



Republic of Nauru



NAURU

Economic Infrastructure Strategy and Investment Plan

November 2011



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Abbreviations

ADB	Asian Development Bank
AMU	Aid Management Unit
AusAID	Australian Agency for International Development
CIE	Ministry of Commerce, Industry and Environment
DOT	Department of Transport
DPPD	Development Planning and Policy Division
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
ICAO	International Civil Aviation Organization
ICT	Information & Communication Technology
IDG	Internationally-agreed Development Goals
IWRM	Integrated Water and Resources Management
lpd	Liters per person per day
MCA	Multi Criteria Analysis
MDG	Millennium Development Goal
MFEP	Ministry of Finance and Economic Planning
MoD	Ministry of Education
MTC	Ministry of Transport & Communications
NDC	National Development Committee
NIA	Nauru International Airport
NICC	National Infrastructure Coordinating Committee
NEISIP	Nauru Economic Infrastructure Strategy and Investment Plan
NRC	Nauru Rehabilitation Corporation
NSDS	National Sustainable Development Strategy
NUA	Nauru Utilities Authority
O&M	Operation and Maintenance
PACTAM	Pacific Technical Assistance Mechanism (AusAID)
PIAC	Pacific Infrastructure Advisory Centre
PIPI	Pacific Infrastructure Performance Indicators
R/O	Reverse Osmosis Units
RoN	Republic of Nauru
RONPHOS	Republic of Nauru Phosphate Company
SOE	State Owned Enterprise
SOPAC	South Pacific Commission Applied Geo-science & Technology Division
SWM	Solid Waste Management
TA	Technical Assistance
TOR	Terms of Reference

CURRENCY EQUIVALENTS

(as of February 15, 2011)

Currency Unit – A\$ (Australian dollar)

AUD 1.00 = USD 1.00

USD 1.00 = AUD 1.00

EXECUTIVE SUMMARY

Introduction

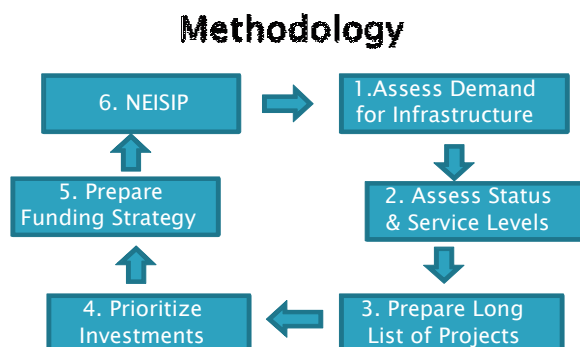
In the decade to 2005, financial mismanagement and government missteps caused Nauru incomes and living standards to plunge. In 2005, Nauru embarked on a program of change, including the development of a 20 year National Sustainable Development Strategy (NSDS). The NSDS and its 2009 update, aim for Nauru to achieve growth by building on economic infrastructure and advancing structural reforms. As part of this effort, the Government of Nauru decided to formulate and develop a Strategic Plan for Economic Infrastructure in Nauru that would identify and prioritize infrastructure investments, and set out recommendations for addressing the country's infrastructure requirements for growth and economic development. Besides economic infrastructure, this plan also includes the infrastructure requirements of the social and health sectors.

Objectives

The Nauru Economic Infrastructure Strategy and Investment Plan (NEISIP) represents a country led and prioritized investment plan for economic infrastructure for the next 5-10 years. The plan identifies the needs and priorities for investments in economic infrastructure (including government buildings) and assesses the financial resources to support implementation. The NEISIP aims at improving coordination in planning and financing of infrastructure development and maintenance between national stakeholders and international development partners and to strengthen the capacity of the Government to plan and manage the development of its economic infrastructure.

Methodology

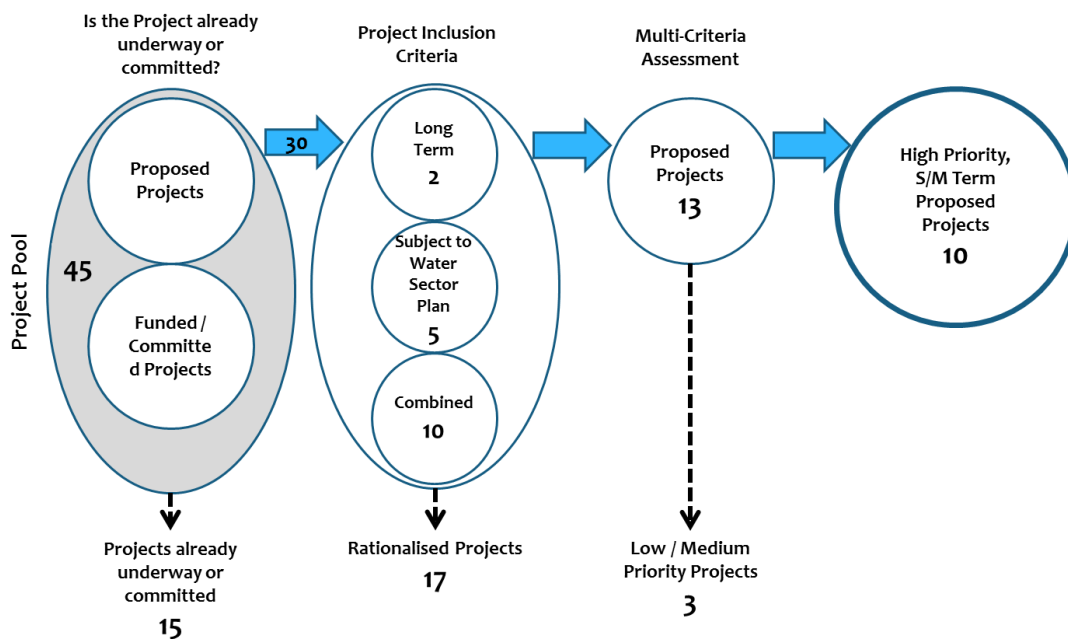
The NEISIP is closely linked to achieving the economic and social strategies of the NSDS. It is based on sector policies, targets and standards and assesses the economic and social drivers that determine the demand for infrastructure. Simultaneously an assessment of the current status and service levels in the various infrastructure sectors was carried out. This resulted in a long list of projects for each sector. A project prioritization tool using multi-criteria analysis has been developed and projects were ranked resulting in a short list of high priority projects. Short project descriptions and "whole of life" cost estimates of the prioritized projects were prepared and based on this a funding strategy has been developed. The methodology is schematically presented in the figure below.



Infrastructure needs in Nauru are generally driven by social policies and objectives and economic developments. Nauru's economic prosperity is largely dependent on the success of the phosphate and dolomite quarrying industries. In addition, fisheries support and licensing can also bring much-needed revenue. Supporting these industries are the water, sanitation, power, telecommunication and transport infrastructure sectors. Education and Health also contribute to a strong community, with concomitant economic potential.

Project Prioritization

The process of project prioritization is presented in the figure below. Nauru's infrastructure steering committee undertook an analysis of each of the infrastructure sectors, comparing performance with relevant plans and policy targets. A long list of 45 projects was identified across 10 sectors that would address gaps and inadequacies and enhance Nauru's capacity to achieve its NSDS goals. The long list was rationalized, with some projects identified as already underway, others combined to enhance efficiency, and others removed due to their premature planning nature. The remaining list of projects was subjected to a multi-criteria analysis, which ranked projects based on their alignment with seven key selection criteria - policy, economic, financial, social, environmental, readiness, and maintenance. The draft list of priority project was subsequently presented and discussed in Cabinet which resulted in a final list of high priority actions and investments.



High Priority Actions and Investments

The following list of Actions and Investments were ranked as high priority, and prioritized for development in the next 5 years. They include (in no specific order):

Maritime Transport Sector:

- Development of a new Quay Wall - Scenario 2 & Anibare Mooring

Aviation Sector:

- Resurfacing and Fencing of the Runway
- Supply of Navigational Aids (Distance Measuring Equipment) for the Airport

Roads Sector

- Road Rehabilitation (contingent on runway resurfacing)

Water and Sanitation Sector

- Preparation of a Master Plan for Water and Sanitation (including Solid Waste)
- Sludge "Alternative Disposal Options" Project
- Procurement of Additional Water Tankers for Water Supply

Power Sector

- Preparation of a Strategy for Renewable Energy (with an emphasis on the use of solar power)
- Establishment of an O&M Spare Parts Store and Workshop for NUA

Government Buildings

- *Development of a New Hospital*
- *Rebuilding of the Aiwo School*
- *Implementation of the Learning Village Project*

Complementary Planning and Capacity Building

In addition to the priority investment program are a number of complementary planning and capacity building activities. These include:

- *Formulation of a feasible approach to contain oil spills in connection with the outsourcing of fuel supply and the management of fuel tanks*
- *Institutional reform of road maintenance and land transport with increased involvement of the private sector*
- *An assessment of the need for maintenance of roads and the vulnerability to coastal erosion*
- *Various operation, maintenance and corporatization programs.*

Funding Strategy

The government team then examined methods for scheduling and funding of the proposed, high priority infrastructure investments and actions. Whole of life costs were calculated for all projects taking into account capital expenditure, up-front planning & design costs, and lifetime operating and maintenance costs. Taking into account the current capacity of government to obtain funds, the priority investments were assembled into a comprehensive and rational investment strategy.

Current and committed projects were costed at close to \$11.3 million. High-priority projects total about \$ 52 million in capital costs and an additional \$9 million for planning, supervision during implementation and detailed design. All these investments are scheduled over the next five years until 2015. Based on whole of life costs until 2036, there is close to \$199 million worth of investment (including operation and maintenance) required in the infrastructure sector with a present value of \$104 million..

Ownership

The NEISIP has been formulated at the initiative of the Government of Nauru and with support of the Pacific Infrastructure Advisory Center (PIAC). Its preparation has been managed by the Planning and Aid Division of the Ministry of Finance and Economic Planning (MFEP) under the direction of an Infrastructure Steering Committee consisting of senior officials of each sector, which has also been responsible for the initial prioritization of the projects. The NEISIP has been developed in close consultation with government and private sector stakeholders who participated in a series of workshops conducted throughout its preparation. Cabinet and ministries have been briefed on various occasions and the document was formally approved by Cabinet in November 2011.

The Way Forward

The Government of Nauru intends to use the NEISIP to improve coordination in planning and financing of economic infrastructure development among national stakeholders and international development partners. Oversight and regular monitoring of the NEISIP will be the responsibility of the National Development Committee (NDC) with the support of the Planning & Aid Division (PAD) of the Ministry of Finance and Economic Planning.

The Government is committed to ensuring that the priority program is delivered as quickly and effectively as possible and is keen to enhance cooperation. The NEISIP is a means for Nauru to streamline the development of economic infrastructure by providing a clear direction and information about its infrastructure developments to its own departments, the private sector and the donor community.

I. INTRODUCTION

1. The Nauru Economic Infrastructure Strategy and Investment Plan (NEISIP) has been developed by the Planning and Aid Division (PAD) of the Ministry of Finance and Economic Planning (MFEP) of the Republic of Nauru. The development of the Plan has been coordinated by the infrastructure steering committee comprising of heads of relevant departments and key technical specialists. A Technical Assistance (TA) consultant team was provided by the Pacific Infrastructure Advisory Centre (PIAC) to assist with the preparation.

