APPENDIX B

Infrastructure Asset Management Plan

1 Introduction

This document, along with the asset register submitted in MS Excel format, provides a list of the infrastructure assets employed for providing public sector services in Nauru and summarizes the results of infrastructure asset condition and capacity assessments, performed by a joint team of PRIF consultants and the Government of Nauru (GON) infrastructure asset managers. This report should be read in conjunction with the following documents, where relevant information related to infrastructure asset management framework, public sector service level targets, and investment prioritization criteria are documented:

- Policy for the Development of Nauru Infrastructure Asset Management Framework
- Nauru Infrastructure Service Delivery Review (NISDR)
- Nauru Integrated Infrastructure Sector Strategy (NIISS)
- Infrastructure Asset Management Procedures
- Infrastructure Asset Maintenance Guide
- Infrastructure Condition Assessment Guide
- Infrastructure Cost Estimating Guide
- Project Prioritization Criteria and Process.

The infrastructure assets covered by this report include all public sector assets in Nauru:

- buildings
- roads
- airstrip and navigation aids
- wharfs and boat ramps
- telecommunication plant
- waste water treatment plant
- solid waste management assets
- coastal protection assets
- heavy duty and light duty motor vehicles
- motor boats
- electricity water and fuel storage assets.

Nauru Utilities Corporation (NUC) prepared an infrastructure asset register and developed an asset condition methodology in 2015, covering the electricity, water, and fuel storage assets, under a separate ADB-sponsored Technical Assistance (TA) project. Therefore, to avoid duplication of work, condition assessment of electricity, water, and fuel storage infrastructure assets was not performed, but the results of the asset condition assessment undertaken by the ADB-sponsored TA project were used in preparing the investment project pipeline and prioritizing investments.

Except for the electricity, water, and fuel storage infrastructure, none of the remaining public sectors in Nauru had previously developed asset registers, with the information on existing assets required for making asset management decisions. Therefore, field surveys were

undertaken to gather the required information and dimensional details of assets to prepare the asset register. All material infrastructure assets belonging to the public sector entities in Nauru, above the materiality threshold of $25,000 (replacement cost) have now been recorded in the asset register.

High-level infrastructure condition and capacity assessments were undertaken to identify the infrastructure assets presenting high risk of failure and this assessment resulted in sorting the existing infrastructure assets according to their current operating condition and ability to meet public needs. Assets in “poor” and “very poor” condition, that is not able to serve their intended functions and meet the required service levels, were also identified.

To comprehensively address the risks associated with the assets in “poor” and “very poor” condition, investment alternatives of either asset renewal or asset replacement were evaluated and in a project pipeline of investments for the least-cost alternatives was produced.

To prevent premature impairment of proposed investments and to ensure that the assets continue to provide required performance service levels, it is imperative the infrastructure assets are proactively managed and preventative maintenance is undertaken regularly. The maintenance funding requirements for all infrastructure assets currently in use are identified and documented in this report.

This report is organized into six sections, including this Introduction section. Section 2 discusses the hierarchy and attributes of infrastructure assets, captured in the asset register. Section 3 is a summary of the methodology used for infrastructure assessments and summarizes the results in Section 4. Section 5 documents the maintenance strategy to prevent premature impairment of infrastructure assets and Section 6 lists the proposed project pipeline, identifying the capital investments required to address the infrastructure deficiencies and risks identified through the assessments.

2 Infrastructure asset register

2.1 Asset register hierarchy

An asset register hierarchy plays an important role in improving the effectiveness of asset management practices within an organization. Not only does it define which service sector, state-owned enterprise (SOE) or department is responsible for making asset management and investment decisions, it also identifies the services impacted by those decisions. Systematic relationships between facilities, assets, and their components and subcomponents allow accurate component and subcomponent operating condition or costs to be rolled up to determine the condition or costs at the facility or the asset level, as illustrated in Figure B-1.

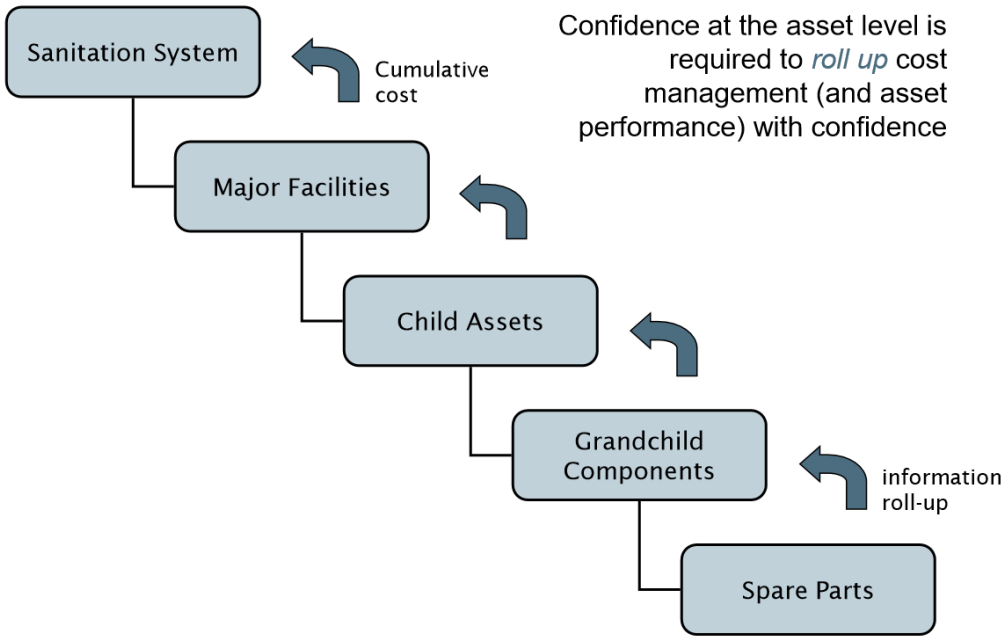

Figure B-1: Systematic relationships between facilities, assets, and their components

For some assets, the typical useful life for some components is significantly different than the parent asset. Where these components can be independently replaced, extending the life asset, systematic hierarchy definitions lead to informed asset management decisions and help improve the economic efficiency of investments. In countries, where accounting practices based on IFRS-13 (Fair Value Measurement), have been adopted, accurate asset register hierarchy is needed to correctly calculate asset depreciation allowance.

In preparing this asset register, we have selected an asset register hierarchy with five levels, as shown in Table B-1, which provide the required information to make informed decisions, without unduly burdening the relatively weak capacities available in-country for managing information. While developing an asset register that is compliant with IFRS-13 (Fair Value Measurement) is not included in the scope of this assignment, the selected hierarchy would provide the required information to an accounting professional to develop fair values of assets, if required in the future.

Table B-1: Nauru asset register hierarchy

Hierarchy level 1 (Service)	Hierarchy level 2 (System/category)	Hierarchy level 3 (Asset Class)	Hierarchy Level 4 (Asset Type)	Hierarchy Level 5 (Asset Components)

In developing this asset register, the complex assets, i.e. buildings, roads, air strip, and wharf have been broken into components, with the type, subtype, condition rating, and renewal cost of each component accurately captured in the register. By breaking down the complex assets into their component parts, an annual depreciation allowance has been calculated at the component level, resulting in more accurate net book value of assets. For simple assets, i.e. security

fences, footpaths etc., and for lower-value assets, i.e. motor vehicles, the asset register hierarchy captures information at the asset level, reducing the amount of work required for asset maintenance.

The first worksheet in the asset register defines asset register hierarchy. There are 24 worksheets containing asset information. Assets of different classes and belonging to different sectors are shown on separate worksheets. The worksheet titled “Asset Register Summary” provides a summary of all assets in use at the end of 2018 that are owned by the Government of Nauru and in use for providing public services. The worksheet titled “GRC and TUL assumptions” shows the per-unit costs used for gross replacement cost and typical useful life of assets. The worksheet titled “Maintenance cost assumptions” shows annual maintenance costs expressed as a percentage of Gross Replacement Cost of the asset. The worksheet titled “Inflation adjustments” shows inflation-adjusted indices used to estimate initial book value of assets from the 2019 gross replacement cost. These indices are also used to project future replacement cost of assets, based on anticipated inflation. The worksheet titled “Condition rating weights” shows the weights assigned to various condition ratings for determining assets’ remaining service potential (RSP). The last two worksheets show descriptions of the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI) codes for buildings.

A number of cells in the asset register contain locked formulae to prevent accidental corruption of the workbook. A password has been provided to the Secretaries for each public sector if these cells need to be unlocked. Cells within the worksheets with cream yellow shading can be changed and updated without the password.

2.2 Asset attributes

The asset register attributes have been selected to capture information for three distinct stakeholder needs:

1. Data required for asset management decisions, including asset location, operating district, dimensional details and ratings, types and subtypes of components, condition rating at component level, replacement cost, maintenance cost, and RSP.

2. Data required for financial controls, including the year the asset was acquired and placed in service, typical useful life, initial book value, accumulated depreciation, and current book value, all based on historic costs. In cases where initial cost of acquisition was not known, it has been estimated from the current replacement cost of asset, by applying adjustments for inflation.

3. Data required by PCRAFI-GPS coordinates and construction details for buildings.

2.3 Financial information

Each infrastructure asset with procurement cost above the materiality threshold of $25,000 has been included in the asset register. The register contains the following financial information for every asset:

Gross replacement cost (GRC): the estimated replacement cost of an asset during the current year, using like-for-like specifications. The cost estimates for GRC meet Class 3 accuracy (-20%, +30%), suitable for budgetary approvals.

