water produced - total produced from sources and treatment	kL/conn/day		0.96	182	246
Efficiency: Volume of water produced	L/capita/day		173	257	286
Efficiency: Volume of water sold (i.e., billed) - through meters or estimated unmetered	kL/conn/day		0.74	0.51	0.67
Efficiency: Employees per 1,000 connections		X		5	8
Efficiency: Volume of sewage produced - total[24]	kL/conn/day		Not applicable	Not applicable	Not applicable
Efficiency: Non-Revenue Water	% of water produced	X	22	53	35
Efficiency: Non-Revenue Water	kL/km/day		5.7	22.6	16.75
Affordability: Average water supply services	US$/$m^3$		1.06	1.27	1.14
Affordability: new connection	% of GNI per capita		2.7	4.7	5.7

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			PWWA 2013	PIPIs 2016	TWB Data
Affordability: average bill	% of GNI per capita		1.1	4.1	5.2
Affordability: bill for 6 kL/month/connection	% of GNI per capita		0.4	2.3	3.2
Sustainability: Cost recovery (revenues from tariffs/ direct operating cost)	%	X		43	37
Sustainability: Number of qualified personnel in water utilities (% of staff with a diploma/ certificate that qualifies them for their position)	#	X		73	92
Sustainability: Yearly maintenance expenditure over TWB infrastructure assets replacement value (%)	%			7	9
Safety: Proportion of population with access to drinking water that meets World Health Organization guidelines	% of water treated in urban/ rural areas	X		100	100
Safety: Incidence of waterborne diseases	reported cases/ year	X		0	0
Safety: Diarrhea and dysentery per year as a percentage of the total population	% urban % rural	X		0	0
Safety: Drinking water quality compliance - residual chlorine	% compliance		97	98	100
Safety: Drinking water quality compliance - microbiological	% compliance		97	99	100

PIPIs=Pacific Infrastructure Performance Indicators; PWWA=Pacific Water and Waterwater Association; TWB=Tonga Water Board;

a. Wastewater (septage) collection and treatment is under the responsibility of the Waste Authority Limited.

Source: Government of Tonga, Ministry of Public Enterprises, Tonga Water Board. Dataset received in December 2020..

Current Projects under Implementation

Table A3.6 in Appendix 3 summarizes the main water supply projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding for infrastructure of the TWB during 2015–2020 was around T$3.0 million per year.

Progress Since 2015

The NIIP 2 (2015) project pipeline included four water supply projects (two under implementation and two proposed). By 2020, no new projects had been completed and one was under implementation. From the two proposed projects in 2015, both remained at the proposal stage in 2020.

The main improvements achieved since 2015 include (i) increase of water production by 4.7 million cubic meters per year in FY2020, (ii) progressive reduction of non-revenue water by 10%, and (iii) new pumps replaced through the Nuku'alofa Urban Development Sector Project, with five of seven diesel pumps modified into electrical pumps

Asset Management Situation

According to the data extracted from TWB annual reports, the ratio of maintenance expenditure over fair asset value for TWB operations for FY2019 was 0.26 %. This is a low percentage, which signals insufficient funding for infrastructure and equipment maintenance and upkeep.

Main Deficiencies and Gaps

The main infrastructure-related deficiencies in the sector include (i) lack of mapping information on reticulation systems, (ii) weak customer-handling policies, (iii) insufficient equipment and tools of production, and (iv) impacts of climate change and vulnerability of some equipment to disaster risks.

In Tongatapu, there are concerns that increasing salinity in and around water supply wells, as well as growing groundwater pollution, may have adverse effects on water resources in future water supply.

The constituencies report 2020 highlighted needs in community development plans: 14 communities from four TBU expressed the need for water storage facilities and improved public water supply.

Main Drivers for Infrastructure Development

Main drivers according to the Business Plan 2020–2021 include:

(i) improvement of water production capacity by increasing the number of operational pumps to 51;

(ii) drilling new boreholes at 'Eua and at Neiafu;
(iii) upgrading the laboratory to improve water quality service delivery;
(iv) developing a zoning program for Nuku'alofa & Neiafu to improve water demand management and to reduce non-revenue water losses (physical and commercial losses); and
(v) continuing to review and improve the asset management plan to optimize the effectiveness and efficiency of operating, maintenance, and capital expenditure procedures.

A7.5.4 Solid Waste Management

Entity Responsible and Infrastructure Overview

The public enterprise in charge of solid waste management is the Waste Authority Limited (WAL), with geographic coverage as shown in Table A7.31.

Table A7.31: Management of Solid Waste Infrastructure, by Geographic Area

Sector Solid waste	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Solid Waste Management	MPE	Waste Authority Limited	WAL	X	X	X	X	X

MPE = Ministry of Public Enterprises, O&M = operation and maintenance.

Source: Data from Ministry of Public Enterprises

The WAL is also responsible for the oversight of the collection of septage sludge from individual septic tanks and the treatment and disposal of those sludges at dedicated septage treatment plants in Tongatapu, Vava'u, and Ha'apai. There is currently no centralized sewage collection and treatment system in any part of Tonga.

Table A7.32 summarizes key infrastructure managed by the WAL in the solid waste management sector.

Table A7.32: Main Solid Waste and Sanitation Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Solid waste collection trucks	#	#	#	#	#
Number of trucks	10	3	5	3	0
Landfill sites	#	#	#	#	#
Number of controlled sanitary landfill	1	1	1	-	-
Uncontrolled discharge sites	6	4	-	-	-
Sorting and/or recycling facilities	#	#	#	#	#

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Number of sites with facilities	1	1	-	-	-
Septage sludge treatment plants	#	#	#	#	#
Number of treatment plant sites	1	1	1	-	-

Source: Government of Tonga, Ministry of Public Enterprises, Waste Authority Limited. Dataset received in December 2020..

Select Key Performance Indicators

Table A7.33 summarizes the KPIs for the solid waste management sector.

Table A7.33: Sectoral Key Performance Indicators for Solid Waste Management

Indicator	Unit	Covered in KPI list targeted by PRIFCO	Value in 2013/2014	Value 2015/16	Value 2019/20
Source of data			WAL data	PIPIs 2016	
Efficiency: Cost per capita for waste disposal	T$/capita, year	X		No data	T$243.19
Efficiency: Cost Recovery of services	Collection Fee; % collected		Urban 65%; Rural 15%		Collection Fee 85%
Sustainability: Number of shipping containers exported that contain recyclable commodities or waste	#	X		No data	Not applicable
Sustainability: Number of Extended Producer Responsibility programs	#	X		No data	Not applicable

KPI=Key Performance Indicator; PRIFCO=PRIF Coordination Office; T$=Tonga paanga;

Source: Government of Tonga, Ministry of Public Enterprises, Waste Authority Limited. Dataset received in December 2020.

Current Projects under Implementation

Table A3.7 in Appendix 3 summarizes the main solid waste management projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding for infrastructure of the WAL during 2015–2020 was around T$3.5 million per year.

Progress Since 2015

The NIIP 2 (2015) project pipeline included two solid waste management projects (one under implementation and one proposed). In 2020, no new projects had been completed and no new projects had advanced to implementation. The proposed project in 2015 remained at the proposal stage in 2020.

The main progress since 2015 has been to improve the existing site and the landfilling procedures at the Tapuhia landfill and to improve the access road to the landfill for all types of vehicles. However, a new landfill is becoming necessary. Efforts were also deployed with the support of Japan to extend the waste collection service to the outer islands.

Main Deficiencies and Gaps

The main deficiencies of the sector include (i) the age and deterioration of the waste collection trucks, which are not dedicated solid waste collection trucks; (ii) the absence of a sanitary landfill in Ha'apai; and (iii) the limited revenue and resources that limit the capacity of the sector to sustain efficient operations and maintenance tasks in all main urbanized areas in all main islands groups.

The treatment of septage from septic tanks and cleaning and removal across Tongatapu may also become issues requiring increasing attention. There is currently no centralized wastewater collection and treatment system in the urbanized area of Nuku'alofa. Sanitation is based on individual underground septic tanks, which overflow into the ground, even leaking from the top in areas that are flooded during heavy rains. This is polluting the groundwater. In low-lying areas, especially but not only in the western side of Nuku'alofa, the environmental problem is compounded with high groundwater levels, especially during storm surges, which let untreated septage overflow into nearby roadside channels. Septage in Tongatapu, Vava'u, and Ha'apai are collected by private haulers, who discharge septage at treatment plants where treatment efficiency and final effluent discharge pathways may not be up to sound international environmental standards.

The constituencies report 2020 highlighted needs documented in community development plans: 14 communities from Tongatapu expressed the need for improved latrines.

Main Drivers for Infrastructure Development

Addressing the challenges facing the solid waste management sector will require a new comprehensive sector plan to replace the incomplete national plan dating from 2008.