2. The Plan was developed over a period of five months in late 2010 and early 2011, and comprised of an infrastructure stocktake, technical and economic analysis, and development of a prioritized list of infrastructure investments. The report follows the outline and draws upon methods used in other Pacific Island infrastructure plans, including the Tonga National Infrastructure Investment Plan (PRIF, 2010) and the Cook Islands Preventative Infrastructure Master Plan (ADB, 2006).

A. Background to the NEISIP

3. In the decade to 2005, financial mismanagement and government mis-steps caused Nauru incomes and living standards to plunge. At that time, Nauru's key infrastructure was not maintained and public services were almost non-existent. In 2005, Nauru embarked on a program of change, including the development of a 20-year National Sustainable Development Strategy (NSDS). This strategy aims for Nauru to achieve growth by building on economic infrastructure and advancing structural reforms.

4. In 2009, progress towards the NSDS was assessed in detail, and refined goals and milestones were defined. However, the NSDS does not define specific programs or activities to achieve the milestones nor their budgetary requirements or implications. Furthermore, there has been limited progress in developing sector-level planning aligned to the NSDS.

5. The Government of Nauru decided to formulate and develop an Infrastructure Strategic Plan that would identify and prioritize infrastructure investments, and set out recommendations for addressing the country's infrastructure requirements for growth and economic development. It is the intention of government to update the NEISIP annually as part of the national planning and budgeting process in order to ensure its relevance for guiding sector planning and discussions with development partners.

B. Nauru Economic Infrastructure Strategy & Investment Plan (NEISIP)

6. This Plan aims to identify the Government's needs, strategies, policies, and immediate priorities in the infrastructure sector as well as identify the financial resources to support their realization. The plan assesses current status and needs in each infrastructure sector, and uses this assessment to review proposed projects. The development of a project prioritization tool and investment and funding strategies will assist Government to regularly update and utilize the Plan in an active manner.

7. The NEISIP includes the following key economic and social infrastructure sectors with a lower limit on individual project size of \$250,000:

- Transport – Air, Road and Maritime
- Energy – Electricity and Fuel
- Water, Sanitation and Solid Waste Management
- Telecommunication – Telephone, Internet and Broadcasting
- Government Buildings - including Schools and Hospitals

8. Nauru's planning, institutional and implementation arrangements have often been haphazard. In most sectors, numerous studies and assessments have been undertaken in recent years, yet there is often political and development partner inertia to commit to sector master plans let alone comprehensive infrastructure investments. This is often due to a lack of financial and technical resources in Nauru to plan, manage, operate and maintain current infrastructure, let alone new investments. To ameliorate this inertia, the NEISIP was developed with the following principles:

9. **Administrative Efficiency** – Responsibility for infrastructure is often shared across multiple Government agencies and SOEs. The NEISIP focuses on rationalising stakeholder management, planning and operations within and across relevant sub-sectors.

10. **Cross Sectoral Efficiency** – where there is ability to combine construction/maintenance activities across multiple projects/sectors/agencies; or develop infrastructure for multiple purposes, these have been noted and given relevant priority.

11. **Financial Responsibility** – Current infrastructure is often not maintained in accordance with economic or technical standards, ensuring its depreciation is accelerated. New and replacement infrastructure needs to be maintained and operated within the current budget envelope or attract additional revenue. Whole of life costs are calculated for new infrastructure and compared with current required expenditures.

12. **Demand Driven** – a shift in focus so that infrastructure planning is motivated by demonstrated demand and improved cost recovery rather than just supply

13. **Development Partnership** – enabling Government to determine its own development agenda and investment envelope so that it can move from being a donor recipient to an equal partner in negotiating international development assistance.

C. NEISIP & Nauru's Planning Framework

14. The NEISIP forms an integral part of the national planning and budgeting process, and provides an indication to development partners of the priority investments that Nauru wishes to pursue.

Figure 1 outlines how the NEISIP fits within the overall infrastructure planning, policy and operational framework in Nauru.

1. National Sustainable Development Strategy (NSDS)

15. The 2005 NSDS, and the revised 2009 NSDS, have a clear focus for the infrastructure sector and how it relates to achieving the vision and objectives for Nauru's sustainable growth. The NSDS is also consistent with a number of internationally agreed development goals (MDGs), the Pacific Plan, and Paris Declaration.

16. The Goal of the NSDS is "*A future where individual, community, business and government partnerships contribute to a sustainable quality of life for all Nauruans*". Of the five supporting long term goals, three are linked with the infrastructure sector:

- a. Stable, trustworthy, fiscally responsible government
- b. Provision of enhanced social, infrastructure and utilities services
- c. Development of an economy based on multiple sources of revenue

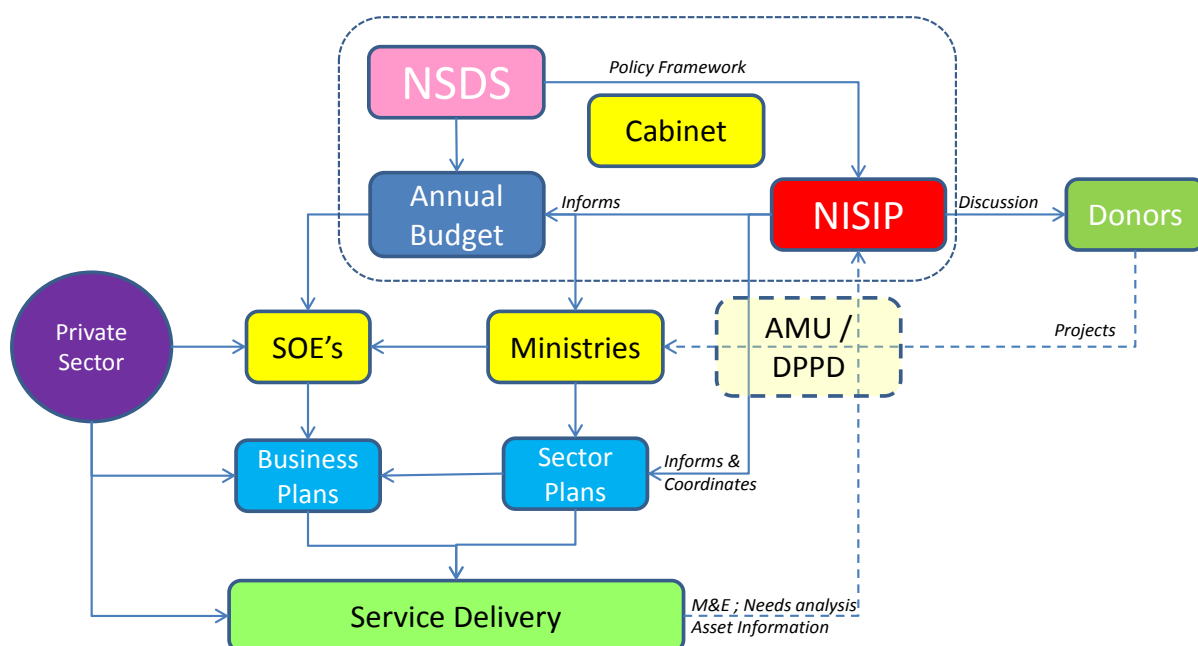


Figure 1 : NEISIP in the Nauru Planning Structure

17. The NSDS groups key economic infrastructure into 5 areas which contain associated policies and milestones. These are:

1. *Energy* - Provide a reliable, affordable, secure and sustainable energy supply to meet socio-economic development needs;
2. *Water & Sanitation* - Provide a reliable, safe, affordable, secure and sustainable water supply to meet socio-economic development needs
3. *Waste & Sewerage* - Effective management of waste and pollution that minimizes negative impacts on public health and environment
4. *Transport* - Improve transport infrastructure and provide reliable and affordable public transport service
5. *Communications and Media* - Provide universal and reliable access to internationally competitive communication services and an independent and commercially viable media

18. The NSDS identified the key constraints to infrastructure development as:

- Lack of funding
- Lack of capacity
- Lack of coordination
- Unclear goals
- Unclear land arrangements
- Lack of a sound business environment
- Governance

19. The NEISIP has been developed to integrate with the relevant NSDS long term goals (including relevant MDGs), strategies and milestones and incorporate approaches that ameliorate the key hindrances to infrastructure development. In setting priorities, projects that are closely aligned with and contribute to long term goals receive a high rating.

2. Sector Plans and Studies

20. There are no detailed or agreed sector plans or strategies for any infrastructure in Nauru. While education and health have formulated strong business plans, the infrastructure sectors only have had multiple project and sector studies undertaken. These have incorporated widely held standards for infrastructure provision, but mostly in the absence of a comprehensive and specific strategic plan. In quite a few cases, these studies have been “pilot programs” or small scale improvements which have not been adequate to address the needs of all Nauruans and are inefficient uses of resources.

21. A list of the plans and studies that are available to date is contained in Annex D. The NEISIP incorporates key elements of these plans in the relevant sub-sector needs analyses. In most cases, these have formed outline sector strategies as an interim measure prior to the development of detailed sector master plans.

3. Institutional Arrangements

22. The 10 infrastructure sub-sectors in Nauru are controlled by 7 separate SOEs and 5 Government ministries (see Figure 2). Some infrastructure sub-sectors have sections that are controlled and/or owned by three separate organisations – for example, the Ministry of Transport, the Republic of Nauru Phosphate Company (RONPHOS), and the Nauru Rehabilitation Corporation (NRC) each control part of the road system of the country. The NEISIP has focussed on each sub-sector as a whole, engaging stakeholder agencies as a group in order to facilitate improved planning and to interact more effectively with development partners.

23. There are four main ministries involved in infrastructure provision. The two key ministries are Transport & Communications (MTC) and Commerce, Industry and Environment (CIE). The Chief Secretary is technically responsible for road maintenance. Home Affairs have undertaken a considerable strengthening of TV and Radio over the past 12-18 months.

24. Of the six relevant SOEs, four are solid commercial entities. NRC is responsible for the development of the remaining phosphate reserves while also rehabilitating previous mining incursions. It is also responsible for brackishwater supply, solid waste management and the roads on Topside. NRC is an SOE run along commercial lines.

25. RONPHOS is also a commercially driven SOE responsible for actual mining operations. Much of its infrastructure (hospital, roads, rail and port) developed during the height of the mining operations have been passed to the State for maintenance.

26. Although Digicel is not an SOE, it has recently been granted a licence to operate exclusively in the mobile phone sector in Nauru, and has been given all telecommunication infrastructure by the Government as part of the deal. The Government maintains a 20% stake in the private company. Our Airline is providing limited but sustainable air services to the country and the region, while slowly turning to profit under difficult economic circumstances.

27. The remaining two SOEs (Utilities and Eigigu) are struggling to become commercially viable entities, with capital, assets, planning and personnel only now beginning to be coordinated. While the outlook remains hopeful, there is still a need for government support in order to survive and provide much needed services.

28. Nauru has a small private sector, comprising mostly of service based enterprises – retail and trade services. There are few private professional services, as health professionals

are employed by the government and financial services are non-existent. There is a distinct lack of skilled and relevant tradespeople for constructing, maintaining and operating infrastructure.

29. The Government is pushing to move its SOEs further into the private sector, so that they are more economically rational, and stimulate private sector up-skilling. Its proposal to open up investment to foreign nationals may stimulate private capital and investment once banking and insurance services have been restored.

