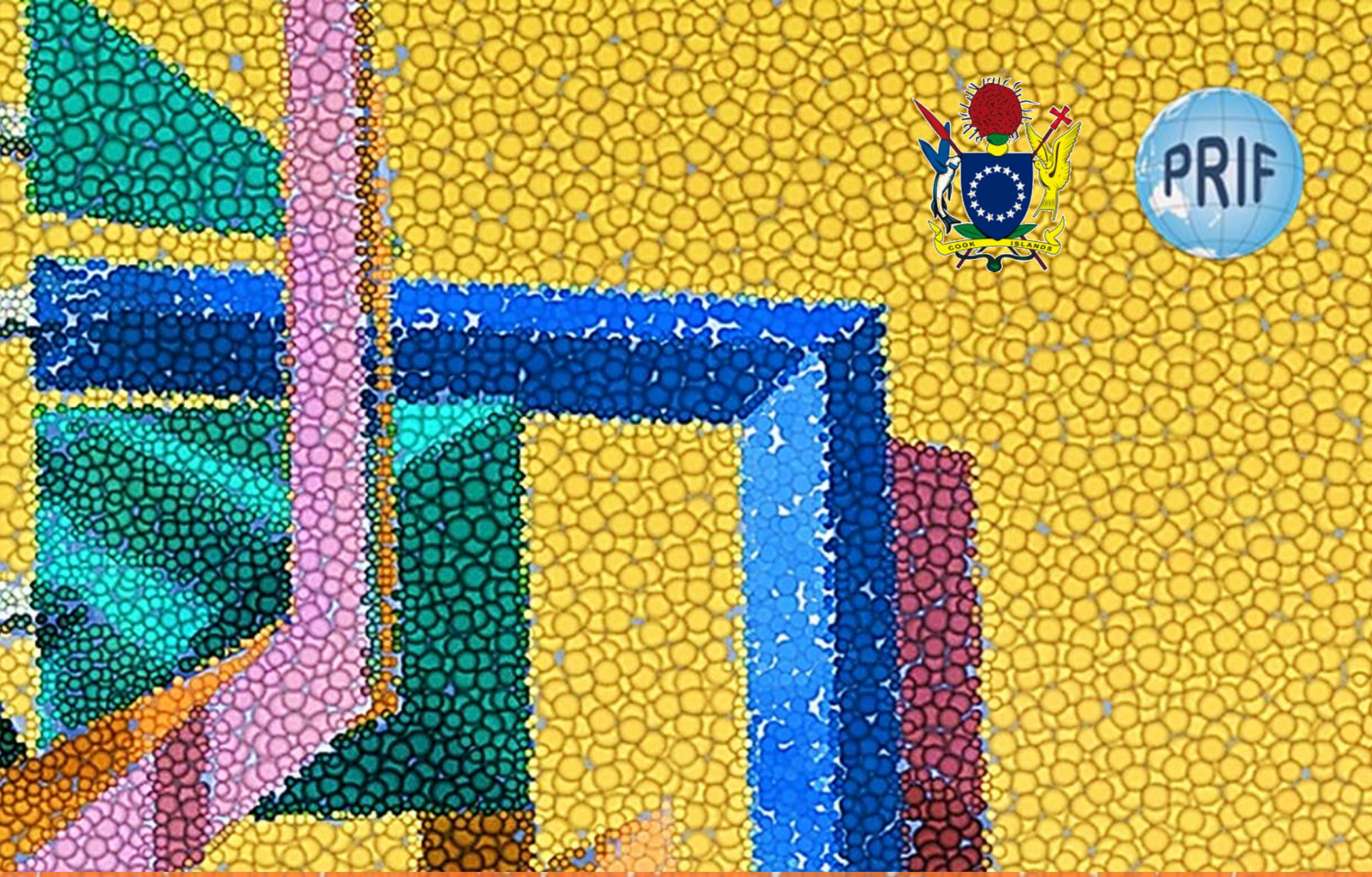
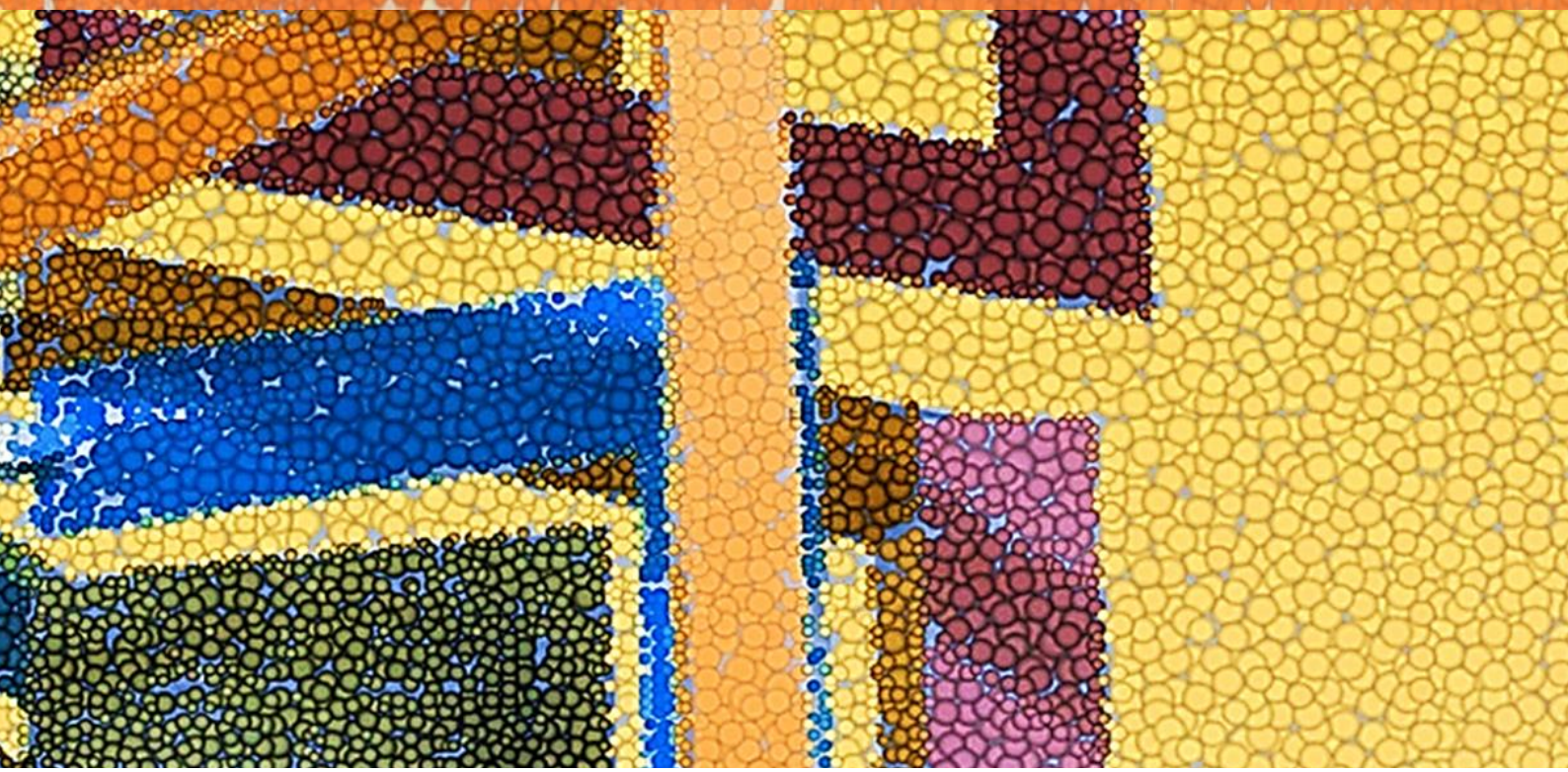


Study of Infrastructure Maintenance Budgets
Government of the Cook Islands



ADB

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The report was written by Bernadette Raffe, a consultant working for the PRIF Coordination Office (PCO). The views expressed are those of the author and do not necessarily reflect the views and policies of ADB, its Board of Governors, or the governments they represent or any of the other PRIF Partners. None of the above parties guarantees the accuracy of the data included in this publication or accepts responsibility for any consequence of their use, though due care has been taken in preparing and reviewing the report.

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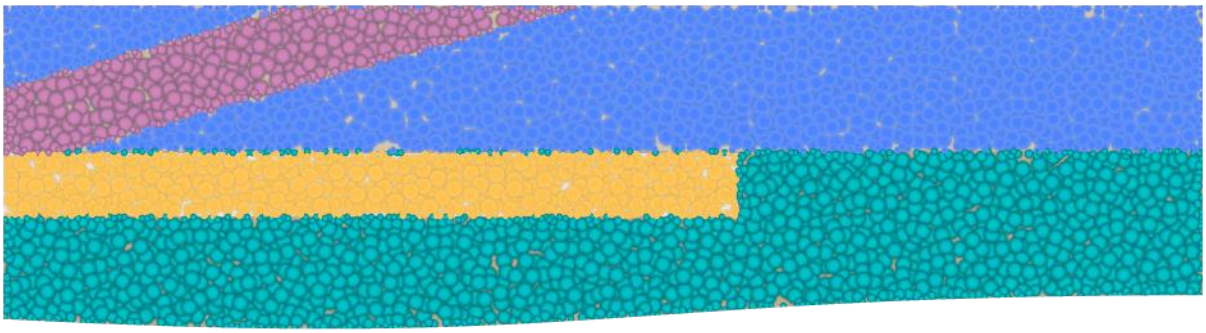
Study of Infrastructure Maintenance Budgets
Government of the Cook Islands

August 2015



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List of Acronyms

ADB	Asian Development Bank
CAA	Civil Aviation Authority
CEO	Chief Executive Officer
CIAA	Cook Islands Airport Authority
CIIC	Cook Islands Investment Corporation
CIPA	Cook Islands Ports Authority
DFAT	(Australia's) Department of Foreign Affairs and Trade
EBITDA	Earnings Before Interest, Tax, Depreciation and Amortisation
EIB	European Investment Bank
EU	European Union
GDP	Gross Domestic Product
GIS	Geographical Information System
ICI	Infrastructure Cook Islands
ICT	Information and Communications Technology
JICA	Japan International Development Agency
MFEM	Ministry of Finance and Economic Management
MOIP	Ministry of Infrastructure and Planning (now Infrastructure Cook Islands)
NIIP	National Infrastructure Investment Plan
NZD	New Zealand Dollar
NZMFAT	New Zealand Ministry of Foreign Affairs and Trade
OPM	Office of the Prime Minister
PCO	PRIF Coordination Office
PICs	Pacific Island Countries
PRIF	Pacific Region Infrastructure Facility
PVC	Polyvinyl Chloride
SOEs	State-Owned Enterprises
TAU	Te Aponga Uira O Tumutevarovaro
TCI	Telecom Cook Islands Ltd
WATSAN	Water, Waste and Sanitation Unit
WIP	Works in Progress

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Executive Summary

Background

The Cook Islands is currently investing heavily in economic infrastructure with significant projects underway in the water, sanitation and renewable energy sectors.[1] The recently approved National Infrastructure Investment Plan 2015 (NIIP) recommends further capital expenditure on economic infrastructure of NZD250 million over the next 10 years. Importantly, 50% by number and 60% by value of the projects in the NIIP are not new construction but involve repair and rehabilitation of existing infrastructure assets resulting from inadequate maintenance of existing assets. It is therefore timely to consider the situation in regard to maintenance of new and existing infrastructure.

In 2014, the Pacific Region Infrastructure Facility (PRIF) commenced a research study on maintenance budgets in conjunction with the Ministry of Finance and Economic Management (MFEM). The study focuses on economic infrastructure – notably in the areas of energy, solid waste management, telecommunications, transport, and water and sanitation.

Objectives

The study was designed to achieve three objectives:

- to provide the Cook Islands Government with information about the current situation with its infrastructure maintenance budgets – how they are developed, allocated, expended and monitored – particularly noting any shortcomings
- to determine the feasibility of retrieving information about capital and recurrent budgets (as a pilot study for understanding maintenance budgets across the Pacific), and
- to build the capacity of staff in MFEM to undertake this work in the future.[2]

There were four key areas of interest:

- determining the current level of expenditure for capital works and maintenance
- determining the adequacy of the maintenance budget (against benchmark figures)
- understanding how much of the budget allocated to maintenance gets spent on maintenance (and the process for reallocation), and
- gathering information about any differences in process between the sectors and also geographically between main island (Rarotonga) and the Outer Islands of the country.

Methodology and Limitations

A consultant based in the Cook Islands conducted the study alongside a member of staff of MFEM. The study considers both the system at national level and also in two of the Outer Islands – Mauke and Mangaia – selected because they are believed to be representative of the differences in how infrastructure maintenance is managed in the Outer Islands. The study is based on the 2013/2014 financial year i.e. July 2013 to June 2014 (the most recent financial year). A visit was made to the Outer Islands to review documentation and conduct interviews with relevant officials. In total 47 people were consulted in the course of the study.

[1] In 2013/2014, the budget for economic infrastructure assets capital works was NZD3.5 million and there was NZD6.7 million in donor-funded investment in economic infrastructure assets (though this is normally closer to NZD1 million annually).

[2] Capacity building was considered successful and has been reported separately to MFEM.

A limitation of the study is that many of the figures used are budget estimates. In some cases it was not possible to identify all maintenance costs and, in other cases, it was not possible to accurately split maintenance from capital costs, particularly for expenditure on the road and water networks in Rarotonga. Even so, it has been possible to draw general conclusions about the process and issues.

Budget Structure

The budget structure, processes and systems are discussed in detail in the report. The critical point is that infrastructure services are provided by eight different organisations representing a mix of government agencies, state-owned enterprises (SOEs) and private sector companies. These entities differ considerably in the nature of their asset base, how they plan for maintenance work, how much maintenance is carried out, how accurate their asset registers are, and what information they can make available.

In general, private sector companies appear to be better than government agencies at planning for and undertaking maintenance work. Typically, in organisations where maintenance is poor, maintenance staff is not involved in the budget process whereas in entities where maintenance is good, there are clear links between maintenance planning and budgeting. Nonetheless, each sector and agency needs to be considered separately to understand the situation fully (see below).

Allocation of Budget and Expenditure

Government maintenance budgets are assigned during the Government's budget process. The Government does not currently have any formal guidelines for this and budgets are based on budget appropriations in previous years. Many Ministries use previous budget baseline figures as the basis for their budgets. In addition, in recent years a separate fund has been set aside for maintenance of the road and water networks on Rarotonga.

The study determined that the operating budget assigned to maintenance of economic infrastructure in 2013/2014 was approximately NZD4.5 million,[3] while total operating spending on maintenance was approximately NZD3.4 million. This means that an estimated NZD1.1 million was not spent on maintenance work as planned.

Differences Between Service Providers

As mentioned earlier, the infrastructure assets in the Cook Islands are managed and operated by a number of different entities, the organisational structure and operation varying along a spectrum from public service to private company (see Table A below).

Table A: Infrastructure Service Providers in Cook Islands

Sector/Area	Service Provider	Organisational Structure	Level of Maintenance Spending*	Level of Planning**
Energy	Te Aponga Uira	SOE	High	Medium
Telecommunications	Telecom Cook Islands	Private Company	High	High
Transport - Aviation	Cook Islands Airport Authority	SOE	Medium	High
Transport - Maritime	Cook Islands Ports Authority	SOE	Low	Medium
Transport - Road	Infrastructure Cook Islands (ICI)	Government Ministry	Low	Low
Sanitation	Cook Islands Investment Corp (CIIC)	SOE	Medium	High
Solid Waste	Water, Waste and Sanitation Unit, ICI (WATSAN)	Project Unit within ICI	Low	Low
Water	WATSAN	Project Unit within ICI	Low	Low
Outer Islands	Island Government	Island Government	Low	Low

Note: CIIC has an oversight role in respect to Crown Assets which are operated by SOEs or ICI and it manages a small Crown-owned local sewage installation at Tepuka. WATSAN manages solid waste and sanitation on Rarotonga and all other sanitation systems are privately owned.

[3] NZD = New Zealand dollars; these figures do not include information and communications technology (ICT)

Infrastructure providers towards the private company end of the spectrum (i.e. that earn their revenue from service delivery generated by infrastructure assets) tend to have a much greater focus on maintenance of their assets, a greater awareness of the need to budget funds to cover maintenance expenses, and routine maintenance plans are in place. They also tend to maintain their capital investment with regular capital spending on upgrading their assets.

Entities that are structured as government departments do not generally perform as well with respect to managing and budgeting for maintenance and, because maintenance is frequently lacking, a significant portion of their capital expenditure is often in the nature of 'deferred' maintenance.[4] The maintenance budget is more likely to be significantly under-spent in those sectors where the service is provided by a government agency. As the table above notes, planning and implementation is low at the Government's infrastructure Ministry (ICI) and in the Outer Islands.

Differences Between Sectors

A more detailed review by sector shows some correlation to the table above, but also some variance. It is not simply that private companies spend the amount recommended as satisfactory and the Government does not. As Table B below shows, the budgets for the transport sector and for solid waste management are lower than what is needed while the budgets for the energy sector and Outer Islands appear to be satisfactory.

Table B: Annual Maintenance Budget in Relation to Asset Base

Sector/Area	Existing Asset Base* (NZD million)	Current Maintenance Budget (NZD million)**	Required Maintenance (2%-4% of Asset Base)	Gap Between Actual and Required Maintenance
Energy	19	1.1	0.38 - 0.76	0.72 to 0.34
Transport - Aviation	51.7	0.7	1.03 - 2.07	-0.33 to -1.37
Transport - Maritime	33.6	0.1	0.67 - 1.34	-0.57 to -1.24
Transport - Roads	72.8	1.1	1.46 - 2.91	-0.36 to -1.81
Sanitation	0	0.02	0	0.02
Solid Waste	4.6	0.02	0.09 - 0.18	-0.07 to -0.16
Water	13	0.5	0.26 - 0.52	0.24 to - 0.02
Outer Islands All Sectors	3.9	0.9	0.08 - 0.16	0.82 to 0.74
Total	198.6	4.44	3.97 - 7.94	0.47 to -3.50

Notes:
* Independent valuations of replacement cost for road transport and solid waste sectors, higher of revaluation or historical cost from most recently audited accounts for other sector. No figures available for communications. Many aid-funded assets in the Outer Islands are not included in the government fixed asset register.
** Annual budget 2013/2014 for all sectors. No figures available for communications.

Outer Islands

On both Mauke and Mangaia there has been significant investment in infrastructure projects by the Government and development partners. In Mangaia there is a well-operated and maintained electricity system and an underground reticulation system, and the water supply system in Mauke is said to be the best in all the islands in the Cook Islands. On the other hand, a maintenance culture is absent and staff on both islands confirm that some assets are failing due to lack of maintenance.

There are a range of factors influencing the situation in the Outer Islands. Firstly, there are issues with capacity and aspects of process. While budgets for infrastructure maintenance in the Outer Islands are calculated using an 'Outer Islands funding formula', this formula is not well understood by staff in the Outer Islands and they do not appear to be in a position at present to negotiate this in the budget submission process to MFEM. In addition, the local authorities have the discretion under the Island Government Act to reallocate operating expenditure as they see fit within their overall budget and reallocation of budget is

[4] Deferred maintenance refers to a situation in which maintenance work has been postponed, often where the funding is needed for other work. This can result in a physical deterioration of assets due to a lack of periodic repairs and routine maintenance. Left unattended, this can lead to physical damage, lack of efficiency, decline in production and the need for capital investment to replace the asset.

common. Secondly, it is important to note that the asset base in the Outer Islands is understated because many donor-funded assets are not included in the Crown's asset register. This means that while it appears that the Outer Islands had more budget assigned in 2013/2014 for maintenance than was needed, this is probably not the case. Thirdly, maintenance budgets are not adjusted to accommodate increased or decreased maintenance costs resulting from new infrastructure. The study concludes that further support for maintenance is needed in the Outer Islands.