The Business Plan 2020–2021 defines the following objectives and strategies regarding improved infrastructure and plant management:

(i) develop a comprehensive asset management plan and set of procedures;
(ii) prepare new landfill site for Tongatapu;

(iii) construct new purpose-built rubbish collection facilities and purchase landfill vehicles;
(iv) establish a recycling center to sort and process plastic and glass bottles;
(v) partner with the "No Plastic" campaign to minimize single-use plastics;
(vi) expand waste collection services to Ha'apai and 'Eua; and
(vii) develop waste collection services for main outer island groups.

A7.6 Pilar 5: Natural Resources and Environmental Inputs

A7.6.1 Environment and Disaster Risk Management

Entities Responsible and Infrastructure Overview

Three departments of the MEIDECC are responsible for environment-related matters and resilience to disaster risks, with geographic coverage as shown in Table A7.34.

Table A7.34: Management of Environmental Infrastructure, by Geographic Area

Environment & DRM Sector/ Responsibility	Ministry Responsible	Entity Responsible for O&M	Abbreviation	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Environment & Climate Change	MEIDECC	Climate Change Department	CCD	X	X	X	X	X
Disaster Risk Management	MEIDECC	National Emergency Management Office	NEMO	X	X	X	X	X
Meteorology	MEIDECC	Tonga Meteorological Services	TMS	X	X	X	X	X

DRM = disaster risk management, MEIDECC = Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication, O&M = operation and maintenance.

Source: Data from Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication

Table A7.35 summarizes key infrastructure managed by the MEIDECC in the environmental sector.

Table A7.35: Main Environmental Infrastructure in Tonga

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Sea wall protection	km	km	km	km	km
Length of seawall protection installed	ndr	ndr	ndr	ndr	ndr
EOCs_working with NEMO	#	#	#	#	#

Infrastructure	Tongatapu	Vava'u	Ha'apai	'Eua	Ongo Niua
Number of built and equipped EOCs under NEMO oversight	1	under construction (commissioning in March 2021)	1	shared office/ responsibility with Tonga MET in Eua	currently using Government representative's office/ resources for operation

EOC = emergency operations center, km = kilometer, NEMO = national emergency management office; MET = Ministry of Education and Training; ndr =no data received

Source: Government of Tonga, Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication. Dataset received I December 2020.

The various emergency operations centers operated under National Emergency Management Office (NEMO) oversight include the following first-responder agencies: (i) police, (ii) Tonga Fire and Emergency Services, (iii) His Majesty's Armed Forces and (iv) Tonga Red Cross.

Regarding environment-related infrastructure, divisions of the MOI may be tasked with the development and management of large infrastructure (seawalls) and rehabilitation of public buildings (C5 climate-proofed buildings). According to the MOI Corporate Plan for FY2021 and FY2023, the MOI is to support the building of seawall protection across all coastal low-lying areas in Tongatapu and the outer islands

Current Projects under Implementation

Table A3.8 in Appendix 3 summarizes the main environmental projects and programs advanced between NIIP 2 and NIIP 3. The absorption capacity for funding for infrastructure of the MEIDECC's Disaster Risk Management (DRM) Department during 2015–2020 was around T$11.8 million per year.

Progress Since 2015

The NIIP 2 (2015) project pipeline included eight environmental projects (three committed and five proposed). By 2020, four projects had been completed and four were under implementation. From the five proposed projects in 2015, none remained at the proposal stage in 2020.

The main advancement has been to address the need for rehabilitation due to Tropical Cyclone Gita and to use the opportunity to improve resilience to climate change and ensure outcomes under the Pacific Resilience Project and the Climate Resilient Sector Project at the national level, whereby most projects were soft infrastructural development.

Under the Meteorological Department, those activities that were advanced included (i) the automation of warning dissemination (weather program) through the National Early Warning System Project, (ii) the upgrade of the Observations Network under Climate Resilient Sector Project, and (iii) the upgrade of Nuku'alofa Maritime Radio through the Pacific Resilience Project.

Under the DRM Department, main actions included (i) reviewing and enacting the new National Emergency Management Act; (ii) the development of the NEMO website; (iii) the installation

of the NEMO server for filing, archiving, and data storage under the Pacific Resilience Project; (iv) the development of the NEMO Asset Management Plan; and (v) the development of emergency operations centers in several outer island groups.

Under the Environment Department, recently implemented projects included community engagement in conservation work.

Under the Climate Change Department, major projects included (i) the Pacific Resilience Program (T$28.8 million), which financed a school renovation initiative following Tropical Cyclone Gita; (ii) the implementation of Green Climate Fund readiness for MOF accreditation under the fund; and (iii) the completion of the new Tonga Broadcasting Commission building, funded by Japan. In addition, the Climate Change Department manages smaller projects funded by the United Nations Development Programme, such as projects for coastal protection readiness.

Main Deficiencies and Gaps

One main deficiency remains the limited action to address the priorities defined in the Joint National Action Plan II report and others, which can assist local communities practically, as documented in the constituencies reports 2020 and the needs expressed in the community development plans. As an example, 18 communities from Tongatapu expressed the need for coastal protection against rising sea levels.

Main Drivers for Infrastructure Development

The main drivers in the sector are to improve further office infrastructure and equipment at each main island group and to establish an officer in charge in the outer islands for shared NEMO responsibilities.

Together with the DRM Department, the Climate Change Department needs to coordinate and manage the implementation of the program of actions under the Joint National Action Plan II.

The main drivers of the Environment Department will be to preserve or strengthen a safe and clean environment and establish across all islands an effective system to facilitate the conservation of biodiversity and sustainable use of the natural environment, while maintaining ecosystem services.

Appendix 8: Unfunded Projects in the National Infrastructure Investment Plan 3.

Table A8.1: Unfunded National Infrastructure Projects by Pillar, Sector, and Status

G	MDA or PE Propose	Project title	Cost TOP'000	Pillar No	Sec-tor
1	MAFF	Improve existing & build new MAFF Packing Facilities (HACCP cert.)	1,800	1.0	AGR
4	MAFF	Relocation and upgrade of the fumigation facility		1.0	AGR
5	MAFF	Livestock slaughter, abatoir, storage and process facility		1.0	AGR
5	MAFF	New food and water quality control laboratory [link to Env+Health+Fisheries project]		1.0	AGR
5	MAFF	Village Household Health Kitchens		1.0	AGR
2	MoFi	Fisheries Export Refrigerator Storage – Fua'amotu Airport	1,500	1.0	FIS
5	MOFi	Fisheries Wharf and Market (Sopu)		1.0	FIS
5	MOFi	New Aquaculture hatchery (Vava'u and Ha'apai)		1.0	FIS
4	MOT	Solar street lights (500) for tourism & historical landmarks		1.0	TOU
4	MOT	Mala'ekula Royal Tomb Upgrade	15,000	1.0	TOU
4	MOT	Upgrade of the Queen Salote Memorial Hall	10,000	1.0	TOU
4	MOT	Upgrade of the Tonga National Centre and sea wall structure	10,000	1.0	TOU
4	MOT	New Toursim conference building (VV)	3,000	1.0	TOU
4	MOT	Upgrade of the Vava'u Mariner facilities (VV)	1,000	1.0	TOU
5	MTED	New non-agriculture produce packing facility		1.0	TRA
1	TMCL	Talamahu (TBU, Nuku'alofa) and 'Utukalungalu (Vv) Market upgrade	5,000	1.0	TRA
4	TMCL	New shelters for Siamelie and Tofoa flee market (TT)	2,000	1.0	TRA