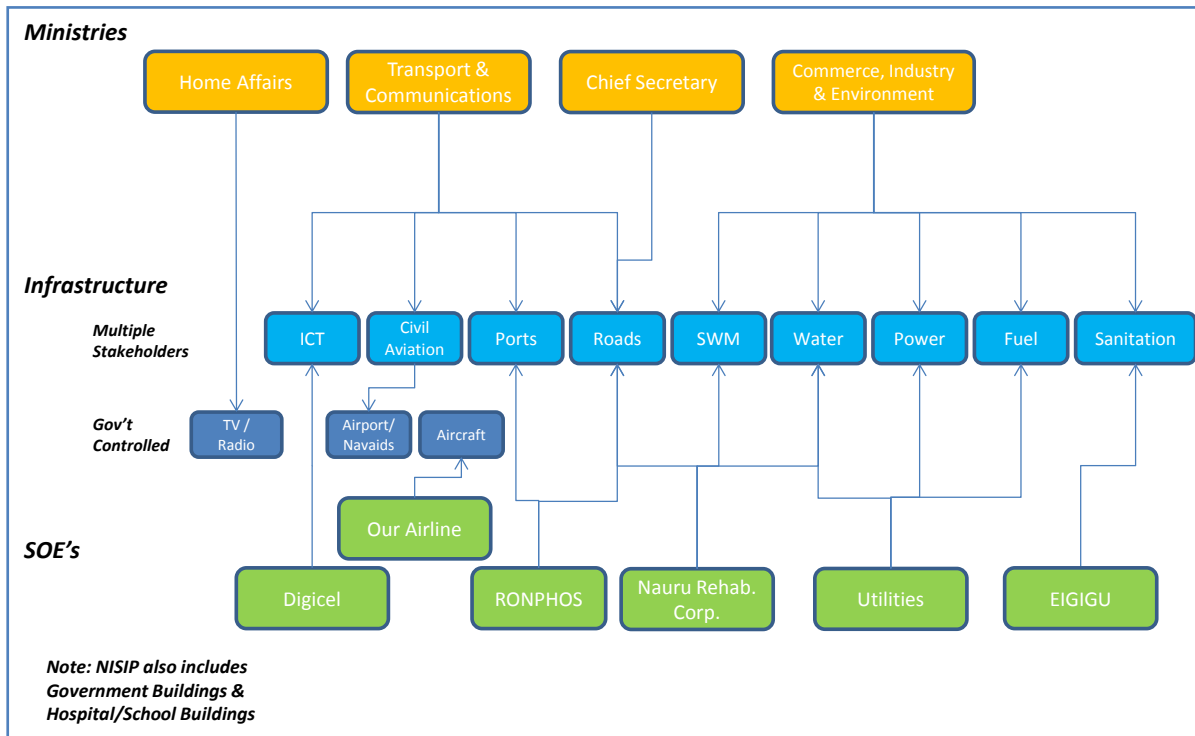


Figure 2: Institutional and SOE Infrastructure Responsibilities

D. Layout of the NEISIP

30. The NEISIP has been developed and organized as follows:

31. **Needs Analysis** – the section assesses the need for infrastructure in the context of Nauru’s national policy and economy; outlines the key drivers of infrastructure in Nauru and its sector-wide needs.

32. **Sector Analysis & Investment Plans** – this section provides brief details of each infrastructure sub-sector - policy, planning, financial and operational position. A gap analysis leads to a description of current and proposed projects and the proposed investment plans for each sub-sector.

33. **Prioritizing Infrastructure Investment** – this section outlines the details of the multi-criteria analysis (MCA) adopted by Government to rank projects and guide investment decision making. A prioritized list of infrastructure is developed.

34. **Life Cycle Costs** – this section outlines the life cycle costs of infrastructure and the current situation in Nauru. It examines the current balance between maintenance needs and

maintenance expenditure and contrasts that with the potential operational and maintenance implications of the NEISIP infrastructure investment program.

35. **Funding Strategy** – the section outlines the projected demand for infrastructure-related finance; the capacity of Government and SOEs to address total costs; and the interventions that Government can make to improve the infrastructure financing environment.

36. **Sector Priority Programs** – the section combines the prioritization, timing and investment analysis, and outlines the key program requirements and necessary supporting activities for each sector over the coming five years.

37. **The Way Ahead** – the section outlines the key supporting activities that Nauru needs to undertake to plan, manage and deliver the infrastructure over the short- to medium-term.

II. INFRASTRUCTURE NEEDS

38. This section will outline the key drivers of infrastructure in Nauru and its sector-wide needs.

A. Infrastructure Drivers

39. In order to develop a comprehensive infrastructure plan, it is necessary to understand the economic and social factors that drive the need for infrastructure in Nauru. This section will assess how infrastructure forms an integral part of National policy and is a positive driver for the economy. Each sub-sector will be analysed for its linkage with policy and planning outcomes, relevant demand drivers and potential investment directions.

40. Growth in demand for basic infrastructure capacity and services is driven by population growth and economic activity. Individuals want, as a minimum, for their basic needs to be met so that they have a good quality of life. In addition, the services delivered by economic infrastructure are an intermediate input into production, and affect business efficiency and economic growth.

41. There is general international consensus that there is a positive correlation between infrastructure and economic outcomes and that investment in infrastructure is a major driver of productivity. Core economic infrastructure (such as transport, electricity, telecommunications, sewerage and water systems) leads to the greatest levels of productivity, particularly when delivered with increased efficiency and reduced service prices.

42. Inadequate infrastructure is a bottleneck to economic activity. Inadequacy can be due to a lack of assets or where there is diminution of service due to poor management and maintenance. Appropriate maintenance is a much more cost effective approach to effective infrastructure than capital expenditure. Poor maintenance results in the compromise of service coverage, pricing and quality. As a result, the NEISIP focuses not just on physical infrastructure but also on the way that it is used and managed.

B. Key economic infrastructure drivers

43. Nauru has the same basic infrastructure drivers as other countries. However, due to the dilapidated nature of most of its infrastructure and the dominance of the mining and quarrying sector in determining economic growth, the priorities for new infrastructure are somewhat different to other countries. Also the dominance of aid to fund new projects means that Nauru must negotiate with donors whose requirements may not always fully align with the goals of the government. In addition, the country's dependence on highly volatile sources of revenue which includes fisheries licenses and phosphate, has led to a priority to broaden the economic base.

44. While the development of a fishing industry would seem sensible, there are many examples of attempts by Pacific island countries to develop local fishing industries only to fall well short of expectations because the risks cannot be adequately managed. Export of high value fish species requires excellent regular air connections to markets in Asia that are not possible for the foreseeable future for Nauru. Domestic on-shore processing facilities require large scale to be economically competitive. Running fishing boats out of remote islands like Nauru is relatively expensive compared with operating from a major regional base, as needed infrastructure is specialized and cannot survive on a small scale of operation.

45. The setting up of a national trust fund with international governance is a priority for the government to broaden the economic base. It is as a way of saving wind-fall gains and spreading the benefits over future years when times are economically difficult.

46. From an economic point of view, an important step in developing a prioritized infrastructure program is to identify the main sectors of economic growth and social development over the relevant period of 5-15 years. Nauru, unlike its near neighbors, is well placed to escape an aid dominated economy due to the potential of the remaining natural reserves of phosphate and dolomite. Efficient and effective exploitation of these reserves is a key driver for infrastructure development. Other sector opportunities leverage off this.

47. Nauru's economic prosperity over the NSDS timeframe is largely dependent on the success of the phosphate and dolomite quarrying industries. Now that primary phosphate mining has been completed and the feasibility of secondary mining confirmed, the next phase of development has a life of approximately 30 years over which time secondary phosphate reserves will be exhausted.

48. Access to the next layer of phosphate is dependent on the removal of the dolomite pinnacles to form a stable platform for heavy machinery to work. The Government's initiatives to create value from this process have borne fruit in that, rather than being a cost to mining, the value of the pinnacles has been identified and will be exploited and exported as aggregate and high value marble-like products. While exports of phosphate and aggregate will utilize the sectors' own infrastructure, these industries are dependent on the port to import necessary inputs of plant, equipment, spares and fuel. Air freight is also critical for small, high value urgently required items and for the movement of people. As major businesses, these industries need all the usual business services including telecommunications to be available at high service levels in order to run efficiently.

49. Integral to the mining operations is the rehabilitation of the mined areas for a range of post-mining activities including agriculture, horticulture, forestry, housing, industry, water storage and social infrastructure, including much needed burial ground.

50. Royalties, dividends and taxes associated with mining and quarrying will provide the revenue for the rebuilding of the Nauruan economy. Once stable revenue flows are established this will boost confidence for the private sector to take an increasing role in the economy.

51. The upstream and downstream economic benefits of mining and quarrying will reach into most other sectors, thus acting as a catalyst for the development of a more diversified and robust economy. In order to realize these benefits there will need to be a concurrent investment in infrastructure to enable the exploitation of the reserves, to build a new more diversified and resilient economy and realize cultural, social and environmental goals.

C. Key social infrastructure drivers

52. The ability to contribute to the growth of the economy and to benefit from the wealth created is closely tied to progress in the education and health sectors. As mining and quarrying ramps up again there will be an increasing demand for well educated people through the range of occupations from semi-skilled to highly technical. As the economy begins to diversify, increased opportunity will become available. Without Nauruans to fill these positions, many of the benefits will be captured by expatriates. Nauru has a very high population density (433 people/sq km), but population growth rate is relatively low (0.6%)¹.

¹ NSDS as revised 2009, p. 68.

This means that while there is a high pressure on social infrastructure, the pressure will increase relatively slowly in the future.

53. The quality of education delivered depends not only on the quality of the teachers, but also on the quality of the learning environment. Thus the education infrastructure including school buildings, teaching materials and cultural and sport facilities are key drivers to achieve Nauru's vision.

54. Nauru is suffering from the same health challenges as other Pacific Island Countries, that is, deteriorating health indicators despite an increasingly monetized society. There seems to be a close correlation between increasing incomes and demand on health facilities. Much of this can be attributed to bad diet and a less active way of life.

55. Traditional food catching, gathering and production resulted in a much better quality and balance in the diet than today's store bought food. With increased paid work, the time available to participate in traditional food production decreases. Unfortunately, the replacement food from overseas that is available at prices people can afford, is much inferior to home grown natural food. In addition, the effort that goes into traditional food production burns fats and sugars. In contrast, sedentary occupations along with the little effort needed to buy and prepare store bought food results in these same fats and sugars being deposited in the body with resulting lifestyle diseases, poor quality of life and much shortened life expectancy.

56. Improved preventative health infrastructure and upgrading palliative care facilities are important components of the short term infrastructure requirements, while these health challenges are met and people's food habits are changed over time to more nutritious sources. Current supplies of potable water do not meet existing needs due to inadequate maintenance of existing storage and distribution of rain fed systems and deterioration of groundwater supplies. Poor water quality creates hidden health costs through water borne diseases that debilitate and result in general malaise so that the general population lacks energy and drive.

57. The 2005 National Sustainable Development Strategy is the key policy document behind Government decision making. The NSDS aimed to enhance infrastructure [utilities and transport services (including renewable energy, power, water, waste management, roads, sea and air)] in partnership with economic, social and cross-cutting priorities to provide a higher quality of life.

58. The NSDS noted that "infrastructure sectors have a key role in underpinning development in the economic and social sectors of Nauru. In particular, transport, reliability of power, asset maintenance and the development of information and communications technology is critical to sustaining economic growth and the provision of social services"².