Revenue Generation

Telecom Cook Islands Ltd. (TCI), the SOEs and Rarotonga Waste Management Facility all collect sufficient revenue from 'user pays' fees to fund maintenance expenses. Virtually no revenue is collected from roads and water assets. Once the current water project on Rarotonga is complete, 'user pays' charges will be introduced. The bulk of the overall trading revenue[5] in the Outer Islands is derived from electricity sales and this is insufficient to cover generation costs, without considering maintenance or any other required expenses.

Reallocation of Budget

It is common practice in the Cook Islands to reallocate unspent maintenance budget to other priorities. This does not necessarily mean that maintenance was not needed; it can mean that maintenance was needed but the money was reallocated for what was considered to be higher priorities. For example, in 2013/2014, funding that was originally allocated for bridge and drainage maintenance on Rarotonga was then reallocated for emergency repairs to Outer Islands' airstrips which had become unsafe to use.

Adequacy of Budget

Maintenance budget estimates can be based on several methodologies, such as a ratio to Gross Domestic Product (GDP) or to asset values. For methods based on asset values, it is therefore critical to get those values correct. In the PRIF research report on *Infrastructure Maintenance in the Pacific: Challenging the Build-Neglect-Rebuild Paradigm*[6] it indicates that annual spending on maintenance should be between 2%-8% of the non-depreciated value of the asset (i.e. replacement cost). Moreover, the report argues that the amount needed will vary between the sectors, with energy, rail and road assets requiring approximately 2% expenditure each year, water and sanitation requiring approximately 3%, and telecommunications requiring up to 8%. The study has adopted a range of 2%-4% of asset values.

Using this approach, the study concludes that while the overall maintenance budget in the Cook Islands falls within the acceptable range, in certain sectors/areas (e.g. transport and solid waste management) there could be shortfalls.

Conclusions

Information about capital and operating budgets for infrastructure maintenance was relatively easy to obtain from the service providers.

In respect to the budget structure, processes and systems, the study concludes that:

- service providers differ in the way they manage planning, budgeting and delivery of infrastructure maintenance with some sectors performing very well and some less so (particularly the Outer Islands and the Government's Ministry of Infrastructure Cook Islands)
- aspects of process and capacity are barriers in the Outer Islands including a lack of understanding of the 'Outer Islands funding formula' used to calculate maintenance budgets, local authorities having the discretion to reallocate operating expenditure within their overall budget, the asset base being understated, and maintenance budgets not being adjusted when new infrastructure is added
- maintenance work is not generally 'contracted out', the exception being the maintenance of the Tepuka enviroflow system, and

[5] Trading revenue is revenue earned by the Outer Islands in addition to the revenue received by appropriation from the Crown. Trading revenue includes items such as electricity generation, plant hire, boating and reefing, landing fees and agriculture sales.

[6] Pacific Region Infrastructure Facility (PRIF), 2013, *Infrastructure Maintenance in the Pacific: Challenging the Build-Neglect-Rebuild Paradigm,* PRIF: Sydney, pp. 28-29.

- using maintenance budgets as a percentage of asset values to measure adequacy of maintenance budgets, the overall budget for maintenance of infrastructure assets in the Cook Islands falls within the acceptable range of 2%-4% of asset value, though there appears to be a shortfall in some sectors (i.e. transport and solid waste management).

The methodology used in this project could be used to extend the study to other Pacific countries.

Recommendations

In respect to the management of the Cook Islands budget process, it is recommended that:

- all new significant infrastructure projects include a maintenance plan and estimate of future maintenance costs
- the Government review needs and budget allocation in the Outer Islands as priority maintenance and basic service provision to communities may be compromised at present
- support be given to capacity building within ICI for maintenance planning, budgeting and implementation, and
- maintenance and capital budgets be made more transparent by clearing the large amounts of capital work in progress in Government Ministry balance sheets (by transferring to the fixed asset register for capital additions or transferring to operating expenses in the case of maintenance spending).

If further studies of this kind are undertaken in other Pacific Islands, it is recommended that:

- the infrastructure service providers which are expected to have the poorest records should be reviewed early in the process to allow as much time as possible for information to be provided by them, or for alternative sources of information to be found, and
- consideration be given to broadening the scope of the study to include asset management as well as asset maintenance (if appropriate), thereby including issues such as asset capitalisation policies, who specifies levels of service, whether there are any community service obligations and matching subsidies, what services are ‘contracted out’ and what consideration is given to ‘contracting out’ maintenance work.

1. Introduction

1.1 Background

This study concerns maintenance budgets for economic infrastructure assets in the Cook Islands. It was undertaken as a pilot study in an effort to explore the challenges Pacific Island countries (PICs) have in ensuring adequate provision for maintenance in government budgets and 'tracking' of expenditure to ensure it has been spent on maintenance work. Related issues include whether sufficient revenue is raised to finance maintenance work (e.g. from user fees), and the process of transferring funds to sub-national level where much of the maintenance work is managed.

This study was designed to examine the budget structure and processes in the Government of the Cook Islands for maintenance of economic infrastructure and to determine the feasibility of conducting similar studies in other countries.

The study was designed to achieve three objectives:

- to provide the Government of the Cook Islands with information about the current situation with its infrastructure maintenance budgets – how they are developed, allocated, expended and monitored – particularly noting any shortcomings
- to determine the feasibility of retrieving information about capital and recurrent budgets (as a pilot study for understanding maintenance budgets across the Pacific), and
- to build the capacity of staff in MFEM to undertake this work in the future.

There were four key areas of interest:

- determining the current level of expenditure for capital works and maintenance
- determining the adequacy of the maintenance budget
- understanding how much of the budget allocated to maintenance gets spent on maintenance (and the process for reallocation), and
- gathering information about any differences in process between the main island (Rarotonga) and the Outer Islands of the country.

The paper is structured as follows:

- Chapter 1 – background information including the scope and limitations of the study
- Chapter 2 – methodology of study
- Chapter 3 – overview of infrastructure ownership and operation in the Cook Islands
- Chapter 4 – analysis of findings and provision of detailed information on specific issues such as how maintenance budgets are allocated and used, the use of asset management procedures, and what happens to unspent asset maintenance funding
- Chapter 5 – more detail about the operation and management of infrastructure in the Outer Islands, particularly Mauke and Mangaia
- Chapter 6 – revenue generated by infrastructure service providers in the Cook Islands
- Chapter 7 – processes and practices in place for the reallocation of maintenance budgets
- Chapter 8 – discussion of the adequacy of maintenance budgets in the Cook Islands, and
- Chapters 9 to 11 – other observations noted during the study, conclusions and recommendations.

1.2 Scope of Study

1.2.1 Sectoral Focus

The study included five sectors: energy, telecommunications, transport, urban development, and water and sanitation.

The study only considers maintenance of economic infrastructure assets in the energy, telecommunications, transport (aviation, maritime and roads), urban development (specifically solid waste management), and water and sanitation sectors.

Other categories of built infrastructure supporting social services and governance, such as education, healthcare, and correctional services, are not included in this study.

1.2.2 Geographical Focus

All relevant agencies in Rarotonga, Mauke and Mangaia were included.

There are 12 populated islands in the Cook Islands (see Figure 1). The study considered both the system at national level and in two of the Outer Islands – Mauke and Mangaia – selected because Mauke has a relatively new, highly developed reticulated water system, while Mangaia has a much less developed reticulated water infrastructure. MFEM advised that they are considered to be representative of how infrastructure maintenance is managed in the Outer Islands.

1.2.3 Asset Maintenance within Broader Asset Management Framework

As asset maintenance can be considered a sub-set of asset management, the issues that relate to asset management more generally have been included where they were identified. However, they were not studied systematically given the objective of the study concerned maintenance budgets.

1.3 Limitations of Study

The key limitation of the study is that many of the figures used are estimates. In some cases it was not possible to identify all maintenance costs and, in other cases, it was not possible to accurately split maintenance from capital costs, particularly for expenditure on the road and water networks in Rarotonga.

Another limitation is that both of the selected Outer Islands are located in the Southern Group and no Northern Group island was included. This is because it was not possible to undertake travel there due to the irregular transport links and high cost of travel.

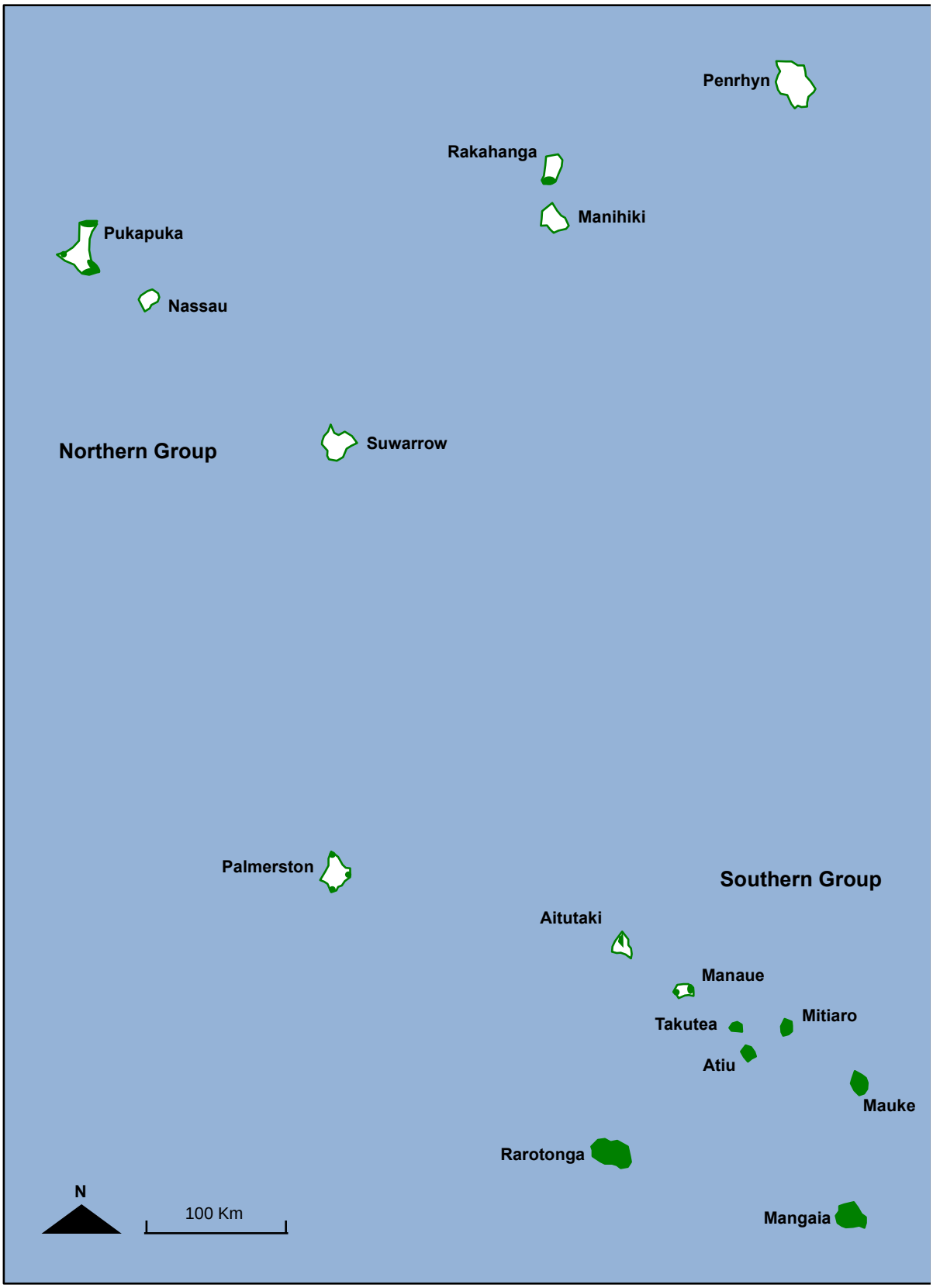
1.4 Why is Maintenance Important?

Pacific Island countries face significant challenges in ensuring adequate maintenance of existing infrastructure.

It is generally recognised that PICs face significant challenges in ensuring adequate maintenance of existing infrastructure assets. One challenge relates to making adequate provision for maintenance in government budgets and then tracking the expenditure to ensure that it has been spent on maintenance work. Another issue concerns whether sufficient revenue is raised (e.g. from user fees) to finance maintenance work. These and other challenges are exacerbated by the process of annual budgeting and the complexity associated with the process of transferring funds to sub-national level where much of the maintenance work is managed.

The Cook Islands is currently investing heavily in economic infrastructure with significant projects underway in the water, sanitation and renewable energy sectors. The recently approved National Infrastructure Investment Plan 2015 (NIIP) recommends capital expenditure on economic infrastructure of NZD250

Figure 1 Map of the Cook Islands



Key: Green shading shows land mass; white shading shows lagoon areas in atolls.
(Prepared by Richard Mabbitt)

million[7] over the next 10 years, adding significantly to the stock of assets that need to be maintained. While a large proportion of the new investment will be funded from donor grants, provision needs to be made in the Government's future operating budgets for adequate maintenance of economic infrastructure assets. Failure to properly maintain infrastructure assets affects service provision to communities and leads to their premature deterioration resulting in either major expenditure for rehabilitation of the assets or even greater expenditure on replacement. A number of the projects in the NIIP are not new construction but the repair and rehabilitation of existing infrastructure assets as historically expenditure on maintenance of existing assets has not been sufficient to adequately maintain the assets.

1.5 Definition of Maintenance

There are several different types of maintenance:

Planned

- *Routine Maintenance*– conducted on a regular basis, designed to minimise wear-and-tear and maintain assets in operational condition e.g. pot hole repairs

- *Periodic Maintenance* – not based on condition of asset but scheduled work at pre-determined periodic intervals (e.g. every six months) - designed to ensure the continuing operation of the asset - tends to occur less frequently than routine maintenance and on a larger scale e.g. resealing of a stretch of road

- *Rehabilitation* – usually considered as capital expenditure rather than maintenance - occurs less frequently than other maintenance and involves major work on an asset to bring it back to operational condition and/or prolong its useful life – it is planned in the sense that it is usually a large expense and needs to be added into the budget in advance of the works

Unplanned

- *Reactive/Urgent Maintenance*– work undertaken to repair an asset that has failed and does not deliver its intended function.

Routine and periodic maintenance are often referred to as preventative (or planned) maintenance as these activities are designed to prevent additional and more costly repairs or rehabilitation in future. Reactive/urgent maintenance and rehabilitation tends to increase when routine and periodic maintenance are neglected. Reactive/urgent maintenance is sometimes undertaken as a 'stop-gap' measure whilst waiting for a more extensive rehabilitation. Preventative maintenance generally provides a better financial return than investment in new infrastructure.[8]

In the Cook Islands, there is also a concept of deferred maintenance. This refers to a situation in which maintenance work has been postponed, often where the funding was needed elsewhere. It can result in physical deterioration of the assets for which maintenance was delayed, inefficiency and reduction in service levels to communities.

[7] All currency values in the report are expressed in New Zealand dollars, the currency used in the Cook Islands.
[8] Pacific Infrastructure Advisory Centre, Sept. 2014, *Infrastructure maintenance in the Pacific: Challenging the build-neglect-rebuild paradigm, Sydney: Asian Development Bank,* p. 31.

2. Study Methodology

2.1 General Methodology

The study was prepared with extensive consultation and participation of stakeholders in Government and SOEs. This included meetings with finance and maintenance staff from all infrastructure service providers. In total 47 people were consulted in the course of the project and a list of their names and organisations is provided in Appendix A.

In addition to consultation with stakeholders, the study also involved analysis of financial information and consideration of maintenance procedures and practices for each infrastructure service provider.

There was wide consultation with Government and other infrastructure service providers as well as analysis of their financial and maintenance records and practices.

The study is based on the 2013/2014 financial year i.e. July 2013 to June 2014 (the most recent financial year).

A consultant based in the Cook Islands conducted the study alongside a member of staff of MFEM. Both were involved in collecting information in Rarotonga, though only the consultant was able to visit the Outer Islands to review documentation and conduct interviews with the relevant officials. The MFEM staff member was then involved in the analysis of Outer Island data.

2.2 Analysis of Financial Data

Financial information for the previous three years was collected for each service provider. The following key activities were performed:

- collection of budget data for maintenance on infrastructure assets
- review of actual costs in the general ledger for capital and maintenance expenditure
- comparison of actual costs to budget
- investigation of any major variances between budget and actual costs (in particular whether the budgeted funds have not been spent at all or if they have been reallocated to other areas)
- identification and documentation of the process used to approve any reallocation of funding
- consideration of the adequacy of the maintenance budget (against benchmark figures)
- review of revenue accounts in general ledger if fees are charged, and
- analysis of whether the revenue is enough to finance maintenance requirements.

2.3 Consideration of Maintenance Procedures and Practices

Discussions were held with maintenance staff in all the agencies to determine the following:

- whether there are any planning, routine maintenance, procedures and/or other relevant manuals related to either capital or maintenance spending on infrastructure
- whether there are established and agreed standards/service levels
- details of the budget process

- how the maintenance budget is developed, what the budget is and what process exists for expending the budget
- if there is an Asset Register and/or asset maintenance or asset management system, whether all assets are recorded and in what level of detail, and who has responsibility for assets, and
- whether there is routine monitoring and reporting of maintenance work.

2.4 Ease of Access to Information

All the infrastructure service providers included in the study were cooperative in providing information in relation to both their maintenance procedures and their financial systems.

As Telecom Cook Islands Ltd. (TCI) is a private company, it did not provide any financial information for the study; however, information about infrastructure maintenance was provided in general terms. Te Aponga Uira O Tumutevaroro (TAU), Cook Islands Ports Authority (CIPA), and Cook Islands Airport Authority (CIAA) all had very good financial systems and were able to provide financial information as requested. The quality of the financial information at both the Outer Islands visited was good and the finance staff were able to answer all questions asked of them. There was, however, an issue with the 2012/2013 financial accounts for all the Outer Islands. These were being processed by MFEM, so financial information for that year was not available. Obtaining the relevant financial information was more challenging at ICI, although the most important data was provided.

Maintenance staff in all the service providers supplied information about their maintenance budgets and procedures.