G	MDA or PE Propose	Project title	Cost TOP'000	Pillar No	Sec-tor
5	PAL	Old Zion Church (relocation, preservation)		2.0	COM
5	MEIDECC	Water and Sanitation facilities for schools (Nationwide)		2.0	EDU
1	MET	New Junior Campus for Tupou College	10,000	2.0	EDU
1	MET	TIST & TMPI extension/upgrade building (more inclusive for student)	6,000	2.0	EDU
2	MET	New 'Safer Schools' warehouse building	2,000	2.0	EDU
2	MET	New Tonga Side School Complex	10,000	2.0	EDU
2	MET	New ICT building & infrastructure Tupou Tertiary Institute (TTI)	2,000	2.0	EDU
4	MET	New MET headquarters (Loupoukamea)	10,000	2.0	EDU
4	MET	Refurbishment of primary & secondary school toilets	14,000	2.0	EDU
4	MET	Primary and Secondary school Resilience Ground Development	7,000	2.0	EDU
4	MET	Existing High Risk Primary Schools upgrade and improvement	2,000	2.0	EDU
4	MET	Safer Primary and Secondary School Classrooms (national)	10,000	2.0	EDU
4	MET	New Early Childhood Classroom buildings (national)	20,000	2.0	EDU
4	MET	New Classroom buildings (Form 1 and 2) (national, only Govt)	6,000	2.0	EDU
5	MET	Tonga College Atele Building Development (new & upgrade)	5,000	2.0	EDU
5	MET	New Tonga National University campus	30,000	2.0	EDU
5	MET	St. Andrew's College classrooms upgrade	2,000	2.0	EDU
5	MIA	Infrastructure services for Elderly Age Care		2.0	ELD
5	MOI	Housing for Vulnerable groups and over crowding		2.0	HOU
5	MOI	Nationwide household bathrooms for vulnerable groups		2.0	HOU
5	MOI	Complete Household Flush Toilets		2.0	HOU
1	MOH	Upgrading of Vava'u Hospital (Prince Ngu Hospital)	40,000	2.0	HTH
1	MOH	Upgrading of a new Public health building (Tongatapu)	5,000	2.0	HTH
2	MOH	Upgrading 'Eua Hospital (Niu'eiki Hospital)	5,500	2.0	HTH
2	MOH	National Pharmacy Warehouse No2	2,500	2.0	HTH
4	MOH	New clinical storage facility for Vaiola Hospital		2.0	HTH
4	MOH	Vava'u clinics (Tungua, Pangimotu and Leimatu'a)		2.0	HTH
5	MOH	New Hospital staff quarters (Princess Fusipala Building) - phase 2		2.0	HTH
5	MOH	New Public Health Building (Princess Fusipala) - phase 2		2.0	HTH
5	MOH	Kolovai Health Center Staff Living Quarters (Kolovai, Fua'amotu)		2.0	HTH
5	MOH	Establishment of New Health Clinic (Tongatapu-'Atata)		2.0	HTH
5	MOH	Establishment of Dialysis Center (Tongatapu)		2.0	HTH
2	MIA	Upgraded National Mini Sports Stadium/Rugby Field (VV, HP, 'Eua)	1,200	2.0	SPR

G	MDA or PE Propose	Project title	Cost TOP'000	Pillar No	Sec-tor
1	OLA	New Fale Alea (Parliament House and Office Complex)	25,000	3.0	CON
2	HMAF	New Kauvai and Tufumahina military camps	1,500	3.0	DEF
4	HMAF	New Niuafo'ou Military Camp	2,000	3.0	DEF
4	MOF	Renovation of Old Treasury Building for Treasury functions	15,000	3.0	HQG
4	MOI	MOI Branch Offices (Vava'u, 'Eua)	1,000	3.0	HQG
4	MJP	New Registrar General Office (Deaths, Births, Marriage) Archive	2,000	3.0	JLO
4	MJP	New Residence for Lord Chief Justice and Supreme Court Justices	2,000	3.0	JLO
5	MIA	Community Volunteer Patrol Post (polisi fakakolo)		3.0	JLO
5	MJP	Renovation/upgrade Fasi Magistrate Courts (Probation office)	1,000	3.0	JLO
1	MJP-J	New Law Court Complex (Supreme and Magistrate)	13,500	3.0	JLO
2	MJP-PD	Expanded and upgraded of facilities for Fale'one Prison (Ha'apai)	6,000	3.0	JLO
2	MJP-PD	Expanded and upgraded facilities for Ha'alefo Prison (Vava'u)	6,000	3.0	JLO
2	MJP-PD	Expanded and upgraded facilities for Sainai Prison ('Eua)	6,000	3.0	JLO
2	MJP-PD	Expanded and upgraded facilities Hu'atolitoli prison (Tongatapu)	12,000	3.0	JLO
2	MPFS-TP	New Tonga National Police Head Quarters	5,000	3.0	JLO
2	MPFS-TP	New and Renovated Police District Accommodation Quarters	3,000	3.0	JLO
5	PMO	New integrated Ha'apai Government Office Builidng		3.0	LGA
5	PMO	New integrated Vava'u Government Office Builidng		3.0	LGA

G	MDA or PE Propose	Project title	Cost TOP'000	Pillar No	Sec-tor
1	TAL	Upgrade/expande carpark, pedestrian access Fua'amotu Airports	1,000	4.1	AIR
1	TAL	New Fire Tender Fua'amotu	2,100	4.1	AIR
2	TAL	New Fire Tender Lupepau'u Airport (Vava'u)	2,100	4.1	AIR
2	TAL	Light for Runways at all domestic airports	9,700	4.1	AIR
3	TAL	Runway extension at Fua'amotu airport	103,100	4.1	AIR
4	TAL	Vava'u Airport Terminal Upgrade and Runway Extension	120,000	4.1	AIR
4	TAL	Terminal Building extension Fua'amotu Airport with Domestic		4.1	AIR
4	TAL	Runway resurfacing ('Eua, Kaufana Airport)		4.1	AIR
5	TAL	New Aircraft Hangar at Fua'amotu	2,100	4.1	AIR
5	TAL	Fua'amotu International terminal relocation (southern side)		4.1	AIR
5	TAL	Replacement of Fire Tender Fua'amotu (Vv, Lupepau'u airport)		4.1	AIR
1	MOI	Fanga'uta Evacuation Bridge and Roads	150,000	4.1	LTD
1	MOI	Overlay of Asphalt Concrete on Primary Roads in Tongatapu	20,000	4.1	LTD
4	MOI	New bridge in Tongatapu from Patangata to Makaunga	300,000	4.1	LTD
4	MOI	New 'Otumoto Lalo bridget (Talihua, 'Out Mala, 'Otea) Vava'u		4.1	LTD
4	MOI	Community partnership roads transportation (minor roads)	300,000	4.1	LTD
4	MOI	Vava'u New Sidewalks Project (Tu'i Rd)	18,000	4.1	LTD
4	MOI	School Bus Stops and Public Toilets	3,000	4.1	LTD
4	MOI	Widen to three lanes Taufa'ahau Rd (Pea to Tofoa)	1,000	4.1	LTD
4	MOI	Upgrade of Foa causeway to climate resilience (Ha'apai)		4.1	LTD
4	MOI	National Main Roads upgrading Phase 2 (65km)	28,000	4.1	LTD
5	MOI	Tonga Roads Project Phase 2		4.1	LTD
5	MOI	Bridges to allow flow of seawater (TT, 'Eua, HP and VV)		4.1	LTD
5	MOI	New bridge in 'Eua from Ohonua to Ta'anga	10,000	4.1	LTD
5	MOI	Vava'u - upgrade of five causeway (Toula, Utungake, Okoa, Tu'anekivale and	15,000	4.1	LTD
5	MOI	Nationwide Upgrade Road in vulnerbale areas (holopeka)	5,000	4.1	LTD
5	MOI	Integrated CBD Transport Management System (traffic lights)	15,000	4.1	LTD
5	MOI	Village Sidewalks and Walkways		4.1	LTD
2	MoFi	New maintenance workshop and boat ramp upgrade (HP, VV)	3,000	4.1	SEA
4	MOI	Outer Islands Wharf Jetties affected by TC Harold (none PAT)		4.1	SEA
5	MOI	Ha'afeva Wharf Rehabilitation (Relocation)	4,000	4.1	SEA
1	PAT	New Wharfs for Small Outer Island	16,000	4.1	SEA
1	PAT	First New Tug boats	20,022	4.1	SEA
2	PAT	Relocation and Rebuild of Nafanua Habour – 'Eua	26,000	4.1	SEA
2	PAT	Second New Tug boats	20,022	4.1	SEA
3	PAT	New International Cruise Wharf, Vava'u	54,000	4.1	SEA
4	PAT	New Sopu Wharf (Slipway, fisheries, packing facilities etc)	140,000	4.1	SEA
5	PAT	Vuna Wharf (Stage 2 Marina and onshore facilities)	20,000	4.1	SEA
5	PAT	Yellow Pier Upgrade and super yatch berth	15,000	4.1	SEA

G	MDA or PE Propose	Project title	Cost TOP'000	Pillar No	Sec-tor
2	MEIDECC	Renewable Energy Testing and Research Center	4,000	4.2	ENE
5	MEIDECC	Establishment of fuel tank farm		4.2	ENE
1	TPL	Nuku'alofa Power Network Upgrade Project (NNUP) Area 3, 4 and 5	34,160	4.2	ENE
1	TPL	Additional/Replacement Generators (TBU, Vv, Hp and 'Eua)	6,000	4.2	ENE
4	TPL	Public street lighting (50) on Tongatapu	2,500	4.2	ENE
4	TPL	Relocate Critical Power Lines Underground (Tongatapu)		4.2	ENE
4	TPL	Tonga Circular Economy System (Renewable energy pilot biogas)		4.2	ENE
5	TPL	First Wind Farm (Vava'u)		4.2	ENE
1	TCC	Upgrade and Expansion Niuas Mobile Networks	2,627	4.2	ICT
1	TCC	Upgrade and Expansion 'Eua Mobile and Fixed Networks	2,960	4.2	ICT
1	TCL	New international secondary / redundancy internet cable	35,000	4.2	ICT
5	MEIDECC	Microwave backup - Government backbone (TBU, OIs)		4.2	ITC
5	MEIDECC	Point to Point satelite connectivity, for Govt network (Niuas)		4.2	ITC
5	MEIDECC	Back-up data centre		4.2	ITC
5	MEIDECC	NICT (Data centre, government network and unified communication)		4.2	ITC
2	T Post	Tonga National Home & Street Addressing	6,732	4.2	POS
5	TPost	Tonga Post extension (Vaololoa, Vava'u)	1,000	4.2	POS
1	WAL	Close (Kalaka) and establishing new landfill(s) Vava'u	12,000	4.2	SWA
1	WAL	Convert dump sites to new structured landfill, Ha'apai & 'Eua	8,000	4.2	SWA
4	WAL	Extension of waste management to remote islands	5,000	4.2	SWA
4	WAL	National household segregation for waste recycling	5,000	4.2	SWA
2	MEIDECC	New water and sewage testing laboratory building	3,000	4.2	WAT
1	TWB	Improved 'Eua Water Supply System	6,705	4.2	WAT
1	TWB	Improved Water Supply System in Vava'u (Greater Neiafu)	14,748	4.2	WAT
1	TWB	Centralized Tonga Water Board and Village Water Supply Tongatapu	103,389	4.2	WAT
4	TWB	Water Softening for Nuku'alofa System	8,000	4.2	WAT
4	TWB	Pangai and Foa new centralised water supply system	8,000	4.2	WAT