Annual maintenance funding needs: calculated as a percentage of GRC, in accordance with the maintenance cost assumptions in Section 5 of this report. The indicated costs are for preventive maintenance, including costs for emergency repair (corrective costs that are not capitalized). However, maintenance costs do not include asset operating costs or capital renewal costs for asset components.

Initial book value: the actual or estimated asset procurement cost, during the year the asset was procured. Because many assets were donated rather than procured, actual procurement costs are not known for most assets and therefore, the costs have been calculated from the GRC and applying adjustments for inflation. The inflation data is tabulated in the worksheet titled “Inflation adjustments”.

Accumulated depreciation: the accumulated depreciation allowance for the number of years an asset has been service, using a straight-line depreciation method. For simple assets identified in the asset hierarchy as “Whole of Asset” under hierarchy level 5, the deprecation rate is based on the typical useful life of the asset. But for complex assets, where components are identified in hierarchy level 5, depreciation has been calculated at the component level.

Net book value: provided at the beginning and end of a year and is calculated by subtracting the depreciation allowance from the initial book value.

RSP average: estimate of remaining useful life of the asset as a percentage of the typical useful life— the average of all assets in the asset category.

RSP weighted average: estimate of the remaining useful life of the asset as a percentage of its typical useful life—replacement cost-weighted average of all assets in the asset category.

Table B-2 is a summary of the public sector infrastructure assets in use in Nauru at the end of 2018.

Table B-2: Nauru Asset Register Summary

Assets	Initial Book Value	Accum. Depreciation	Net Book Value	Gross Replacement Cost	Annual Maintenance Allowance	Average RSP	Weighted Avg. RSP
Buildings:							
Education Buildings	$ 24,696,024	$ 6,126,757	$ 18,569,268	$ 36,834,920	$ 184,175	64%	72%
Public Service Admin, Emergency, Police, Justice Buildings	$ 28,990,454	$ 4,243,135	$ 24,747,319	$ 44,118,930	$ 220,595	65%	80%
ICT Buildings	$ 388,777	$ 240,454	$ 148,323	$ 1,728,250	$ 8,641	58%	57%
Health Buildings	$ 5,817,227	$ 1,125,005	$ 4,692,222	$ 12,298,440	$ 61,492	63%	65%
Fisheries and Marine Resources Buildings	$ 1,765,814	$ 434,173	$ 1,331,640	$ 2,627,000	$ 13,135	76%	74%
Civil Aviation Buildings	$ 3,740,979	$ 2,189,016	$ 1,551,963	$ 10,536,840	$ 52,684	75%	71%
Port Authority Buildings	$ -	$ -	$ -	$ -	$ -		
CIE Buildings	$ 63,317	$ 29,989	$ 33,328	$ 102,600	$ 513	61%	57%
Total Buildings	$ 65,462,592	$ 14,388,529	$ 51,074,064	$ 108,246,980	$ 541,235		
Coastal Protection:							
Seawalls & ripraps	$ 1,629,078	$ 1,059,041	$ 570,038	$ 6,600,000	$ 71,250	60%	61%
Department of Transport:							
Sealed Roads	$ 7,514,347	$ 5,653,944	$ 1,860,402	$ 27,755,644	$ 148,364	46%	49%
Footpaths	$ 490,807	$ 490,807	$ -	$ 3,116,400	$ 31,164	62%	62%
Total Dept of Transport	$ 8,005,153	$ 6,144,751	$ 1,860,402	$ 30,872,044	$ 179,528		
Civil Aviation Assets:							
Runway, Taxiways and Hard stop Areas	$ 9,502,331	$ 6,326,888	$ 3,175,444	$ 34,540,299	$ 128,030	52%	52%
Other navigation assets	$ 1,715,420	$ 136,029	$ 1,579,391	$ 1,995,000	$ 39,900	79%	78%
Total Civil Aviation Assets	$ 11,217,751	$ 6,462,916	$ 4,754,835	$ 36,535,299	$ 167,930		
Port Authority Assets:							
Motor Vehicles:	$ 1,130,309	$ 599,031	$ 531,278	$ 1,535,000	$ 22,050	55%	31%
Boats, Mooring and Unloading Equipment	$ 9,206,123	$ 1,435,841	$ 7,770,281	$ 10,040,000	$ 261,600	62%	62%
Total Port Authority Assets	$ 10,336,431	$ 2,034,872	$ 8,301,559	$ 11,575,000	$ 283,650		
Emergency Services Assets:							
Motor Vehicles:	$ 731,851	$ 378,890	$ 352,961	$ 960,000	$ 28,800	61%	64%
Motor boats	$ 86,250	$ 19,534	$ 66,716	$ 100,000	$ 4,000	57%	57%
Total Emergency Service Assets	$ 818,101	$ 398,423	$ 419,677	$ 1,060,000	$ 32,800		
Fisheries and Natural Resources Assets:							
Heavy Duty Vehicles and boats	$ 257,223	$ 40,027	$ 217,196	$ 280,000	$ 10,400	61%	81%
Total Fisheries Assets	$ 257,223	$ 40,027	$ 217,196	$ 280,000	$ 10,400		
NRC Assets:							
Unsealed Roads	$ 1,856,602	$ 541,724	$ 933,776	$ 5,896,000	$ 294,800	90%	90%
Motor vehicles	$ 12,377,858	$ 6,110,768	$ 6,267,090	$ 15,356,770	$ 460,703	41%	45%
Total NRC Assets	$ 14,234,460	$ 6,652,492	$ 7,200,866	$ 21,252,770	$ 755,503		
ICT Assets:							
Antenna Towers & IT equipment	$ 483,587	$ 135,930	$ 347,657	$ 641,553	$ 12,831	61%	60%
Total ICT Assets	$ 483,587	$ 135,930	$ 347,657	$ 641,553	$ 12,831		
Public Service Admin Assets:							
Light Duty Motor vehicles	$ 7,426,448	$ 2,789,831	$ 4,636,618	$ 9,160,000	$ 274,800	71%	71%
Heavy Duty Vehicles and Equipment	$ 1,059,289	$ 640,977	$ 418,311	$ 1,440,000	$ 43,200	57%	56%
Total Public Service Admin Motor Vehicles	$ 7,426,448	$ 2,789,831	$ 4,636,618	$ 9,160,000	$ 274,800		
Fuel Storage Farm Assets	$ 19,000,000	$ 4,200,000	$ 14,800,000	$ 25,000,000	$ 500,000	38%	31%
Electricity Sector Assets	$ 31,407,196	$ 6,205,165	$ 25,202,031	$ 35,000,000	$ 700,000	47%	42%
Water Sector Assets	$ 3,544,140	$ 1,395,307	$ 2,148,833	$ 4,000,000	$ 80,000	38%	33%
Total GON Infrastructure Assets	**$ 173,822,163**	**$ 51,907,284**	**$ 121,533,777**	**$ 290,223,647**	**$ 3,609,927**		

3 High-level infrastructure asset condition assessment methodology

Infrastructure assets experience degradation over time. Degradation in assets' operating condition gradually impacts their functional performance. When functional performance drops below a pre-determined acceptable level, the asset is deemed to have reached the end of its useful service life and must be retired from service and replaced. Typical Useful Life (TUL) of an asset is the time period, in years, the asset is expected to perform at acceptable levels, under typical operating conditions when maintained as recommended by manufacturer, before reaching the end of its useful service life.

TUL for a class of asset is defined based on the historic experience and it represents the mean service life of an asset under typical operating conditions. But the actual useful service life of an asset can deviate significantly from the TUL, depending on the asset's operating environment, conditions of service, exposure to climatic events or major storms, and the level of preventative maintenance an asset receives. Some assets fail prematurely, before they reach their TUL, while others continue to provide reliable service for years beyond their TUL.

Therefore, rather than planning to replace an asset when it reaches its TUL, modern asset management practices are based on periodically assessing the condition of assets to determine their remaining service potential (RSP). Assets with low RSP can be grouped and assets with a "poor" operating condition targeted for retirement, replacement, or renewal.

In case of simple assets and low-value of assets, RSP can be calculated by a condition assessment of the whole asset in meeting its intended functions. However, for complex assets, operating performance of assets' components is assessed first and an appropriately weighted sum of individual component's performance is used to determine an asset's RSP using an appropriate algorithm. Table B-3 provides objective and rationale criteria for detailing and ranking the operating condition of all infrastructure assets or their components.

Table B-3: Condition assessment criteria for infrastructure assets and their components

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

While Table B-4 provides useful and objective criteria for detailing assets' operating condition, in some cases it may be difficult to accurately measure an asset's operating performance in the field. There are limits to in-situ tests and field inspections to detect and identify all defects in assets. Because the scope and frequency of preventative maintenance plays a major role in sustaining an asset's operating performance in the long run, the accuracy of estimates of an asset's remaining useful life can be improved by including maintenance history in the assessment criteria. Table B-4 shows how an asset's maintenance history can be used to rank and detail readiness to provide its intended functions.

Table B-4: Use of assets' maintenance history for condition assessment

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

And finally, an asset may be in perfect operating condition, but it may not meet the public's need for services because the user needs have evolved or the regulations have changed. Asset obsolescence incidents most commonly arise in the telecommunication industry. For example, a country may have a perfectly reliable system for landline telephones, but it would not effectively meet public needs if most customers are demanding cellular phone service. Therefore, it is important to assess functional obsolescence and include it in the criteria to assess asset condition, as summarized in Table B-5.