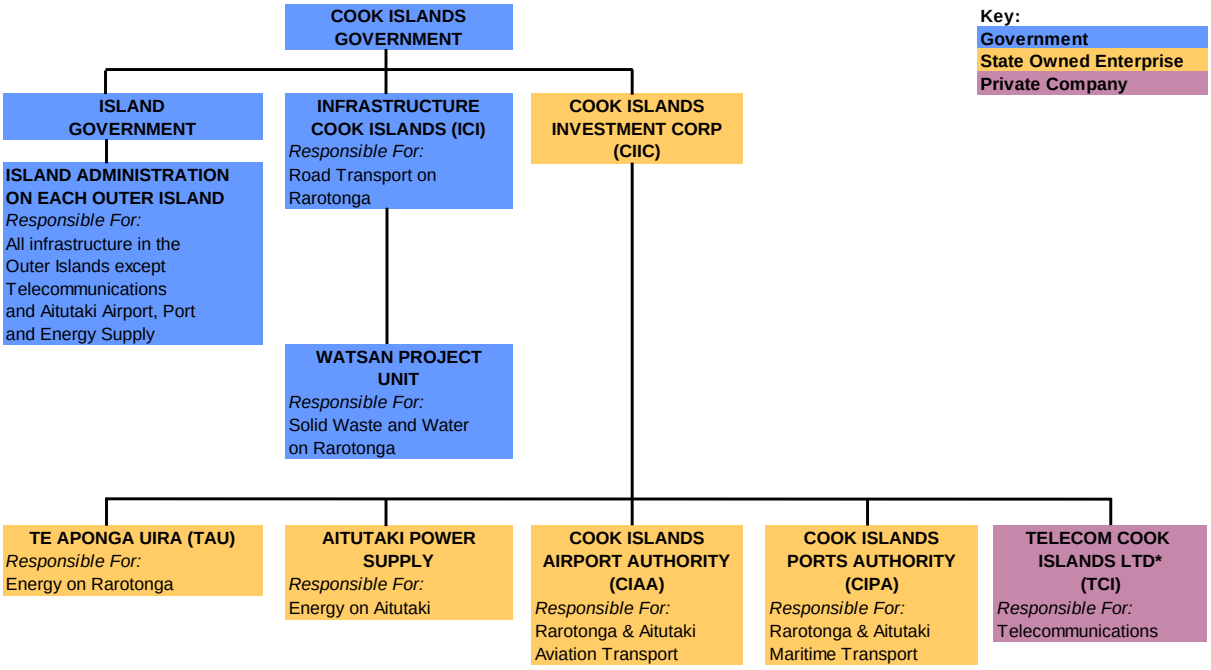
3. Infrastructure Assets in the Cook Islands

3.1 Ownership of Public Infrastructure Assets

As illustrated in Figure 2, almost all infrastructure and infrastructure service providers in the Cook Islands are ultimately owned or managed by the Government of the Cook Islands on behalf of the community. The exception is telecommunications and Telecom Cook Islands. This is a joint venture private company. At the time of this study, it involved Telecom New Zealand (with a holding 60% of the shares) and the Government of the Cook Islands (with a holding 40% of the shares).[9]

All public infrastructure in the Cook Islands is owned by the Government (except telecommunications).

Figure 2 Institutions Involved in Infrastructure Service Provision in Cook Islands



* The Cook Islands Government owns a 40% share holding in Telecom Cook Islands Ltd through a number of intermediary companies. The ultimate parent company is 100% owned by CIIC.

[9] At the time of the study Telecom New Zealand was in the process of selling its shares in Telecom Cook Islands to another private sector entity. The sale was completed in March 2015 with the shares sold to Teleraro Ltd, a consortium comprising three groups of shareholders: the majority shareholder Bluesky Pacific (75%), Telecom Cook Islands staff (10%) and Cook Islands public (15%).

Infrastructure assets in Rarotonga and energy assets in Aitutaki are the responsibility of CIIC. The energy, ports and airport assets are owned and operated by the relevant SOEs. Telecommunications assets are owned and operated by Telecom Cook Islands Ltd.[10] Infrastructure assets in the Outer Islands (with the exception of telecommunications and the Aitutaki port, airport and energy supply) are owned by the Crown on behalf of the community.

A brief description of each of these organisations follows, with more details in a series of Appendices.

3.2 Infrastructure Service Providers in the Cook Islands

As illustrated in Figure 1 there are a number of service providers in the Cook Islands working on behalf of the Government. Their institutional structures range from private company through to government department. Each one is described in more detail below.

3.2.1 Energy – Te Aponga Uira O Tumutevaroro

There are seven national infrastructure providers in the Cook Islands and 10 Outer Island Governments that are responsible for infrastructure provision and maintenance.

TAU is a SOE tasked with the generation and distribution of electricity on Rarotonga. It has no involvement in the generation and supply of electricity in the Outer Islands. The Board of TAU has set a target of continuous supply to TAU's customers so, while faults are occurring, customers generally do not experience significant impact. There is a general awareness of the need for asset maintenance within TAU and its Board, and maintenance spending in recent years has been significant. Appendix B contains more details.

3.2.2 Telecommunications – Telecom Cook Islands

As mentioned above, TCI is a joint venture structured as a private company. TCI is responsible for telecommunications throughout the whole of the Cook Islands. It has been in existence for 23 years and is a financially successful company, having paid significant dividends to its shareholders for many years. Appendix C contains more details.

3.2.3 Transport (Aviation) – Cook Islands Airport Authority

CIAA is a SOE, established in 1987 and responsible for the operation of the Rarotonga and Aitutaki airports. The Rarotonga Airport is an international airport with a concrete paved runway while Aitutaki Airport has a chip-sealed runway. CIAA has no involvement in the operation of the other airports in the Outer Islands. Appendix D contains further information about CIAA.

3.2.4 Transport (Maritime) – Cook Islands Ports Authority

CIPA is a SOE responsible for the operation of the ports in Rarotonga and Aitutaki. It has no involvement in the operation of other ports in the Outer Islands.

A major upgrade of the main Rarotonga port facility at Avarua was completed in 2013, largely funded by a NZD24 million loan from Asian Development Bank (ADB). The upgrade means that the requirement for maintenance has reduced and maintenance spending is currently very low, though there is a high awareness of the need for routine maintenance to keep the new facility in good condition. Appendix E contains further information about CIPA.

3.2.5 Infrastructure Cook Islands

Infrastructure assets in Rarotonga are owned by CIIC. Infrastructure Cook Islands (ICI) is the Government Ministry responsible for the operation of roads, sanitation, solid waste and water infrastructure assets on Rarotonga and for assisting the Outer Islands in the development and maintenance of infrastructure assets. In 2011, a separate WATSAN Unit was setup within the Ministry to focus on the protection of the Cook Islands environment, especially the fragile lagoons. Initially the WATSAN Unit was responsible for solid

[10] SOEs are generally required to provide a Statement of Corporate Intent, however these were not included in the data collection for this project.

waste and sanitation, however, since a reorganisation in mid-2014, the Unit now has responsibility for water infrastructure as well. Further details are outlined in sections 3.2.7-3.2.9 (below) and in relevant Appendices.

3.2.6 Transport (Roads) – ICI

Road maintenance on Rarotonga is the responsibility of ICI. Currently there are no standards for the quality of roads and there is no road master plan which would incorporate all existing roads, allow a coordinated approach to maintaining roads, and help determine the maintenance program and budget. There is a lack of legislation to empower ICI in particular with respect to land issues, but also road safety and traffic management issues. There is no policy on upgrading or maintenance of roads. Appendix F has more details on the Roads Division, ICI.

3.2.7 Sanitation – WATSAN Unit, ICI and CIIC

The Government of the Cook Islands has not generally invested in sanitation infrastructure. Currently all properties on Rarotonga are served by septic tank systems. Non-compliant septic tank systems contribute over 40% of the pollution entering the Cook Islands lagoons.[11] WATSAN (ICI) managed a pilot project to upgrade the private septic tanks in the Muri area, Rarotonga's main tourist area; however, these tanks remain in private ownership and the Government has no maintenance responsibility.

The Tepuka enviroflow system is a small reticulated network disposing of the septic waste from the Tepuka area. There were continual problems with the operation of the system which led to it being taken out of operation for many years until it was overhauled by WATSAN in late 2012. The system has been working well since then, managed by CIIC, with maintenance of the system being 'contracted out'.

3.2.8 Solid Waste Management – WATSAN Unit, ICI

The main solid waste infrastructure asset is the Rarotonga Waste Facility in Arorangi which was opened in 2005. It is operated by the WATSAN Unit in ICI and includes the landfill, septage treatment ponds and recycling centre. The waste facility was intended to have a design life of 15 years but was being filled up much more quickly than expected. In response, to reduce the amount of waste going into the landfill, recycling has been introduced. In addition, a baling machine has been purchased so rubbish is baled and the bales are stacked in the landfill rather than just being dumped, compacted and covered. 'User pays' charges are collected at the landfill. Revenue for the last three financial years has increased from about NZD80,000 in 2011/2012 and 2012/2013 to NZD138,000 in 2013/2014. Appendix G provides a detailed case study of Solid Waste, ICI.

3.2.9 Water – WATSAN Unit, ICI

The operation and management of the water infrastructure on Rarotonga has traditionally been a responsibility of the Ministry of Infrastructure, however with a restructure of the Ministry that took effect from 1 July 2014, the operation of the Waterworks Division has moved into the WATSAN Unit. Appendix H contains a detailed case study of Waterworks Division, ICI.

3.2.10 Island Government and Outer Islands Administration

Responsibility for the infrastructure assets in the Outer Islands rests with the Island Council[12] on each Outer Island. They are operated by the Island Administration on behalf of the Island Council. Chapter 5 discusses infrastructure maintenance in the Outer Islands.

[11] http://watsan. gov.ck/muri-avana-pilot
[12] Island Councils are elected on each Outer Island with the exception of Nassau which is included with Pukapuka

4. Budgeting and Delivery of Maintenance

This chapter begins with some preliminary observations about planning and management of maintenance (which is important as context for how budgets are developed). Information is then provided about:

- budget structure and differences between service providers
- how maintenance budgets are used and disparity between budget allocation and expenditure, and
- differences between maintenance budgets and practices across service providers and sectors.

4.1 Planning and Delivery of Maintenance

4.1.1 Type of Organisation and Approach to Maintenance

As shown in Table 1, the organisational structure of infrastructure providers varies from public service to private company. Generally where the infrastructure provider is a government entity, the level of both planning and implementation are low. TCI and the SOEs tend to have a greater awareness of the importance of maintaining their assets, have routine maintenance plans and plan their maintenance in advance.

Private sector companies have a better track record than government agencies in planning for and undertaking maintenance work.

Table 1 Infrastructure Service Providers in Cook Islands

Sector/Area	Service Provider	Organisational Structure	Asset Owner	Level of Maintenance Spending*	Level of Planning**
Energy	TAU	SOE	TAU	High	Medium
Telecommunications	TCI	Private Company	TCI	High	High
Transport - Aviation	CIAA	SOE	CIAA	Medium	High
Transport - Maritime	CIPA	SOE	CIPA	Low	Medium
Transport - Road	ICI	Government Ministry	CIIC	Low	Low
Sanitation	CIIC	SOE	CIIC	Medium	High
Solid Waste	WATSAN	Project Unit within ICI	CIIC	Low	Low
Water	WATSAN	Project Unit within ICI	CIIC	Low	Low
Outer Islands	Island Government	Island Government	Crown	Low	Low

Notes:
* Level of maintenance is based on maintenance expenditure. Spending greater than NZD500,000 pa is high, and less than NZD100,000 pa is low. Relative maintenance spending as a percentage of asset base is discussed in Chapter 8.
** Level of planning is high where routine maintenance plans exist and are executed, and there is a strong link between maintenance plans and budgets; level of planning is low where neither of these exist.

As mentioned earlier, CIIC has 'contracted out' the routine maintenance of the Tepuka sanitation system and there is an agreed schedule of work to be carried out on a daily basis, every second day, monthly, quarterly, six monthly and annually. This appears to be the only example of the 'contracting out' of infrastructure maintenance in the Cook Islands.

CIIC is the first organisation in the Cook Islands to 'contract out' maintenance of public infrastructure assets.

In contrast, at the Government's Ministry for Infrastructure (ICI), maintenance of the infrastructure assets tends to be more reactive.

4.1.2 Maintenance and Asset Records

As with the planning and delivery of maintenance, the maintenance and asset records tend to be better in TCI and the SOEs than in ICI.

There are no comprehensive asset management systems in place in any of the infrastructure providers at present. Most focus on certain issues only and records are mostly paper-based. CIIC is currently developing a computerised asset management system (supported by the ADB) which, once completed, will provide a base for improved planning for maintenance and will also be implemented in all SOEs. TCI and the SOEs all have accurate financial information in the fixed asset registers (i.e. in the sense that the financial information matches that in the general ledger).

4.2 Budget Structure, Processes and Systems

There are no formal guidelines on the process of budget allocation to maintenance and it is largely based on spending in previous years.

In the Cook Islands, operating budgets for maintenance are assigned during the Government's budget process. In addition, in recent years a separate fund has been set aside under the Government's capital budget for maintenance of the road and water networks on Rarotonga. There are no formal guidelines on the process of budget allocation to maintenance and it is largely based on spending in previous years.

There are clear linkages between maintenance planning and maintenance budgets in TCI and the SOEs. For example, TAU plans to build a new power station in the 2014/2015 financial year with three new high speed engines and to phase out the old, inefficient engines over the next 10 years. The planned replacement of these engines is reflected in reduced forecast running hours for 2014/2015 and reduced budgets for maintenance from 2013/2014. TAU also plan maintenance 12 months in advance by forecasting how long each engine will run with no faults and then estimating when the routine servicing/overhauls will be due. This information is then used to determine the timing and amount of the maintenance funds required for the budget for the next financial year. Given the subject CIAA is Civil Aviation Authority (CAA) standards, maintenance is fairly routine so the costs are reasonably well known. In TCI and CIPA, much of the maintenance is routine and the budget is based on previous actual costs, with any one-off maintenance tasks identified for which additional funds are budgeted.

There are clear links between maintenance planning and budgeting in entities where maintenance is good.

TCI and the SOEs have robust budget processes. TCI and TAU both develop business plans which underpin their budgets, and both TCI and CIPA include "challenge sessions" in the budget process during which staff are asked to justify their budget requests to Management prior to a decision about whether to fund them. Maintenance staff in ICI have little input into the annual maintenance budgets with the bulk of the funding for road and water maintenance expenses budgeted for in the capital works budget by MFEM and reviewed by the Infrastructure Committee.

4.3 Expenditure Against Budget

4.3.1 Expenditure Recorded as Maintenance

In 2013/2014, an estimated 25% of the total maintenance budget was

As shown in Table 2, in 2013/2014, an estimated 25% of the maintenance budget was not used. The estimated budget for maintenance of infrastructure assets was NZD4.5 million, while the estimated expenditure was NZD3.4 million. However, care needs to be taken in interpreting the figures in the Table. Only those items that could be identified as maintenance expenses have been included, so the figures are likely to be lower than actual spending. In addition, many of the amounts making up the totals had to be estimated.

Table 2 Cook Islands Budget for Maintenance of Infrastructure Assets (Year Ended 30 June 2014)

Sector/Area	Scope of Service	Annual Budget ($'000)	% of Operational Budget	Actual Expenditure ($'000)	% of Annual Budget
Energy	Rarotonga	1,142	25%	1,317	115%
	Aitutaki (Aitutaki Power Supply)*	n.a		n.a	n.a
Telecommunications	Cook Islands (Telecom Cook Islands)*	n.a		n.a	n.a
Aviation Transport	Rarotonga and Aitutaki	128	3%	110	86%
	Other Outer Islands~	548	12%	520	95%
Maritime Transport	Rarotonga and Aitutaki	130	3%	58	45%
Road Transport	Rarotonga	1,147	25%	506	44%
Solid Waste	Rarotonga	25	1%	31	124%
Sanitation	Rarotonga	20	0%	22	110%
Water	Rarotonga	517	11%	244	47%
All Sectors	Outer Islands**	858	19%	558	65%
TOTAL OPERATIONAL BUDGET		4,515	100%	3,366	75%

Notes:
* No information was available for Aitutaki Power Supply or Telecom Cook Islands
~ Budget figure is from the supplementary budget plus funds reallocated from bridges and drainage recurring expenses capital fund, actual spent is from MFEM capital expenditure matrix
** Budget is estimated from Outer Islands Funding formula plus Outer Islands small capital expenditure fund, actual spent is estimated based on data from Mauke and Mangaia assuming 65% of the budgeted amount is spent. Chapter 5 contains a more detailed analysis of infrastructure maintenance in the Outer Islands.

The table also indicates that 93% of the operating budget for maintenance is allocated to energy, road transport, water and the Outer Islands.[13] The remaining 7% is allocated to aviation transport and maritime transport on Rarotonga and Aitutaki and solid waste and sanitation on Rarotonga. The only sector where spending on maintenance is significantly above budget is energy on Rarotonga. While spending on solid waste and sanitation were both above budget, the total values were small.

In the Cook Islands 93% of the operating budget for maintenance is allocated to energy, road transport, water and the Outer Islands, but this represents only 55% of the infrastructure asset base.

The two sectors where the budget is large and significantly under-spent are the Rarotonga road and water networks. Maintenance spending in both sectors in 2013/2014 was less than half the allocated budget and significant under-spending has been occurring for several years. Since these funds are so large and usually under-spent, they are often used as a source of funds for other priority work that arises during the financial year for which no funds have been allocated under the budget.

Analysis of figures for previous years shows that, even if the maintenance budget is under-spent in a particular year, it continues to be allocated in successive years. There may be several explanations for this. Many Ministries use previous budget baseline figures as budget estimates and there are also cases where unexpected expenditure has been more than was anticipated. It therefore appears to be a relatively conservative approach, though it can lead to a practice of assuming there will be additional funds for unexpected urgent projects (either for maintenance or not) and it works counter to careful maintenance planning.

A detailed analysis of expenditure by each infrastructure provider is contained in Appendix I.

4.3.2 Other Maintenance Expenditure

TCI and the SOEs generally maintain their assets well and regularly invest capital in upgrading them. In contrast, assets in the Outer Islands and the Rarotonga road and water networks are not well maintained and the Government often has to undertake capital projects to refurbish assets that have prematurely deteriorated due to lack of maintenance. Expenditure of this nature could also be considered when analysing maintenance spending as, although it is budgeted as capital, in reality at least some of it is

[13] However, although this amounts to 93% of the operating budget, these sectors represent only 55% of the infrastructure asset base (see Chapter 8).

spending on deferred maintenance that would not be necessary if regular maintenance had been carried out.

4.4 Differences Between Service Providers and Sectors

Table 3 below summarises the performance of the infrastructure service providers in the Cook Islands. Green indicates positive/good performance, amber indicates alert/average performance and red indicates negative/poor performance.

There is good service provision and maintenance in the aviation sector, communications, energy, maritime and sanitation services.

As individual organisations manage whole-of-sector service provision, it is relatively easy to see which sectors support good service provision (e.g. aviation services, communications, energy, maritime services and sanitation services) as well as those where lack of maintenance may compromise service delivery to the community (e.g. roads, solid waste management and water).

There are examples of excellent practice with both TCI and CIAA having good or positive performance in all areas. CIIC is also performing to a very high standard with the only weak area being revenue generation which is to be expected in the sanitation sector. TAU and CIPA are generally performing well.

ICI and the Outer Islands are not managing as well as other agencies and need support and more involvement in the process.