G	MDA or PE Propose	Project title	Cost TOP'000	Pillar No	Sec-tor
1	HMAF	Upgrade Touliki coastal protection structure	3,000	5.0	COA
2	MEIDECC	Hahake (TT) coastal area protection	22,000	5.0	COA
2	MEIDECC	Ha'apai coastal area protection	11,000	5.0	COA
3	MEIDECC	Hihifo (TT) coastal area protection	38,000	5.0	COA
5	MLNR	Reclamation Government Land (Lagoon area)		5.0	COA
1	MEIDECC	New Warehouses for NEMO (one Vava'u, Eastern District, TT)	2,000	5.0	DRM
1	MEIDECC	Multi-Hazard Early Warning/Emergency Operations Centre (Niuas)	15,000	5.0	DRM
4	MEIDECC	Construction and or retrofitting community evacuation centres		5.0	DRM
4	MEIDECC	Environment Resources Interactive Center		5.0	ENV
5	MLNR	Nuku'alofafo'ou site preparation		5.0	ENV
5	MLNR	Neiafu urban site preparation		5.0	ENV
1	MPFS-FED	Upgrade Fire Station 1, Nuku'alofa	2,630	5.0	FIR
2	MPFS-FED	Construction of new Fire & Emergency Service HQ	1,542	5.0	FIR
2	MPFS-FED	New staff quarters Fire Stations (FS1, FS2, FS3, FS6) (TT, VV, HP)	1,183	5.0	FIR
4	MEIDECC	New severe weather radar forecasting network (NTT, VV, TBU)		5.0	MET

G	MDA or PE Propose	Project title	Cost TOP'000	Pillar No	Sec-tor
		MOI Proposed 2018/19 - 019/0 Corporate Plans			
4	MOF	Renovation of Old Treasury Building for Treasury functions	15.00	3.0	HQG
4	PAT	New Sopu Wharf (Slipway, fisheries, packing facilities etc)	140.00	4.1	SEA
4	MOT	Mala'ekula Royal Tomb Upgrade	15.00	1.0	TOU
4	TAL	Vava'u Airport Terminal Upgrade and Runway Extension	120.00	4.1	AIR
4	MOT	Solar street lights (500) for tourism & historical landmarks		1.0	TOU
4	MOI	Vava'u New Sidewalks Project (Tu'i Rd)	18.30	4.1	LTD
		MOI Proposed 2020/21 Corporate Plan			
4	MOI	Community partnership roads transportation (minor roads)	300.00	4.1	LTD
1	MOI	Overlay of Asphalt Concrete on Primary Roads in Tongatapu	20,000	4.1	LTD
1	MOI	Fanga'uta Evacuation Bridge and Roads	150,000	4.1	LTD
		MOI Proposed 2021/22 Corporate Plan			
4	MOI	School Bus Stops and Public Toilets	3.00	4.1	LTD
4	TPL	Public street lighting (50) on Tongatapu	2.50	4.2	ENE
4	MOI	Widen to three lanes Taufa'ahau Rd (Pea to Tofoa)	1.00	4.1	LTD
4	MOI	MOI Branch Offices (Vava'u, 'Eua)	1.00	3.0	HQG
4	MOI	New bridge in Tongatapu from Patangata to Makaunga	300.00	4.1	LTD
4	MOI	New 'Otumoto Lalo bridget (Talihua, 'Out Mala, 'Otea) Vava'u		4.1	LTD

HMAF=His Majesty Armed Forces; MAFF=Ministry of Agriculture, Food and Forests; MEIDECC=Ministry of M MET=Ministry of Education and Training; MIA=Ministry of Internal Affairs; MoFi=Ministry of Fishery; MOF=Ministry of Finance; MOH=Ministry of Health; MOI=Ministry of Infrastructure; MOT=Ministry of Tourism; TPL=Tonga Power Limited; MEIDECC= Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communication; MPFS-FED=Ministry of Police and Fire services-Fire and Emergency Services; MPFS-TP=Ministry of Police and Fire services-Tonga Police; PAT=Ports Authority Tonga; PMO=Prime Minister's Office; TAL=Tonga Airport Limited; TMCL=Tonga Market Corporation Limited

Key:	
	Group 1 (within likely funding)
	Group 2 (needs extra funding)
	Group 3 (delay, and/or revise)
*	See Sectors in Table 2-2

TSDF Pillar 1: Economic institutions	1.0
TSDF Pillar 2: Social institutions	2.0
TSDF Pillar 3: Political (governance) institutions	3.0
TSDF Pillar 4: Infrastructure & technology Inputs (transport)	4.1
TSDF Pillar 4: Infrastructure & technology Inputs (utilities)	4.2
TSDF Pillar 5: Natural resources and environmental inputs	5.0

Source: Consulting team compilation based on project documents received

Appendix 9: Opportunities for the Financing of Infrastructure

A9.1 Government Capacity to Finance Infrastructure

A9.1.1 Government Fiscal Operations

Table A9.1 presents a summary of the operations (actual, estimated, and projected) of the Government of Tonga over the period from fiscal year (FY) 2017 (ended 30 June 2017) to FY2023, in the Government Finance Statistics (GFS) format[25], which is a standard format enabling international comparison and compatible with the United Nations System of National Accounts.

Table A9.1: Government of Tonga Operations; Actual, Estimated, and Projected (T$ million)

Statement of Government Operations	FY2017 Actual	FY2018 Actual	FY2019 Actual	FY2020 Provisional Actual	FY2021 Budget Estimate	FY2021 Revised Estimate	FY2022 Forecast	FY2023 Forecast
Revenue	313.4	319.5	378.2	420.2	389.1	432.5	389.5	403.2
Taxes	211.6	235.4	243.0	238.6	236.7	222.9	222.9	236.7
Grants	70.0	53.1	106.7	139.0	124.1	178.9	135.9	135.9
Other revenue	31.8	31.0	28.4	42.7	28.3	30.6	30.6	30.6
Expense	266.1	267.3	301.3	331.4	405.0	388.9	365.0	387.9
Compensation of employees	128.8	127.5	134.5	148.7	165.7	148.7	165.7	148.7
Use of goods and services	87.5	91.6	110.7	129.3	181.3	182.3	141.3	181.3
Interest	8.2	8.3	8.0	8.2	8.8	8.8	8.8	8.8
Subsidies	0.9	0.8	0.9	0.8	0.9	0.9	0.9	0.9
Grants	5.5	5.1	2.9	3.7	4.3	4.3	4.3	4.3
Social benefits	14.9	14.5	14.7	17.2	18.2	18.2	18.2	18.2
Other expense	20.3	19.4	29.6	23.4	25.8	25.8	25.8	25.8

[25] International Monetary Fund. 2014. *Government Finance Statistics Manual 2014*. Washington, DC.

Statement of Government Operations	FY2017 Actual	FY2018 Actual	FY2019 Actual	FY2020 Provisional Actual	FY2021 Budget Estimate	FY2021 Revised Estimate	FY2022 Forecast	FY2023 Forecast
Gross operating balance	47.2	52.2	76.8	88.9	(15.8)	43.6	24.5	15.3
Net acquisition of nonfinancial assets	19.7	20.9	14.0	27.9	21.7	21.7	21.7	21.7
Net lending/borrowing requirement	27.5	31.4	62.8	61.0	(37.5)	21.9	2.8	(6.4)

FY = fiscal year, T$ = pa'anga.

Note: The table is shown in Government Finance Statistics (GFS) format

Source: Government of Tonga, Ministry of Finance. Budget Strategy and Funding Envelope 2021–2022.