Table B-5: Use of assets' functional obsolescence for benchmarking performance

Degree of Functional Obsolescence	Condition Rating
Asset design and construction fully meet the functional requirements, conform to the applicable standards and regulations and are the most economically efficient alternative available	5
Asset design and construction fully meet the functional requirements, conform to the applicable standards and regulations and represent one of the economically efficient alternative	4
Asset design and construction fully meet the functional requirements, conform to the applicable standards and regulations, but other alternatives offering greater economic efficiency are available	3
Asset design or construction do not meet the full functional requirements and are not economically efficient, original suppliers no longer manufacture the product	2
Asset design or construction do not meet the full functional and regulatory requirements and are not economically efficient, original suppliers no longer manufacture spare parts	1
Asset or asset component has failed in service or it poses the risk of catastrophic failure in service posing serious public safety risk and must be retired immediately and replaced.	0

After condition assessment, obsolescence assessment, and maintenance history assessment have been completed using the criteria in Tables B-3 to B-5, the results of these assessments should be combined to determine the RSP of assets on a normalized scale. The algorithms for calculating the RSP are described in further detail in Appendix C.

While RSP provides indicative information about the remaining useful life of an asset, because asset management practices around the world are relatively new, there is insufficient data available to quantitatively link RSP to the remaining useful life of an asset in years.

For all infrastructure assets currently in service in Nauru, field inspections were carried out in February 2019 by a joint team of PRIF consultants and GON asset managers and an RSP for each asset was calculated and recorded in the asset register.

In addition to the RSP for each asset, a capacity adequacy Index was calculated for each asset class. Table B-6 provides an example of the criteria used to determine the capacity adequacy index for buildings. Although the Nauru Sustainable Development Strategy (NSDS) does not have specific goals related to building capacity, the following criteria for assessing the adequacy of building capacity aligns with the broader objectives of NSDS, which require adequate infrastructure capacity to meet requirements for accessibility, availability, safety, security, and productivity.

Table B-6: Buildings—capacity adequacy index

Condition Criteria	Capacity Adequacy Index	Interpretation
There is more than 5% spare capacity in existing buildings to fully meet the users' current and future needs for next five years and beyond.	5	Very Good
There is less than 5% spare capacity in existing buildings to fully the meet the users' current and future needs for up to next five years	4	Good
There is just adequate capacity to meet the current needs, but no spare space to meet growth in office staff in coming years	3	Fair
There is significant shortage of space – supply is exceeded by demand less than 10%.	2	Poor
There is severe shortage of space - supply is exceeded by demand by more than 10%	1	Very Poor

4 Infrastructure asset assessment results

Figure B-2 shows the replacement cost of infrastructure assets currently used in Nauru. Among all asset categories, buildings are the costliest asset currently in use (prior to the redevelopment of the port).

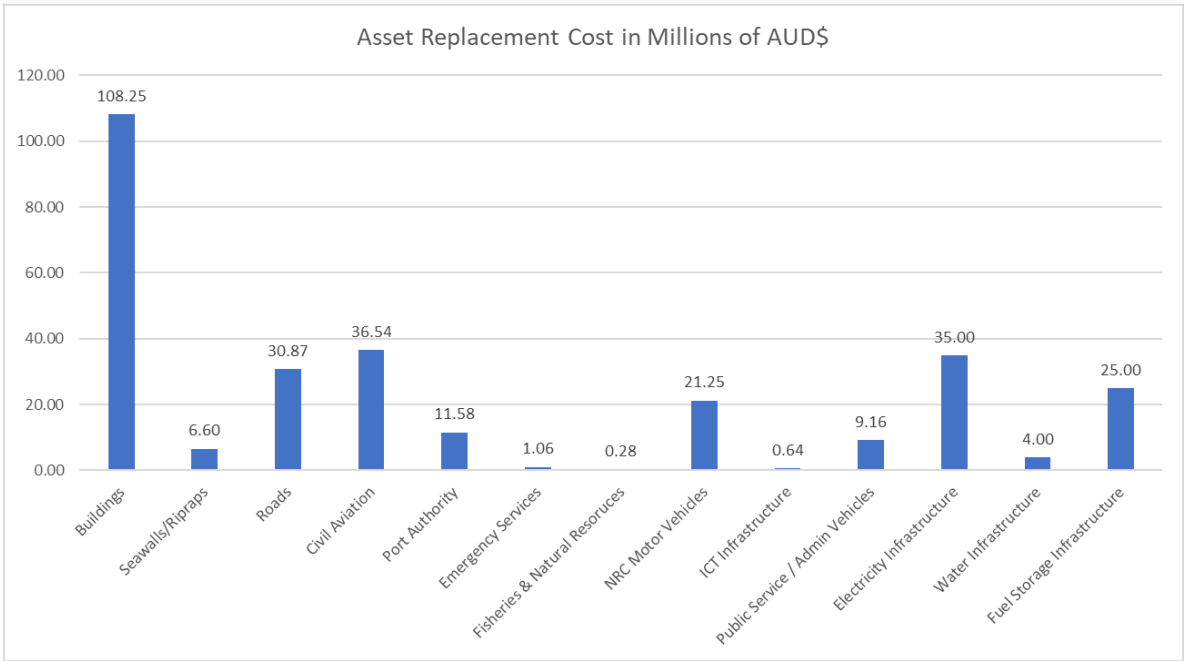

Figure B-2: Estimated replacement cost of infrastructure assets (AUD million)

Figure B-3 further breaks down the replacement cost of buildings into various service sectors. Buildings used for public service administrative functions represent the highest level of investment level, followed by the education, the health services and the civil aviation sectors.

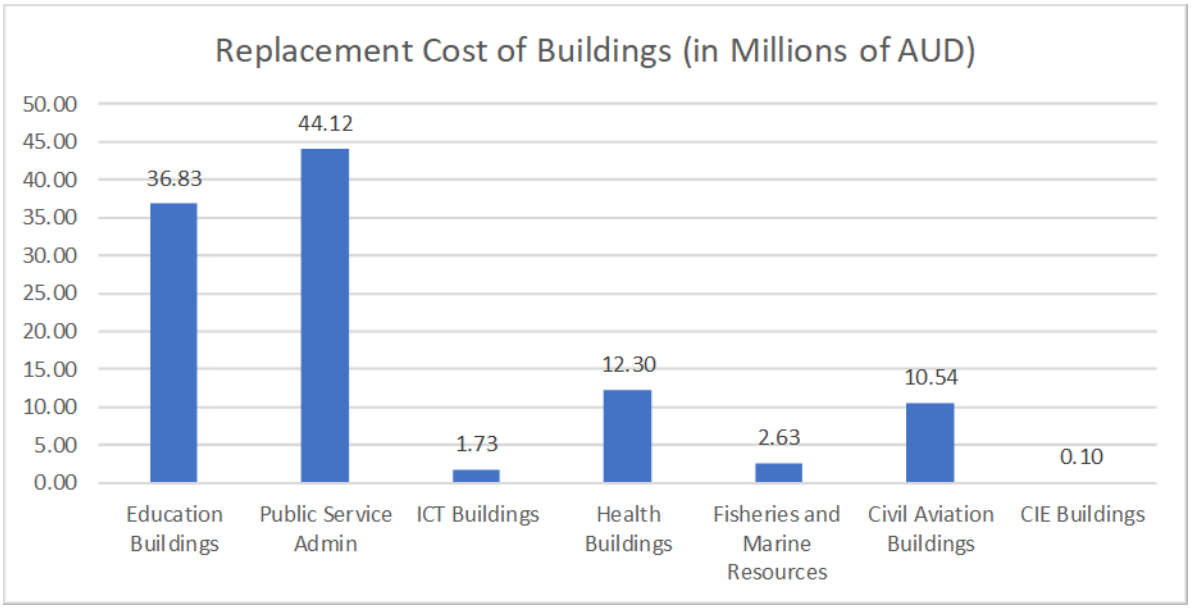

Figure B-3: Estimated replacement cost of infrastructure assets (AUD million)

Using the methodology described in Section 3, infrastructure condition assessment was undertaken and the RSP for each infrastructure asset, representing estimated remaining useful life as a percentage of TUL was calculated and recorded in the asset register.

The results of infrastructure asset condition and capacity assessments are summarized in the following section for different types of infrastructure assets.

4.1 Results of condition assessment—buildings

a. Education sector buildings

The buildings in the education sector include infant, primary, college, and secondary schools as well as for the technical vocational training institute and the University of South Pacific, which operates in a building leased from the government, above the Nauru Public Library and the community hall. Table B-7 shows there are approximately 3,600 students enrolled in Nauru schools, which amounts to about 30% of the country's population.

Table B-7: Buildings—number of educational institutions and enrolments

Type of Institution	Number of Schools	Approximate enrolment
Infant Schools (Pre-School)	4	470
Primary Schools (Grade 1 to 5)	2*	1500
Colleges (Grade 6 to 8)	2	800
Secondary Schools (Grade 9 to 12)	1	800
School for Disabled Students	1	40

*Nauru Primary School (Grade 3 to 5) and Yaren School (Grade 1 & 2) are counted as one school, split into two separate campuses

The results of condition assessment of the buildings used by the education sector are presented in Figure B-4.