Table 3 Performance of Infrastructure Service Providers in Key Areas of Planning, Budget Preparation and Management

	Te Aponga Uira	Telecom Cook Islands	Cook Islands Airport Authority	Cook Islands Ports Authority	Infrastructure Cook Islands	WATSAN	Cook Islands Investment Corp (Tepuka Enviroflow)	Infrastructure Cook Islands	Island Government
SECTOR	**Energy**	**Communications**	**Aviation**	**Maritime**	**Road**	**Solid Waste**	**Sanitation**	**Water**	**Outer Islands**
Is maintenance planned?									
Is routine maintenance carried out?									
Are staff aware of the need for maintenance as part of whole-of-life management of assets?									
Do maintenance staff have input to the budget?									
Is the budget linked to planned maintenance?									
Is the asset register accurate?									
Are the financial systems robust and accurate?									
Are maintenance costs accurately recorded?									
Are maintenance costs correctly split between operating and capital costs?									
Is the maintenance budget adequate?									
Is the maintenance budget fully spent?									
Is at least 85% of the maintenance budget spent on maintenance?									
Do processes exist to allow un-needed maintenance funds to be reallocated?									
Does necessary maintenance get deferred because budgeted funds are reallocated to other priorities?									
Is enough revenue generated to fund maintenance?									

Scale:

Positive/Good Performance

Alert/Average Performance

Negative/Poor Performance

5. Maintenance of Infrastructure Assets in the Outer Islands

5.1 Introduction

There has been a significant investment in infrastructure projects in the Outer Islands by both the Government and development partners; accordingly, a large portion of the Cook Islands infrastructure assets are located on the islands outside Rarotonga. Construction and maintenance of assets in the Outer Islands presents an even greater challenge than for those assets on Rarotonga. The total area of the Cook Islands territory is over 2 million square kilometres, but land comprises only about 240 square kilometres of this or about 0.01%. There are 15 islands of which 12 have permanent populations. These islands are spread over a distance of some 800 kilometres. The islands are split into two separate groups, the Northern Group (comprising Manihiki, Nassau, Penrhyn, Pukapuka, Rakahanga and Suwarrow) and the Southern Group (comprising Aitutaki, Atiu, Mangaia, Manuae, Mauke, Mitiaro, Palmerston, Rarotonga and Takutea). Most of the Outer Islands have populations of less than 1,000.

It is not financially viable to keep specialised equipment and skilled maintenance staff on all the Outer Islands. With the exception of the airport, port and energy supply in Aitutaki which are run by CIAA, CIPA and Aitutaki Power Supply respectively, and telecommunications which TCI provides nationwide, all other infrastructure in the Outer Islands is the responsibility of the Island Councils, supported by Rarotonga based ICI staff.

There has been significant investment in infrastructure projects in the Outer Islands by both the Government and development partners.

In February 2013, the Island Government Act was passed following a review of the system of governance in the Outer Islands. The Act empowers Island Governments to determine development priorities for their own islands and provides clear processes for dealing with the financial affairs of Island Governments. In addition to the budgets provided by Central Government, Island Governments are empowered and encouraged to generate local revenues. Any revenues so generated and collected will not result in a reduction in the budget from Central Government, hence, Island Governments have an incentive to generate income that will assist in progressing development on their island. However, there are problems with the generation and collection of income in the Outer Islands with revenue frequently being below budget. Under the Act, Island Governments also have greater flexibility and discretion to allocate savings in one budget appropriation output to other outputs[14] if needed. This discretion allows funds that have been budgeted for maintenance to be diverted to other spending.

In general, there is not a strong maintenance culture in the Outer Islands and staff confirm that some assets are failing due to lack of maintenance. There are exceptions with some islands performing well in one or more sectors, but it is largely dependent on individual personnel and there is very limited availability of skilled staff.

In general, there is not a maintenance culture in the Outer Islands and some assets are failing due to lack of maintenance.

As discussed in Chapter 6, the bulk of the overall trading revenue in the

[14] Outputs are specific areas of activity funded by Government appropriation and are described in the Government Budget. Budget appropriations are allocated to specific outputs.

Outer Islands is derived from electricity sales. This is insufficient to cover generation costs, without considering maintenance or any other required expenses.

5.2 Budget Process

Budgets for infrastructure maintenance in the Outer Islands are calculated using an 'Outer Islands funding formula'.

An Outer Islands Funding Formula has been developed to determine the appropriate level of funding for each Outer Island and to ensure a fair and transparent allocation of funds.[15] The formula was first used in the 2013/2014 budget. It treats each island individually, taking into account local circumstances. In addition, each island Government has the discretion to spend any revenue it earns as it sees fit.

However, as the funding formula is a recent innovation and still being refined, it is not well understood by staff at the Island Administration level (at least in Mauke and Mangaia) and they do not appear to be in a position at present to negotiate this with MFEM in the budget submission process.

Part of the funding formula uses the value of assets to calculate the appropriate level of funding, though many assets are missing from the Crown asset register (including those involving donor funds). Also, an effort has been made to include the cost of power generators in the fixed assets total however there is no separate appropriation in the Outer Islands for major overhauls of the generators.[16] While there is a separate appropriation under ICI for these maintenance costs (Outer Islands Equipment Repairs of NZD100,000), staff on both Mauke and Mangaia said they had been unable to access the funds for generator overhauls and repairs for the last two years. The Outer Islands personnel do not have the tools or training to conduct overhauls themselves and the engines are usually sent to Rarotonga for ICI staff to do the work.

The asset base in the Outer Islands is understated because many donor-funded assets are not included in the Crown's asset register.

As far as this study could establish, no provision is made for maintenance when a budget is requested for capital items. This was evident in the experience of Mauke Island Administration staff who had a new water system installed which incurs much higher maintenance costs than the system it replaced but without an increase in the maintenance budget which placed strain on the operation of the water system as well as overall infrastructure maintenance funds for the island.

Requests for capital items to be included in the budget are routed from the Outer Islands through the Director Pa Enua[17]at the Office of the Prime Minister (OPM). The Director collates the requests and forwards them to MFEM for consideration for inclusion in the budget. For the 2014/2015 budget, the Director Pa Enua submitted requests totalling NZD6.7 million, of which NZD2.5 million were for infrastructure assets (see Table 4).

Maintenance budgets are not adjusted to accommodate increased or decreased maintenance costs resulting from the completion of new infrastructure.

There is also a capital fund administered by MFEM called the Outer Islands Small Capital Fund totalling NZD110,000, which allocates approximately NZD10,000 per annum to each Outer Island to spend on small capital items. Once these funds are exhausted, an Island Administration can pay for other small capital items (up to NZD3,000) out of their operating budgets if they have made savings in other areas.

[15] For details of the factors used to determine the appropriate level of funding for each island see Appendix J.
[16] All Outer Islands generators should be undergoing scheduled top and major overhauls after a set number of running hours. Top overhauls are due every 500 to 1,000 running hours depending on the equipment type, while major overhauls are due every 6,000 running hours. A top overhaul costs around NZD6,000 with a major overhaul costing about NZD15,000.
[17] Pa Enua means "Sister Islands" in Cook Islands Maori and is used to refer to the Outer Islands.

Table 4 Pa Enua Capital Project Requests, 2014/2015

Capital Project	Total ($'000)	Other Capex ($'000)	Infrastructure ($'000)
Aitutaki Power Supply	400		400
Aitutaki Island Government	789		789
Atiu Island Government	510	180	330
Mangaia Island Government	195	195	-
Mauke Island Government	510	341	169
Manihiki Island Government	590	440	150
Mitiaro Island Government	176	68	108
Palmerston Island Government	458	458	-
Penrhyn Island Government	1,665	1245	420
Pukapuka/Nassau Island Government	951	831	120
Rakahanga Island Government	470	440	30
Total Requested All Islands	6,714	4,198	2,516

5.3 Capital Projects

Analysis of the capital budgets for 2012/2013 and 2013/2014 showed the following items of expenditure for infrastructure projects (see Table 5).

Table 5 Budget and Expenditure for Outer Islands Capital Projects, 2012/2013 – 2013/2014

Capital Project	Budget 2012/2013 ($'000)	Spent 2012/2013 ($'000)	Budget 2013/2014 ($'000)	Spent 2013/2014 ($'000)
Mangaia Harbour Completion	212	206		
Atiu Power Generators	480	479		
Manihiki Generators	78	75		
Nassau Power Generators (Lister March 2012)	43	16		
Manihiki Harbour	1,000	-	2,140	2,039
Vaimaru Water Upgrade	300	-	200	195
Rakahanga Harbour Improvement			120	-
Mangaia Water and Roads			180	-
Complete Climate Adaptation of Mangaia Harbour			100	70
Water Pumps (Vaipeka, Tautu, Vaipae) Aitutaki			26	19
Mini Transformers Aitutaki			96	83
Rakahanga Control Panels and Powerhouse			95	-
Atiu Power Distribution			264	41
Mitiaro Generator Powerhouse Relocation			280	-
Total	2,113	776	3,501	2,447
Note: Some of these projects are likely to include an element of deferred maintenance.				

Major capital expenditure projects for the Outer Islands are not controlled by the Island Administrations but usually by ICI. Costs for projects will be collected by the agency controlling the project and the costs are then transferred to the Island Administration Balance Sheet. The Island Administration is not given details of what has been spent, only the project the funds are for.

5.4 Mauke and Mangaia

5.4.1 Introduction

For the purposes of the study, visits were undertaken to the islands of Mauke and Mangaia. Both islands have small populations which have declined dramatically in recent years. As previously mentioned, Mauke

has a relatively new, highly developed reticulated water system (said to be the best in the Cook Islands - see Appendix K), while Mangaia has a much less developed reticulated water infrastructure.

5.4.2 Maintenance Procedures

In general, neither the Mauke nor the Mangaia Island Administration plans for maintenance of infrastructure assets.

In Mauke there are monthly checks done on power equipment and reports are sent to the OPM in Rarotonga. The airport is well maintained with regular compacting and weed spraying, with a person in charge of maintenance being there most of the time. Staff who manage the water supply undertake some routine maintenance including monthly water use readings to identify consumers using excessive volumes and repairing any leaks if the excess usage is caused by leaks. They also check the pumps at each of the ground water sites every three months and the 80 litre storage tanks are cleaned every six months. There is no coordinated plan for maintenance of other infrastructure assets.

In Mangaia there is planned maintenance for the power generating equipment and water pumps for the Oneroa water system, however even that maintenance is constrained by a lack of funds. Mangaia has a well-operated and maintained electricity system and an underground reticulation system. When asked about routine maintenance on other infrastructure assets, it was clear there is no coordinated plan.

5.4.3 Budget Process

As previously explained, budgets for infrastructure maintenance in the Outer Islands are calculated by MFEM using the Outer Islands Funding Formula.

Mauke is given an operating budget under the outputs of “Infrastructure” (which includes Roads, Port, Airport and Solid Waste), ”Energy” and “Water” to cover all operating costs of infrastructure, including the costs of power generation and all infrastructure maintenance.

Mangaia is given an operating budget under the outputs of “Infrastructure and Amenities” (which includes Roads, Ports, Airports and Waste) and “Public Utilities” (which includes power and water) to cover all operating costs of infrastructure, including the costs of power generation and all infrastructure maintenance.

However, it must be remembered that each Island Administration has the discretion to spend the operating budget as it thinks best and it is likely to either exceed or underspend the maintenance budget given staff are not aware of how much of the operating budget has been allocated for maintenance under the funding formula.

5.4.4 Expenditure Against Budget

Actual expenditure for 2011/2012 and 2013/2014 were well recorded by both Mauke and Mangaia. The financial records for 2012/2013 were dealt with centrally by MFEM who encountered difficulty obtaining the detail required from the Outer Islands to properly process the transactions resulting in the accounts for 2012/2013 not yet being completed.

Mauke

In 2013/2014 the total operating budget under the outputs of Infrastructure, Energy and Water was NZD180,000.[18] Analysis of the Outer Islands Funding formula reveals approximately NZD67,000 of the NZD180,000 was allocated for maintenance of infrastructure assets (37%). As Table 6 shows, analysis of Mauke’s financial records revealed a total expenditure on infrastructure maintenance of NZD95,903 for 2011/2012 (53% of the allocation) and NZD27,384 for 2013/2014 (15% of the allocation).

[18] Cook Islands Government Budget Estimates 2013/14 Book 2 Ministry Budget Statements

Table 6 Mauke: Maintenance Expenditure on Infrastructure Assets, 2011/2012 – 2013/2014

Budget Output	2011/2012 (NZD)	2012/2013 (NZD)	2013/2014 (NZD)
Energy	28,495	n.a	1,462
Infrastructure	55,917	n.a	16,541
Water	2,951	n.a	532
Outer Islands Small Capital	8,540	7,942	8,850
Total Mauke Infrastructure	95,903	n.a	27,384

Maintenance spending on the airport was unusually high in 2011/2012 as a replacement fence costing NZD13,000 was erected to secure the airstrip. It was expected that landing fees would be increased as a result; however, this has not yet happened. Energy maintenance costs were also high in 2011/2012 with replacement parts for a generator costing NZD18,000. Maintenance spending in 2013/2014 was unusually low as Mauke had an outstanding fuel account at the beginning of the year of NZD41,000 which the supplier demanded be paid or they would not supply any more fuel. Mauke Island Administration, with approval from MFEM, took all their remaining bulk funding for the year in one payment to clear the debt, and then had to manage for the remainder of the financial year on their trading income alone. Accordingly, spending in all areas had to be reduced as much as possible.

In Mauke, a large part of the budget in 2013/2014 was spent on maintenance at the airport and replacement parts for generators.

Mangaia

In 2013/2014 the operating budget under the outputs of "Infrastructure and Amenities" and "Public Utilities" totalled NZD441,000.[19] Analysis of the Outer Islands Funding formula reveals approximately NZD160,000 of the NZD441,000 was allocated for maintenance of infrastructure assets (36%). As Table 7 shows, analysis of Mangaia's financial records revealed a total expenditure on infrastructure maintenance of NZD76,742 for 2011/2012 (48% of the allocation) and NZD119,116 for 2013/2014 (74% of the allocation).

Table 7 Mangaia: Maintenance Expenditure on Infrastructure Assets, 2011/2012 – 2013/2014

Budget Output	2011/2012 (NZD)	2012/2013 (NZD)	2013/2014 (NZD)
Public Utilities	6,910	n.a	16,055
Infrastructure and Amenities Fuel Costs	42,495	n.a	60,897
Infrastructure and Amenities Other Costs	16,023	n.a	30,544
Outer Islands Small Capital	11,314	11,155	11,620
Total Mangaia Infrastructure	76,742	n.a	119,116

Two-thirds of the maintenance spending on Infrastructure and Amenities (NZD42,495 in 2011/2012 and NZD60,897 in 2013/2014) **–** which makes up the majority of total maintenance spending – is the cost of fuel for the heavy plant and machinery. Fuel costs are not usually considered a maintenance cost.

In Mangaia, two-thirds of the maintenance budget in 2013/2014 was spent on the cost of fuel for heavy plant and machinery.

5.4.5 Asset Records

Both Mauke and Mangaia have an asset register. However neither includes all the assets included on their respective Island Balance Sheets and there is no reconciliation done between the fixed asset register and the general ledger. Items of capital work in progress and capital projects are included on Mangaia Island Balance Sheet, though the Island Administration staff have not been given details of what makes up the balances. At 30 June 2013 capital work in progress totalled over NZD3 million, more than half of the cost of all the fixed assets on the Balance Sheet.

See Appendix K and Appendix L for detailed case studies of Mauke and Mangaia.

[19] Cook Islands Government Budget Estimates 2013/14 Book 2 Ministry Budget Statements

6. Revenue Generated by Infrastructure Service Providers

As illustrated in Table 8, the SOEs are generating sufficient income from their infrastructure assets to cover both their operating and maintenance expenses with all reporting positive Earnings Before Interest, Tax, Depreciation and Amortisation (EBITDA) for the last three financial years. This includes the aviation and maritime transport and energy sectors.

While sufficient revenue is collected in some sectors to fund maintenance expenses, very little is collected from road and water assets.

Table 8 Financial Performance of SOEs in Cook Islands, 2011/2012 – 2013/2014

	CIAA ($'000)			CIPA ($'000)			TAU ($'000)		
	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14	2011/12	2012/13	2013/14
Total Revenue	7,761	8,165	7,986	2,218	3,077	2,725	21,379	21,176	18,955
Net Profit After Tax	-950	-2,647	484	224	-1,311	-658	3,854	1,643	898
EBITDA	2,286	2,349	2,217	978	1,678	1,221	6,461	3,901	2,820

Total Revenue includes revenue appropriated by the Crown, trading revenue plus any aid funded revenue.

Likewise, although no actual figures have been provided by Telecom, it is understood that the company is profitable and this perception is confirmed by the payment of significant dividends to shareholders (including Government) for many years.

In contrast, in ICI there is relatively little income from sources other than Government revenue and it would not be sufficient to cover either operating or maintenance costs, apart from in the case of Rarotonga Waste Management. As Table 9 shows, ICI earns some income from the sealing of private roads, installing new water connections, other water services including repairs and maintenance on private property, and operating the waste management facility. However, some of these amounts are very low.

Table 9 ICI – Revenue from Infrastructure Assets, 2012 – 2014

Revenue Type	Actual $'000 2012	Actual $'000 2013	Actual $'000 2014
Road Sealing Services	46	25	26
Water Services:			
Water – New Connections	8	8	8
Water – Other Services		1	2
Total Water Services	8	9	10
Total Waste Management	79	80	138
TOTAL ICI Revenue	133	114	174

In the case of the waste management facility, maintenance costs are very low, so as demonstrated in Table 10, the revenue covers both this and operating costs.

Table 10 ICI – Solid Waste Revenue and Maintenance Expenses, 2012 – 2014

Revenue/Expense Type	Actual $'000 2012	Actual $'000 2013	Actual $'000 2014
Total Waste Management Revenue	79	80	138
Maintenance Expenses (Excluding Collection):			
Compact Cover and Seal	37	31	
Vector Spray	2		
Waste Facility Maintenance		17	31
Other	1		
Total Maintenance Expenses	40	49	31
Surplus Revenue: Expenses	39	31	107

After the current water project on Rarotonga is completed, the Government intends to introduce a 'user pays' system.

It is also worth noting that once the Te Mato Vai water project has been completed on Rarotonga, it is intended that the operation of the water infrastructure will be managed by a SOE and 'user pays' charges for water will be introduced. Depending on the charges, this could mean that operating and/or maintenance costs will be covered. Finally, the Government does collect vehicle registration fees, but this is not directed to road maintenance but allocated towards the general pool of funds to cater for all public services.

In the Outer Islands trading revenue is almost all derived from electricity sales, though it is insufficient to cover operating costs.

The bulk of the trading revenue in the Outer Islands is derived from electricity sales. As can be seen in Table 11, in Mauke about 85% of all trading revenue is from electricity and in Mangaia it accounts for about 95% of all trading revenue. Other infrastructure revenue consists mostly of plant hire and charges for boating and reefing, with small amounts for landing fees and other sundry services (see Appendix M for details of the revenue components for Mauke and Mangaia).

Table 11 Mauke and Mangaia: Revenue Breakdown, 2012 and 2014

Revenue Type		2012 (NZD)	2012 % of Total	2014 (NZD)	2014 % of Total
Mauke					
	Electricity Sales	107,443	85%	126,042	83%
	Other Infrastructure Revenue	19,693	15%	26,004	17%
	Total Revenue	127,136	100%	152,046	100%
Mangaia					
	Electricity Sales	233,847	95%	268,369	95%
	Other Infrastructure Revenue	13,510	5%	14,948	5%
	Total Revenue	247,357	100%	283,317	100%

However, the revenue from electricity is not enough in either Mauke or Mangaia to cover the costs of generation, even before taking account of maintenance costs (see Table 12).