Tonga's budget has benefitted for some decades from grants from development partners. Since the Global Financial Crisis (GFC), this has included budget support designed to sustain an appropriate level of government expenditure in the face of shortfalls in domestic revenues. These grants have enabled Tonga to bring down a GFS surplus budget in most years, which enables reserves to be built up for debt repayment and to provide emergency relief funds in the event of natural disasters. Observers, including the International Monetary Fund (IMF) have commended the government for its prudent management of economic policies, including the strong commitment to fiscal consolidation[26]. Governance arrangements for budget support include a Joint Policy Reform Matrix negotiated between government and relevant development partners.

The FY2021 Budget was an exception, budgeting for a deficit equivalent to more than 3% of gross domestic product (GDP), due to the impact of the COVID-19 pandemic on domestic revenues and the need to maintain government expenditure through an economic and social stimulus package to prevent a more serious downturn in the economy. In the event, additional grant funding has been made available during the year (the government and the World Bank negotiated a special Emergency Development Policy Operation from the Crisis Recovery Window), and the budget result for FY2021 is now expected to be a surplus equivalent to approximately 2% of GDP.

It is of note that projections for FY2022 and FY2023 are for closer to a balanced budget, even with grants assumed to be maintained at a level similar to that in FY2020. If realized, this would impact on the ability to build reserves.

[26] Tonga: *Staff Concluding Statement IMF 2020 Article IV Consultation Mission, 25 February 2020, paragraph 3*.

The government has put in place a set of fiscal anchors to encourage stability in fiscal operations. These fiscal anchors are:

(i) domestic revenue as a percentage of GDP (with a medium-term target to remain above 22%);
(ii) compensation of employees as a percentage of domestic revenue (with a medium-term target to remain below 53%);
(iii) compensation of employees as a percentage of operating expense (with a medium-term target to remain below 45%);
(iv) external debt as a percentage of GDP (with a medium-term target to remain below 50%); and
(v) maintaining a cash buffer to cover 2 months of the recurrent budget (with a medium-term target of T$64 million).

The medium-term targets for the first two fiscal anchors are not currently being met due to shortfalls in domestic revenue because of the pandemic.

A9.1.2 Government Capital Expenditures

Most capital expenditure by the Government of Tonga on infrastructure is financed by grants from development partners (cash and in-kind) and potentially through concessional loans. This expenditure is addressed later in this appendix, covering infrastructure financing by each development partner.

The government funds some capital expenditure on infrastructure from its own resources sourced from domestic revenues (tax and nontax), budget support from development partners, and domestic borrowing to finance any deficit expenditure. The government's capacity to finance capital expenditure on infrastructure in this way is limited, due to pressure to manage public debt and from the financing of recurrent expenditure including salaries and other operating costs of government.

In FY2021, the government budgeted T$13.1 million in expenditure on assets (capital expenditure) with funding sourced from the Government Fund or from budget support. This represented 3.5% of total budgeted expenditure sourced from the Government Fund or from budget support (which amounted to T$380.0 million, including T$38.5 million in budget support), and 2.2% of total budgeted expenditure from all funding sources (which amounted to T$589.6 million). Most of this budgeted capital expenditure relates to smaller items of office equipment and furniture and fittings. However, this does represent a potential source of funding for investment in infrastructure, particularly if the government's fiscal position improves.

The government retains direct responsibility for some key infrastructure, including the road network and other infrastructure on outer islands, and is pursuing mechanisms for improving the financing of asset maintenance such as the Road Maintenance Fund. Other infrastructure is managed through the public enterprises, though frequently funded through the national budget.

A9.1.3 Borrowing and Debt Sustainability

Tonga's stock of public debt stood at T$490.1 million as of 30 June 2020 (equivalent to 41.2% of GDP), with external public debt amounting to T$420.1 million (equivalent to 35.3% of GDP)

and domestic debt amounting to T$70.0 million (equivalent to 5.9% of GDP). Expenditure on debt servicing for FY2020 amounted to T$26.1 million (equivalent to 2.2% of GDP and 6.0% of recurrent revenue)[27].

The government currently has a policy to not borrow externally, except on very concessional terms, and to maintain the ratio of external debt to GDP at below 50%. This policy continues to have support from the IMF, though the IMF indicates that debt sustainability considerations should restrict financing to grants if possible[28]. The IMF also notes that, without new grant commitments from development partners, public debt needs to be at or below 35% of GDP. This is needed to ensure stable debt dynamics over the long term and to build fiscal buffers for debt repayment and emergency funds for climate-related shocks, and will require higher fiscal surpluses averaging some 4% of GDP for the foreseeable future. The IMF concludes that substantial additional donor funding in the form of grants will be needed, but that a more sustainable solution to Tonga's fiscal, development, and growth challenges is to grow the private sector[29].

The most recent debt sustainability analysis, undertaken for Tonga under the auspices of the IMF and the International Development Association (IDA), was in 2017[30]. This increased Tonga's external debt distress rating from moderate to high risk, given the large expected impact on economic growth and fiscal balances posed by future natural disasters[31]. This rating has implications for the availability of budget support in grant form for Tonga from multilateral institutions. The 2020 Article IV consultation mission confirmed that Tonga's risk of external debt distress remains high because of an impending upturn in debt repayments commencing in 2024 (particularly to the Exim Bank of China).

Tonga is eligible for refinancing of debt service obligations to bilateral lenders under the Debt Service Suspension Initiative taken by G20 finance ministers and central bank governors in April 2020 and extended in November 2020. Loans from the Exim Bank of China (those associated with the Road Improvement Project and the Nuku'alofa Central Business District Project) qualify under this initiative[32].

A9.2 Public Enterprises Financial Situation

This section provides an assessment of the capacity of main public enterprises managing large infrastructural assets to contribute to the financing of investment in infrastructure. The public enterprises included in this review and assessment are shown in Table A9.2.

[27] Government of Tonga, Ministry of Finance. 2020. *Government of Tonga Budget Strategy and Funding Envelope 2021/22*. November. pp. 25–26.

[28] IMF. 2020. *Tonga: Staff Concluding Statement IMF 2020 Article IV Consultation Mission*. 25 February. para 15.

[29] Ibid., paragraph 13 and summary IMF report.

[30] IMF. 2017. *Tonga: Staff Report for the 2017 Article IV Consultation – Debt Sustainability Analysis*. 19 December.

[31] The indicative thresholds for the present value of debt to GDP and debt to exports are breached in the projection horizon (to 2037).

[32] Government of Tonga, Ministry of Finance. *Government of Tonga Budget Strategy and Funding Envelope 2021/22*. November 2020. p. 24.

Table A9.2: List of Public Enterprises Assessed

Sector	Public enterprise	Function
Energy	Tonga Power Limited	Generation, distribution and retailing of electric power across a four-grid system in Tonga.
Transport	Ports Authority of Tonga	Operation of the port of Nuku'alofa for international and domestic shipping (with possible extension to some outer islands being considered).
	Tonga Airports Limited	Operation of all domestic and international airports in Tonga.
Communications	Tonga Cable Limited	Operation of submarine fiber-optic telecommunications cables connecting Tongatapu, 'Eua, Ha'apai and Vava'u with the rest of the world, wholesaling to retail service providers.
	Tonga Communications Corporation	Operating as a service provider for telecommunications services in Tonga in competition with other service providers.
	Tonga Broadcasting Corporation	Operation of television and radio broadcasting services to inform, educate and entertain the people of Tonga.
	Tonga Post Limited	Operation of postal services for Tonga.
Water supply	Tonga Water Board	Provision of safe and reliable reticulated water supplies to consumers in areas served in Tongatapu and parts of Neiafu, Pangai and Ohonua.
Waste management	Waste Authority Limited	Operation of waste management services in Tongatapu and extension of services to other islands.
Other	Tonga Market Corporation Limited	Operation of the Talamahu produce market and three other markets in Tongatapu, the produce market in Vava'u, and a produce market in American Samoa.
	Tonga Asset Managers and Associates Limited	Operation of the Small Industries Centre in Nuku'alofa.

Source: Authors.

A9.2.1 Financial Positions of Public Enterprises

Table A9.3 presents select items from the profit and loss accounts of public enterprises from FY2018 to FY2020, including revenue and net profit after tax.

Table A9.3: Select Items from Profit and Loss Accounts of Public Enterprises

	Revenue (T$ million)			Net profit after tax (T$ million)		
	FY2018	FY2019	FY2020	FY2018	FY2019	FY2020
Tonga Power Limited	48.1	53.0	53.1	4.7	2.2	(0.9)
Ports Authority of Tonga	11.8	12.4	11.7	3.2	3.3	2.1
Tonga Airports Limited	11.6	12.5	9.9	1.4	2.0	(0.6)
Tonga Cable Limited	5.0	6.7	7.1	1.9	1.5	2.5
Tonga Communications Corporation	30.1	30.4	28.1	0.7	3.4	0.2
Tonga Broadcasting Corporation	2.0	2.1	1.8	(0.05)	(0.2)	(0.4)
Tonga Post Limited	9.1	1.0	1.4	0.2	0.05	0.4
Tonga Water Board	6.4	6.8	7.9	1.3	1.1	0.9
Waste Authority Limited	2.3	2.5	3.0	0.3	0.5	0.2
Tonga Market Corporation Limited	1.1	1.3	1.7	0.1	0.1	0.08
Tonga Asset Managers and Associates Limited	0.8	0.9	0.8	(0.4)	(0.5)	(0.5)

FY = fiscal year, T$ = pa'anga.