59. The NSDS was reviewed in 2009 and noted that there had been significant improvements in infrastructure in the intervening years, particularly in power and water. Moreover, the goals of enhanced utility and transport services remained unchanged – apart from a greater emphasis on renewable energy.

² NSDS, 2005.

III. INFRASTRUCTURE ANALYSIS

60. The following is an overview of the current status, performance and needs of the infrastructure sector, followed by a brief analysis of each infrastructure sub-sector. The analysis generally takes the format:

- National strategy and policy
- Demand, targets, standards
- Sector strategy
- Current sector performance
- Analysis of major gaps and needs
- Proposed investments and actions

61. Projects are listed at the end of each sub-sector analysis, and are based on identification by the relevant departments and through the infrastructure stocktake process. Their status is listed as Funded (and in progress); Committed (for funding by Government or donors); Planned (by departments); or Identified (at concept level). Proposed project costs and timing are outlined, with certainty increasing the closer the project is to being funded and implemented. Donors are identified where known.

A. Population

62. Infrastructure capacity has to account for a projected 2025 population³ of approximately 12,300 people reflecting an annual increase of 0.6%. This equates to approximately 2,050 households with an average of 6.1 persons per household. While numbers of children remain generally constant over the next 15 years, there will be a significant increase in the working age population; and a five-fold increase in the elderly (over 65). Average annual household income in 2006 was \$9,555.

63. Table 1 outlines the current infrastructure in Nauru and includes health and education buildings.

³ Demographic and Health Survey 2007 (Department of Health and Statistics).

Table 1 : Overview of Economic Infrastructure		
Sector	Brief Description of Key Infrastructure	2010 Performance <small>(unless indicated)</small>
Water	2 x Seawater intake pumps (100ML/d) 3x120 m ³ /day R/O Units Concrete & Steel storage (various states of repair) 2 x 10m ³ & 1x 4m ³ water delivery trucks Community and household storage	100% access to basic Government subsidised water delivery 80% Unaccounted For Water 12 lpd (12% of demand) delivered \$20 / m ³ cost of production and distribution \$2.50 / m ³ price
Sanitation	1 x dump operated by NRC; 3 x skip bin and 2 x flat-bed collection trucks No central sewage collection and treatment system (septic tanks) Sludge pump out vehicle – open ocean disposal	Estimated 2-5 year life span for dump 100% household access to SWM collection No recycling or cost recovery by SWM operator 50% access to improved sanitation(2008) <5% population access to uncontaminated groundwater (2010)
Power	5 x Main generators (total 10.5MW) 4 x backup generators (total 2.1MW) Fully Reticulated supply (100% coverage)	95% household access to reticulated power 8.6MW peak demand (2025) 12.6 MW rated peak supply capacity 4MW actual supply capacity 21 days load shedding per year \$0.45 Cost per MWh production \$0.28 Price per MWh consumer
Telecommunication	Privatised telecom and internet monopoly (Digicel) Access to mobile phone and Wi-max connections	0% commercial land lines 100% access to mobile service 95 (est) mobile connections / 100 adults \$40 / month average spent by low volume user.
Airports	1 International Airport – 2100m asphalt runway DME/VOR	2 departures total per week
Roads	22 kms of paved ring road 4 kms of community access roads Over 25 kms of unsealed mining access roads School bus and irregular public bus service	\$0.00 road user charges Condition Primary Road – Good Condition Secondary Road – Poor Bus Fare - \$0.60 per trip
Maritime	4 offshore “A” mooring buoys 1 harbour with no berthing facilities 1 small boat harbour Container shed	4-5 ships per month. 2-5 day loading/unloading depending on weather, utilities. No security of cargo area
Health	1 hospital (50 beds) with associated facilities 1 old hospital used as health clinic	85% Average Daily Bed occupancy <5% cost recovery
Education	1 high school 1 middle school (college) 3 higher primary 4 infants schools 4 kindergartens	Average classroom size <ul style="list-style-type: none"> • Primary – 20 • Middle – 22 • High School - 26

B. Water

64. Nauru's development strategy for water is to provide a reliable, safe, affordable, secure and sustainable water supply to meet socio-economic development needs. The NSDS short term goal focuses on reliability and highlights improved water storage and rainwater harvesting capacity; optimal groundwater use; and cost effective reverse osmosis water production. Long term goals are that 50% of potable and non-potable water should emanate from rain water harvesting or groundwater extraction. Education should be improved to reduce water use through recycling.

65. The key agencies in the sector are the Ministry of Commerce, Industry and Environment (CIE) which is responsible for sector policy; the Ministry of Health is responsible for quality and standards; the Nauru Utilities Authority (NUA) is the operator; and the Menen Hotel and Nauru Rehabilitation Corporation (NRC) provide supplementary and mutually cooperative assistance to NUA. Together, they are meant to comprise a water sector working group and guide future sector investment and management – however, so far this has not occurred.

66. Nauru is without an approved water policy that outlines demand targets. However, there is Government acceptance of WHO (2002) and AusAID (2003) set targets of 100L of potable water per person per day (comprising 30L for drinking and 70L for cooking and washing); and 70L of non-potable water for toilet and other uses.⁴ There is strong agreement from all stakeholders that these targets are quite high compared to other Pacific countries, and reiterates the necessity for them to be subject to stringent re-assessment during the development of the water resource policy by SOPAC in 2011 and the subsequent water master planning process. Until that has been undertaken, this report will utilise agreed targets determined by Government in the NSDS.

67. In addition to household demand, a further 370 m³ of water per day is expected to be demanded by commercial and public service entities.⁵ Assuming that non-potable water can continue to be supplied from groundwater, seawater and other activities (such as reduced flush sanitation), this equates to a total (2025) demand of 1,600 m³/day of which 800 m³ is to be through rainwater collection and 800 m³ from RO.⁶

68. With no defined and agreed water policy, a disjointed institutional structure, and lack of revenue, there has been no ability to develop a sector master plan or coordinated approach to sector investments. Instead, provision is left to individual households, who can avail themselves of water deliveries from the NUA, collect rainwater, or pump (mainly) contaminated groundwater. All stakeholders emphasise the urgent need for a coordinated water supply master plan that comprehensively assesses sustainable demand, production and storage requirements; develops options for investment, tariffs and delivery; and garners political and community support for a detailed and sustainable strategy.

69. Potable water production is from either rainwater or reverse osmosis. SOPAC undertook a preliminary review of potential household rainwater collection⁷ through inspection of roofs and tanks. Utilising historical rainfall data, they estimated that every household could collect enough water (140L/p/d) for its own use through rainfall in an average year. This drops significantly to 50% of demand in 1 in 5 rainfall year and 25% in a 1 in 10 rainfall year. Calculations also assume that all roofs, gutters and tanks are in working

⁴ Based on WHO 2002 and AusAID 2003 calculations.

⁵ AusAID 2003.

⁶ It is suggested that these targets be reviewed as they are significantly higher than many other Pacific Islands, particularly dry atolls; and they do not accurately reflect the implications of subsidized RO supply and supply ability from other sources.

⁷ Nauru IWRM Diagnostic Report, SOPAC, 2007.

condition, and that there is enough storage to last through dry spells. Unfortunately, it is estimated that less than 40% of households have adequately maintained collection and storage. Combined with less than average rainfalls, rainwater collection in Nauru is severely diminished. Although the restricted supply of RO water contributes to increasing rainwater demand, this is outweighed by the subsidised price of delivered water which reduces household incentives to maintain rainwater collection infrastructure.

70. The data does indicate that the strengthening of rainwater harvesting capability and capacity by households and communities has extraordinary potential, and be extremely cost-effective. Combined with changes in tariff structures for RO water, it should be a major focus in the proposed water sector master plan that is to be prepared in 2011.

71. NUA operates three 120 m³/day reverse osmosis units, with a rated production of 360 m³ per day. Actual production in 2009/10 was estimated at 228 m³/day, due to ongoing and significant repair and maintenance issues, with one unit out of service for over 4 months.⁸ NUA also collects small amounts of rainwater from its own and nearby commercial premises. Water is sometimes purchased from the Menen hotel (which has another 120 m³/day RO unit) to supplement production.

72. All NUA water is stored in nearby tanks. Water storage acts as a buffer between fluctuating RO supply and demand. NUA controls approximately 28,000 m³ of storage tanks comprising C1-C6, B13, B5, B4, the hospital and Menen Hotel. Most of these tanks have significant leaks, with current estimates indicating that from 30-40% of water is lost. There are further bulk storage tanks that could be refurbished to act as long term emergency water supply dumps (golf course tanks). If leaks in the current tanks are repaired, current storage capacity would be equivalent to 35 days supply, exceeding the WHO (2001) recommended target of 20 days supply.

73. Water is delivered at subsidised cost (both the water price and the delivery charge) to household and community tanks utilising 2 x 10m³ and 1 x 4m³ delivery trucks which operate 16 hours a day, 6 days a week. Delivery is supplemented on a commercial basis by trucks from NRC, RonPhos and private operators such as Capelle. An average of 73 m³ of water per day was sold in 2009/10 based on water receipts by NUA⁹. The average delivery during the current year is 304 m³/day¹⁰. There is a current backlog of over three weeks for requested deliveries, utilising either public or private tankers.

74. Based on this data, actual water sold is only 12% of current demand¹¹. Actual RO water production is at just over 63% of potential 24 hour/7 day hour. Given that stored water has remained relatively constant over this time, the difference between produced and delivered water indicates an Unaccounted For Water (UFW) and Non-Revenue Water (NRW) of over 76%¹². Including NUA estimates of their rainwater collection from nearby buildings, this raises the UFW/NRW to over 80%. The majority of this "loss" is through significant leakages in storage tanks and the inability to store or distribute excess production/harvesting. In addition, water theft through unaccounted water deliveries, free water (as part of Government policy) and water filling of storage containers (which is provided free from a public tap) is considerable and may contribute up to 20-40% of UFW/NRW.

⁸ RO production was also purposely reduced, as there was a significant rainy season, and an inadequate storage and delivery system to distribute the available water.

⁹ This data was prior to the new 10m³ and 4m³ trucks which began operations in 2010.

¹⁰ This is based on a double shift. Also much of the water is free due to Government policy and is not invoiced.

¹¹ Based on a 2009 population of 9,300.

¹² Statistics are based on very rough estimates by NUA. Given the paucity of data collected by NUA, it is impossible to determine actual figures for MRW or UFW. Simple data collection at key points in the production and delivery system of NUA will be an important component of the Water Sector Master Plan.

75. Given the significant water losses, the calculated cost of water per m³ sold is \$20. If leakages were fixed, and all water invoiced, UFW/NRW could feasibly be reduced to less than 20% - resulting in a revised cost of \$4/m³. Benchmarked averages for similar RO units¹³ range from an average \$2 to a high of \$5.80/m³, depending on fuel price and the salinity of water treated. NUA currently sells water at Government regulated rate of \$2.50/m³ plus delivery charge, with the remainder of the cost provided by Government subsidy.

76. The main activities in the sector are currently through EU and SOPAC. Their IWRM project has two components: the EU IWRM planning component, dealing with policy and legislation in 14 countries including Nauru and a GEF Integrated Water Resource Management (IWRM) demonstration project component. AusAID is also providing technical assistance to NUA through PACTAM.

77. The major issue in the water sector is **maintenance** – of both rainwater collection infrastructure at the household level and the RO units by NUA. In line with the NSDS short and long term goals, the EU and SOPAC are currently undertaking the Disaster Risk Mitigation Project to repair and improve rainfall collection and storage by over 300 households, communities and commercial establishments. This will improve households' ability to collect and store rainwater, but maintenance needs to be encouraged by Government through policy, regulation and incentives.