Table 12 Mauke and Mangaia: Cost of Electricity Generation, 2012 and 2014

Revenue/Expense Type		2012 (NZD)	2014 (NZD)
Mauke			
	Electricity Sales	107,443	126,042
	Fuel (incl. freight)	221,186	232,087
	Loss on Electricity Generation	- 113,743	- 106,045
Mangaia			
	Electricity Sales	233,847	268,369
	Fuel (incl. freight)	284,367	326,977
	Loss on Electricity Generation	- 50,520	- 58,608

7. Reallocation of Maintenance Budgets

It is common practice in the Cook Islands to reallocate unspent maintenance budget to other work. This does not necessarily mean that maintenance was not needed; it can mean that maintenance was needed but the money was reallocated for what was considered to be higher priorities.

The general approach in the SOEs and TCI is that once a maintenance budget has been approved through the budget process, then the funds are available to be spent on maintenance. As the financial year progresses, if maintenance funds are under-spent, then the funds might be reallocated to other priorities but only if they are not required for maintenance. Conversely, if unexpected maintenance issues arise which need urgent attention, funds can be reallocated from other sources to cover the unexpected costs. The same process exists in the Outer Islands where the Islands Administrations have the discretion to transfer funds as they see fit, provided they stay within their total budget.

In this study, it was only ICI staff who expressed concern about this practice, primarily because it affects more than half its overall maintenance budget. As shown in Table 13, in 2013/2014 NZD1.14 million of their original budget for recurring maintenance expenses of NZD1.93 million had been reallocated to other priorities (59%).

It is common practice in the Cook Islands to reallocate unspent maintenance budget to other work.

Table 13 Total Adjusted Funds in Capital Budget for Recurring Maintenance, 2011/2012 – 2013/2014

Capital Budget Item	2011/2012 ($'000)	2012/2013 ($'000)	2013/2014 ($'000)
Original Budget	1,455	1,455	1,930
To Other Capex Projects	-	-	-150
To Other Capital Projects (supplementary budget)			-110
To Mitiaro Airport	-	-109	-99
Supplementary Budget	-	-	-509
To Turangi Cleanup	-	-	-60
To Pukapuka Airport	-	-	-140
To Atiu Airport	-	-	-74
Total Maintenance Funds	1,455	1,346	788

Very often the projects which the funds are reallocated to become a priority because of a lack of maintenance of infrastructure e.g. lack of maintenance of Outer Islands airstrips resulted in the need for emergency repairs as happened in Mitiaro in 2012/2013 and 2013/2014, and emergency repairs to Atiu and Pukapuka airstrips in 2013/2014.

In accordance with Section 11 of Part B of the Cook Islands Government Financial Policies and Procedures Manual, the process is that ICI applies to the Financial Secretary for a reallocation, then MFEM determines the amount of the reallocation (if any) and organises the transfer. It is also notable that total spending charged against the recurring maintenance budgets for the last three years has been well below the original amounts budgeted (see Table 14).

Table 14 Capital Budget for Recurring Maintenance of Roads, Water, Bridges and Drains, 2011/2012 – 2013/2014

Capital Budget Item	2011/2012 ($'000)	2012/2013 ($'000)	2013/2014 ($'000)
Total Original Budget	1,455	1,455	1,930
Less Actual Spent July – December	143	154	204
Less Actual Spent January – June	546	908	542
Balance Underspent	766	393	1,184
Less Reallocations To Other Projects	-	109	1,142
Balance Unspent	766	284	42

8. Adequacy of Maintenance Budgets

Maintenance budget estimates can be based on several methodologies, such as a ratio to GDP or to asset values. For methods based on asset values, it is therefore critical to get those values correct. In the PRIF research report on *Infrastructure Maintenance in the Pacific: Challenging the Build-Neglect-Rebuild Paradigm*[20] it indicates that annual spending on maintenance should be between 2%-8% of the non-depreciated value of the asset (i.e. replacement cost). Moreover, the report argues that the amount needed will vary between the sectors, with energy, rail and road assets requiring approximately 2% expenditure each year, water and sanitation requiring approximately 3%, and telecommunications requiring up to 8%. The study considers a range of 2%-4% of asset values to be adequate.

As demonstrated in Table 15, using 2%-4% of asset base,[21] the estimated total required annual operating budget for infrastructure maintenance is NZD3.97 million to NZD7.94 million, whereas the estimated actual budget for 2013/2014 was NZD4.44 million (2.2% of the asset base). While in total the budget may be within the acceptable range, there are differences between the sectors. In the energy and water sectors and in the budget for the Outer Islands, the budget appears sufficient; however, in the transport sectors and in solid waste management, the budget is insufficient.

While the annual spending required on maintenance will vary between the sectors, a range of 2%-4% of asset values is probably adequate.

Table 15 Annual Maintenance Budget in Relation to Asset Base

Sector/Area	Existing Asset Base* (NZD million)	Current Maintenance Budget (NZD million)**	Required Maintenance (2%-4% of Asset Base)	Gap Between Actual and Required Maintenance
Energy	19	1.1	0.38 – 0.76	0.72 to 0.34
Transport – Aviation	51.7	0.7	1.03 – 2.07	-0.33 to -1.37
Transport – Maritime	33.6	0.1	0.67 – 1.34	-0.57 to -1.24
Transport – Roads	72.8	1.1	1.46 – 2.91	-0.36 to -1.81
Sanitation	0	0.02	0	0.02
Solid Waste	4.6	0.02	0.09 – 0.18	-0.07 to -0.16
Water	13	0.5	0.26 – 0.52	0.24 to – 0.02
Outer Islands All Sectors	3.9	0.9	0.08 – 0.16	0.82 to 0.74
Total	198.6	4.44	3.97 – 7.94	0.47 to -3.50

Notes:
* Independent valuations of replacement cost for road transport and solid waste sectors, higher of revaluation or historical cost from most recently audited accounts for other sector. No figures available for communications. Many aid-funded assets in the Outer Islands are not included in the government fixed asset register.
** Annual budget 2013/2014 for all sectors. No figures available for communications.

[20] Pacific Infrastructure Advisory Centre, 2013, *Infrastructure Maintenance in the Pacific: Challenging the Build-Neglect-Rebuild Paradigm,* PRIF: Sydney, pp. 28-29.

[21] The existing asset base figures are an estimate based on the best available information; however, there are limitations to the accuracy of the figures. Independent valuations of replacement cost have been used for the road transport and solid waste assets, with the higher of revaluation or historical cost from the most recently audited accounts for the other sectors. In addition, many aid-funded infrastructure assets in the Outer Islands are not included in the Government's fixed asset register.

As illustrated in Table 16, the estimated annual operating expense for infrastructure maintenance is only NZD3.35 million (1.7% of the asset base). The table also illustrates that while 90% of expenditure was in the energy, aviation and road transport sectors and in the Outer Islands, that represents only 74% of the total infrastructure asset base.

Table 16 Annual Maintenance Spending in Relation to Asset Base

Sector/Area	Existing Asset Base* (NZD million)	% of Total Asset Base	Current Maintenance Spending (NZD million) **	% of Total Maintenance Spending	Spending as % Asset Base
Energy	19	10%	1.3	39%	7%
Sanitation	0	0%	0.03	1%	0%
Solid Waste Management	4.6	2%	0.02	1%	0%
Transport – Aviation	51.7	26%	0.6	18%	1%
Transport – Marine	33.6	17%	0.05	1%	0%
Transport – Roads	72.8	37%	0.5	15%	1%
Water	13	7%	0.25	7%	2%
Outer Islands All Sectors^	3.9	2%	0.6	18%	15%
Total	198.6	100%	3.35	100%	1.7%

Notes:
* Independent valuations of replacement cost for road transport and solid waste sectors, higher of revaluation or historical cost from most recently audited accounts for other sector. No figures available for communications. Many aid-funded assets in the Outer Islands are not included in the Government's fixed asset register.
** Current maintenance budget and spending is for 2013/2014 for all sectors. No figures available for communications.
^ Outer Islands All Sectors current maintenance spending is estimated based on Mauke and Mangaia actual expenditure.

The overall maintenance budget in the Cook Islands falls within the acceptable range of 2%-4% of asset value, but there are shortfalls in the transport sector and in solid waste management and there are issues with the execution of maintenance budgets.

In addition to the NZD3.35 million maintenance costs in the operating expenses for the 2013/2014 year there are also items included in the capital expenditure that could be in the nature of deferred maintenance (e.g. Manihiki Harbour upgrade), as well as items funded by aid (e.g. replacement Outer Islands water tanks).

While care needs to be taken when interpreting the information in Tables 15 and 16, at face value the total maintenance budget appears to be within the acceptable range of asset value and the issues are concerned with execution i.e. how it is allocated and expended.

9. Other Observations

While the main objectives of the study were to understand the budget structure, processes and systems in the Government of the Cook Islands and the feasibility of retrieving information about capital and recurrent budgets, some other broader issues of interest to MFEM arose and they are outlined in this chapter.

9.1 Reliability of Financial Data from the Outer Islands

Due to concern at the lack of financial capability in the Outer Islands, processing of all Outer Islands transactions was centralised at MFEM in June 2012. MFEM staff had difficulty getting enough details from the Outer Islands staff to properly process the transactions and the financial accounts for June 2013 have still not been completed. At the end of June 2013, MFEM suggested all Outer Islands payment transactions be processed through the payments system in Rarotonga (and thus be correctly coded at the time of payment), however, this did not eventuate and processing was returned to the Outer Islands. For Mangaia, the 2014 profit and loss account appears feasible but they do not have a balance sheet as they do not have confirmed opening figures from 2013 accounts. Also, the Crown Accountant had the final audited version of Mangaia's 2012 financial accounts which was different to Mangaia's version.

9.2 Capital Works in Progress

There was concern about the entries in the Mangaia Balance Sheet relating to seven accounts with over NZD3 million for capital works in progress (WIP). The amount in five of those accounts did not change between June 2012 and June 2013.[22] Further investigation revealed that six of the projects originated in the 2008/2009 year with the other project dating back to 2006/2007.

At 30 June 2014 the Balance Sheet for ICI also included NZD17.75 million in capital WIP. Based on the project codes, some of the projects date back as far as 2010. Despite the Cook Islands Government Financial Policies and Procedures Manual setting out how infrastructure assets are to be transferred and accounted for,[23] it seems that the procedure is not being followed in this case.

9.3 Government Audit Delays

The Government Audit office has a backlog of work for the audit of Crown agencies. The latest Annual Crown accounts to be published are for 2009/2010 and the Audit office is still auditing entities for 2010/2011. This means that changes are not made until long after financial year end and opening balances are not available for months or years after the financial year begins. By the time the Audit Office is ready to query any issues, the staff who were involved may have left or cannot remember details of the events in question as they took place years before.

9.4 Quality of Fixed Asset Registers

No one person has responsibility for ensuring that the consolidated Crown asset registers are correct and comprehensive. As noted, there are very old capital WIP balances and significant assets are missing from the Crown asset register, many of which were funded by aid grants and not properly accounted for as fixed

[22] A June 2014 Balance Sheet was not available as June 2013 had not been audited so there were no agreed opening figures for July 2013

[23] Cook Islands Government Financial Policies and Procedures Manual Part B, Section 12

assets. In addition, CIIC should be taking the infrastructure assets onto their balance sheet but they will not do so without proper documentation. In many cases in the Outer Islands, projects were done by ICI and the balance just ends up on the Islands Balance Sheet without any notification or documentation from ICI about what the balance is made up of.

The asset management system currently being implemented by CIIC and SOEs may address some of the fixed asset issues as they are attempting to revalue and include all infrastructure assets on the asset management system. The asset management system will not, however, address the issues associated with documentation and transfer of project assets which are managed by ICI.

9.5 Expenditure Charged to Capital Recurring Maintenance Budgets

Reviewing items charged to the capital funds it is clear that the expenses are a mixture of maintenance costs (which should be expensed through the operating expenses for the year) and upgrades (which should be capitalised and added to the fixed asset register). The balances charged to the funds for the last four years appear to be part of the capital WIP in ICI's balance sheet. This means that maintenance budgets are not transparent and the various amounts should be correctly split between maintenance expenses and capital improvements.

10. Conclusions

The main objectives of the study were to understand the budget structure, processes and systems in the Government of the Cook Islands and the feasibility of retrieving information about capital and recurrent budgets.

10.1 Budget Structure, Processes and Systems

Service providers in the Cook Islands differ in the way they manage planning, budgeting and the delivery of infrastructure maintenance. Some sectors perform very well, particularly those structured as SOEs and private companies, while the Outer Islands and the Government's Infrastructure Ministry do not perform as well.

There are a range of factors impacting on the situation in the Outer Islands, including the following:

- while budgets for infrastructure maintenance in the Outer Islands are calculated using an 'Outer Islands funding formula', this formula is not well understood by staff in the Outer Islands and they do not appear to be in a position at present to negotiate this in the budget submission process
- the local authorities have the discretion under the Island Government Act to reallocate operating expenditure as they see fit within their overall budget and reallocation of budget is common
- the asset base in the Outer Islands is understated because many donor-funded assets are not included in the Crown's asset register, and
- maintenance budgets are not adjusted to accommodate increased or decreased maintenance costs resulting from new infrastructure.

Maintenance work is not generally 'contracted out', the exception being the maintenance of the Tepuka enviroflow system. In that case, a key benefit of the approach to 'contracting out' is that there is a clear schedule of maintenance work for the contractors. This may prove a good case study for other agencies considering 'contracting out' approaches.

Using maintenance budgets as a percentage of asset values as a measure of adequacy of maintenance budgets, the overall budget for maintenance of infrastructure assets in the Cook Islands appears to be adequate, however in certain sectors (e.g. transport and solid waste management) there could be shortfalls.

10.2 Accessibility of Data

The information about capital and operating budgets for infrastructure maintenance was relatively easy to obtain from the service providers. In some cases where the service providers were unsure of details, MFEM were able to provide supporting information.

Historically, there were no computerised asset management systems in place within any of the infrastructure service providers. However, this is changing and CIIC is in the process of developing a computerised system which will also be implemented in the SOEs.

10.3 Extending Study to Other Pacific Island Countries

The methodology used in this project could be used to extend the study to other PICs. In the course of drafting and reviewing the project report, it became apparent that some additional information would have been useful (e.g. Statements of Corporate Intent and asset management and capitalisation policies, as well as additional information regarding community service obligations and any matching government subsidies, more details on service levels and who specifies them. In future studies, consideration could be given to broadening the scope by including asset management as well as asset maintenance. This would depend on the focus of the work, what can be achieved in a given time frame, and what the perceived need is in the country/countries that are included in the study/studies.

In the case of the Cook Islands, the central Finance Ministry (MFEM) was an alternative source of financial information particularly for the infrastructure service providers that are Government Ministries. This is likely to be similar in other PICs.

11. Recommendations

11.1 Management of Cook Islands Budget Process

In respect to the management of the Cook Islands budget process, it is recommended that:

- all new significant infrastructure projects include a maintenance plan and estimate of future maintenance costs,
- the Government review budget allocation and needs in the Outer Islands to ensure priority maintenance is undertaken and basic service provision to communities is not jeopardised,
- support be given to capacity building within ICI for maintenance planning, budgeting and implementation, and
- maintenance and capital budgets be made more transparent by clearing the large amounts of capital work in progress in Government Ministry balance sheets.

11.2 Undertaking Further Studies of this Kind in Other Pacific Islands

If PRIF (or others) undertake further studies of this kind in other Pacific Islands, it is recommended that:

- the entities which are expected to have the poorest records should be visited first to allow as much time as possible for information to be provided by them, or for alternative sources of information to be found, and
- consideration be given to broadening the scope of projects to include asset management more broadly, giving consideration to the focus of the study/studies and the need/s in the participating country/countries.

Appendices

Appendix A:
List of People Consulted

Organisation	Name	Gender	Position
AECOM Consultants	Miles Wyatt	M	Principal Engineer, Strategic Asset Management
Asian Development Bank	Charmaine Dolan	F	ADB Administrator
	Vanessa Jenner	F	ADB Liaison Officer
Cook Islands Airport Authority	Florence Epati	F	Director, Corporate Services
	Tony MacQuarrie	M	Manager, Aerodrome
	Mami Nikoro	F	Finance Manager
	Mike Pauka	M	Supervisor, Aerodrome
Cook Islands Investment Corporation	Anne Tuoro	F	Property Manager
Cook Islands Ministry of Finance and Economic Management	Garth Henderson	M	Te Mato Vai Client Side Representative
	Russell Hynd	M	Treasury Operations Manager
	Elizabeth Tommy	F	Crown Account Manager
	James Webb	M	Economic Advisor
Cook Islands Ports Authority	Andre Tuiravakai	M	Assets/Operations Manager
	Alfereti Vamarasi	M	Chief Financial Officer
Infrastructure Cook Islands	Joseph Akaruru	M	Director of Planning
	Diane Charlie-Puna	F	Director, Corporate Services
	Mac Mokoroa	M	Secretary
	Solomona Solomona	M	Program Co-ordinator
	Tinirau Tamarua	M	Manager, Rarotonga Waste Facility
	Peerui Tepuretu	F	Senior Finance Officer
	Adrian Teotahi	M	Acting Director, Water Division
Mangaia Islands Administration	Ngametua College	M	Executive Officer
	Marion Harry	F	Finance Officer
	Tangimama Harry	F	Tourism and Community Officer
	Nuku Koroa	M	Manager, Agriculture
	Clarke Mautairi	M	Workshop Supervisor
	Taoi Nooroa	M	Tourism and Community Officer

Organisation	Name	Gender	Position
	Anthony Whyte	M	Public Utilities Manager
	Matomea William	M	Quarry Supervisor
Mauke Island Administration	Edwin Ngariki	M	Manager Water
	Tuakea Raui	M	Executive Officer
	George Samuela	M	Mayor, Mauke Island Counci
	Tonga Taoro	M	Manager Infrastructure
	Tekura Tura	F	Finance Manager
	Arapo Urarii	M	Acting Manager, Energy
Office of the Prime Minister	Otheniel Tangianau	M	Director of Pa Enua Division
Te Aponga Uira	Tere Akava	M	Electrical Supervisor
	Yamanika Cooray	F	Chief Financial Officer
	Charles Koronui	M	Manager, Generation
	Tauu Purea	M	Technical Manager
	Apii Timoti	M	Chief Executive Officer
Telecom Cook Islands Limited	Ngatama Aniterea	M	Chief Operating Officer
WATSAN Unit, Infrastructure Cook Islands	Tekao Herrmann	M	Acting Director
	Tangi Taoro	F	WATSAN Program Administrator

Appendix B:
Sector Analysis – Energy – Case Study of TAU

B.1 Introduction

TAU is a SOE tasked with the generation and distribution of electricity on Rarotonga. TAU has no involvement in the generation and supply of electricity in the Outer Islands; that is the responsibility of each individual island administration.

TAU is a financially successful enterprise having recorded profits and returned dividends to its shareholders in recent years. TAU has no debt on its balance sheet, though it will soon commence a very large program of capital investment to build a second power house and install new generators which will be integrated with renewable energy generation. Over the next 10 years, the current aging high-maintenance generators will be phased-out and replaced with more modern and efficient generators, with a consequent reduction in both running costs and maintenance expenses.

The Board of TAU has set a target of continuous supply to TAU's customers, so, while faults are occurring, customers generally do not experience significant impact. There is a general awareness of the need for maintenance within TAU and its Board, and maintenance spending in recent years has been significant. Expenditure against budget is shown in Table 17.