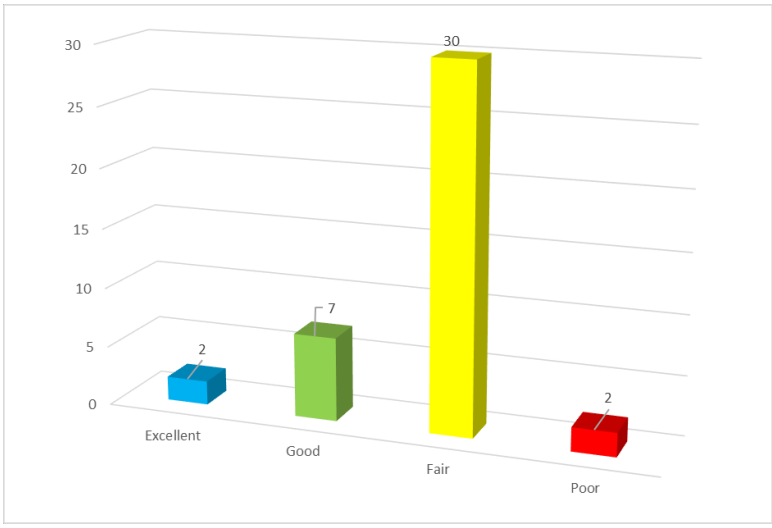

Figure B-4: Educational sector buildings condition assessment

Figure B-4, is a snapshot of the school buildings condition assessment. Two of the existing buildings in the Nauru Primary School are in poor condition. Both buildings are pre-fabricated structures, as shown in Figure B-5, transferred from the old Regional Processing Centre. The sub-floor has degraded prematurely due to water damage. The buildings were originally air-conditioned. These air-conditioners were installed on concrete pillars and the sub-floor was exposed to moisture from condensation, which resulted in premature degradation. These buildings have low ceilings that are not suitable for ceiling fans.

Figure B-5: Pre-fab buildings at Nauru Primary School in poor condition

Capacity assessments also indicate space constraints at both Nauru Primary School and Kaiser College. Kaiser College immediately requires one additional classroom. Nauru Primary School immediately requires two new classrooms and will require two additional classrooms within the next five years. Two schools, Bue Infant School and Yaren Primary School, require a roof over the play area to provide shade for the children. The secondary school requires a cafeteria.

b. Civic, emergency services, and administration buildings

This sector includes a total of 26 buildings and includes the main government administrative office, the parliament, the conference center, the sports complex, the police and ICT department buildings, the courts, and the jail buildings. As shown in Figure B-6, four of the buildings are in poor condition, including two very old buildings used as the jail, the land records committee building, and the radio broadcast and media center building. There is a new jail, which was constructed on top of the hill in 2016, but is vacant. It is recommended that the jail operations are moved to the new building. The media center building should be demolished and a new building should be constructed for media operations near the ICT office. The land records committee building in Uaboe district should be renovated, renewing the roof, fit-outs, flooring, and services.

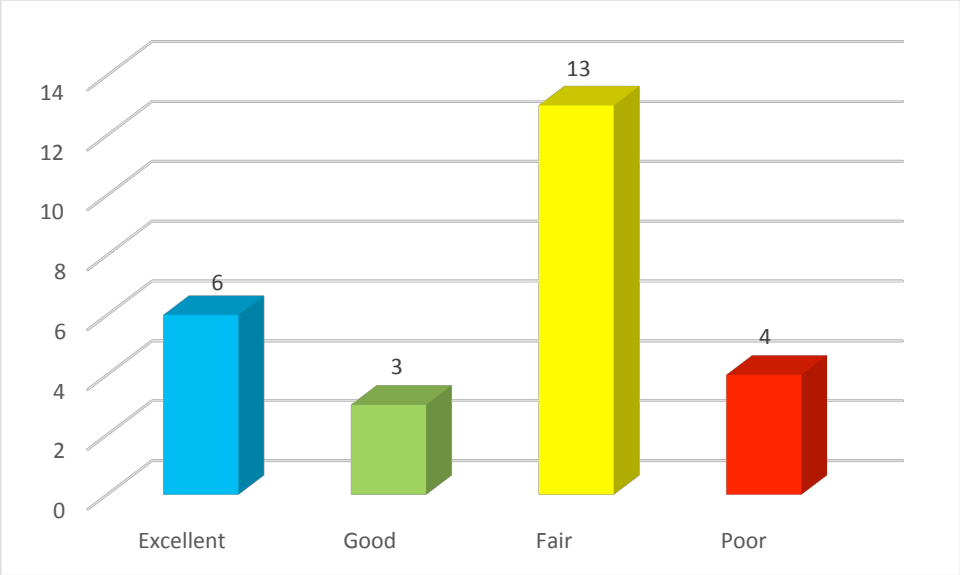

Figure B-6: Civic, administration and emergency services buildings

Figure B-7: Jail building in poor condition

The main administration building is in fair condition, but it needs major repairs and renovations to prevent further degradation, including repairs to exterior wall cladding and windows, the roof in several locations, renewal of air conditioning and plumbing fixtures and roof gutters. Similarly, there are four Ministry of Home Affairs buildings on Meneng Hill, all urgently requiring renovations to prevent further impairment, including roof renewal, exterior wall cladding, and renewal of mechanical and plumbing service fixtures.

c. Health sector buildings

The health sector buildings include the hospital complex buildings, which have been grouped into three buildings: the old hospital buildings that have not been yet renovated, the old hospital buildings that have been renovated during the past 10 years, and the newly constructed pre-fabricated hospital complex buildings. The health sector buildings also include two buildings at the public health center and four small buildings used as district clinics at four locations along the ring road.

Figure B-8 shows the condition assessment of the health sector buildings. Four of the existing buildings are in poor condition, including the old, unrenovated buildings at the hospital site, both existing buildings at public health building site in Denig and one of the abandoned clinic buildings, which appears to have been vandalised in Meneng district.

Figure B-8: Health sector buildings

To improve the health sector infrastructure, the old hospital buildings should be renovated on an as-required basis following the original Master Plan for Stage-3 Redevelopment. There is an immediate need for a maternity ward and an isolation ward. At the public health building site, the masonry-walled building should be renovated, and the timber-framed building should be demolished. The capacity assessment identified the need for nursing residential quarters, which can be constructed at the site vacated by demolition of the timber-framed building at the public health site. The clinic in Meneng requires a new roof and new windows.

During the inspection of the health sector buildings, the poor quality of construction and use of inappropriate materials for the local environment was noted. The following defects were noted in the newly constructed hospital complex building:

- Early corrosion and a high corrosion rate on a large number of steel members.
- The railings and hardware attached to the walls with screws are falling off in several locations, inside the building. It appears in a number of locations, the hardware was attached to the wall covering without any structural support.
- Some of the doorframes have warped, which appears to be related to the sagging of the subfloor.
- In many locations, the vinyl floor tiles are lifting off the subfloor.
- The selected wall materials do not appear to be fireproof.

Figure B-9: Poor quality of construction at the new hospital building, showing where the fire extinguisher fell off its mounting

Figure B-10: Poor quality of construction at the new hospital building where floor tiles are lifting off

Figure B-11: Poor quality of construction at new hospital building where door frames are warping

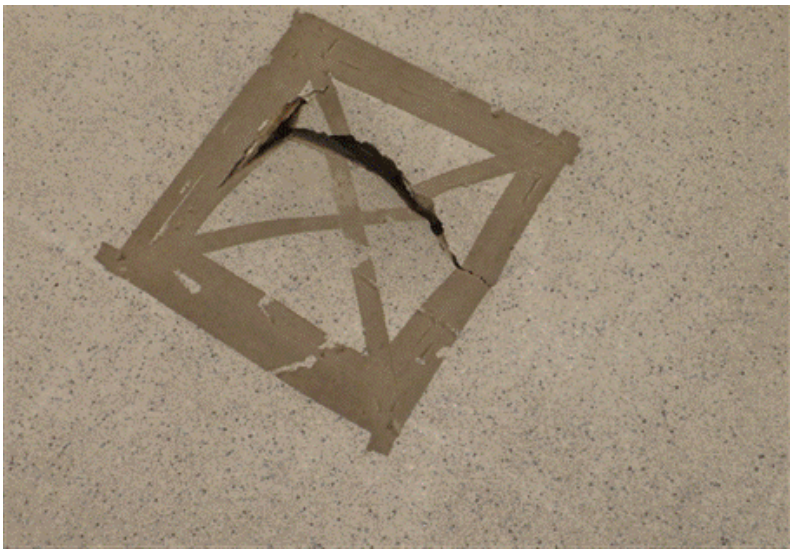

Figure B-12: Poor quality of construction at the new hospital building where low ceilings and flimsy ceiling material is resulting in damage to ceilings

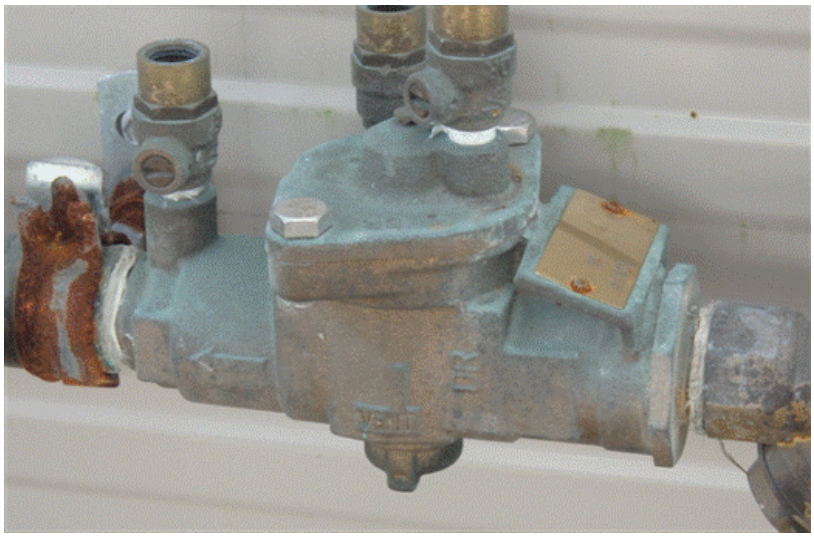

Figure B-13: Poor quality of construction at the new hospital building where hardware is rusting

Similarly, the recently constructed clinic building in Meneng district is degrading due to poor quality construction and materials.