78. The EU/SOPAC project is also repairing the NUA and Hospital storage tanks, which are expected to save significant amounts of water wasted through leakages. This is a 2015 milestone in the NSDS, and will ensure a more cost effective supply.

79. There is an urgent need to repair and maintain the RO units, which are relied upon to produce much of the island's potable water supply. With spare parts often taking months to arrive due to delays in Government approval, lack of funds and supplier backlogs, the requirement for a store of inventoried major spare parts is seen as critical for rapid repairs and maintenance. A dedicated workshop to train operators and undertake repairs would complement the store project. To increase efficiency, it is proposed that the workshop/store be shared with the power generation arm of NUA. Security must also be increased, given current reports of theft of major parts from NUA stocks.

80. Overall, it is essential that there is adequate funding to repair and maintain all public equipment and inventory in the water sector, particularly the proposed O&M workshop and store. This must emanate from either increased tariffs to NUA or a dedicated budget line. This issue is a key priority as the development of water sector policy and planning occurs over the coming year.

81. The second major issue is **supply**. With delivery trucks currently operating at near full capacity; demand exceeding available supply; and, an expected increase in available water (due to storage tank leakage repairs) – there is an urgent need for additional capacity to deliver water options. While consideration is being given to the feasibility of fully reticulated supply through an island ring main or various gravity-fed pipe options to communities such as Location, the complexity of the sector, stakeholder and policy implications (such as subsidies, linkage with salt and brackish water options, sanitation) means that these ideas need to be comprehensively assessed in a proposed water master plan before any further commitment.

82. In the interim, until agreement is reached on optimum water delivery options, additional tanker trucks are required. In order to meet increased supply, and ameliorate

¹³ Economic and Technical Assessment of Desalination Technologies in Australia, URS, 2002.

current demand, NUA has proposed to provide an additional 1 x 10m³ & 2 x 4m³ tanker trucks. This plan should be in conjunction with NUA improving its water inventory control to deter theft. All delivery vehicles also should be subject to adequate operation and maintenance to enhance sustainability, which may require increased delivery tariffs to match those of the private sector.¹⁴ The proposed water master plan should also give consideration to eventual privatisation of water delivery to allow NUA to focus on its core business of production and supply.

83. Currently, **sector planning and management** is fragmented and haphazard, and subject to significant political involvement, particularly with tariffs. Donors interact with some departments and not others, and often agree to fund investments in-line with their own priorities in the absence of a consistent and comprehensive integrated water sector plan. A Nauru water sector policy and master plan have been prioritised activities for over 12 years, yet work has been slow and unsystematic due to its perceived complexity. Without clear policy guidelines for sustainable demand and supply; a clear understanding of the implications of options such as reticulation versus delivery, or subsidisation versus economic tariffs etc; there cannot be a clear vision of how NSDS water targets can be met, let alone the justification and scheduling of major infrastructure works. SOPAC is funding a water sector policy process in 2011 through its IWRM process in conjunction with other water and sanitation pilot studies. It is proposed that a separate consultancy be engaged to cooperate with this work and develop a detailed water and sanitation master plan in the short term, using the IWRM approach and providing a detailed investment and management strategy for the sector. Sanitation is included due to the clear integrated nature of sanitation and water initiatives and impacts in Nauru.

84. Another issue is **production**. Adequate maintenance of the RO units and storage tanks is expected to reduce UFW to approximately 10-20%. This is still not adequate to supply the Government-accepted demand projections. With this in mind, the Government has committed to purchase a 300 m³ RO unit in FY 2011, which should almost double current theoretical production. A 96 m³ solar power unit is also being funded by JICA. Combined, theoretical RO water production will be over 750 m³/day, approaching the Government's target of 50% water needs from RO by 2025. It will be more than adequate if water demand targets are revised downwards to reflect more sustainable and realistic levels and water conservation education activities are successful.

85. However, these additional RO units will significantly increase operation and maintenance cost implications for NUA, particularly if tariffs and Government subsidies remain low. Of greater concern, is the ability for NUA power generation to meet the significant increase in demand for the additional 300 m³ RO unit. The requirements for sustainable RO production will be addressed in the investment planning section, and must be systematically addressed in the proposed WSS master plan.

86. There is also an issue of **water quality** and its relationship to health. SOPAC reports that there is a serious water safety risk at holding and transfer points, and there have been recent examples of recontamination of clean RO water stored in dirty tanks. While standards are being developed with PIAC technical assistance, CIE recognizes that achieving these standards in practice will be difficult, and is currently exploring options to address them. SOPAC strongly advocates the benefits of a drinking water safety planning approach in deriving improvements to water supply, and feels that this approach is particularly relevant to Nauru. Incorporating such an approach into the proposed Water and Sanitation Master Plan, supported by reliable data, would result in a more integrated and effective investment strategy.

¹⁴ Capelle currently charges a delivery fee five times greater than NUA government-regulated charges.

87. While most studies have shown that proper rainwater harvesting can provide adequate supplies of basic residential water needs in average to partially dry years, there is still a need to produce and store water for emergency purposes. WHO (2001) suggests a minimum storage of 20 days supply, which should be achieved in 2011 with tank repairs and increased RO production. The WHO, SOPAC and EU reports all suggest examination of options to increase central, household and community storage, combined with improved rainwater catchment, particularly the use of the runway to collect bulk emergency supplies. These options should all be considered and evaluated in the proposed water master plan.

88. In summary, Table 2 outlines projects that are underway or are being proposed for consideration. Consideration of sector- or community-identified projects, such as runway rainwater harvesting, large community water tanks and bulk storage tank rehabilitation, is seen as premature prior to full assessment during the proposed water and sanitation sector master plan.

Table 1 : Current & Proposed Water Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
W1	EU Envelope B - Risk Reduction Project (C1-C6) & water tankers (1@10m3)	0.76	F	EU						
W2	Solar Power RO Unit	3.00	F	PEC						
W3	Supply and commissioning of 300m3 RO Unit (AusAID)	0.60	C	AusAID						
W4	Water Delivery - Additional Water tankers (1 x 10 & 2 x 4m3)	0.50	P	U						
PW1	NUA O&M Workshop and Parts Store	3.0	P	U						
W5	Repairs and Upgrade Tanks (B13, B4, B5)[2]	0.40	I*	U	Subject					
W6	Runway rainwater harvesting (* contingent on Runway resurfacing A3)	8.00	I*	U	To					
W7	Additional large community rainwater storage tanks (15x100m3)	0.80	I*	U	Proposed					
W8	Rehabilitation & filling of bulk storage tanks (golf course) for emergencies	0.40	I*	U	IWSSSMP					

Note: * - Subject to proposed Integrated WSS Sector Master Plan
 F – Funded; C – Committed; P – Planned; I – Identified; U - Unfunded

C. Sanitation and Waste Management

89. Nauru’s strategy for sanitation and waste aims for effective management of waste and pollution that minimizes negative impacts on public health and the environment. In particular that raw sewage and grey water be properly managed. The long term goal is for pollution and waste management efforts to become environmentally sustainable.

90. The key agencies involved in this sector are CIE as the policymaker and NRC as the “unofficial” operator. Eigigu¹⁵ was active in sanitation before transferring its operations to NRC. There is scope for them and other private operators to be involved in future service provision.

91. Nauru is currently in the process of developing some sanitation standards, through the baseline assessment and preparation of an IWRM Policy – expected to be completed by mid-2011. This will link with the proposed Water and Sanitation Master Plan and be supplemented by further trials of sewage and grey water treatment options such as sealed septic tanks, composting toilets, biogas and composting of sludge. Although solid waste

¹⁵ Eigigu is the ex-Public Works Department turned SOE.

management has significant commercial, environmental and community issues, it is not seen as a significant priority by Government at this time.

92. Following the closure of the saltwater supply to the flush system in Location, there remains no centralised sewerage system in Nauru. Residents there are reported to still use brackish water to flush to the original outfall, however water volumes are not enough to sustain adequate flows, resulting in blocked pipes. Assessments by CIE indicate that the saltwater and waste piping is still usable.

93. The majority of Nauru households have a cesspit or septic tank. A recent analysis by SOPAC indicates that many tanks have not been maintained and are leaking, with many close to groundwater sources for household washing and cleaning. While there is no documentary evidence of health issues arising from contaminated groundwater, Nauru has one of the higher rates of hospitalized diarrhoea in the Pacific region.¹⁶

94. The provision of a new sewage (sludge suction) truck in 2007 by NRC, provides households with access to a cost-effective sewage removal service. Despite this, estimates by CIE place adequate tank maintenance at less than 30% of households. As such, the service is running at a loss to NRC and therefore the maintenance of the vehicle is poor and sustainability is in doubt. Furthermore, disposal of sludge is directly into the ocean near the port, and close to the densely populated Location community.

95. The NRC controls the current dump on Topside, although this is not part of its mandate. The dump has no liner, and meagre processing equipment. Attempts have been made to instigate at-source and post-collection sorting of recyclables and green waste, with limited success. It is expected that there will be further assessments by SOPAC in the coming years to determine the environmental impact of the dump and options for its replacement. Reports by NRC indicate that the dump has less than 2-3 years life, before a new site is to be selected. This would provide an opportunity for an improved landfill to be developed that is more environmentally sustainable.

96. The NRC, as part of its community responsibilities, provides a weekly garbage collection service to households and communities for a fixed fee that is affordable, but is well below cost. Most households have been provided 200L wheelie-bins which are then hand-loaded onto a flat-deck truck and transported to the dump, before being returned to the household. The operation is unwieldy, costly and inefficient. Commercial premises are able to access bulk skip bins which are cleared on-demand by skip trucks for a higher fee.

97. Although there is an old incinerator at the dump site for disposal of hospital hazardous waste, it has not been used since the death of the sole operator a few years ago. It has now fallen into disrepair. Instead, hazardous waste is wrapped and buried in a separate section of the dump.

98. There are numerous opportunities around the island for recycling old equipment and materials, or refurbishment through re-use, painting or maintenance. There is also a concern with the high incidence of asbestos sheets for housing and roofing and the lack of capacity for removal and disposal.

99. Without investment in alternative sanitation options, contaminated groundwater will continue to be a serious issue in Nauru, as it contributes to some 70% of household water needs where wells exist. While improved pump-out practices are clearly needed, they will do little to address the contamination issue (particularly as many existing tanks are unlined and even fully functional septic tanks do not significantly remove pathogens). As cesspits

¹⁶ SOPAC, 2010.

and septic tanks are the main contributor to contaminated groundwater, a strategic, planned approach to sanitation options is needed. Improving sanitation infrastructure could make groundwater a safe and viable non-potable option for more households, open up the possibility of other innovative supply technologies, and alleviate many of the water stresses on Nauru.

100. An important issue in the sanitation and waste management sector is the lack of policy and regulations, allowing the environment to be degraded, and placing public health in jeopardy. The Government has committed to SOPAC mainstreaming IWRM through the development of sanitation and water resource policy and plans in 2011, and supporting ongoing community education programs. Regulations will be prepared regarding sanitation management in new and existing structures. The IWRM efforts should begin to address deficiencies in the operation and preventative maintenance of septic tanks, which has led to the contamination of the water lens. Although it is expected that this will increase the number of households who will avail of the “sludge removal service”, it will take many years before there is an appreciable impact on contaminated ground water resources. SOPAC is also exploring the use of composting toilets as a means to reduce water use and reduce environmental contamination.