Table 17 TAU – Expenditure and Budget for Maintenance of Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	1,147	1,158	-11	-1.0%
2012/2013	1,871	1,332	539	40.4%
2013/2014 (11 months)	1,317	1,047	271	25.9%

B.2 Maintenance Procedures

Responsibility for infrastructure assets in TAU is split between generation and distribution. The Manager Generation looks after the generation assets and the Chief Executive Officer (CEO) looks after the distribution assets. Maintenance is condition-based as assets are generally operating below their design level. i.e. under-utilised. Condition monitoring results in a reduction in maintenance costs for some assets. The wear-and-tear on an engine is similar whether the engine is over-loaded or under-loaded because there are a lot of moving parts so it is rare to be able to reduce maintenance on generation assets; however, maintenance can often be reduced on distribution network assets. As the nature of each group of assets is different, so too are the maintenance procedures.

B.2.1 Generation

The Generation team have maintenance plans in place for each individual generator in the power house as the generators are not all the same e.g. Engines 1, 2, 3 and 7 are serviced at 500 hours, then 1,000 hours, then every 6,000 hours until 24,000 hours when a major overhaul is undertaken; Engines 4 and 5 are serviced at 750 hours, then every 6,000 hours up to 24,000 hours when a major overhaul is done. There is a maintenance manual for each engine which details how to carry out servicing and overhaul, and a recommended list of parts that will be required for each service/overhaul. A report is produced after every major overhaul including details of what was done and when the next overhaul is due.

Maintenance is planned 12 months in advance by forecasting how long each engine will run with no faults and then estimating when the routine servicing/overhauls will be due.

Records are kept of all planned and unplanned maintenance on the generators. The records show an improvement in the ratio of planned to unplanned maintenance hours in 2013/2014 compared to the two previous financial years (see Table 18). However, it should be noted that actual planned hours in 2013/2014 were significantly higher than in the previous two years.

Table 18 TAU – Planned and Unplanned Outage Hours

	2011/2012	2012/2013	2013/2014
Planned Outage Hours	14,209	13,478	20,495
Unplanned Outage Hours	5,057	5,839	2,425
% Planned : Unplanned Hours	74%	70%	89%
No. of Months with No Unplanned Hours	1	1	3
No. of Months % Planned Hours > 90%	4	5	8
No. of Months Unplanned Hours > 50%	1	2	0

B.2.2 Distribution

The assets in the distribution network are generally under-utilised, so as well as lengthening the normal life of assets, maintenance and related costs can be reduced. The condition of distribution assets are monitored and maintenance is planned based on their condition. This contrasts with the situation for generation assets where routine maintenance is conducted at pre-scheduled times.

Procedures are in place for regular condition monitoring of the distribution network, and the information collected is recorded in a Microsoft Excel spreadsheet based system. The existing system is soon to be replaced by a new asset management system being implemented by CIIC, the owner of TAU.

B.3 TAU Budget Process

The budget process starts with the drafting of the annual business plan. Once the business plan has been agreed then budgets are developed based on the business plan. Both generation and distribution maintenance staff are involved in determining what maintenance and capital will be required in the coming year and the associated costs. For distribution assets, the maintenance requirements are based on needs (as determined by the condition monitoring). For generation assets, the cost of planned maintenance is calculated based on forecast servicing/overhauls and the parts and equipment required for each planned outage (based on information in the generator service manual). The Generation team does not budget for unplanned maintenance; however, the CEO has a budget under his control to cover unplanned maintenance expenses. Once the list of planned maintenance and associated costs has been collated, Management (i.e. the CEO and the Chief Financial Officer) determine if the total cost is affordable. If not, then Managers are asked to review their requests and identify any items that can be deferred. If the total amount requested is still higher than can be accommodated, then Management will ask the Board to decide whether the company should reduce its maintenance or increase its tariffs to cover the expense.

If unexpected maintenance is needed for which there is no budget available, the Board can approve the transfer of budgeted funds from an under-spent area. If there are no spare funds to reallocate, then the Board makes a decision whether to repair the asset.

As the Board has a target of continuous supply to the customer, Management has a general policy of spending money to fix unplanned faults even if there is no budget available. However, if the cost of repair exceeds NZD1,000, then CEO approval is required. If the repair is going to be expensive then the engine will be taken out of service and the various options considered. If the repair is going to be uneconomical, then it may be decided to take the engine out of service permanently as has been done with Engine 6.

As previously noted, TAU plans to build a new power station in the 2014/2015 financial year and phase-out the current aging high-maintenance generators over the next 10 years. The planned replacement of these engines is reflected in reduced forecast running hours for 2014/2015 and reduced budgets for maintenance from 2013/2014.

B.4 Expenditure Against Budget

Management generally agrees that the majority of the maintenance that is undertaken is planned rather than unplanned, which is reflected in the ratio of planned to unplanned maintenance hours on the engines. However, Management also agrees that unplanned maintenance can be very costly. For example, a fault developed in Engine 1 during the 2013/2014 financial year, which was not known about at budget time but which had to be repaired, resulting in over-spending on the engine of NZD170,000 compared to budget for the year. In 2012/2013 financial year Engine 7 developed a major electronic fault resulting in total expenditure on maintenance on the engine for the year of NZD200,000 compared to budget of NZD78,000.

Analysis of actual maintenance expenditure compared to budget for the last three financial years shows actual spending significantly more than budget for the two most recent financial years as well as significant variances in more than a third of all maintenance accounts over the three year period (see Table 19).

Table 19 TAU – Variances Between Budget and Actual Maintenance Expenditure, 2011/2012 to 2013/2014

	2011/2012	2012/2013	2013/2014
General Ledger Maintenance Accounts	44	43	37
Total Budget ($'000)	$1,158	$1,332	$1,047
Total Actual ($'000)	$1,147	$1,871	$1,317
Variance Actual : Budget	-1%	40%	26%
Significant Variances Between Budget and Actual	15	16	15
% of GL Accounts With Significant Variances	34%	37%	41%
Significant Positive Variances (Under Budget)	8	4	2
Value of Positive Variances ($'000)	-$345	-$233	-$248
% of Total Budget	-30%	-18%	-24%
Significant Negative Variances (Over Budget)	7	12	13
Value of Negative Variances ($'000)	$335	$808	$654
% of Total Budget	28%	60%	61%

When enquiries were made of Management about the reasons for the unfavourable variances, they were largely due to faults or unexpected costs occurring in the course of planned routine overhauls. Where actual spending was less than budget, usually the explanation was that the costs had been over-budgeted. However, there were some occasions when a deliberate decision had been made not to proceed with planned maintenance and other occasions where a fault was so bad that an engine had been completely decommissioned as it would be uneconomical to repair.

B.5 Maintenance and Asset Records

TAU has a fixed asset register for financial purposes but does not have an asset management system although they intend to implement the system currently being installed by CIIC.

For generation assets, there is a report produced for every major overhaul which records the hours the engine has run, when the overhaul was done, and when the next overhaul is due. In addition, the way the general ledger has been structured for generation assets means Management can identify the expenses related to each individual generator.

For the distribution assets there is a complex system of Excel spreadsheets which record the feedback from condition monitoring and maintenance undertaken on assets. The Excel system will be replaced by the asset management system. The structure of the general ledger for distribution network maintenance expenses allows Management to identify routine maintenance and unplanned maintenance costs for each type of asset.

Personnel costs are not allocated to maintenance expenses for either generation or distribution assets.

Appendix C:
Sector Analysis – Telecommunications – Case Study of TCI

C.1 Introduction

TCI is a joint venture structured as a private company. It has been in existence for 23 years and is a financially successful company, having paid significant dividends to its shareholders for many years. As TCI is a private company, they do not disclose their financial information; however, staff were able to discuss maintenance processes and procedures in general terms.

At the time of this study, the TCI joint venture involved Telecom New Zealand Ltd (with 60% of the shares) and the Cook Islands Government (with 40% of the shares).Telecom New Zealand announced its intention to sell its shares in the company in late 2013 and the process of the sale was completed in March 2015, with Teleraro Ltd as the incoming partner. In order to accurately document the situation at the time of the study, a case study is included here on TCI as it operated at that point in time, though it is recognised that some aspects of operation may change under Teleraro Ltd.

C.2 Maintenance Procedures

TCI has maintenance routines in place with the procedures extracted from the manufacturers' manuals for each item of equipment. Different maintenance routines are carried out daily, weekly, monthly, quarterly, six monthly, annually and every three years.

There is an ongoing maintenance program in place for solar panels and batteries, and a replacement program for Outer Islands batteries. The program is staggered so all batteries do not require replacement at same time.

Maintenance of the cable network and pillar upgrading is an ongoing process. When maintenance is completed at the end of the network, it is time to start again. The number of faults has reduced by about 40% in recent years as staff are using new standards and methods for repairing cable faults e.g. they now solder the cable pairs rather than just twisting them.

C.3 Budget Process

Much of the budget is based on previous actual costs. There is a baseline amount in the budget which covers routine maintenance, plus there are also 'one-off' maintenance jobs identified for which additional funds are budgeted e.g. replacing mast stays.

Each year TCI holds a Managers Retreat where information is gathered for the development of the annual business plan. The budget is then allocated to match the work in the business plan. Challenge sessions are held with each budget manager where s/he has to justify the level of spending requested.

In some years the maintenance budget is not fully spent. There may be a number of reasons for this e.g. it may not be possible to organise travel and equipment for a project in some of the more remote Outer Islands. Actual expenditure is reviewed as the financial year progresses and, if the funds are not all going to be spent, the funds may be reallocated and used for unbudgeted items. Staff reported that there is always discussion between the Chief Finance Officer and the Managers who are responsible for the under-spent budgets to agree on reallocation of budgets to areas of higher priority.

C.4 Expenditure Against Budget

As TCI is a private company, it does not disclose its financial information.

C.5 Maintenance and Asset Records

Manual records of maintenance are kept, with the information taken from routine weekly/monthly check and log books. While TCI has a fixed assets register for financial purposes, it does not currently have an asset management system (though staff report that they would be interested in developing one).

Appendix D:
Sector Analysis – Transport (Aviation) – Case Study of CIAA

D.1 Introduction

CIAA is a SOE, established in 1987 and responsible for the operation of the Rarotonga and Aitutaki airports. The Rarotonga Airport is an international airport with a concrete paved runway that handled 2,398 international aircraft and 266,516 international passengers in 2013, as well as 5,663 domestic aircraft and 69,266 domestic passengers. Aitutaki Airport has a chip-sealed runway and handled 3,214 domestic aircraft and 55,573 domestic passengers in 2013.

CIAA has no involvement in the operation of the airports in the Outer Islands other than Aitutaki**.** The other seven airports in the Outer Islands are the responsibility of each individual Island Administration.

CIAA has been operating at a financial loss in recent years. It receives NZD2 million per annum funding from the Government, but it has a large investment in infrastructure to support, and as there are a limited number of commercial users, it is not able to simply increase its charges to improve its profitability. CIAA has only paid a dividend to its shareholders in one year (and that year it did not make a profit) and it has not paid a dividend in the last five years. Maintenance spending in recent years has been quite low. Although in addition to the maintenance expenses recorded in the last three years, CIAA has also undertaken two projects to seal the runway joints at a cost of NZD200,000 each, which have been capitalised and included as assets in the fixed asset register.

D.2 Maintenance Procedures

As Rarotonga Airport is an international airport, it is subject to CAA rules, standards and auditing requirements. Accordingly, maintenance standards are high as failure to comply with CAA standards would result in closure of the airport.

At the time of this study, there were procedure manuals in place for the electrical runway lighting and procedures were being developed for the runway assets with assistance from engineers from a consulting company and staff from Auckland Airport. CIAA have a work plan with tasks that are done regularly – monthly, quarterly, six monthly, annually, two yearly and five yearly. CIAA are only able to do minor repairs themselves as they do not have the tools for major repairs. However, an informal agreement exists with Auckland Airport such that if a major issue of concern is identified, CIAA staff can contact Auckland Airport staff for advice on how best to resolve the issue. It is a CAA requirement that maintenance is recorded in log books.

CIAA has its own Internal Auditor who carries out six monthly checks. In addition, CAA audits are done annually to ensure that maintenance inspections have been done and maintenance work is being carried out as needed. If CAA finds evidence that maintenance is not being done, it can shut down the airport. CAA provides an audit report including recommendations about priorities for work that needs attention. CIAA is given a timeframe in which to address the recommendation, after which the CAA conducts a further inspection.

CIAA Rarotonga staff go to Aitutaki every three months to check the runway. Between visits, CIAA Aitutaki staff monitor the runway and advise the Rarotonga staff if there are any issues. Rarotonga staff will then go to Aitutaki to investigate.

D.2.1 Changes to Maintenance Procedures

The Rarotonga Airport runway is made up of over 3,000 individual concrete slabs each measuring 6 metres x 4 metres. During the course of routine runway inspections in 2010, engineering staff noticed minor cracks appearing in some of the runway slabs where water had seeped through between the joints and eroded beneath the slabs. With the continual landings by aircraft on the affected slabs, cracks began to appear. A project was undertaken in 2011 to fix the cracks by injecting material into the affected runway slabs. In 2012 ‘thump tests’ were carried out to determine what other runway slabs were defective, then a further project was undertaken in 2014 to inject and repair the defective slabs.

In order to avoid the problem recurring, maintenance staff now do a monthly runway check by vehicle, with foot inspection undertaken once a year on every slab in the runway. Every inspection is documented and a profile is kept for each slab. An ongoing program has been introduced for maintaining the expansion joints

and sealing the joints to stop water getting in and eroding under the runway slab. Joint checking is also now part of routine maintenance.

It is intended that the maintenance program will be fine-tuned as part of the preparation of the Rarotonga Airport Master Plan.

D.3 CIAA Budget Process

Given the airport is subject to CAA maintenance standards, maintenance is generally routine in nature, so the costs are reasonably well known. If any extra work is identified, the cost is added to the budget in addition to the routine maintenance costs. Staff do not anticipate significant unexpected maintenance costs because of the careful checking process that has been established. If such an event was to occur, CIAA holds insurance cover for some risks (e.g. cyclone damage) and it also keeps funds on term deposit to cater for emergencies.

D.4 Expenditure Against Budget

Table 20 summarises actual expenditure on maintenance compared to budget for the last three years.

Table 20 CIAA – Expenditure and Budget for Maintenance of Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	146	65	82	126.4%
2012/2013	60	71	-12	-16.6%
2013/2014	110	128	-18	-13.7%

Actual maintenance spending in 2011/2012 was NZD146,000, more than double the NZD65,000 amount budgeted. CIAA staff advised that the large variance was due to expert assistance being used to help inspect and identify cracks in the runway (NZD17,000) and an unusually high cost for fencing repairs for the year as a result of repairing and upgrading the security fence following motor vehicle accidents(NZD50,000). Spending on maintenance for Aitutaki Airport that year was NZD20,000 over budget. Maintenance staff advise that the runway was due for a scheduled overhaul including repainting the runway; however, it appears that this was not included in the budget submission for 2011/12 (even though it was known in advance) given the budget for Aitutaki has remained steady at around NZD20,000 per annum for the last four years.

Actual spending for both 2012/2013 and 2013/2014 was under budget, however CIAA spent NZD200,000 in 2013/2014 on sealing the joints in the runway in addition to maintenance work and these costs were capitalised.

D. 5 Maintenance and Asset Records

It is a CAA requirement that maintenance is recorded in log books. CIAA has a fixed asset register for financial purposes but does not have an asset management system although they intend to implement the system currently being installed by CIIC.

After the project to repair cracks in the runway a profile is now kept for each of the 3,000 concrete slabs that make up the runway and the results of every inspection are documented for each slab.

Appendix E:
Sector Analysis – Transport (Maritime) – Case Study of CIPA

E. 1 Introduction

CIPA is a SOE and is responsible for the operation of the ports in Rarotonga and Aitutaki. CIPA has no involvement in the operation of the ports in the Outer Islands other than Aitutaki; they are the responsibility of each individual island administration.

CIPA had been making small profits until 2012/2013 when it recorded a NZD1.3 million loss. CIPA does receive a small appropriation from Government each year of approximately NZD200,000, but otherwise it generates its revenue from user charges.

In the 2010/2011 financial year, CIPA began a major upgrade of the main Rarotonga port facility at Avarua. The upgrade was completed in 2013 and was largely paid for with concessional loans from the ADB. Currently CIPA has NZD24 million debt on its books and this is having a major impact on the profitability of the business. The positive side of the port upgrade is that the requirement for maintenance has reduced and maintenance spending since the upgrade has been very low. However, there is a high awareness of the need for routine maintenance to keep the new facilities in good condition. Table 21 shows expenditure against budget for the period 2011/2012 – 2013/2014.

Table 21 CIPA – Expenditure and Budget for Maintenance of Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	3	18	-15	-84.8%
2012/2013	16	19	-3	-16.8%
2013/2014	58	130	-72	-55.2%

E.2 Maintenance Procedures and Records

CIPA has a basic routine maintenance plan, kept in a shared calendar in Microsoft Outlook. This prompts staff (with a message coming up on their computer screen) about the maintenance tasks scheduled each week. If the CIPA staff are busy (e.g. there are vessels in port), then scheduled maintenance may be shifted to the next week but it is not usually delayed longer than this. CIPA staff understand that they have to keep up with maintenance or they will have to spend more later on larger maintenance works or rehabilitation.

CIPA does not have any procedure manuals setting out routine maintenance schedules for infrastructure assets, although the Assets/Operations Manager would like to see one developed. Prior to the employment of the current Assets/Operations Manager, maintenance had been neglected and a lot of 'catch-up' maintenance has been undertaken in recent years. Previously there were no routine maintenance plans and the port was not meeting the standards required in its service level agreements. Failure to meet the service level can result in penalties payable by the port.

Since a major upgrade of the port was done only three years ago, maintenance spending is currently very low and is expected to stay low for next five years if routine maintenance is undertaken.

E.3 CIPA Budget Process

Before starting the annual budget process, operations staff consider if there are any 'one-off' projects that need to be done in next year e.g. does something specifically need to be repaired. The operations staff budget for both routine maintenance and 'one-off' projects. Currently there is pressure on the bottom line and cash flow due to the impact of loan repayments, so Management are looking for savings and there is pressure on staff to justify their budget requests. A 'challenge' process has been established whereby operations staff have to justify why they need budget they have requested. Once the budget has been approved, there are no issues with the maintenance budget being reallocated without agreement from the operations staff.

If something urgent arises that has not been budgeted for, then funds can be transferred from elsewhere within each Managers' own budget allocation, following agreement with the Chief Finance Officer. If a

Manager has no funds available within the existing budget or the amount is too large for the budget allocation, then the General Manager or the Board has to approve the expenditure.

E.4 Expenditure Against Budget

As noted, the Rarotonga Port recently underwent a major upgrade, so spending on maintenance is currently very low. Spending on maintenance for the Aitutaki port is also very low as CIPA only have control of the port on the days when there is an international cargo vessel (currently 2-4 days per month). On other days, control of the wharf reverts back to the Aitutaki Island Council.

E.5 Maintenance and Asset Records

CIPA keep track of all repairs, taking before and after photos, but currently they do not have a computerised asset management system (i.e. it is a manual system). CIIC is in the process of developing a computerised asset management system and, once this is completed, the same system will be implemented for CIPA. Information in the new asset management system will be used in preparing asset management plans and for allocating resources, requesting funding etc. CIPA staff currently take 'before' and 'after' photographs of repairs and keep a manual system, but existing data will be loaded into the new asset management system.