Figure B-14: Recently constructed clinic building in Meneng—roof and windows are at the end of life

d. Aviation sector buildings

Four buildings service the aviation sector, including the airport building, the VIP lounge adjacent to the airport, and two small nav-aid equipment buildings on the hill. With the exception of the old masonry nav-aid equipment building (Figure B-15), which requires a new roof, ceiling, and repairs to the standby generator, the rest of the buildings are in good condition.

Figure B-15: Aviation equipment shed needs new roof and renovation

e. Port authority buildings

All buildings at the Nauru Port have been demolished and will be rebuilt with development of the new wharf.

f. Fisheries sector buildings

All five buildings in the fisheries sector have been assessed to be in fair or good condition. Other than routine maintenance, no capital investments are required for this sector.

The Agriculture Training Center building in Buada has been determined to be in poor condition and requires renovations.

g. Commerce, industry and environment sector buildings

The Agriculture Training Center building in Buada is in poor condition and requires renovations.

h. Air strip — runway, taxiways and hard stop areas

The runway, taxiways and hard stop areas at the Nauru airstrip are currently in a fair operating condition. At the beginning of 2019, the surface pavement had reached a service age of 27 years. The typical service age of a superior-quality surface pavement is 25 years. The current condition of the runway surface layer is indicative of the excellent quality of the seal laid in 1992.

A visual inspection of the air strip revealed signs of surface degradation in the form of cracks in the surface layer and damage to the ridges in grooved section of the runway (Figure B-16). The pavement was inspected by subject matter experts from Fulton Hogan (New Zealand) in 2016 and based on the condition of the surface pavement, it was recommended that the surface pavement is resealed. While the sub-base of the air strip is in excellent condition, the surface

pavement is approaching the end of its service life and will need to be resealed within the next five years.

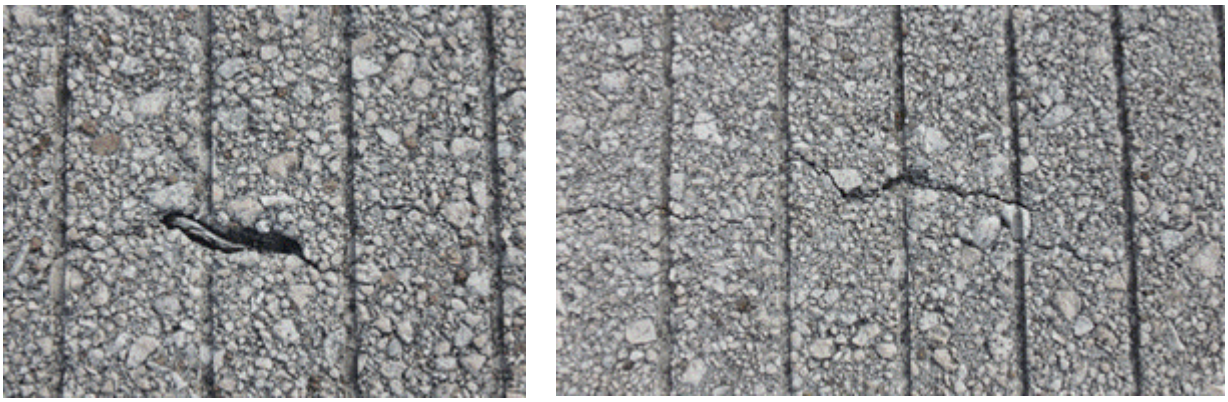

Figure B-16: Typical surface defects in the runway

The drainage sumps in the runaway apron are in good operating condition; however, the steel grills on two sumps have rusted away and they need to be replaced.

The traffic control radio equipment used by the airport control tower consists of a variety of equipment from various manufacturers and is up to 20 years old. The value of individual control tower assets is well below the asset register materiality threshold; therefore, these assets are not recorded in the asset register. However, considering the recent increase in traffic handled by Nauru Airport, the airport requires standardized VHF radio equipment for communications between the control tower and aircraft. To operate safely and efficiently, the airport also requires a standardized meteorological station.

All remaining components associated with aviation operations, including the security fence, the runway and taxiway edge lighting, PAPI, and navigation aid equipment are in fair or good condition and other than the routine maintenance, do not require any capital investment.

i. Sealed roads

As indicated by the RSP score in the asset register, most sections of the sealed road are in a fair operating condition. Although there are visible signs of degradation in the surface layer of sealed roads, the underlying base is in good condition. Only those sections that have been exposed to ponding have experienced damage to the base.

The following sections of the road network are in poor condition:

- Section LTSR -019: Embassy/Hospital Hill Road
- Section LTSR -020: Hospital Hill Access Road
- Section LTSR -021: Embassy Hill Access Road.

These sections were not sealed in 1992 when the rest of the network was resealed and, as a result, have experienced degradation of the base pavement under the surface and are in urgent need of renewal.

Due to the large fixed-cost required to set up a temporary asphalt plant and relocating heavy machinery to Nauru, resealing of the roads should be undertaken at the same time as the runway.

The roadside concrete curb is generally in fair condition, but has experienced damage in some locations. Approximately 5% of the curb requires capital repairs. This work has already started and should be completed before the road reseal work begins.

One of the serious problems with the road network design is the dysfunctional design of the road drainage system. To maintain groundwater, drain sumps with soak pits were installed along the entire length of the ring road. However, the size of the number of sump pumps and the size of existing soaks pits is insufficient to provide effective drainage during rain. To compound the problem, the drainage sumps are not equipped with screened grills and the drainage pipes get clogged with debris, resulting in serious ponding. To resolve this design deficiency, drainage sumps should be equipped with appropriately designed grills and the size of drainage pipes and soak pits should be increased. Alternatively, approximately 15 additional drainage sumps and soak pits should be provided along the ring road, in strategic locations that are subject to frequent ponding, and in locations where sufficient land is available for soak pits. This work should also be completed before the road seal is replaced.

The capacity assessment of the road network revealed there are approximately 90 dwelling sites, located between the Nauru Port and Nauru College and between the ring road and the seashore, that have very poor road access. Some of these dwellings are currently in inhabitable state, but many are occupied by migrant workers working for RONPHOS or NRC. Lack of roads in this area not only results in poor living conditions for residents, but poses a serious safety risk for rescue operations during potential fire, flood, or medical emergencies. Therefore, it is recommended to provide at least a 4-meter wide, single-lane road over a length of approximately 3 kilometers to provide access for these dwellings.

j. Footpaths

Most sealed roads in Nauru have 1.2 meter wide footpaths adjacent to the curb. In most locations, the footpath is provided on one side of the road, but in more densely populated districts, such as Baitsi, Uaboe and Nibok, a footpath is provided on both sides of the road. In sparsely populated districts, such as Ijuw and Anibare, there are sections of road with no footpath. The overall length of footpaths in Nauru is approximately 28.4 kilometers. All of the footpath sections are generally in fair condition, but are damaged in some locations, requiring repairs to prevent further degradation. Approximately 10% of the footpaths require capital repairs. Footpath repair work has already started and should continue until all of the damaged footpath sections have been renewed.

k. Unsealed roads

All of the unsealed roads in Nauru are in the mining area on Topside. These roads were initially developed as temporary access roads to facilitate phosphate mining operations. Over recent

years, a number of permanent facilities have been established on the top side, including the RPC centers, the landfill facility, and the jail, requiring access by non-mining motor vehicles. There are currently approximately nine kilometers of unsealed roads on Nauru used for non-mining operations. Maintaining these roads in good working condition is very costly (approximately $50,000 per km per year) and it would be more economical to seal these roads. However, there may be still phosphate mining potential under the unsealed roads and, therefore, they cannot be sealed at this stage.

The condition of the unsealed roads is highly dependent on the re-grading frequency. For example, in February 2019, all the unsealed roads were in good condition because they had been recently re-graded.

l. Nauru commercial wharf and boat harbor

All existing harbor structures, including buildings, owned by the Port Authority of Nauru have reached the end of their service life and are currently undergoing re-construction with a budget of approximately AUD105 million.

The boat harbor in Anibare district, managed by the Fisheries Department is in good operating condition.

m. Coastal protection (sea walls and rip raps)

With the exception of the rip raps listed below, the remaining sea walls and rip raps are assessed as being in fair condition.

The rip rap in Meneng district (near the Yaren boundary) and the rip rap in the Yaren district (behind Nauru Secondary School) as shown in Figure B-17 are in poor condition. These rip raps have experienced repeated over-topping by waves, resulting in soil erosion under the rip rap, with the rocks falling off the top. These rip raps require capital repairs to prevent further degradation.

Figure B-17: Rip raps in poor condition

The existing sea walls protect the coastal areas reasonably well. There is a small section in Boe district near Yaren, where coastal protection can be improved through addition of approximately 400 meters of a new rip rap.

n. Solid waste management—landfill site

The existing landfill site in Nauru is considered in poor condition. Solid waste is dumped on the land surface without compaction and without the fill layers being covered by soil in between.