101. Despite the success of the sludge truck operated by NRC, the inherent health and environmental risks of pump out near Location are enormous. CIE is proposing the development of alternative waste disposal options. This would assess the potential for, and implement options for utilizing sludge in a composting or biogas facility adjacent to the dump, to be operated by either NRC or a private entity. The aim would be to reduce the amount of untreated waste being dumped on the reef nearby residences.

102. While NRC is currently operating the nearly full landfill and inefficient flatbed collection trucks, NSDS policy indicates that this should be upgraded to a sustained basis and privatized. How feasible privatization of all or part of SWM infrastructure in Nauru needs to be explored. There is a need to first assess the current dump site, assess its true life and potential rehabilitation measures, and then prepare plans for its closure and replacement on a new site. The new landfill should be lined to prevent leachate escape, and be served by more efficient collection trucks to enhance services. There may be some ability for it to be built and operated through a private contract, if commercial rates were able to be charged. It would be efficient to re-commission the Hospital Hazardous Waste Incinerator at a similar time (or relocate to the newly planned hospital) and operate within the new landfill agreement.

103. Although earlier studies have indicated that reconnecting the Location reticulated saltwater flush system may be unfeasible, this was mainly due to a lack of adequate saltwater storage. CIE have identified that the actual piping can be rehabilitated to good condition. The main issue therefore has been adequate saltwater volume to re-establish flows. With the identification of significant spare capacity in the existing NUA saltwater intake pump, plans are in place for saltwater storage on command ridge to address emergency response needs of the tank farm. This storage did and could still be used to provide gravity feed to the hospital and Location reticulated sanitation system – servicing almost 20% of Nauru’s population.

104. The Water Resource Policy being developed by SOPAC in 2011, and the proposed Water and Sanitation Master Plan will specifically address many of the sanitation issues outlined, and will be a precursor for integrating further investment. Table 3 shows projects that have been identified for assisting the sanitation and waste management sector achieve its NSDS goals.

Table 3 : Current & Proposed Sanitation & Waste Management Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
S1	Mainstreaming IWRM (sanitation components)	0.30	F	EU						
S2	New lined Landfill & Compactor Trucks	1.40	P	U						
S3	Sludge "Alternative Disposal Options" Study	0.50	I	U						
S4	Location Saltwater flush (* contingent on P2)	0.30	I	U						
S5	Hospital Hazardous Waste Incinerator	0.30	F	Taiwan						

F – Funded; P – Planned; I – Identified; U - Unfunded

D. Power

105. The Nauru development objective for the power sector is to provide a reliable, affordable, secure and sustainable energy supply to meet socio-economic development needs. The short term milestone is for households and businesses to receive 24 hrs/7 days a week electricity at an affordable cost. In the longer term, the milestone is for 50% of power to be from alternative (including renewable) sources. This is an ambitious target set by ESCAP and the Government, and much will need to be done to achieve this outcome. Other milestones aim to enhance education and management in order to reduce demand and improve efficiency.

106. The main sector agencies are CIE (policy), NUA (power production & distribution, fuel management); and NRC, Menen and RonPhos who have backup generators.

107. Daily peak demand in 2006¹⁷ was estimated to be 6-7 MW which can be extrapolated to a maximum of 8.6 MW in 2025 – based on current population and business projections. However, a prepaid billing system has been introduced, using installed meters, which has been estimated to have reduced demand by over 23%, as households have responded to the price signals.

108. The sector is guided by broad approaches to energy management outlined in the National Energy Policy Framework, 2007 developed by SOPAC. The Nauru Energy Efficiency Action Plan, 2008-2015 was also developed by SOPAC under EU funding in order to explore methods for conserving power. This formed the basis for the 50% alternative energy targets in the NSDS set in 2009. The key sector planning document is a Utilities assessment report funded by AusAID in 2008 which recommended improved NUA management and business practices, and a comprehensive demand assessment. ADB is currently funding an analysis of corporatization options of NUA in order to increase sustainability and effectiveness.

109. Current projects in the sector are mainly confined to EU funding for the rehabilitation of the distribution network and a smaller amount for demand-side efficiency. AusAID is also providing technical assistance to NUA through PACTAM.

110. Since 2005, there have been significant electricity generation achievements towards the NSDS goals. There is now the capacity for 24 hour supply and the power station is no longer dependent on leased generators. There is a theoretical total of 12.6 MW of generating power available. This is within demand forecasts, and allows for operation at 80% capacity and allowances for extended maintenance if necessary. However due to generator breakdowns and lack of spare parts, actual generation is closer to 4 MW peak, and an annual average of 58 MWH per day. NUA reports mechanical breakdowns due to the

¹⁷ Reform of NPC, ADB, 2006.

absence of key maintenance personnel and non-availability of parts resulted in over 500 hours of load shedding spread over more than 60 days during 2010.

111. There are immense direct costs to the economy of poorly maintained power equipment. During a few days' power outages in January 2011, it is reported that phosphate ships charged RonPhos over \$250,000 in demurrage charges as there was not enough capacity to run the kilns and loader due to the breakdown of generator units. Parts are difficult to source quickly for repairs due to the age of the units, instead requiring special machining.

112. Electricity generation costs per unit delivered are \$0.45 per MWH, with residential consumers charged \$0.28 and commercial entities \$0.34 per MWH.¹⁸ The remainder is subsidised by Government. Electricity distribution systems (lines, poles and transformers) are in workable condition, and are undergoing incremental replacement as needed under funding from the EU.

113. Pilot projects with solar power, wind and water power are being trialed for their output capacity, feasibility to connect to the existing grid, and ability to be consistently maintained. These may eventually form the basis of investment proposals in the future and based on the findings a strategy for increasing the use of renewable energy needs to be formulated.

114. NUA is also responsible for fuel stock management. This has improved in recent years and purchasing arrangements have reduced fuel losses, strengthened safety measures, and capability. The tank farm manages storage of fuel for power generation and distribution to vehicle service stations at cost – roughly \$1.25 per litre (of petrol) delivered. Aviation gas (Jet A1) is now stocked (early 2011) with the upgrade of pipeline and storage infrastructure. It allows Our Airline to re-fuel in Nauru and uplift full passenger and increased freight loads (compared with 50% loading previously), generating more than an additional \$50,000 per week in revenue. Despite these improvements, the inability to adequately maintain infrastructure or respond to emergencies, means that there are still significant risks to Nauru's fuel supply. In particular, there is an urgent need for bulk water to comply with emergency safety (fire fighting) preparations. Also, equipment is needed to respond to possible oil spills and a project for this purpose is under preparation and a description of this project is provided in Annex A. The government is currently working on outsourcing of the supply of fuel for Nauru to a private sector operator.

115. The key issue for the power sector is routine maintenance and parts availability. With properly maintained equipment, power demand is well within the limits of generation capacity. NUA needs to engage adequate personnel to routinely monitor generators in order to prevent major equipment failure. There is also a need to rapidly access spare parts and specialized workshop facilities in order to reduce system down time. The O&M spare parts store and workshop would provide NUA with access to critical spares and backup generators and a capability to rapidly repair generation units. This facility would be co-located and developed to link with the NUA water division providing consolidated skills, equipment and economies of scale. Eventually it could also service other entities on a cost recovery basis.

116. Significant funds have been spent over the past four years to rehabilitate the generators to capacity. Despite their need for consistent maintenance and management, these funds would be wasted if the generators were to be replaced in the short term. However, planning and budget allocation must be made for their eventual replacement in around 2022-2025. This should take the form of a comprehensive engineering assessment

¹⁸ These figures reflect current levels of repair and maintenance, which are currently inadequate to sustain average performance.

of the current power generation capacity given expected future demand, and to map out a long term strategy to address this issue.

117. Tank farm management has identified that it is required to develop an emergency response system for the fuel storage tanks. Although it is envisaged that fresh water could be used, its proposal is to utilize spare capacity in the NUA RO sea-water intake pumps to supply the bulk water required to store for emergency response. Salt water foaming agents would be used for emergency fire-fighting. Although this is proposed as a stand-alone project, its return may be amplified by linking it with saltwater reticulation (for the existing toilet piping) to Location, the hospital sanitation system, nearby planned aquaculture farms and to the Airport RFS unit.

118. Although the Nauru Utility Authority is generally keeping pace with demand, Table 4 outlines projects to consider as part of their program for achieving NSDS and corporate goals.

Table 4 : Current & Proposed Power & Energy Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
P1	Jet A1 Fuel Supply	0.40	F	AusAID						
P2	Bulk Saltwater Emergency Response	1.00	P	U						
PW1	NUA O&M Workshop and Parts Store	3.00	P	U						

F – Funded; P – Planned; U – Unfunded

E. Telecommunication and Media

119. Nauru’s policy for the telecommunication sector is to provide universal and reliable access to internationally competitive communication services and an independent and commercially viable media.

120. The Ministry of Transport and Communications (MTC) is responsible for policy in the sector. Digicel Nauru, a joint venture private operator, is the monopoly telecom provider in Nauru. At present, there is no overall public telecommunication strategy for Nauru, planning wholly resting with the operator.

121. Public radio and TV services are professionally delivered by Government, with the development of new studio facilities, transmission capability and technical assistance. Coverage is over the entire island and paid commercials have recently been introduced. In addition, there is significant local content in the media with weekly news programs as well as presentations for special events of local interest. Print media is not as well developed due to the failure of the printing facility soon after it was commissioned in late 2009. This is being repaired and will soon be operational as a weekly newspaper.

122. The Government and Digicel entered a joint agreement for the provision of telecommunication services in 2009. Digicel gained ownership over all Government owned ICT infrastructure so that they could provide commercial telecom and internet services to Nauru. The agreement includes a profit sharing arrangement of 20%, providing dividends to the Government commensurate with the value of the assets transferred as a fraction of total investment. Under this arrangement there are now reliable mobile telephone services, 3G data and WiMax Internet (launched October 2010). There are no landline telephone services. Digicel will remain a monopoly in Nauru until at least 2012, when the Government is considering opening the market to competition.

123. Nauru’s move to digital cellular phone and wireless internet systems places the country at the forefront of telecommunications in the region. A key consequence has been the savings in operating costs associated with the “antiquated” land line system, resulting in savings for the Government. Also, as tariffs are pitched to ensure full cost recovery and users must pre-pay for service, there is an expectation that telecommunications in Nauru will be maintained at a high service level.

124. Prices for average, low volume mobile phone use are approximately \$40 per month¹⁹ comparable with medium to high tariff countries in the Pacific such as PNG and Vanuatu.²⁰ Internet data prices are amongst the most expensive, yet may be considered reasonable given the small subscriber base. Services are quite reliable and efficient for a remote atoll country. Although exact numbers are kept private, anecdotal evidence suggest over 90% of households, and over 95% of adults own a mobile phone and are connected to the network. The significant uptake of mobile and internet services indicates that there is a high capacity and capability for households to pay for services.

125. Digicel’s monopoly licence requires that Government must ensure that pricing be monitored and remains competitive. Government is proposing the development of a telecommunications policy and regulations in 2011/12, prior to the opening of the market to competition. The policy will need to address barriers to entry and technical upgrade which may limit any competitive development of internet/phone capacity or pricing.