Appendix F:
Sector Analysis – Transport (Roads) – Case Study of ICI

F.1 Introduction

Road maintenance on Rarotonga is the responsibility of ICI. Currently there are no standards for the quality of roads and no road master plan. This presents challenges for developing a maintenance program, budgeting for required work, and establishing a coordinated approach to maintaining roads. ICI's predecessor, the Ministry of Infrastructure and Planning (MOIP), attempted to develop a roads master plan in 2008, but the plan did not come to fruition. ICI staff indicated that the development of a road master plan is an urgent priority for ICI as the current Te Mato Vai water project on Rarotonga includes a large amount of road reinstatement work.

F.2 Maintenance Procedures

There are no documented maintenance procedures, nor planned maintenance for roads. ICI staff commented that they know there will be potholes when there is heavy rain, and they also receive complaints from the public which lets them know where maintenance is needed.

F.3 Budget Process

Most of the funding for road maintenance expenses is budgeted for in the capital works plan; accordingly, ICI staff budget only a small amount for pothole repairs and bridge clearing in their operating expenses. The total amount budgeted for these in 2011/2012 and 2012/2013 was NZD36,000, with NZD6,000 budgeted for 2013/2014.

MFEM keep tight control over ICI expenditure and MFEM include a budget for road maintenance recurring expenses on Rarotonga in the capital works plan. For 2011/2012 and 2012/2013 the total funding provided for recurrent expenses was NZD680,000, this was reduced to NZD430,000 in 2013/2014. There is also a fund for recurrent expenses for bridges and drainage which was NZD775,000 in 2012/2013 and increased to NZD1 million in 2013/2014.

When asked about the budget process for roads, the ICI staff said that they get the funds provided by MFEM for recurring expenses for the roads, and they see these funds as being available for them to spend on road maintenance as they see fit. The staff say they ask the Rarotonga Members of Parliament to prioritise the roads that need to be sealed in their electorate. ICI staff then consolidate the individual lists and prioritise the final list. If there are not enough funds, then the lower priority roads will be deferred. ICI staff claim a portion of the capital fund is allocated to routine maintenance, but there is no evidence of a specific split of the funds between routine maintenance and upgrading.

F.4 Expenditure Against Budget

ICI was not able to provide details of the expenses being charged to ICI's operating expenses during the course of this study. However, over the last three years, these amounts have been very small and did not impact on the overall impression of the way the budget is developed and expended (see Table 22). It is notable that the amounts were also well below the budget for 2011/2012 and 2012/2013. ICI staff commented that all maintenance costs for roads for 2013/2014 were charged through the MFEM recurring expenses capital fund, and not through ICI's operating expenses.

Table 22 ICI – Expenditure and Budget for Maintenance of Road Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	21	36	-15	-41.7%
2012/2013	10	36	-26	-71.9%
2013/2014	5	6	-1	-22.0%

MFEM control all payments made from the road maintenance recurring expenses fund and keep a spreadsheet showing details of each payment made. It is apparent that costs for both routine maintenance and upgrading of roads are being charged against the capital fund (see Table 23).

Table 23 ICI – Road Maintenance Capital Fund

Capital Budget Item	2011/2012 ($'000)	2012/2013 ($'000)	2013/2014 ($'000)
Original Appropriation	680	680	430
Reallocations			
To Other Capex Projects			-150
From Bridges/Drainage		200	
From Water Maintenance			89
Adjusted Appropriation	680	880	369
Less Actual Spent	402	811	359
Balance Unspent	278	69	10

In 2011/2012 the total investment on roads from the capital fund was NZD402,000 – NZD278,000 less than the budget. In 2012/2013 spending was much higher at NZD811,000 and required a reallocation of NZD200,000 from the bridges and drainage capital fund. It is difficult to be certain from the payments records held by MFEM, but it appears that the increased spending was due to additional work done to upgrade the roads before the Pacific Islands Forum Leaders meeting in Rarotonga that year. Spending in 2013/2014 was much lower at NZD359,000 and a net NZD61,000 was reallocated to other projects.

MFEM also control all payments made from the bridges and drainage recurring expenses fund and keep a spreadsheet showing details of each payment made. No budget was allocated for 2011/2012 but significant sums were budgeted for 2012/2013 and 2013/2014. A review of the expenses charged during 2012/2013 indicates that as well as funding maintenance on bridges and drainage, the fund was used to pay for water maintenance for the year as no budget was made for water recurring maintenance expenses. Even so, the total amount spent for 2012/2013 was only NZD249,000 – well below the total budget of NZD775,000. In 2013/2014 only NZD145,000 was spent out of a total budget of NZD1 million, with a net NZD842,000 from the original budget being reallocated to other priorities during the financial year as detailed in Table 24.

Table 24 ICI – Bridges and Drains Maintenance Capital Fund

Capital Budget Item	2011/2012 ($'000)	2012/2013 ($'000)	2013/2014 ($'000)
Original Appropriation	-	775	1,000
Reallocations			
To Mitiaro Airport		-109	
To Road Maintenance		-200	
Supplementary Budget			-509
To Turangi Cleanup			-60
To Pukapuka Airport			-140
To Mitiaro Airport			-99
To Atiu Airport			-74
From Water			20
Adjusted Appropriation		466	138
Less Actual Spent		252	145
Balance Unspent/Overspent		214	-7

F.5 Asset and Maintenance Records

The Rarotonga road assets are included in the Crown fixed asset register. All Rarotonga road assets have recently been revalued as part of the preparation for the introduction of an asset management system. ICI staff began keeping records of road maintenance in 2012 in a database which is linked to mapping information.

Appendix G:
Sector Analysis – Solid Waste Management – Case Study of WATSAN Unit, ICI

G.1 Introduction

The organisation of solid waste management in Rarotonga is unusual in that the operation is run by the WATSAN Unit while the finances are run by ICI itself.

WATSAN, (the water, waste and sanitation unit of the Ministry of Infrastructure Cook Islands), was created in 2011 to focus on the protection of the Cook Islands environment, especially the fragile lagoons. This includes projects designed to improve the management of sewage, animal waste and waste water, thereby improving the quality of groundwater and streams entering the lagoon.

WATSAN has developed a Solid Waste Management Strategy (2013-2016) for the Cook Islands that was approved by Cabinet in 2013. The next priority areas that stem from the strategy include a national waste audit, an economic assessment of what is the most appropriate long term future waste disposal option, and development of appropriate legislation. However, staff report that a higher priority at present is the concern that the existing septage ponds will not have the capacity to cope with the volume of output from septic tanks on Rarotonga, so an assessment of their capacity is being done. The results from the assessment will be taken into account in determining the most appropriate future waste disposal option for Rarotonga.

The main solid waste infrastructure asset is the Rarotonga Waste Facility in Arorangi which was opened in 2005 and includes the landfill, septage treatment ponds and recycling centre. The waste facility was intended to have a design life of 15 years but was being filled up much more quickly than expected. In response, to reduce the amount of waste going into the landfill, recycling has been introduced. In addition, a baling machine has been purchased so rubbish that is not recycled is baled and the bales are stacked in the landfill rather than just being dumped, compacted and covered. Glass bottles are crushed and added to the landfill.

'User pays' charges are collected at the landfill. Revenue for the last three financial years has increased from about NZD80,000 in 2011/2012 and 2012/2013 to NZD138,000 in 2013/2014.

G.2 Maintenance Procedures

There is very little maintenance required on the landfill itself, most of the costs of the operation are the running costs for the heavy plant and equipment. The septage ponds also require little maintenance other than the pumping equipment; however as the pumps are not heavily utilised, there is no regular scheduled maintenance. Management believe that a private electrician looks at the pumps once every three months.

G.3 Budget Process

The Manager of the Rarotonga Waste Facility has no input into the maintenance budget. It is prepared by staff in the Ministry's finance team.

G.4 Expenditure Against Budget

Table 25 summarises spending charged to maintenance of solid waste infrastructure for the last three financial years. From the information obtained from ICI, it appears very little is spent on maintenance of the solid waste infrastructure.

Table 25 ICI – Expenditure and Budget for Maintenance of Solid Waste Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	40	55	-14	-25.8%
2012/2013	49	24	25	102.4%
2013/2014	31	25	7	27.1%

In 2011/2012 and 2012/2013 the bulk of the expenses went on "compacting, covering and sealing" of landfill (NZD37,000 and NZD31,000 respectively for the two years). However, with the purchase of the

baler, this expense is no longer being incurred. For 2013/2014, about 50% of the total costs (NZD15,000) were for bands for the bales of rubbish.

G.5 Asset and Maintenance Records

The Rarotonga waste management facility assets are included in the Crown fixed asset register and have recently been revalued as part of the preparation for the introduction of an asset management system.

Appendix H: Sector Analysis – Water – Case Study of WATSAN Unit, ICI

H.1 Introduction

The operation and management of the water infrastructure on Rarotonga has traditionally been a responsibility of the Ministry of Infrastructure. However, following a restructure of the Ministry that took effect from 1 July 2014, the operation of the Waterworks Division has moved into the WATSAN Unit while the finances are still being managed by the Ministry. The Waterworks Division collects a small amount of revenue from charges for new connections, amounting to about NZD10,000 per annum. Staff in the Water Division are keen to introduce charges for repairs to the water network, although they have been advised by the Crown Law Office that they do not have the legal authority to implement such charges. The Government of the Cook Islands is currently investing approximately NZD60 million in the Te Mato Vai project, to deliver fresh, clean, potable water to all properties connected to the current water network in Rarotonga. Once the Te Mato Vai project has been completed, it is intended that the operation of the water infrastructure will be managed by a SOE and 'user pays' charges for water will be introduced.

H.2 Maintenance Procedures

There are two maintenance teams of four staff each that work separately on the water infrastructure. One team maintains the intakes and pump stations and other maintains the delivery system. There are daily, weekly, monthly and quarterly maintenance plans for both the intakes and delivery systems. The intake maintenance team goes to all 12 intakes daily to ensure all water galleries are clean. They complete a checklist and job sheet each day for each water intake. The delivery system maintenance team only works on the delivery infrastructure on the main road and does not maintain the delivery systems on private land. There is no regular maintenance carried out on the pumps or tanks as there are not enough staff and none of the staff are trained to maintain the pumps. Whenever repairs are required, private sector electricians are engaged.

H.3 Waterworks Division Budget Process

The maintenance budget for the Waterworks Division is prepared by staff in the Ministry's finance team. There is a small operational budget, with the bulk of the maintenance funding being budgeted within the capital works program (a practice also in place in the Roads Division).

Enquiry with the ICI finance team and the Ministry of Finance revealed that the Waterworks Division had an annual operational budget of NZD17,000 in 2011/2012 and 2012/2013 and no operational budget in 2013/14. In addition there is an annual allocation in the capital budget for maintenance of the Rarotonga water network.

H.4 Expenditure Against Budget

The same findings apply to expenditure on water maintenance as to expenditure on roads maintenance i.e. no details of the expenses being charged to ICI's operating expenses were supplied by ICI, the amounts were very small for the last three years (as illustrated in Table 26) and all maintenance costs for water for 2013/14 were charged through the MFEM recurring expenses fund and not through ICI's operating expenses.

Table 26 ICI – Expenditure and Budget for Maintenance of Water Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	19	17	2	12.3%
2012/2013	0	17	-17	-97.1%
2013/2014	1	0	1	1088.1%

MFEM control all payments made from the water maintenance recurring expenses fund and keeps a spreadsheet showing details of each payment made. Costs for both routine maintenance and upgrading of water are being charged against the capital fund which makes monitoring of expenditure on maintenance difficult and also hampers informed planning.

The water network maintenance capital fund is well under-spent. As Table 27 shows, in the 2011/2012 financial year, only NZD286,000 out of the total capital budget of NZD775,000 was spent. The following year there was no budget allocated and there was no documentation showing that the balance of the 2011/2012 budget was carried forward. Likewise, expenditure in 2013/2014 was well below budget at NZD242,000 out of NZD500,000 budget – with NZD219,000 being reallocated to other priorities during the financial year.

There also appears to be a practice of reassigning funds without formal clearance. For example, it seems that the bridges and drainage recurring expenses capital fund was used to fund water maintenance during the 2012/2013 financial year, although there is no documentation of the approval to transfer these funds, and the source invoices would need to be reviewed to be certain about which payments were made for work in the water sector and which relate to bridges and drains.

Table 27 – Water Network Maintenance Capital Fund

Capital Budget Item	2011/2012 ($'000)	2012/2013 ($'000)	2013/2014 ($'000)
Original Appropriation	775	-	500
Less Reallocations			
To Road Maintenance			89
To Bridges and Drainage			20
To Other Capital Projects (supplementary budget)			110
Adjusted Appropriation	775	-	281
Less Actual Spent	286		242
Balance Unspent	489	-	39

H.5 Asset and Maintenance Records

The water infrastructure assets are owned by CIIC and are on their fixed asset register. The water network and intakes are mapped on the Ministry's Geographical Information System (GIS). There are automated monitoring and logging systems in place from which the data is downloaded and analysed each month. This monitors all the pressure within the network and, through this, any areas where there is a problem can be identified. The current Te Mato Vai project used the data previously collected from the logging systems to design the new water system.

Appendix I: Detailed Analysis of Maintenance Expenditure Against Budget in Infrastructure Service Providers

I.1 Energy – TAU

The majority of the maintenance that is undertaken in TAU appears to be planned rather than unplanned, as demonstrated by the ratio of planned to unplanned maintenance hours on the engines. However, unplanned maintenance can be very costly. For example, an unexpected fault developed in Engine 1 during the 2013/2014 financial year resulting in overspending on the engine of NZD170,000 compared to budget for the year. In 2012/2013 financial year Engine 7 developed a major electronic fault resulting in total expenditure on maintenance on the engine for the year of NZD200,000 compared to budget of NZD78,000.

Table 28 shows TAU actual maintenance expenditure compared to budget for the last three financial years. This indicates that actual spending has been significantly more than budget for the two most recent financial years. Management explained that the unfavourable variances were largely due to faults or unexpected costs occurring in the course of planned routine overhauls. Where actual spending was less than budget, the explanation was often that the costs had been over-budgeted. However, there were some occasions when a decision had been made not to proceed with planned maintenance and other occasions where a fault was so bad that an engine had been completely decommissioned as it would be uneconomical to repair.

Table 28 TAU – Expenditure and Budget for Maintenance of Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	1,147	1,158	-11	-1.0%
2012/2013	1,871	1,332	539	40.4%
2013/2014 (11 months)	1,317	1,047	271	25.9%

I.2 Telecommunications – TCI

As TCI is a private company, it does not disclose its financial information.

I.3 Transport (Aviation) – CIAA

Overall, maintenance spending in recent years has been quite low in the aviation sub-sector. This is the case even though CIAA has undertaken two projects over the last few years to seal the runway joints at a cost of NZD200,000 each, which have been capitalised and included as assets in their fixed asset register.

As shown in Table 29, actual maintenance spending in 2011/2012 was NZD146,000, more than double the NZD65,000 amount budgeted. This was largely due to expert assistance being used to help inspect and identify cracks in the runway (NZD17,000), plus an unusually high cost of fencing repairs for the year (NZD50,000) as a result of repairing and upgrading the security fence after damage caused by motor vehicle accidents. Spending on maintenance for Aitutaki Airport for the year was NZD20,000 over budget. Maintenance staff advise that the runway was due for a scheduled overhaul including repainting the runway, however, it appears the overhaul was not budgeted for as the budget for Aitutaki has remained steady at around NZD20,000 per annum for the last four years.

Table 29 CIAA – Expenditure and Budget for Maintenance of Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	146	65	82	126.4%
2012/2013	60	71	-12	-16.6%
2013/2014	110	128	-18	-13.7%

I.4 Transport (Maritime) – CIPA

Since a major upgrade of the port was done only three years ago, maintenance spending is currently very low (see Table 30) and is expected to stay low for next five years if routine maintenance is undertaken.

Spending on maintenance for the Aitutaki port is also very low as CIPA only have control of the port on the days when there is an international cargo vessel (currently 2-4 days per month). On other days control of the wharf reverts back to the Aitutaki Island Council.

Table 30 CIPA – Expenditure and Budget for Maintenance of Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	3	18	-15	-84.8%
2012/2013	16	19	-3	-16.8%
2013/2014	58	130	-72	-55.2%

I.5 Transport (Road) – ICI

ICI was not able to provide details of the expenses being charged to ICI's operating expenses during the course of this study. However, as Table 31 shows, these amounts were relatively small for the last three years and also well below the budget for 2011/2012 and 2012/2013.

Table 31 ICI – Expenditure and Budget for Maintenance of Road Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	21	36	-15	-41.7%
2012/2013	10	36	-26	-71.9%
2013/2014	5	6	-1	-22.0%

In the last three years, the funds budgeted under the capital budget for the maintenance of roads, bridges and drains have been significant, with NZD680,000 in 2011/2012, NZD1.45 million in 2012/2013 and NZD1.43 million in 2013/2014. MFEM control all payments made from these funds and keep a spreadsheet showing details of each payment made. It is apparent that costs for both routine maintenance and upgrading of roads are being charged against the capital fund. A review of the expenses charged during 2012/2013 indicates that as well as funding maintenance on bridges and drainage, the funds were used to fund water maintenance for the year as no budget was made for water recurring maintenance expenses. Even so, the funds were significantly under-spent compared to budget as illustrated in Table 32.

Table 32 Actual Expenditure from Roads, Bridges and Drainage Capital Funds

Capital Budget Item	2011/2012 ($'000)	2012/2013 ($'000)	2013/2014 ($'000)
Total Original Budget	680	1,455	1,430
Less Actual Spent	402	1,063	504
Balance Unspent	278	392	926

Because these funds are considerably under-spent, they are often used to fund other priority work that arises during the financial year. During 2012/2013 NZD109,000 was reallocated to other priorities, while in 2013/2014, there were reallocations to the amount of NZD923,000.

I.6 Sanitation – WATSAN Unit, ICI

As shown in Table 33, the total annual budget for running the Tepuka system is NZD40,000, including the electricity cost to run the pumps and blowers, which amounts to approximately NZD20,000 per annum.

Table 33 Tepuka Enviroflow Sanitation Maintenance Costs

Year	Actual ($'000)	Budget ($'000)	Variance ($'000)	Variance (%)
2013/2014	22	20	2	11.9%

I.7 Solid Waste Management – WATSAN Unit, ICI

From the information obtained from ICI, it appears very little is spent on maintenance of solid waste infrastructure (see Table 34).

Table 34 ICI – Expenditure and Budget for Maintenance of Solid Waste Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	40	55	-14	-25.8%
2012/2013	49	24	25	102.4%
2013/2014	31	25	7	27.1%

In 2011/2012 and 2012/2013 the bulk of the expenditure went on "compacting, covering and sealing" of landfill (NZD37,000 and NZD31,000 respectively). However, with the purchase of the baler, this expense is no longer being incurred. For 2013/2014, about 50% of the total costs (NZD15,000) were for bands for the bales of rubbish.

I.8 Water – WATSAN Unit, ICI

The same findings apply to expenditure on water maintenance as to expenditure on roads maintenance i.e. no details of the expenses being charged to ICI's operating expenses were supplied by ICI, the amounts were very small for the last three years (see Table 35) and all maintenance costs for water for 2013/2014 were charged through the MFEM recurring expenses fund and not through ICI's operating expenses.