The landfill site does not have the provision for collection of leachate as shown in Figure B-18 and vent pipes are used to dissipate odor. These deficiencies may create environmental issues if leachate overflows and contaminates the surrounding ground. This is a serious concern because the landfill site is located close to the Buada district pond, which is the main pond to capture and store groundwater in Nauru.

Figure B-18: Existing landfill site in Nauru

The medical waste incinerator is installed at the hospital, but it is not currently in use, due to its installation next to the oxygen production chamber. Medical waste is currently buried at the landfill site. It is recommended to relocate the medical waste incinerator to the landfill site and recommission it.

The recyclables are not sorted and are being dumped at the site mixed with waste, which means the landfill site is not being used economically. A small building has recently been constructed at the landfill site as a pilot project to demonstrate sorting recyclables. But this building is not being used because it is too small for the sorting functions and appears to have been designed without professional input.

o. Sewage treatment plant

The status of sewage treatment in Nauru is assessed as being in poor condition.

There are currently only two small-scale secondary sewage treatment plants functioning correctly: one installed at the hospital building and the second installed at RPC site. These plants are designed to treat sewage discharge at those two locations. NUC maintains the sewage treatment plant at the hospital and they have been asked to take over treatment of sewage from all the schools for which they are setting up a small size plant (donated by Israel) at the Nauru Public School site.

Iguigu Holdings currently pumps out the private household septic tanks and drains the waste into the small size sewage treatment plant behind the Nauru Public School, which is undersized for the task and is not operating correctly.

Nauru needs one or two secondary treatment plants of sufficient capacity to handle sewage waste from all private household septic tanks and the government needs to assign the responsibility for planning and designing this plant to either NUC or NRC.

p. Antenna towers

All of the antenna towers owned by the ICT and aviation sectors are assessed as being in fair condition and do not require any capital investment during the next 10 years. However, a new media/ICT tower will be required when the media building is relocated near the ICT building.

q. Light-duty motor vehicles

All light duty vehicles in Nauru, except those owned by NUC and NRC, are managed by the Public Service Administration. There are a total of about 240 vehicles in this pool. Figure B-19 summarizes the condition of light-duty vehicles as at May 2019. Vehicles in very poor condition require immediate replacement and vehicles in poor condition requiring replacement within two to five years.

Because the typical useful life of a light-duty vehicle in Nauru is 12 years, it is expected that all of the vehicles currently in fair condition will be in poor condition within the next 10 years.

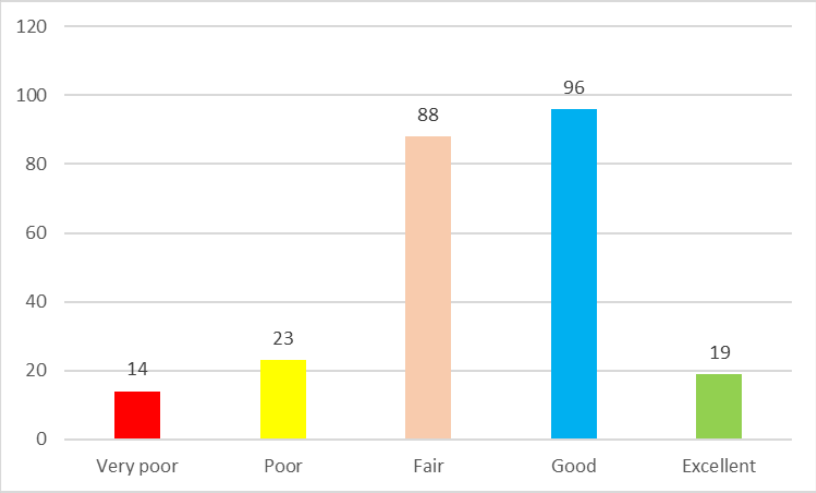

Figure B-19: Condition of light-duty motor vehicles

r. Heavy-duty motor vehicles

Nauru Rehabilitation Corporation manages the majority of the heavy-duty vehicles owned by Government of Nauru. Most of these vehicles are used for land rehabilitation operations in the Topside mining areas. The average cost of a heavy-duty vehicle used in land rehabilitation operations is more than AUD400,000. A review the recent operating history of these vehicles indicates the need for improved accountability for asset management. Over the past five years, three of these vehicles were destroyed by fire and had to be prematurely retired from service prematurely.

Figure B-20 summarizes the results of condition assessment of heavy-duty motor vehicles managed by NRC. Lack of vehicles in fair or good operating condition is hampering the ability of NRC to carry out its intended functions.

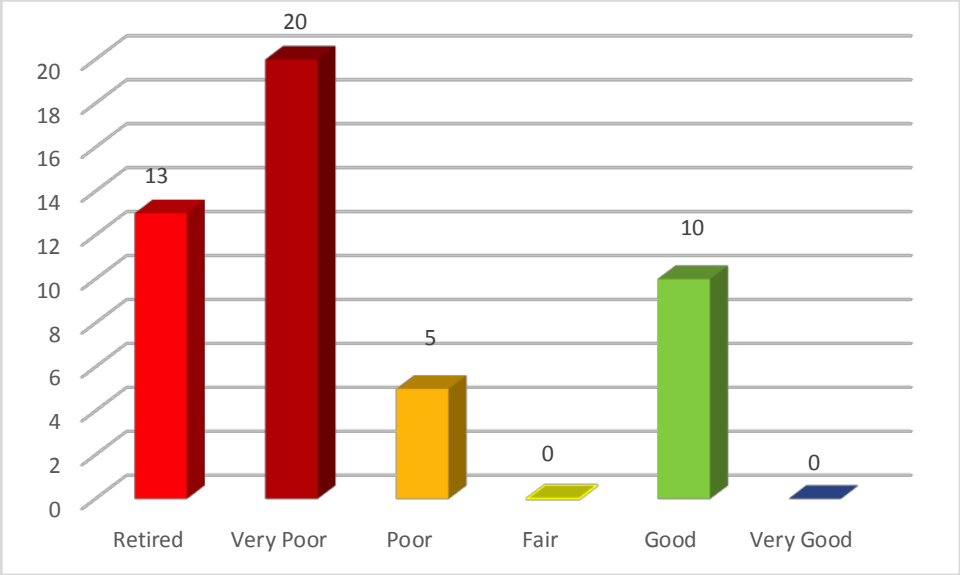

Figure B-20: Condition of NRC heavy-duty vehicles

All assets in poor and very poor condition will need to be replaced within the next two years and the remaining assets will need to be replaced at least once during the 10-year investment plan.

The Port Authority of Nauru also owns capital-intensive heavy-duty vehicles used for unloading containers from ships and offshore mooring equipment to hold ships waiting for a porting berth. Emergency Services is responsible for managing the fire trucks and ambulance fleet. The Department of Transportation manages public transit and school buses and Fisheries and Marine Resources Authority also owns mini excavators to excavate ponds to promote small-scale fish hatcheries at household level. All these vehicles have a typical useful life of eight years and will need to be replaced at least once during this 10-year investment plan.

s. Motorboats

The Port Authority of Nauru owns heavy-duty motorboats, referred to as sea mules, which are currently used to transport loaded containers from ship to dock. These boats are currently in fair operating condition and when the new port is commissioned and the ships can dock at the port, these boats will become redundant and will not need to be replaced.

The Fisheries and Marine Resources Authority manages a few small-sized motorboats, all of which are currently in fair condition. Emergency Services has four jet-skis that are currently in fair or good condition.

4.2 Summary of NUC infrastructure condition assessment

Based on the asset condition assessment undertaken by NUC, the following assets were found to be in poor condition, and require capital investments to improve their operation condition to acceptable levels:

- medium-speed diesel generator set (G4)—2.8 MW, replacement with a used generator optimal option, investment of $500,000 (self-funded)
- medium-speed generator set (G6)—2.4 MW, refurbishment of generator prime-mover optimal option, investment of $1,000,000 (AusAid)
- medium-speed generator set (G1)—2.4 MW, refurbishment of generator prime-mover optimal option, investment of $1,000,000 (AusAid)
- medium-speed generator set (G5)—1.0 MW, refurbishment of generator prime-mover optimal option, investment of $500,000 (AusAid)
- medium voltage 11 kV, overhead lines, rebuild of overhead lines, investment of $3,000,000 (European Union)
- water production plant in Meneng, plant rehabilitation investment of $1,500,000 (self-funded)
- water storage tanks (3 million L capacity) and two 300kL tanks at water treatment plant for B13 site, investment $700,000 (self-funded)
- relining of four sea tankers, investment $160,000 (self-funded).

In addition to these projects, the following additional investment needs were identified during condition assessment of the assets, aimed at improving the quality or cost efficiency of providing services:

- addition of 1.1 MW PV solar generation, $4,000,000 in 2019
- addition of 6.0 MW PC solar generation, $20,000,000 in 2020/2021
- relocate 5x1 MW high-speed gen sets to solar farm site, $700,000 in 2019
- relocate high-transmission lines to facilitate Nauru Port Construction, $400,000 in 2020

- convert alternators to synchronous converters to improve system stability, $100,000 in 2019
- pumped storage using sea water to improve operation of PV solar, $10,000,000 in 2022
- ocean thermal energy generation (concept stage), $5,000,000 in 2023/24
- water remineralization plant, $150,000 in 2020
- new administration building for water office, $250,000 in 2020
- procurement of sewage pump truck and tanker, $500,000 in 2020
- sewage treatment plant (10-ton capacity), $500,000 in 2020.