126. Government is keen to ensure 100% coverage of internet and mobile communications and ensure that any black spots are covered. With the provision of a monopoly concession to Digicel to provide private telecommunications, much of the investment will occur commercially. However, Government has been asked by Digicel to maintain its level of shareholding (20%) through commensurate investment. In particular they have been asked to fund two new telecom towers in Ibwenape and Baiti to cover two black-spots on the island which have large populations and a school. Although the project has been proposed by Government, full disclosure of economic and cost information cannot be provided due to commercial-in-confidence reasons. It has therefore only been listed in this study for information purposes and has not been assessed or ranked.

127. Table 5 outlines the telecommunications and media projects that are being proposed.

Table 5 : Current & Proposed Telecommunication Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
T1	New Telecom Towers	0.35	P	U						

P – Planned; U – Unfunded

F. Airports

128. Nauru’s strategy for the air transport sector is for infrastructure to be improved to provide a reliable and affordable service. The emphasis is on the maintenance of safe, reliable and economically sustainable air services.

129. The Ministry of Transport, Department of Civil Aviation (DCA) is responsible for air transport infrastructure. The infrastructure and operations are subject to safety oversight audits by the International Civil Aviation Organization (ICAO) to maintain standards. DCA has a maintenance agreement with Airways (NZ) to maintain navigation aids and essential equipment.

¹⁹ Based on 25 calls, connection charges and 30 sms messages per month.

²⁰ “Progress of competition in Pacific Islands mobile markets”, Network Strategies, NZ, 2010.

130. Nauru International Airport consists of a terminal building, control tower, runway and apron, basic nav aids and lighting. Improvements have recently been made to emergency equipment, baggage screening machines and GPS charts. It currently hosts only two regular flights a week, and the occasional charter aircraft. DCA provides nav aids such as the VOR²¹ to assist with managing its remote, high-altitude airspace, which provides a consistent revenue stream from over-flights.

131. The Government, with the assistance of a loan from Taiwan, purchased an aircraft and launched services to Nauru under the new SOE brand name “Our Airline” in 2008. In addition to this, Nauru acquired a second aircraft through an external loan. Both aircraft are managed efficiently so as to generate revenue and profit; including charter and leasing to generate further revenue. The repayment of the original loans indicates that major economic infrastructure can be profitable and generate considerable revenue if utilised efficiently.

132. A major issue for Our Airline has been the inability of the island to store aviation fuel (Jet Avgas fuel) due to a major leak in the main tank. This resulted in the airline only being able to lift 50% load (freight and passengers) on flights to Australia and Fiji, resulting in a loss of a potential \$50,000 every week. The tank and associated pipes were repaired in early 2011 and full operations can now occur.

133. The main priority for DCA is to maintain facilities to an appropriate ICAO standard in order to maintain authorisation for international operations. Based on the recent ICAO assessment (2009)²² the runway urgently needs resurfacing (within 1-2 years) to maintain it at international standards. The original runway was overlaid in 1993, almost 18 years ago. Most runways in the Pacific require resurfacing every 10-15 years. Low traffic volumes into and out of Nauru have resulted in the aging runway surface remaining in a reasonable condition, however there are increasing signs of erosion of the binder and fine aggregate. This erosion is leading to the loss of some large aggregate particles which pose a significant risk of jet engine ingestion. Immediate and significant damage to the engines could occur, and in the worst case, could lead to a catastrophic engine failure on take-off or landing. DCA’s original plan was to patch surface cracks and holes in order to temporarily extend life for 2-3 years prior to a complete resurface. However, with the ability now to source crushed aggregate on island (from RonPhos), complete resurfacing costs have dropped and make it a competitive and preferred option.

134. Although ICAO’s safety oversight audit (2007) outlined the need for security fencing, the requirements are not practical for Nauru given local land owner access and amenity issues. Since the Nauru International Airport (NIA) is located in a residential area, and in close proximity to a school, the airport and the runway continue to be accessed by the general public and in some cases house-hold pets. Since there are presently only two flights per week, the runway is almost daily used for recreation by nearby residents. Garbage and rubbish is an on-going pre-flight problem as a result. In addition there are instances of vandalism which contribute to the breaking down of posts, mesh and gates.

135. DCA is therefore proposing a simple fence, with regular gates, at defined community access points. This would protect the runway from foreign objects, small animals and children during operations. Given some fencing would be removed during the proposed runway resurfacing, a fencing sub-component has been included in the runway resurfacing proposal.

²¹ VHF Omni-Directional Range.

²² Pacific Aviation Safety Office (PASO) Safety Report – Civil Aviation Directorate, Aerodrome Inspection - Part 139, Inspection Date: 3 September 2010. PASO is designated by ICAO as the Pacific regional aviation safety oversight organization.

136. Apart from runway and terminal maintenance, DCA’s other major concern is with maintaining adequate nav aids. On the advice of Airways Corporation (NZ) DCA has begun the installation of the PAPI²³ landing assistance system using AusAID Assistance. This will enhance the current visual-only approach, improving safety.

137. Airways Corporation (NZ), which has been maintaining all other nav aids have recently (December, 2010) reported the imminent failure of Distance Measuring Equipment (DME) and five-year serviceability of the VHF Omni-directional Range (VOR). Despite its best efforts, these aging basic nav aids are nearing the end of their useful life. Although GPS systems are becoming commonplace in aircraft navigation, DME/VOR is still seen as essential basic equipment in case of differential terrestrial or on-board GPS failure. Furthermore, DME/VOR is essential for Nauru to continue to service and collect revenue from the numerous over flights in its territorial high-altitude air space. The proposal is to replace the DME immediately, and plan for VOR replacement within five years.

138. In order to support the operations of “Our Airline”, other potential export industries and the NSDS strategy, the Air transport sector has identified a program of investments as shown in Table 6.

Table 6 : Current & Proposed Air Transport Projects

Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
A1	PAPI System	0.10	P	AusAID						
A2	Runway Resurfacing & Fencing	3.80	P	U						
A3	Nav aids Distance Measuring Equipment (DME)	0.40	P	U						
A4	Nav aids VHF Omni-directional Range (VOR)	0.40	I	U						

P – Planned; I – Identified; U - Unfunded

G. Roads and Land Transport

139. The Government of Nauru’s road and land transport policy is to achieve improved road infrastructure and provide a reliable and affordable public transport service. The Government’s short term strategies indicate a preference to increasingly contract-out road maintenance and to facilitate the establishment of privately managed public transport services.

140. Although road assets are theoretically owned by Government, RONPHOS and NRC, the main ring road is maintained by the Department of Transport (DOT). Similarly, DOT operates the various public and school bus services. There are no studies supporting any plans for privatisation or contracting of assets or operations.

i. Roads

141. The main roads were built over 20 years ago by the Government of Japan. The overall quality of the main island ring road network (22 kms) is reasonable although distribution roads (29 kms) are in very poor condition. The main ring road is currently suffering some surface and sub-surface degradation, and repairs and maintenance in the coming years will be important. Repair and maintenance of drainage is crucial if further deterioration is to be avoided. A section of the main ring road (hospital to phosphate loader) is prone to flooding during heavy rain with negative impacts on the hospital – despite Government funded repairs. The main topside roads, although gravel, are maintained to a satisfactory standard by the NRC.

²³ Precision Approach Path Indicator.

142. The current state of the ring road owes a lot to the original construction rather than to its maintenance, which has been minimal. Comparing its condition to the poor state of secondary roads, highlights the importance of undertaking quality construction works at the outset. Clearing of channels along the ring road needs to be extended to storm water drains which are invariably blocked. This is a key aspect of road maintenance that has been lacking. Although the Government has provision and systems for road user fees, it currently does not collect any licence, registration fees or regulation enforcement which could be utilised for road funding.

143. With the proposal by DCA to begin airport runway re-surfacing, the opportunity arises to utilize machinery that will be on island at that time to also rehabilitate the road network. It is likely that this would include basic road resurfacing and minor upgrades to selected secondary roads. Any works would have to be in conjunction with concomitant curb/footpath repair and high pressure storm-water drainage cleaning. There are also certain locations in the road network which suffer from coastal erosion. It will be necessary to carry out an assessment and inventory of vulnerable and weak spots in the road network.

144. The government is working on the contracting-out of road maintenance services which it is hoped will reduce costs and improve efficiencies. However, the capacity and capability of Nauru's private sector to absorb such work is poor, and it is unclear how the Government would manage performance. It is proposed that a "road maintenance and land transport privatization" technical assistance be undertaken to assess the management of road maintenance privatization in line with Government strategy.

145. The Government has also agreed to accept the provision by Taiwan in 2011 of 150 solar street lights which will aid its goals of improving road safety and energy efficiency. Whole of life costs and repair and maintenance requirements are yet to be budgeted.

ii. Land Transport

146. The Government policy is to provide minimum transport needs for school bus services and privatise public transport. There is intermittent public transport services provided to individuals who are charged a fee of \$0.60 for a trip around the island. Since the introduction of increased fees, usage has dropped substantially. Services to school children and public servants have been improved; however maintenance of existing and new buses is still problematic. The Government has accepted the donation of five buses from the Government of Azerbaijan in 2011 to supplement its existing fleet. Additional operational and maintenance costs for these vehicles are yet to be budgeted.

147. DOT has proposed that the TA to facilitate road maintenance privatisation also examine options for public-private or public-community partnerships for land transport as part of an integrated road and transport master plan. This would be undertaken in conjunction with any further capital investment in roads or land transport.

148. Table 7 outlines the projects that are being proposed for consideration in the roads and land transport sector.

Table 7 : Current & Proposed Air Transport Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
R1	Solar Street Lighting	0.30	F	ROC						
R2	Fleet Augmentation	0.15	F	AZB						
R3	Road Rehabilitation (contingent on A2)	1.00	P	U						

F – Funded; P – Planned; U - Unfunded

H. Maritime

149. The NSDS goal for maritime transport is to improve infrastructure and provide reliable and economical freight services. The short term strategy is to refurbish and develop port infrastructure for vessel handling – comprising the deep sea mooring initially; and followed by the construction of the wharf, port and cargo handling equipment.

150. The main agency involved in maritime is the Port Authority of the Ministry of Transport. However, RonPhos and NRC are major stakeholders and utilize the cantilevers and adjacent land for their own operations.

151. Nauru imports over 95% of its goods by sea transport. It is also the vital link for the country’s current and potential exports (phosphate, dolomite aggregate and fish), all of which require bulk transport. According to Government statistics, an average of 5-7 vessels visits Nauru per month. A regular shipping service is set to begin in partnership with other small island nations in the region (including Kiribati and Tuvalu) which will require a regular schedule unaffected by mooring restrictions or weather.

152. A recent ADB report²⁴ indicated that “the additional costs associated with running the port in its run down state are considerable and limits the ability of the country to tap into the full benefits associated with mining operations and the opening of the regional fishing resources.”²⁵

153. The mooring system is the key maritime infrastructure in Nauru in the absence of a wharf. It has been maintained and upgraded with the assistance of Taiwan and Russia in 2009/10 resulting in a reduction in demurrage charges. The upgraded mooring can accommodate ships up to 35 tonnes. Unloading containers from moored vessels can take up to 5 days depending on weather conditions, and the operation of power generation and container handling equipment. Average unloading times are in the order of 1-2 days.