Source: Ministry of Public Enterprises Annual Reports (FY 2018.2019 and 2020)

Table A9.4 presents select items from the balance sheets of public enterprises from FY2018 to FY2020, namely equity, debt, and cash (which for this purpose includes term deposits with banks and government bonds held).

Table A9.4: Select Items from Balance Sheets of Public Enterprises

	Equity (T$ million)			Debt (T$ million)			Cash and/or Term Deposits (T$ million)		
	end FY2018	end FY2019	end FY2020	end FY2018	end FY2019	end FY2020	end FY2018	end FY2019	end FY2020
Tonga Power Limited	61.4	62.9	60.7	27.6	31.4	29.6	4.7	1.4	2.2
Ports Authority of Tonga	21.9	23.5	24.6	1.2	2.3	2.9	6.0	3.8	1.8
Tonga Airports Limited	36.6	38.3	36.2	0.0	0.0	0.0	9.5	8.6	8.3
Tonga Cable Limited	50.5	50.8	52.5	0.0	0.0	0.0	7.1	7.8	7.7
Tonga Communications Corporation	45.2	48.4	48.6	15.0	18.2	20.5	0.9	2.2	1.0
Tonga Broadcasting Corporation	3.0	2.9	2.4	0.5	2.0	2.5	0.2	0.3	0.7
Tonga Post Limited	3.5	3.5	3.6	0.6	0.5	0.4	4.6	11.8	14.6
Tonga Water Board	5.6	5.6	5.4	2.5	2.4	2.3	1.8	1.6	1.8
Waste Authority Limited	0.7	1.5	1.7	0.1	0.1	0.1	0.6	0.2	0.5
Tonga Market Corporation Limited	1.7	1.8	1.8	1.6	1.4	1.2	1.3	1.3	0.6
Tonga Asset Managers and Associates Limited	16.7	16.2	15.6	1.5	1.5	1.5	0.9	1.0	1.1

FY = fiscal year, T$ = pa'anga.

Source: Ministry of Public Enterprises Annual Reports, 2018, 2019 and 2020)

In FY2019, all the public enterprises listed in Table A9.4 recorded profits, except for the Tonga Broadcasting Corporation and Tonga Asset Managers and Associates Limited, which recorded losses. In the case of Tonga Broadcasting Corporation, it has a mix of commercial and social objectives (with its Government Policy Obligations resulting in some financial support from the government). The rate of return on equity for the profitable public enterprises ranged from 1.3% for Tonga Post Limited to 35.4% for the Waste Authority Limited, with a rate of return on equity of 5.3% for the group.

Performance deteriorated significantly in FY2020, due in significant part to the combined impact of Tropical Cyclone Harold and the COVID-19 pandemic, with Tonga Power Limited and Tonga Airports Limited recording losses in addition to the Tonga Broadcasting Corporation and Tonga Asset Managers and Associates Limited. In the case of Tonga Power Limited, the positive effect of lower fuel prices has been outweighed by other impacts from the pandemic and from the overhang of damage from recent cyclones. A new tariff arrangement coming into

effect in 2021 may assist in arresting the decline in financial performance. In the case of Tonga Airports Limited, revenues have been drastically affected by the suspension of most flights and costs are being met by running down cash reserves.

For the public enterprises that remained profitable, the rate of return on equity ranged from 0.3% for the Tonga Communications Corporation to 17.3% for the Tonga Water Board, with the rate of return on equity for the group as a whole declining to 1.6%. Only two public enterprises, Tonga Cable Limited and Tonga Post Limited, generated a higher rate of return on equity in FY2020 than in FY2019. Six public enterprises recorded increases in revenue from FY2019 to FY2020, while five recorded decreases, indicating that increases in costs are at play in the decline in profitability as well as decreases in revenue.

Given much of their asset base is funded from grants, debt to equity ratios are low, with only the Tonga Broadcasting Corporation having a ratio above 1 at the end of FY2020. Tonga Airports Limited and Tonga Cable Limited have significant reserves of cash (the high level of cash held by Tonga Post Limited is offset by a corresponding current liability for terminal dues related to extraterritorial office of exchange services).

Financial performance of public enterprises is expected to deteriorate rather than improve in FY2021, with the COVID-19 pandemic unlikely to be brought under control until vaccination is completed for a significant proportion of the population.

A9.2.2 Capacity of Public Enterprises to Fund Capital Expenditure and Maintenance

Table A9.5 provides data relevant to the assessment of the capacity of public enterprises to fund capital expenditure and maintenance. It collects information on the value of fixed assets (at cost), the annual level of capital expenditure, and the annual level of expenditure on repairs and maintenance, for public enterprises involved in the provision and operation of infrastructure.

Table A9.5: Asset and Maintenance Expenditure by Public Enterprises

	Fixed Assets[a] (T$ million)			Capital Expenditure (T$ million)			Maintenance Expenditure (T$ million)		
	end FY2018	end FY2019	end FY2020	FY2018	FY2019	FY2020	FY2018	FY2019	FY2020
Tonga Power Limited	167.7	206.2	208.0	14.9	40.4	1.9	3.3	2.6	5.6
Ports Authority of Tonga	43.3	49.7	54.1	0.9	6.9	4.5	0.3	0.7	0.4
Tonga Airports Limited	85.8	90.6	116.7	1.5	5.4	26.5	0.2	0.3	0.3
Tonga Cable Limited	65.7	66.0	70.8	0.7	0.3	4.8	0.5	1.0	0.6

	Fixed Assets[a] (T$ million)			Capital Expenditure (T$ million)			Maintenance Expenditure (T$ million)		
Tonga Communications Corporation	146.9	143.2	146.4	2.3	5.8	7.1	na	0.7	0.6
Tonga Broadcasting Corporation	6.2	6.2	6.6	0.01	0.5	1.0	0.03	0.07	0.04
Tonga Post Limited	2.5	2.6	2.6	0.08	0.06	0.01	0.06	0.09	0.06
Tonga Water Board	35.3	38.5	48.4	1.6	2.8	9.9	0.1	0.1	0.1
Waste Authority Limited	8.5	8.7	10.2	0.6	0.3	1.4	0.1	0.2	0.4
Tonga Market Corporation Limited	4.3	4.4	4.5	na	0.1	0.1	0.1	0.1	0.1
Tonga Asset Managers and Associates Limited	18.8	18.8	18.8	0.01	0.01	0.0	0.2	0.4	0.3

FY = fiscal year, na = not available, T$ = pa'anga.

a. at cost

Source: Ministry of Public Enterprises Annual Reports

All public enterprises are making some capital investments, though the larger investments made by Tonga Power Limited, Tonga Airports Limited, and other public enterprises over the period examined are supported by development partners. Expenditures on repairs and maintenance over the period examined have generally been low[33], though expenditures on repairs and maintenance have averaged around 2% of the value of fixed assets (at cost) for four public enterprises (Tonga Asset Managers and Associates Limited, Tonga Power Limited, Tonga Post Limited, and Waste Authority Limited).

Table A9.6 provides an assessment of the capacity of public enterprises to self-fund infrastructure costs. Costs of operations, maintenance, small-scale capital expenditure,

[33] It is noted that the expenditures identified here are those charged specifically to repairs and maintenance accounts in the financial statements, and may miss some relevant expenditures charged to other accounts.

medium-scale capital expenditure, and large-scale capital expenditure are considered. The assessments are based on a medium-term perspective of the financial position of public enterprises, and do not focus too heavily on the FY2020 results, which have been affected by the combined impact of Tropical Cyclone Harold and the COVID-19 pandemic.

The assessment rates the capacity of each public enterprise on a scale relative to its capital base, as follows:

(i) high: indicates a full capacity to self-fund without assistance;
(ii) medium: indicates a partial capacity, whereby the public enterprise can self-fund some needs, but a backlog will accumulate gradually; and
(iii) low: indicates that the public enterprise is effectively unable to self-fund this activity.

Table A9.6: Capacity of Public Enterprises to Self-fund Infrastructure Costs

	Operations	Maintenance	Small Capex	Medium Capex	Large Capex
Tonga Power Limited					
Ports Authority of Tonga					
Tonga Airports Limited					
Tonga Cable Limited					
Tonga Communications Corporation					
Tonga Broadcasting Corporation					
Tonga Post Limited					
Tonga Water Board					
Waste Authority Limited					
Tonga Market Authority Limited					
Tonga Asset Managers and Associates Ltd					

Capex = capital expenditure.