Based on the infrastructure condition assessment of the fuel storage plant, the following assets have been identified in poor condition, requiring investments:

- replace 8-inch diameter steel pipes from the cantilever location to the fuel farm required in conjunction with the Nauru Port redevelopment, estimated cost $1,500,000 in 2020
- install low-level and high-level gauges on fuel storage tanks, estimated cost $300,000 in 2020;
- improve fire-fighting capacity at the fuel farm, estimated cost of $2,000,000 in 2020
- procure new 22kL fuel tanker for aviation fuel delivery, estimated cost of $600,000, in 2019.

5 Asset maintenance

For safe, reliable and economically efficient operation of infrastructure, all infrastructure assets require a maintenance plan. While most of the infrastructure assets in Nauru are simple building structures, some assets, such as the wharf (currently under construction), involve engineered structures and complex equipment and require subject matter expertise to develop detailed maintenance plans. It is recommended that when new assets are acquired, a maintenance plan be developed as part of the engineering scope, during the procurement and construction phases of the infrastructure assets.

5.1 Recommended maintenance activities

The maintenance guidelines that follow are very general and generic and will need to be tailored to meet the asset specific requirements. All infrastructure assets will require the following maintenance activities:

a. Scheduled inspections and minor maintenance

Scheduled inspections and minor maintenance at regular intervals are required for minor repairs and replacement of degraded parts identified through inspections to avoid more serious damage and asset degradation. The scope and frequency of minor maintenance varies depending on

the asset. The minor maintenance activities are funded through operations and maintenance budgets.

b. Reactive maintenance

Reactive maintenance involves repairing or replacing minor asset components when they fail in service to maintain asset functionality, meet the required service levels, and to prevent further asset degradation. The reactive maintenance is generally covered through operations and maintenance budgets but may occasionally involve capital expenditure, depending on the scope of required repairs.

c. Planned condition assessment

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

d. Planned major repairs and refurbishment

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

Typical maintenance activities for various assets are described in more detail in Appendix B of the Plan.

5.2 Budget for maintenance

The optimal funding requirement for maintenance of an asset is a function of the asset's design and construction as well as its operating environment and it can be calculated only through detailed analysis. A recent World Bank study estimates the minimum annual maintenance costs for electricity and road network to be of the order of 2%, for water and sanitation assets to be of the order of 3%, and for mobile assets to be of the order of 8% of assets' replacement cost.[1]

The scope of maintenance activities varies significantly for different asset types, to achieve the desired objectives of: (a) preventing premature asset degradation; (b) reducing the risk of in-service asset failures; and (c) providing economically efficient asset operations, throughout assets' life cycle. The level of optimal maintenance required by an asset depends on several factors. Those assets that employ a large number of moving parts for their operation, experience a higher degree of wear and tear and therefore, require more frequent and more extensive maintenance. Similarly, those assets that are routinely exposed to corrosive

[1] Fay, M. and Yepes, T. 2003. *Investing in Infrastructure — Policy Research Working Paper #3102* , The World Bank.

environment, experience accelerated degradation of metal surfaces due to oxidation and therefore, require more extensive maintenance to restore the condition of corroded surfaces.

The maintenance effort required for an asset also increases with asset's service age. As assets age and approach the end of their typical useful life, they require significantly greater maintenance effort, in relation to brand new assets.

Based on the scope of maintenance activities required for different assets classes, the annual maintenance budget requirements should be calculated as a percentage of gross replacement cost of the assets, as indicated Figure B-21. The indicated costs are for routine maintenance, inspections and minor emergency repairs and do not cover the cost of major component renewal.

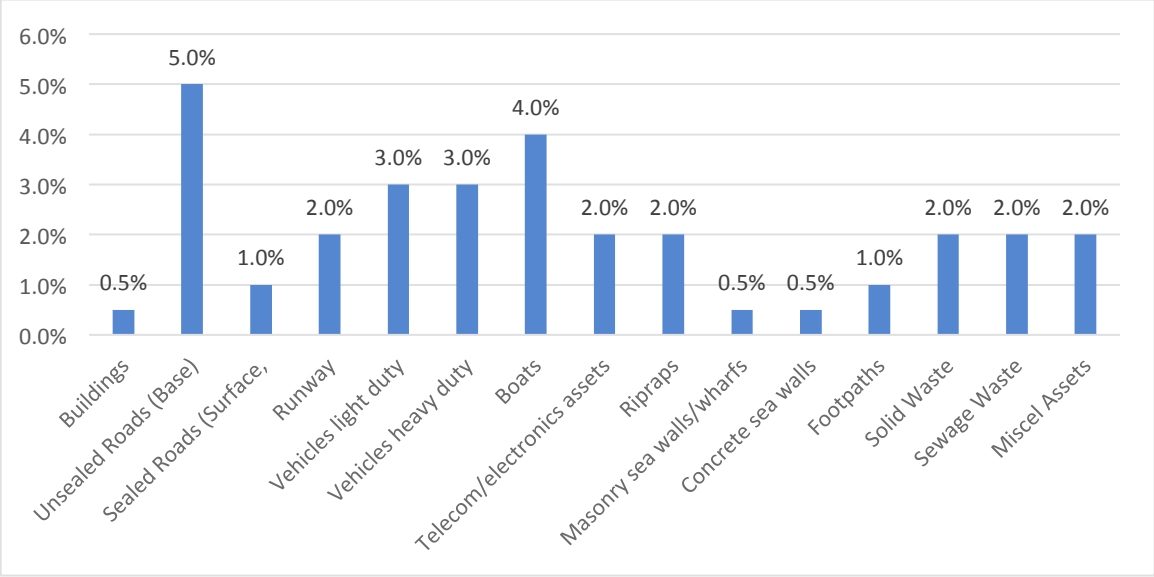

Figure B-21: Recommended maintenance budget as a percentage of asset replacement cost

Based on the maintenance budget allowances for different types of infrastructure assets (Figure B-21) and the annual maintenance budget requirements for various service sectors (Table B-2), the infrastructure assets in Nauru require an annual funding allocation of approximately A$3.6 million for preventative maintenance of infrastructure assets.

6 Proposed pipeline of capital investments

The procedures for identifying capital investment needs of infrastructure assets, considering results of assets' capacity assessment and condition assessments, are described in detail in Appendix C and are summarized below.

Table B-8 shows the interpretation of the capacity adequacy index results and the required action for asset classes in different capacity adequacy categories.

Table B-8: Capacity adequacy index interpretation and required action

Capacity Adequacy Index	Interpretation	Required Action
1	Very Poor	Prepare NPP for addition of new assets (high priority)
2	Poor	Prepare NPP for addition of new assets (high priority)
3	Fair	No Action Required
4	Good	No Action Required
5	Very Good	No Action Required

Table B-9 shows the interpretation of RSP results and the required action depending on the RSP. For the assets determined to be in poor or very poor condition, the operating department should prepare a New Project Proposal (NPP) for asset renewal or replacement by considering all alternatives and selecting the optimal solution. The project specifications should take into account the harsh corrosive operating environment in Nauru and any other site-specific operating requirements. During preparation of asset renewal plan, institution strengthening and capacity building through knowledge transfer and skills development must be incorporated into the asset procurement plans.

Table B-9: RSP interpretation and required action

Remaining Service Potential (RSP)	Interpretation	Required Action
0-25	Very Poor	Prepare NPP for asset replacement - (High Priority)
26-50	Poor	Prepare NPP for asset replacement
51-70	Fair	Continue with recommended maintenance
71-85	Good	Continue with recommended maintenance
85-100	Very Good	Continue with recommended maintenance

In case of complex assets, for asset components that can be individually renewed (e.g. roof of a building, or surface seal in case of a road), the condition score of individual components should be reviewed and interpreted for appropriate action, in accordance with Table B-10.

Table B-10: Asset component condition interpretation and required action

Component Condition	Interpretation	Required Action
1	Very Poor	Prepare NPP for component renewal - (High Priority)
2	Poor	Prepare NPP for component renewal
3	Fair	Continue with recommended maintenance
4	Good	Continue with recommended maintenance
5	Very Good	Continue with recommended maintenance

While preparing New Project Plans, cost estimates should be prepared by applying suitable adjustments for inflation to the cost of most recent acquisition of an identical or similar asset and by including the full cost of the asset acquisition, including procurement, transportation, construction, testing and commissioning, as well as the cost of disposing of existing assets that are being retired and replaced with the new assets.

Per unit costs for 2019 used in the asset register are documented in Appendix F and the asset register automatically calculates asset replacement and component renewal costs.

For assets involving complex designs, consideration should be given to extended parts and labor warranties (3 to 5 years), including on-the-job training for local staff in asset operations, troubleshooting and repair and performing maintenance. For the assets being retired from service, adequate funding should be allowed for proper disposal of the assets being removed from service.

Tables B-11 to B-13 list the specific infrastructure capital investment projects required within the next 10-year period to address infrastructure deficiencies described in Section 4 and to keep the infrastructure assets in Nauru in satisfactory operating condition. These investments have been identified using procedures described above.

The investment projects involving renewal or replacement of buildings are shown in Table B-11. Table B-12 lists the investment projects for all infrastructure, other the buildings and motor vehicles. Table B-13 summarizes investment required for motor vehicles and boat assets. These tables do not cover the infrastructure assets managed by NUC and Vital Energy Inc. The capital investment projects proposed by NUC and Vital Energy Inc for energy and water sector

projects are shown separately, in Table B-14. Table B-15 shows the extent of overall capital investments required.