Table 35 ICI – Expenditure and Budget for Maintenance of Water Infrastructure Assets

Years	Actual ($'000)	Budget ($'000)	Variance ($)	Variance (%)
2011/2012	19	17	2	12.3%
2012/2013	0	17	-17	-97.1%
2013/2014	1	0	1	1088.1%

MFEM control all payments made from the water maintenance recurring expenses fund and keep a spreadsheet showing details of each payment made. Costs for both routine maintenance and upgrading of water are being charged against the capital fund which makes monitoring of expenditure on maintenance difficult and also hampers informed planning.

The budget for water infrastructure maintenance is well under-spent. As Table 36 shows, in the 2011/2012 financial year only NZD286,000 out of the total capital budget of NZD775,000 was spent. The following year there was no budget allocated and there was no documentation showing that the balance of the 2011/2012 budget was carried forward. Likewise, expenditure in 2013/2014 was well below budget at NZD242,000 out of the total budget of NZD500,000.

There also appears to be a practice of reassigning funds without formal clearance. For example, it seems that the bridges and drainage recurring expenses capital fund was used to fund water maintenance during the 2012/2013 financial year, although there is no documentation of the approval to transfer these funds, and the source invoices would need to be reviewed to be certain about which payments were made for work in the water sector and which relate to bridges and drains.

Table 36 ICI – Water Network Maintenance Capital Fund

Capital Budget Item	2011/2012 ($'000)	2012/2013 ($'000)	2013/2014 ($'000)
Original Appropriation	775	-	500
Less Actual Spent	286		242
Balance Unspent	489	-	258

Because these funds are considerably under-spent each year, they are often used to fund other priority work that arises during the financial year. During 2013/2014 NZD219,000 was reallocated to other projects.

Appendix J:
Cost Factors in 2013 Outer Island Funding Formula

Table 37 Cost Factors in Outer Island Funding Formula (2013)

Factor/Output	What determines the amount of funding for the relevant factor
Administration	Population as per the Census
Councils	The number and wages of Councillors, Ui Ariki and Aronga Mana as per the *Outer Islands Local Government Act 2012/13*
Infrastructure: Water Road Maintenance Sealed Roads Unsealed Roads Maintenance (of machinery and vehicles) Airstrip Waste Management Literage (unloading of boats) Beautification Building Maintenance	 Fixed amount per person / household Per km of road Per km of road Per cent of registered assets Per km or runway Fixed amount per person Island Administrations to cost recover Per km of road Funding and services provided through the Cook Islands Investment Corporation
Energy (electricity generation)	Estimation of generation cost (varies between Northern and Southern Group) Estimated trading revenue from appropriate usage charges
Other Costs	Varies by island

(Source: Cook Islands Government Budget Estimates 2013/2014 Book 1 Appropriation Bill Appropriations and Commentary)

Appendix K: Case Study – Mauke

K.1 Introduction

Mauke is situated in the Southern Group of the Cook Islands. It has suffered a significant decline in population over the last 40 years with the number of residents recorded as 763 in 1971 and 307 in the 2011 census (a reduction of 60%). The Mauke Island Administration is responsible for the maintenance of all infrastructure on the island.

K.2 Mauke Water System

Mauke is recognised as having the best water system of all the Cook Islands (including Rarotonga), although there is a significant cost associated with it. The system uses reticulated ground water from 10 bore holes (six for household use and four for agricultural use). The water was pumped by diesel powered pumps and then distributed through a galvanised piping system to all households. Three years ago a major project was undertaken which replaced the diesel pumps with solar powered pumps and, at the same time, the galvanised piping was replaced with polyvinyl chloride (PVC) piping. It means that all households on Mauke have a reliable supply of clean, drinkable water delivered to their homes.

Maintenance is this system can be expensive. At each bore hole there is a solar pump system consisting of solar panels, submersible pump and controller system. The controller systems have had a very limited life and, as they are a sealed unit, they are not repairable. When a controller fails, the whole component has to be replaced at a cost of about NZD2,000 per controller. In the three years since the solar pumps were installed, Mauke has replaced 12 controllers and currently there are five others that are faulty; consequently, they are unable to use those solar pump systems. The submersible pumps have also proved to be quite unreliable, with a useful life of about two years. Currently only three of the pumps are working and so water is not being extracted from all 10 bore holes. A replacement pump costs about NZD600.

The system also requires a cost in terms of mains power. While the solar pumping system works well in normal sunny weather, if there is not enough sun to power the pumps, then the system reverts to mains power which is very expensive – although at present Mauke Energy does not bill Mauke Water for this. Given the high cost of maintenance, Island Administration staff are currently conducting a trial to identify how much mains power is required to power the whole water system. This is with a view to switching to a renewable energy solar power system that is being installed in the current financial year. Island Administration staff are hopeful that there will be sufficient capacity in the new system to enable the water system to run from the mains power so they can switch off the solar powered pumps.

The Island Council is concerned that the water resource is not wasted. It is able to measure how much water is being used by each consumer and the water use on Mauke is significantly higher than on any other Outer Island. The Mauke Island Council did consider introducing a charge for excess water usage to help cover the costs of maintaining the new system; however, the suggestion was met with such stiff resistance from the residents that the Council decided not to proceed with a user-pays scheme for the time being. In the December 2013 drought, the Island Administration attempted to introduce water rationing but found that water usage actually increased, as people were filling up containers before the water to their area was shut off to ensure they did not run short.

During the drought, the level of the water in some of the bore holes fell from the normal level of six to eight meters to below two meters, at which point the pump automatically shut off and no further water was extracted for several days until the bore hole had had time to replenish.

K.3 Maintenance Procedures

The Mauke Island Administration does not have a maintenance plan for infrastructure. However, maintenance work is undertaken in the various sectors. In the energy sector, there are monthly checks done on power equipment with monthly reports sent to Rarotonga. In the water sector, some routine checks are carried out on the water system. In the transport sector, there is one person in charge of maintenance at the airport who is there most of the time attending to regular compacting and weed spraying. Staff indicated that the airstrip may need to be reshaped as water puddles when it rains. However, there have been no complaints from the airline company and a grader would be required to do the work (which Mauke does not have although one may be donated as part of a Chinese-funded plant and equipment project in the Outer Islands).

Energy Sector
There are some significant issues in with energy sector in respect to maintenance. The Mauke power system has four generators, two of which are about 15 years old while the other two are about 10 years old. All four generators are currently working although two of them are overdue for a major overhaul. While the relevant staff do monthly routine checks and oil changes on the generators and transformers, there is no system for ensuring regular periodic overhauls. This is because Mauke Island staff do not have the tools or skills to carry out the overhauls, so the generators are usually sent to ICI in Rarotonga for the work to be done there. While there is a separate appropriation under ICI for these maintenance costs (Outer Islands Equipment Repairs of NZD100,000), the staff in Mauke have been unable to access the funds for generator overhauls and repairs for the last two years and Mauke Island Administration does not have the funds either. This means that major overhauls are overdue on two generators and staff are hoping that an upcoming renewable energy system will be installed in Mauke before the generators fail. In addition, most of the Mauke power reticulation is by overhead lines and many of the cross arms on the poles are in need of repair; however, maintenance staff say there is no money to buy the braces that are required.

Water Sector
Staff responsible for water maintenance undertake some routine maintenance work. They take monthly water use readings to identify consumers using excessive volumes, then repair any leaks if the excess usage is caused by leaks. They also check the pumps at each of the ground water sites every three months and the 80 litre storage tanks are cleaned every six months.

Solid Waste Sector
The Island Administration does fortnightly waste collection with the waste being disposed of in a landfill on the coast. The landfill is close to being full and the Island Administration is looking for a new site. The Island Council advised this study that a properly designed landfill is necessary for Mauke to avoid compromising the quality of the ground water which provides Mauke's water supply. As part of the waste collection, glass bottles are separated and crushed for use for filling potholes. Mauke Island Administration also provide recycling bins around the island for people to dispose of their waste and to help raise awareness of recycling, even though only the glass bottles are actually reused at present. There is no budget for solid waste management (although there is an allowance calculated as part of the Outer Islands Funding formula), with the fortnightly collection being done by Island Administration staff using Island Administration equipment as part of their normal duties.

Other Sectors
There is no coordinated plan for maintenance of other infrastructure assets. For example, there is no specific maintenance plan for the harbour which was upgraded very recently and is still in the defect liability stage of the upgrade contract. There are defects that need to be addressed, so the Island Administration is unwilling to do any work for fear of voiding the contract. The Island Administration staff are aware that sand is collecting at the entrance to the harbour, but they do not have the equipment necessary to remove it. They are expecting a 20 tonne excavator as part of the Chinese-funded plant and equipment for the Outer Islands. Once the excavator arrives they will be able to remove the sand.

There is a plan for maintaining the road but, as they do not have a grader, staff are unable to do anything other than maintain the existing road by repairing potholes and clearing the edges. The "Plantation Road" track through the middle of the island - which is used to access the arable land where crops are grown - needs to be properly constructed with appropriate drainage and fill material.

There is no publicly owned sanitation infrastructure; all residences have their own septic tanks.

K.4 Budget Process
The budget for infrastructure maintenance in Mauke is calculated by MFEM using the Outer Islands Funding Formula. The Island Administration is given an operating budget under the outputs of "Infrastructure" (which includes Roads, Port, Airport and Solid Waste), "Energy" and "Water" to cover all operating costs of infrastructure, including the costs of power generation and all infrastructure maintenance.

K.5 Expenditure Against Budget
In 2013/2014 the total operating budgets under the outputs of Infrastructure, Energy and Water was NZD180,000.[1] Analysis of the Outer Islands Funding formula reveals approximately NZD67,000 of the NZD80,000 was allocated for maintenance of infrastructure assets. However, as the Mauke Island staff are not privy to the details of how the budget is calculated and because they have the discretion to spend the

[1] Cook Islands Government Budget Estimates 2013/14 Book 2 Ministry Budget Statements

operating budget for maintenance as they think best, the items of actual expenditure are expected to differ from the budget.

Actual expenditure for 2011/2012 and 2013/2014 was recorded by Mauke, while the financial records for 2012/2013 were processed centrally by MFEM. Given some unexpected difficulty with getting supporting information from the Outer Islands, the accounts for 2012/2013 were not completed at the time of this study. However, analysis of Mauke's financial records showed total expenditure on infrastructure maintenance of NZD95,903 (for 2011/2012) and NZD27,384 (for 2013/2014) as shown in Table 38 below.

Table 38 Mauke Annual Maintenance Spending on Infrastructure Assets

Budget Output	2011/2012 (NZD)	2012/2013 (NZD)	2013/2014 (NZD)
Energy	28,495	n.a	1,462
Infrastructure	55,917	n.a	16,541
Water	2,951	n.a	532
Outer Islands Small Capital	8,540	7,942	8,850
Total Mauke Infrastructure	95,903	n.a	27,384

Maintenance spending on the airport was unusually high in 2011/2012 as a replacement fence costing NZD13,000 was erected to secure the airstrip. It was expected that landing fees would be increased as a result; however, this has not yet happened. Energy maintenance costs were also high in 2011/2012 with replacement parts for a generator costing NZD18,000. Maintenance spending in 2013/2014 was unusually low as Mauke had an outstanding fuel account at the beginning of the year of NZD41,000 which the supplier wanted paid before any further fuel would be supplied. Mauke Island Administration, with approval from MFEM, took all its remaining bulk funding for the year in one payment to clear the debt, and then had to manage for the remainder of the financial year on its trading income alone. Accordingly, spending in all areas had to be reduced as much as possible.

K.6 Asset Records

Mauke has an asset register. However, it does not include all the assets in the Mauke Island Balance Sheet and there is no reconciliation done between the fixed asset register and the general ledger.

Appendix L: Case Study – Mangaia

L.1 Introduction

Mangaia is the most southern island in the Cook Islands and the second largest in size. The island has seen a dramatic decline in population, with the total number of residents falling from more than 2,000 in 1971 to only 572 when the latest census was undertaken in 2011. The population is spread between three separate villages (Oneroa, Tamarua and Ivirua), which are several kilometres apart from each other. This means there is a relatively large amount of infrastructure on the island e.g. Mangaia has 70km of roads. The Island Administration is responsible for the maintenance of all economic infrastructure on the island.

L.2 Maintenance Procedures

In general, the Mangaia Island Administration does not plan maintenance for infrastructure other than the power generating equipment and water pumps for the Oneroa water system, and even that maintenance is constrained by a lack of funds. When asked about routine maintenance on other infrastructure assets, staff indicated there is no coordinated plan. Maintenance on the airstrip is done on an 'as required' basis. No routine maintenance is done on the roads. Consequently, while the roads in the town area were sealed at one stage, they have not been maintained and have now almost reverted back to the old coral road. The maintenance which is done on the roads is reactive and carried out after heavy rain or when potholes appear. Maintenance is not done on the port except to clean up after a cyclone. There is no publicly-owned sanitation infrastructure; all residences have their own septic tanks. The Island Administration does fortnightly waste collection with the waste being disposed of in a natural opening in the side of a cliff. While there is some concern about environmental issues given all waste (including plastic and e-waste) is disposed of in this way, there is no budget for solid waste management and Island Administration staff have simply incorporated waste disposal into their normal duties, using existing equipment.

Energy Sector

The power reticulation system is underground and a lot of work has been done repairing faults on the cable system. The Mangaia power generation system consists of three modern generators which can be controlled remotely. One of the generators currently needs a replacement alternator costing NZD12,000 which the Island Council is unable to fund. There is a small Outer Islands capital fund held by ICI; however, Mangaia can only access NZD10,000 from that fund each year and so the replacement alternator cannot be purchased. There is a regular service schedule and technical reports are produced showing details of servicing and generation.

Water Sector

All households on Mangaia have water tanks to collect rain water for drinking. Prior to the December 2013 drought, fresh water was provided to each village from fresh water intakes. However, at the peak of the drought, the intakes supplying both Oneroa and Tamarua ran dry and the intake supplying Ivirua was very low and unable to supply water to about half the village. In response to the drought, the Vairoronga spring on the coast near the village of Oneroa was utilised and the brackish water pumped through the existing reticulation network for sanitation purposes. The intakes for the other two villages are now back in operation. During the drought the aggregate in the intakes (which is used to filter the water) was dug out in order to extract as much water as possible. The intakes now need to be refilled with aggregate to filter the water. Over the years as the system deteriorated, the water pressure in the pipes was very low but, now that water is being pumped from the spring, the water pressure in the pipes is much greater and staff report they are constantly having to repair leaks in the water pipes. There are two pumps in the Oneroa system, one on the coast at the spring and one inland. The pump on the coast (which was salvaged from a previously failed water project on Mangaia) runs 24 hours a day, whereas the pump in land is older and used less frequently. Routine checks are done on the pumps each week.

L.3 Budget Process

As previously explained, budgets for infrastructure maintenance in the Outer Islands are calculated by MFEM using the Outer Islands Funding Formula. Mangaia is given an operating budget under the outputs of "Infrastructure and Amenities" (which includes Roads, Ports, Airports and Waste) and "Public Utilities" (which includes power and water) to cover all operating costs of infrastructure, including the costs of power generation and all infrastructure maintenance.

L.4 Expenditure Against Budget

In 2013/2014 the operating budgets under the outputs of "Infrastructure and Amenities" and "Public Utilities" totalled NZD441,000.[1] Analysis of the Outer Islands Funding formula reveals approximately NZD160,000 of the NZD441,000 was allocated for maintenance of infrastructure assets. However, it must be remembered that the Mangaia Island Administration has the discretion to spend the operating budget as it thinks best and will almost certainly spend either more or less than the amount allocated for maintenance under the Funding Formula given it is not privy to the detailed calculation of the Funding Formula.

Actual expenditure for 2011/2012 and 2013/2014 was recorded by the Island Administration while the financial records for 2012/2013 were processed centrally by MFEM. Given some unexpected difficulty with getting supporting information from the Outer Islands, the accounts for 2012/2013 were not completed at the time of this study. However, analysis of Mangaia's financial records showed total expenditure on infrastructure maintenance for 2011/2012 of NZD76,742 and for 2013/2014 of NZD119,116 (see Table 39).

Table 39 Mangaia Annual Maintenance Spending on Infrastructure Assets

Budget Output	2011/2012 (NZD)	2012/2013 (NZD)	2013/2014 (NZD)
Public Utilities	6,910	n.a	16,055
Infrastructure and Amenities Fuel Costs	42,495	n.a	60,897
Infrastructure and Amenities Other Costs	16,023	n.a	30,544
Outer Islands Small Capital	11,314	11,155	11,620
Total Mangaia Infrastructure	76,742	n.a	119,116

As Table 39 shows, two-thirds of the maintenance spending on Infrastructure and Amenities (NZD42,495 in 2011/2012 and NZD60,897 in 2013/2014) is the cost of fuel for the heavy plant and machinery, even though fuel costs are not usually considered a maintenance cost.

L.5 Asset Records

Mangaia has an asset register; however, it does not include all the assets in the Mangaia Island Balance Sheet and there is no reconciliation done between the fixed asset register and the general ledger.

Items of capital work in progress and capital projects are included in the Mangaia Island Balance Sheet; however, the Island Administration staff have not been given details of what the amounts comprise. At 30 June 2013, capital work in progress totalled over NZD3 million, more than half of the cost of all the fixed assets in the Balance Sheet.

[1] Cook Islands Government Budget Estimates 2013/14 Book 2 Ministry Budget Statements

Appendix M:
Details of Revenue Earned – Mauke and Mangaia

Table 40 Revenue Earned in Mauke and Mangaia

Mauke Revenue				
	2012 (NZD)	2012 (% of Total)	2014 (NZD)	2014 (% of Total)
Electricity	97,151	66%	125,896	73%
Energy Services	10,292	7%	146	0%
Fuel and Oil Sales		0%	60	0%
Plant Hire	10,221	7%	15,203	9%
Infrastructure Workshop	1,381	1%	1,267	1%
Water Connections		0%	48	0%
Boating and Reefing	6,891	5%	8,316	5%
Landing Fees	1,200	1%	1,110	1%
TOTAL INCOME INFRASTRUCTURE	**127,136**	**86%**	**152,046**	**88%**
Agriculture Sales	13,515	9%	4,174	2%
Admin Miscellaneous	2,553	2%	4,964	3%
Government House Rental	3,982	3%	1,100	1%
Office Rent		0%	802	0%
Other Revenue		0%	8,840	5%
TOTAL OTHER INCOME	**20,050**	**14%**	**19,880**	**12%**
TOTAL INCOME	**147,186**	**100%**	**171,926**	**100%**

Mangaia Revenue				
	2012 (NZD)	2012 (% of Total)	2014 (NZD)	2014 (% of Total)
Electricity	233,847	78%	268,369	83%
Fuel and Oil Sales		0%	89	0%
Plant Hire	24,027	8%	24,983	8%
Aggregate Sales	431	0%		0%
Boating and Reefing	23,202	8%	15,170	5%
Landing Fees	3,358	1%		0%
TOTAL INCOME INFRASTRUCTURE	**284,865**	**95%**	**308,611**	**95%**
Agriculture Sales	3,899	1%	5,452	2%
Other Revenue	9,611	3%	9,496	3%
TOTAL OTHER INCOME	**13,510**	**5%**	**14,948**	**5%**
TOTAL INCOME	**298,375**	**100%**	**323,559**	**100%**