Note: The assessment rates the capacity of each public enterprise relative to its capital base: Green indicated "High" or a full capacity to self-fund without assistance; Yellow indicates "Medium" or a partial capacity by the enterprise to self-fund some needs, but a backlog will gradually accumulate; and red indicates "Low" or that the enterprise is unable to self-fund this activity.

Source: Authors.

Except for the Tonga Broadcasting Corporation, which is consistently recording small losses, and Tonga Asset Managers and Associates Limited, which is also incurring losses, all the public enterprises involved in the provision and operation of infrastructure are assessed as having

high capacity to meet the costs of operation and maintenance, together with smaller items of capital expenditure. Capacity to self-fund medium-scale and large-scale capital expenditure is generally assessed as low, though three public enterprises (Ports Authority of Tonga, Tonga Cable Limited, and Tonga Power Limited,) are assessed as having some capacity to fund medium-scale capital expenditure.

A9.3 Development Partner Support to Tonga

Tonga's national budget integrates development expenditures (both cash and in-kind) financed by development partners, with expenditures financed from the Government Fund including budget support.

Table A9.7 summarizes contributions in recent years from development partners providing support for infrastructure investments and other purposes. The Development Budget for FY2021 at T$209.6 million represents 36% of total budgeted expenditure for the fiscal year at T$589.6 million.

Table A9.7: Development Budget Summary by Development Partner (T$ million)

	FY2017 Actual	FY2018 Actual	FY2019 Actual	FY2020 Estimate out-turn	FY2021 Budgeted	FY2022 Projected	FY2023 Projected
World Bank	14.6	28.1	42.2	24.6	33.3	33.0	34.7
Asian Development Bank	28.4	32.4	37.5	15.7	48.0	31.0	42.4
Australia	23.7	22.9	19.4	22.0	40.8	23.7	35.4
New Zealand	19.5	23.5	21.1	21.7	25.4	15.0	12.9
European Union	1.1	2.1	0.6	6.7	0.6	0.5	0.0
People's Republic of China	21.2	3.4	14.9	18.2	21.9	31.2	34.7
Japan	35.6	28.8	15.7	22.2	2.1	2.9	12.2
United Nations	8.4	10.2	9.1	9.7	14.5	12.7	12.7
Green Climate Fund	0.0	0.2	0.3	0.3	6.2	14.5	14.5
Other	12.8	12.8	17.2	8.4	16.8	6.8	5.7
Total	165.3	164.4	178.0	149.5	209.6	171.3	205.2

FY = fiscal year, T$ = pa'anga.

Source: Government of Tonga, Ministry of Finance. Budget Statements FY2018 to FY2021.

Information presented below, in relation to the current and future assistance programs of individual development partners, is sourced from the Budget Statement for FY2021, and from consultations with DPs. The information presented focuses on assistance related to the provision of infrastructure.

A9.3.1 World Bank Group

The World Bank IDA18 funding cycle is currently under implementation with the major programs and projects related to infrastructure being:

(i) the Tonga Climate Resilient Transport Project ($27.8 million) aimed at improving resilience in the transport sector as well as providing immediate response in the event of an eligible crisis or emergency
(ii) the Tonga Digital Government Support Project ($4.75 million) aimed at improving Tonga's capacity for digital public service delivery
(iii) the Pacific Resilience Program ($33.89 million) aimed at repair and reconstruction of schools damaged by recent cyclones, establishing an emergency operations center for Ha'apai, 'Eua, and Vava'u, and a headquarters for Meteorology and the National Emergency Management Office

The Tonga Aviation Investment Project, involving redevelopment of Fua'amotu International Airport, accessed regional funding and was completed in January 2020.

The Government of Tonga's priorities for the IDA19 funding cycle (FY2021 to FY2023) amounting to $68 million are:

(i) the transport sector, with a focus on agricultural and community roads, jetties, and wharves
(ii) building further the resilience of schools with a focus on safer education
(iii) access to the contingent financing facility known as the Catastrophe Deferred Drawdown Operation, which provides immediate liquidity to address shocks related to natural disasters and/or health-related events.

A9.3.2 Asian Development Bank

The Asian Development Bank (ADB) supports the Government of Tonga's five key priority sectors, including (i) transport infrastructure; (ii) energy, climate change, and disaster risk reduction; (iii) economic development; (iv) public sector reform; and (v) health.

ADB's active portfolio in Tonga for FY2020 and FY2021 comprises the following projects related to infrastructure:

(i) the Nuku'alofa Urban Development Sector Project ($14.59 million) aimed at improving the policy environment for the delivery of urban services and providing high-priority urban infrastructure identified in the Nuku'alofa Urban Infrastructure Development Plan
(ii) the Integrated Urban Resilience Project ($18.3 million) aimed at improved and more resilient urban infrastructure in Tongatapu, including an effective flood risk management system and improvements in water supply and environmental health

(iii) the Outer Islands Renewable Energy Project ($27.72 million) aimed at installing solar power systems on nine outer islands, with additional financing to rehabilitate distribution networks on 'Eua and Vava'u
(iv) the Tonga Renewable Energy Project ($53.2 million) aimed at equipping electricity grids in Tongatapu and five outer islands with systems to manage increased generation of electricity from renewable sources and increasing generation capacity from renewables in seven islands
(v) the Climate Resilience Sector Project ($23.13 million) aimed at mainstreaming climate resilience into development planning and addressing country priorities focusing on the most vulnerable sectors and communities
(vi) the Pacific Regional Disaster Resilience Program ($6 million) aimed at providing contingent disaster financing for timely emergency response and early recovery
(vii) the Cyclone Gita Nukualofa Network Upgrade Project ($9.4 million) aimed at repairing cyclone damage to critical areas of the electricity distribution network and improving the resilience of the network to extreme weather events
(viii) the E-Government through Digital Health program ($7.5 million) aimed at leveraging the increased bandwidth from the fiber-optic cable by fostering an e-governance environment together with more direct investments in digital health in Tonga for improved health system response and efficiencies.

ADB also approved $5 million for a project readiness facility to prepare two high-impact transport sector projects, namely the upgrade of Queen Salote Wharf ($45 million) and the Fanga'uta Bridge and access roads project (now estimated to cost $80 million).

As part of the Tonga Renewable Energy Project, ADB supported the government and Tonga Power Limited to mobilize private sector investments through independent power purchasing agreements for solar and wind power projects.

A9.3.3 Asian Infrastructure Investment Bank

Tonga became a regional member of the Asian Infrastructure Investment Bank (AIIB), headquartered in Beijing, with effect from 5 January 2021, after being approved as a prospective member in 2017.[34]. The AIIB provides loans for infrastructure projects on concessional terms and can also provide grants for project preparation. The AIIB has also established the COVID-19 Crisis Recovery Facility, with a special funding window to allow more concessional terms for projects using this facility. Fiji and the Cook Islands had loan projects approved in 2020, cofinanced with ADB (and New Zealand in the case of the Cook Islands project).

[34] https://www.aiib.org/en/about-aiib/governance/members-of-bank/index.html

A9.3.4 Australia

Managed by Australia's Department of Foreign Affairs and Trade, the current Aid Investment Plan for Tonga has the following thematic areas:

(i) support economic, governance, and private sector development reforms
(ii) promote a more effective, efficient, and equitable health system
(iii) improve economic opportunities for Tongan workers through investments in skills
(iv) foster equitable and sustainable development
(v) cover crosscutting issues (gender, climate change, elderly populations, and disability)

Major projects currently active and relating to infrastructure include cofinancing with ADB for the Outer Island Renewable Energy Project and with the Green Climate Fund for the Tonga Renewable Energy Project, in order to reduce the use of fossil fuels in Tonga.

In relation to the forward program, Australia has a long-term interest in the water sector and in supporting improvements in packing facilities for agricultural products. Cofinancing with New Zealand of the proposed new Parliament House, and with ADB in relation to the Fanga'uta Bridge Project, are also being considered, as is assistance with the design of the proposed new court complex.

As part of Australia's *Pacific Step-up* initiative, the Australian Infrastructure Financing Facility for the Pacific (AIFFP) became operational on 1 July 2019. The AIFFP partners with Pacific governments and the private sector to design high-impact, safeguarded projects and enables their delivery through up to A$1.5 billion in loan financing and up to A$500 million in grants. There is a strong focus on climate resilience in the AIFFP's approval processes. Tonga is eligible for the grant component of the AIFFP and this is a significant opportunity for the financing of major infrastructure projects.

A9.3.5 New Zealand

Managed by New Zealand's Ministry of Foreign Affairs and Trade, the Joint Country Program is under review and there are indications that it will focus on (i) energy, (ii) economic development, (iii) education and skills development, and (iv) law and justice.

Ongoing projects related to infrastructure include the Nuku'alofa Network Upgrade Project aimed at reducing line losses for Tonga Power Limited and increasing access to safe and reliable electricity.