Table B-11: Investment projects—Government of Nauru public sector buildings

Infrastructure Asset	Department/SOE Responsible	Project #	Project Description	Project Trigger	Remaining Service Potential %	Estimated Total Investment Cost (AUD)
Buildings	Department of Education	1	Renovate two class rooms for Nauru Primary School (install on conc slab floor)	Condition Assessment	41%	$ 120,000
		2	Feasibility Study to Determine Need for Classrooms from 2021 to 2030	Capacity Assessment		$ 65,000
		3	Renovate two additional class rooms for Nauru Primary School Install on con slab floor)	Capacity Assessment	41%	$ 120,000
		4	One new class room for Kaiser College	Capacity Assessment	0%	$ 75,000
		5	Provide roof on play area at Nauru College	Capacity Assessment	0%	$ 40,000
		6	Provide roof on play area at Boe Infant School	Capacity Assessment	0%	$ 40,000
		7	Cafeteria Building at Nauru Secondary School	Capacity Assessment	0%	$ 150,000
		8	Disability Access to Learning Village and Disabled School	Capacity Assessment	0%	$ 32,000
	ICT Department	9	New Media Building	Condition Assessment	0%	$ 300,000
	Public Services Admiration	10	Land Records Committee Building renovations	Condition Assessment	48%	$ 100,000
		11	Government Admin Building Renovations	Condition Assessment	58%	$ 500,000
		12	Home Affairs - Renovate four buildings	Condition Assessment	50%	$ 150,000
	Department of Health	13	Renovate Old building to be used as Maternity Ward	Condition Assessment	46%	$ 320,000
		14	Renovate Old building to be used as Isolation Ward	Condition Assessment	46%	$ 350,000
		15	Hospital security fence and improvement to parking area	Condition Assessment	0%	$ 60,000
		16	Redevelopment the old ward block for Paediatrics.	Condition Assessment	46%	$ 480,000
		17	Other Phase 3 renovations and hospital improvements	From long-term development plan	0%	$ 4,000,000
		18	Construction of Nursing home	From NISS	0%	$ 4,500,000
	Nauru Emergency Services	19	New NES Headquarter & Metrology Equipment	From NISS	0%	$ 3,080,000
	Civil Aviation	20	Renovation to Nav-Aid Equipment Building	Condition Assessment	50%	$ 60,000

Table B-12: Investment projects—all infrastructure except buildings

Infrastructure Asset	Department/SOE Responsible	Project #	Project Description	Project Trigger	Remaining Service Potential %	Estimated Total Investment Cost (AUD)
Wharf	Port Authority	1	Redevelopment of Nauru Port and associated buildings	Condition Assessment	0%	$ 105,000,000
Roads and Footpaths	Department of Transport	2	Renovate existing draining sumps and soak pits and install additional draining sumps and soak pits	Condition Assessment	40%	$ 300,000
		3	Capital repairs to road side curbs and gutters	Condition Assessment	40%	$ 250,000
		4	Resealing and Repair of existing roads	Condition Assessment	40%	$ 14,000,000
		5	Capital repair to footpaths	Condition Assessment	62%	$ 300,000
		6	Develop new road for water front area near the port	Capacity Assessment	0%	$ 1,200,000
		7	Addition of Two Sets of Traffic Lights on Simpson Rd	Capacity Assessment	0%	$ 77,000
Airstrip	Civil Aviation	8	Resealing and Repair of runway, taxiway and hardstops area	Condition Assessment	52%	$ 15,000,000
		9	Replacement VHF Air-Ground Radio	From NISS	0%	$ 225,000
		10	Vaisala Meteorological System	From NISS	0%	$ 490,000
Coastal Protection (Sea walls and rip raps)	Infrastructure Management	11	Repairs to Existing Ripraps	Condition Assessment	41%	$ 300,000
		12	Construction of New rip rap in Boe district	Capacity Assessment	0%	$ 400,000
Land fill site	Nauru Rehabilitation Corporation	13	Improvements to Landfill site - Install liner leachate collection system)	Condition Assessment	0%	$ 1,400,000
		14	Relocate medical waste incinerator to landfill site	Condition Assessment	0%	$ 20,000
		15	Install Recyclables sorting system	Capacity Assessment	0%	$ 60,000
Sewage Treatment	Dept of Commerce,	16	New Secondary Sewage Treatment Plant for the country	Capacity Assessment	0%	$ 6,000,000
Telecommunications	Information and Communications	17	East Micronesian Cable Project (undersea internet cable	Capacity Assessment	0%	$ 21,600,000
Decompression Chamber	Fisheries & Marine Resources	18	Decompression Chamber Upgrades	From NISS	0%	$ 36,000

Table B-13: Investment projects—motor vehicles and boats

Infrastructure Asset	Department/SOE Responsible	Project #	Project Description	Project Trigger	Remaining Service Potential %	Estimated Total Investment Cost (AUD)
Motor Vehicles (heavy duty)	Nauru Emergency Services	3	Replace Fire Trucks and ambulances when they reach end of life	Condition Assessment	<50%	$ 960,000
	Department of Education	4	Replace public transport and school buses as they reach end of life	Condition Assessment	<50%	$ 600,000
	Port Authority of Nauru	5	120 Ton Crane to unload containers from ships	Capacity Assessment	0%	$ 1,200,000
		6	Reach Stacker for 20 ft containers	Capacity Assessment	0%	$ 500,000
		7	Replace Mooring Equipment as it reaches end of life	Condition Assessment	<50%	$ 7,595,300
		9	Replace other ship unloading equipment as it reaches end of life	Condition Assessment	<50%	$ 769,890
	Public Services Administration	10	Replace heavy duty vehicles as they reach end of life	Condition Assessment	<50%	$ 280,000
	Fisheries & Marine Resources	11	Replace motor boats and heavy duty vehicles as they reach end of life	Condition Assessment	<50%	$ 280,000
Motor Vehicles (light duty)	Public Services Administration	12	Replace light duty vehicles as they reach end of life	Condition Assessment	<50%	$ 4,490,000

Table B-14: Investment projects—NUC and Vital Energy Inc

Infrastructure Asset	Department/SOE Responsible	Project #	Project Description	Project Trigger	Estimated Total Investment Cost (AUD)
Fuel Storage Farm	Vital Energy Incorporated	1	Replace 8" diameter steel pipes from the cantilever location to the fuel farm;	Port Redevelopment	$ 1,500,000
		2	Install low and high level gauges on fuel storage tanks	Condition Assessment	$ 300,000
		3	Improve fire fighting capacity at fuel farm	Condition Assessment	$ 2,000,000
		4	Procurement of a new 22kL fuel tanker for aviation fuel delivery	Capacity Assessment	$ 600,000
Electricity Infrastructure Gen & Distribution	NUC	5	G4- Replacement of 2.8 MW, Ruston, Med Speed Gen Set (used)	Condition Assessment	$ 500,000
		6	G6 - Rehab of 2.4 MW, Ruston, Med Speed Gen Set	Condition Assessment	$ 1,000,000
		7	G1 - Rehab of 2.4 MW, Ruston, Med Speed Gen Set	Condition Assessment	$ 1,000,000
		8	G5 - Rehab of 1.0 MW, Ruston, Med Speed Gen Set	Condition Assessment	$ 500,000
		9	Relocate 5x1MW high speed Gen Sets to Solar Farm site	Capacity Assessment	$ 700,000
		10	Addition of 1.1 MW PV Solar Generation	Capacity Assessment	$ 4,000,000
		11	Addition of 6.0 MW PV Solar Generation	Capacity Assessment	$ 20,000,000
		12	Pump storage using sea water (feasibility stage)	Capacity Assessment	$ 10,000,000
		13	Ocean Thermal Energy Generation (Concept stage)	Capacity Assessment	$ 5,000,000
		14	Overhead HT line rehab (11 kV)	Condition Assessment	$ 3,000,000
		15	Relocate HT lines to facilitate Port construction	Port Redevelopment	$ 400,000
		16	Convert alternators to synchronous condensers to improve stability	Capacity Assessment	$ 100,000
Water production and Distribution	NUC	17	Meneng water production plant rehab (480 kl per day + 100 kl per day)	Capacity Assessment	$ 1,500,000
		18	Pipe line from AIWO to RON hospital	Capacity Assessment	$ 500,000
		19	Rehab 3 million L water storage tank and 2 x 300,000 L water treatment tanks for B-13 site	Condition Assessment	$ 700,000
		20	Water remineralization plant	Capacity Assessment	$ 150,000
		21	Relining of 4 sea tankers	Condition Assessment	$ 160,000
		22	Water office building (new building)	Capacity Assessment	$ 250,000
Sewage Treatment Plant	NUC	23	New Sewage Treatment Plant for schools (Donated by Govt of Israel)	Capacity Assessment	$ 1,000,000

Table B-15: Summary of investments

Project Groups	Required Investment
Buildings renewal and replacement	$ 14,542,000
New port and associated buildings	$ 105,000,000
Roads reseal and upgrades	$ 16,127,000
Runway reseal and civil aviation upgrades	$ 15,715,000
Coastal protection renewal and replacement	$ 700,000
Landfill site improvements	$ 1,480,000
Sewage treatment plant	$ 6,000,000
Undersea Internet cable project	$ 21,600,000
Renewal & replacement of heavy duty equipment, motor vehicles and boats	$ 32,067,960
Fuel storage farm investments	$ 4,400,000
NUC investments - electricity sector	$ 46,200,000
NUC investments - water sector	$ 3,260,000
NUC investments - sewage treatment plant for schools	$ 1,000,000
Total	**$ 268,091,960**