New Zealand is also considering acting as lead donor in relation to the new Parliament House, with cofinancing from Australia.

A9.3.6 European Union

Assistance from the European Union amounts to €11.1 million under the 11th European Development Fund for 2014–2020.

Most funding is directed to the focal sector of energy in the form of budget support, focusing on supporting initiatives such as the Tonga Energy Bill, which will amalgamate legislation and regulations for all forms of energy.

Under the Building Safety and Resilience in the Pacific Project, managed by the Pacific Community, the European Union assisted all the Pacific island countries, including Tonga, in strengthening their disaster risk preparedness and responses infrastructure.

Assistance provided earlier (under the 10th European Development Fund) to the health sector included relocating the Niuatoputapu Hospital to a less vulnerable location. Looking ahead to the post Cotonou period over the next 20 years, it is likely that renewable energy will feature as a priority, but assistance may be more for capacity building than for infrastructure.

A9.3.7 The People's Republic of China

The People's Republic of China is increasingly active in Tonga. It provides technical cooperation across a range of sectors. The most recent grant agreement signed was for CNY70 million (T$24.5 million), covering assistance for education, infrastructure, transport, health, and agriculture. Current projects related to infrastructure include construction of pedestrian sidewalks in Nuku'alofa. The People's Republic of China will fund the Tonga High School Sports complex, which is in the design phase, and will provide heavy machinery for road maintenance when the international border is reopened.

A9.3.8 Japan

Forms of development assistance provided through the Japan International Cooperation Agency are (i) general grant aid, (ii) grant assistance for grassroots human security projects, (iii) nonproject grant aid, and (v) technical cooperation.

General grant aid is aimed at building facilities such as hospitals, vocational school facilities, roads, bridges, and any related equipment. The current project being implemented under this modality is the Nationwide Wide Early Warning System for disaster preparedness, while data collection is underway in relation to possible assistance to the further development of Fua'amotu International Airport and Vava'u Airport.

Projects supported from 2016 to 2020 included domestic terminal and port facilities in Nuku'alofa, wind power generation, and facilities for the Tonga Broadcasting Corporation.

Japan has provided cofinancing for ADB's Tonga Renewable Energy Project, promoting the mobilization of private sector investment in a solar farm involving an independent power purchasing agreement with Tonga Power Limited.

A9.3.9 United Nations

The current United Nations Development Assistance Framework runs from 2018 to 2022, with total funding of T$104.4 million focusing on supporting five thematic areas (generally not involving direct assistance for infrastructure): (i) climate change, disaster resilience, and environmental protection; (ii) gender equality; (iii) sustainable and inclusive economic empowerment; (iv) equitable basic services; and (v) human rights.

A9.3.10 Green Climate Fund

The Green Climate Fund (GCF) is the world's largest dedicated fund supporting efforts by developing countries to reduce their greenhouse gas emissions and enhance their ability to respond to climate change. It was set up by the United Nations Framework Convention on Climate Change in 2010[35].

The GCF launched its initial resource mobilization in 2014 and rapidly gathered pledges worth $10.3 billion. These funds come mainly from developed countries, but also from some developing countries, regions, and one city. Worldwide, more than 150 projects have been approved with total GCF funding of over $7 billion.

The fund pays particular attention to the needs of societies that are highly vulnerable to the effects of climate change, including small island developing states.

While Tonga's accreditation for direct access to the GCF is underway, ADB and the United Nations Development Programme (both accredited entities) are assisting the government with project proposals for the fund, identified in the Joint National Action Plan (JNAP II). Tonga has to date mobilized $32.3 million in GCF funding across two projects (the Tonga Renewable Energy Project and other Tonga components of the Pacific Islands Renewable Energy Investment Program) and has $3.2 million in readiness support approved for six projects[36].

The GCF represents a significant opportunity for Tonga in financing infrastructure investments that address adaptation to climate change and/or mitigation of emissions.

A9.4 Domestic Financial Institutions

Key components of the mission of the National Reserve Bank of Tonga are to formulate and implement sound monetary policy that is conducive to economic prosperity, and to promote a stable and efficient financial system. The reserve bank supervises and regulates both banks and nonbank financial institutions.

Tonga has three commercial banks providing banking services and the Tonga Development Bank was established by the government to promote economic and social advancement while operating profitably as a financially sound banking institution. As at the end of the third quarter of 2020, commercial banks had total assets approaching $750 million and total loans and advances outstanding to nonfinancial public enterprises amounting to $60 million[37]. Commercial banks are limited in how much they can lend to anyone borrower. This places limits on what they can lend to public enterprises.

The pension funds, comprising the Government Retirement Fund Board and the National Retirement Fund Board, have maintained a solid financial position with a combined asset base of $218 million. They have started lending to public enterprises, including loans to the Tonga

[35] Green Climate Fund. About. https://www.greenclimate.fund/about

[36] https://www.greenclimate.fund/countries/tonga

[37] National Reserve Bank of Tonga, *Quarterly Bulletin*, September 2020.

Water Board for a smart meter project and a solar farm project. They have each acquired 15% shareholdings in the Tonga Development Bank. Both the Government Retirement Fund Board and the National Retirement Fund Board have moved strategically to diversify their investment portfolios from concentrating on low risks financial instruments to investing in other areas, including public enterprises. The pension funds have the financial capacity to lend to viable projects in both public enterprises and the private sector on more favorable terms than the commercial banks.

A9.5 Private Sector and Community Participation

Among the key organizational outcomes sought in the Tonga Strategic Development Framework 2015–2025 are closer and more effective public-private partnerships and a strengthened enabling environment for business. The IMF notes that reforms are needed to unlock private sector potential and that the most durable solution to addressing Tonga's fiscal, development, and growth challenges is to grow the private sector[38].

Private sector involvement in the provision of infrastructure can range from design to construction to operation to financing to ownership. Tongan firms are involved in the design and construction of infrastructure assets, often in participation with international firms. Maintenance of roads is generally carried out by local contractors and the private sector provides a range of support services to public enterprises involved in infrastructure in a range of sectors. Domestic financial institutions are involved in financing working capital for public enterprises involved in infrastructure provision and operation, and also play some role in financing smaller infrastructure investments. The Ministry of Public Enterprises is developing a policy framework for public-private partnerships. Independent power producers are playing an emerging role in the energy sector, particularly in relation to renewable energy systems harnessing solar and wind energy. In the telecommunications sector, the two service providers are the private firm Digicel operating in competition with the public enterprise Tonga Communications Corporation.

The diaspora is a source of funding for some infrastructure. Millions of pa'anga are raised by old-student networks for school buildings and facilities, as well as community facilities such as churches, and private housing. Some churches fund and build facilities that meet a high cyclone rating and provide an important addition to available shelter in times of extreme weather events. These links to the diaspora remain very important in Tonga.

A9.6 Summary of Financing Opportunities

The key take-outs from this review of financing opportunities for infrastructure are that reliance on grants from development partners will continue, and that this reliance will most likely increase as a result of the economic consequences of the COVID-19 pandemic and the increasing risks associated with extreme weather events. It is therefore anticipated that most of the finance required for major infrastructure projects prioritized under Tonga's National

[38] *Tonga: Staff Concluding Statement IMF 2020 Article IV Consultation Mission*, 25 February 2020, summary.

Infrastructure Investment Plan will be sourced from development partners in the form of grants.

Having said this, contributions to the financing of infrastructure projects can be expected from:

(i) Government, which funds some capital expenditure each year and could direct a portion of this to infrastructure investment. Some improvement in the government's fiscal position would be needed for this to have a significant impact on infrastructure financing, and the current restrictive policy in relation to external borrowing is likely to continue in place for some time. The planned introduction of a road maintenance fund under the new Roads Act 2020 will provide a dedicated funding stream for road maintenance.
(ii) Public enterprises, many of which are assessed as having capacity to self-fund small items of capital expenditure, in addition to meeting the costs of operation and maintenance. At least in the short term, however, the financial position of public enterprises is constrained as a result of the impact of recent cyclones and the COVID-19 pandemic.

There are a number of emerging areas of interest in relation to the funding of infrastructure investment in Tonga, including:

(i) increasing recognition of the need for innovative forms of emergency assistance by traditional development partners such as the World Bank and ADB
(ii) the Green Climate Fund, which represents a significant opportunity to finance climate change mitigation and adaptation projects for countries such as Tonga, which are vulnerable to extreme weather events
(iii) the significant pool of funding available for grants under the Australian Infrastructure Financing Facility for the Pacific
(iv) Tonga's membership of the Asian Infrastructure Investment Bank, which offers concessional loans and project preparation grants for infrastructure projects, though recognizing that Tonga has a clear preference for grant finance in current circumstances
(v) greater interest from domestic financial institutions such as the pension funds in financing infrastructure investment by public enterprises
(vi) growing interest in public-private partnerships, most notably those involving independent power producers and power purchase agreements in renewable energy.

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