154. The Government has identified the major upgrade of the existing port to improve turnaround of vessels, reduce demurrage and improve safety as a key priority. The ADB-financed study to assess port development options (2009) suggested 6 alternatives. Government selected a preferred option based on the proposed alternative’s cost effectiveness. This option would provide a “New Quay Wall” constructed on the edge of the reef north of the existing harbor and accessible by causeway. This scenario does not provide any opportunity for replacing the existing phosphate loading arrangements, and hence high maintenance costs for the mooring buoy system will continue. The proposed multi-vessel quay would reduce demurrage times to one quarter, and improve the efficiency and flexibility of the port.

155. Two further port development options have been prioritized by Government for long-term future consideration. These include the “All-Season Berthing Facility” comprising a new

²⁴ ADB Scoping Study for Nauru Port Development, Oldfield, 2009.

²⁵ ADB Mission Report from Donor Roundtable Meeting, November 2009.

enclosed harbor basin excavated from the reef and coastal land north of the existing boat harbor. The other is an “All-Vessel Quay Wall” constructed on the edge of the reef beneath the phosphate cantilevers, to accommodate all vessels visiting Nauru. Both additional options provide an all-weather facility, but were ranked as supplementary due to their large capital and recurrent costs. These two additional projects have not been considered further at this time, due to their large cost and long time horizon.

156. In order to reduce weather delays on the currently proposed quay wall (40-50 days), the Department of Transport has proposed that the current outer buoys (which will become redundant) be moved during construction to Anibare Bay to provide alternate mooring capacity. It would allow boats to be moored and unloaded in Anibare during 40% of the adverse weather restrictions of the proposed new quay wall.²⁶

157. Apart from major infrastructure investments, the key issue with maritime is maintenance of existing equipment and facilities. The main port building is close to collapse and inadequate for existing operations. Part of the structure is now on privately re-claimed land, inhibiting operations. Security fencing is completely degraded. There has been the commissioning of two new work boats in 2010, and the funding of a replacement Pilot Boat in 2011, that are central to port operations. However, there are inadequate funds for their correct maintenance. A crane procured in 2008 has still not been erected as it is perceived as inadequate for the job. A larger 65 tonne Omega crane is now proposed to be purchased by Maritime.

158. As the port is improved, demurrage charges and handling times should decrease as efficiency improves. While this should have carry-on benefits to consumers and exporters, it is essential that some proportion of this saving is retained by Maritime for correct maintenance. The development of a Port Operations Master Plan and possible corporatization should be considered as part of any future detailed design.

159. Maritime transport is the critical sector for the economy, being the source of imported goods, and the export of revenue raising phosphate and aggregate. Mining and quarrying sectors provide their own facilities to export products, but rely on the port for imports. Rehabilitation of secondary mined areas is a crucial strategy of the government to lessen reliance on imported food and beverages, which are the source of much of the lifestyle health problems facing Nauru. Financing the port as a gateway for imports should thus be directed to ensure the full cost of imports including food are passed on through port charges. Co-funding of the port by local industries does not seem to be a sensible way forward. On the other hand, co-funding of improved port facilities may be attractive to donors, with different donors funding different aspects of port development such as design, physical construction, navigation aids and stevedoring facilities, for example. Table 8 outlines the projects proposed for maritime transport.

Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
M1	Omega 65 tonne Crane	0.50	P	U						
M2	New Quay wall and Anibare Mooring	14.40	P	U						

P – Planned; U - Unfunded

I. Government Buildings

160. The Government aims to undertake essential repairs and refurbishment of Government buildings with a particular emphasis on schools and medical facilities. The

²⁶ Reduced from 40-50 days to 20-28 days non access due to weather.

NSDS defines a 2010-2015 milestone, whereby all buildings are rehabilitated and maintained to a “standard” that is yet to be defined.

161. The following outlines the current situation and proposed building construction and refurbishment programs in the administrative, health and education sectors. The key issue across all sections is the ongoing lack of funding for basic repairs and maintenance. Instead, structures are poorly maintained, resulting in the increasingly frequent need for critical repairs and refurbishments which are then usually undertaken with donor assistance. The funding strategy (Chapter VI) outlines how the Nauru Government proposes to take an increasing responsibility for funding repairs and maintenance over the medium to long term.

i. Administration

162. The central Government buildings are managed by the Department of Home Affairs, and are subject to incremental and irregular maintenance due to a lack of budget. Recent refurbishment of the central air-conditioning has resulted in some energy savings. Outside of the main Government area, buildings seem to be the responsibility of the user department – resulting in many buildings being either abandoned or operating in less than ideal conditions.

163. The construction of the new Police Headquarters building, funded by the Australian Federal Police, is due to be completed in early 2011 and will provide improved quarters for police operations. A police youth club facility attached to the Police Headquarters is to be funded by AusAID.

164. The Government has also proposed the development of a National Indoor Sports Stadium and Outdoor Playing Field. This would support the NSDS goals of improving community health through the delivery of a coordinated fitness and sports program. In addition, it provides the potential to host regional weightlifting, boxing and volleyball tournaments which would add to National revenue and local spending. The proposal is still at the concept stage.

ii. Health

165. The Ministry of Health is responsible for the operations and maintenance of all health care facilities. The NSDS health strategy prioritizes the development of a new integrated hospital and public health facility by 2015. In the near term, it aims to improve facilities to an appropriate standard.

166. Nauru’s health buildings consist of the old Nauru General Hospital (now the Naero Public Health Center and health administrative building) and the Republic of Nauru Hospital (formerly the Nauru Phosphate Corporation Hospital). The Republic of Nauru Hospital (RONH) is located at Denigomodu District. It provides accident and emergency, acute clinic and operation theatre, and other curative services, as well as the standard clinical support services (laboratory, blood bank, x-ray, pharmacy, physiotherapy). Both are subject to ongoing critical refurbishments funded by AusAID²⁷ as the buildings are inadequate for improved equipment and modern procedures and standards. There is a fire hazard and infection control risk due to inadequate budget for cleaning and maintenance.

167. Rather than maintain antiquated buildings, the MOH is committed to planning for the construction of a new hospital, with fewer beds, which would house the acute and the public health sectors co-located on one site. This would reduce rehabilitation costs, and save revenue from overseas referrals. There would be more efficient use of human and material resources, and the centralized location of critical equipment such as resuscitation machines.

²⁷ Approximately \$300,000 per year.

AusAID agreed to fund a hospital assessment and development plan in 2011, which would present development alternatives for consideration by Government. The eventual selected alternative is planned to be constructed in 2013-2015.

168. In the interim period, a program of critical refurbishments is required to enable the current buildings to maintain services. Government has indicated that this is a priority request in the Bilateral Aid program with Australia. The expected \$1.2 million over 3-4 years will be incorporated in funding projections.

iii. Education

169. The NSDS aims to bring all school buildings to a recognized Pacific standard. The NSDS calls for a rationalization of schools to be undertaken in order to reduce the number of sites prior to further investment. It also highlights the needs of disabled students and adult learners to be accommodated.

170. Despite attempts to rationalize the number of schools, nothing has occurred. Instead, classes have been re-configured at each school so that each has three year-levels. School-age population projections²⁸ indicate that student numbers will remain flat over the coming years. Reported classroom sizes across the island remain small to average compared to other regional countries. Participation rates in primary school are average for the Pacific at 74%, with less than 23% completing primary school (2008). There is very little difference between male and female rates. Literacy in people over 15 is reported at 99%.²⁹

171. School maintenance and repair of ageing buildings is an ongoing issue. There are inadequate funds provided by the GoN and buildings are often old and run down. AusAID has provided interim refurbishment assistance over the past 3 years; however there are still at least 5 that require upgrading and critical repairs. Combined with an improved maintenance program, the school refurbishment program will allow the education sector to achieve and maintain a core standard for school infrastructure. The GoN has indicated that this program will be sourced through the bilateral aid program with Australia and that they will not be ranked within this plan. However, the expected \$150,000 cost per annum will be incorporated in funding projections.

172. Recently, AusAID completely rebuilt the Nauru Central High School for \$12 million. Although providing important facilities to educate Nauruan children, there has been little to no additional budget allocation to DOE, or consideration of an on-going maintenance program to sustain this structure in the immediate future.

173. Destruction of Aiwo Primary school in 2010 resulted in its temporary relocation to the State House site. The Department of Education commissioned a scoping study for rebuilding and this was conducted in early 2011. A number of options were presented to Cabinet. Cabinet's preferred option was the amalgamation of Yaren and Aiwo Primary schools and the Able Disable Centre onto one site (State House site). Such an option clearly meets the NSDS priority of rationalization of schools. The proposed project would also include a sub-component to ensure all school buildings in Nauru are accessible to both able and disabled students, through a program of classroom and playground retro-fitting and access ramps. Consideration is also being given to including an island-wide tuck shop development sub-component to address health needs of island children.

In 2006, the Government developed the concept of a Learning Village. The Nauru Learning Village integrates the facilities of the Nauru Secondary School, TVET Facility, University

²⁸ Nauru Bureau of Statistics, Demographic and Health Survey, 2007.

²⁹ Key Indicators for Asia and the Pacific, 2010. ADB.

Campus, Public Library and Teacher Training Centre on the same site or Village. A scoping activity has been completed and draft sketches were completed. Provision of training facilities would benefit public and private sector and promote public/private sector partnerships and it will contribute to achieving expanded use of NSS facilities after hours and access to additional learning facilities at the learning village. The Learning Village is a concept that fits the social and economic profile of small island states.

174. Table 9 outlines the current and proposed buildings projects in the administrative, health and education sectors.

Table 9 : Current & Proposed Administrative, Health and Education Building Projects										
Ref	Project	Est. Cost (\$m)	Status	Fund	Proposed Timing					
					11	12	13	14	15	16+
Administrative Buildings										
BA1	Police HQ	2.70	F	AFP						
BA2	Police Youth Club	0.20	C	AusAID						
BA3	National Indoor Stadium and Playing Fields	0.60	C	U						
Health Buildings										
BH2	Annual Refurbishment to Hospital	1.10	C	AusAID						
BH3	New Hospital		P	U						
Education Buildings										
BE1	Schools Annual Refurbishment Program	0.60	C	AusAID						
BE2	Aiwo School Rebuilding and Disability Access	14.1	P	U						
BE3	Learning Village Project	3.6	P	U						

F – Funded; C – Committed; P – Planned; U - Unfunded

J. Overview of Planned Investments

The NEISIP identified a list of 37 planned economic infrastructure investments, totalling around \$75 million over the next 5-10 years; and an additional \$50 million in years 10-15 (Table 10). Of this figure, there are projects worth \$12 million that are currently funded and/or in progress. The remaining projects are proposed projects that generally do not have a confirmed funding source.

175 Over the next 3-5 years, there is expected to be a peak in infrastructure investment as a number of major projects are implemented. Government will make the investments mostly with assistance from grants from development partners. Planning is less well advanced for the period 2016-2020. At this stage, around \$40 million of planned investments have been identified and this is expected to increase as medium- to longer-term planning solidifies.

Table 10: Nauru Economic Infrastructure - Major Current & Proposed Projects					
Ref	Project	Cross Sectoral	Estimated Cost (\$m)	Status	Funding Source
WATER					
W1	EU Envelope B - Risk Reduction Project (C1-C6) & water tankers (1@10kl)	S1	0.76	F	EU
W2	Solar Power RO Unit	P5	3.00	F	PEC
W3	Supply and commissioning of 300kL RO Unit (AusAID)	W2	0.60	C	AusAID
W4	Water Delivery - Additional Water tankers (3 x 4kl)	S2	0.50	P	U
W5	Repairs and Upgrade Tanks (B13, B4, B5)[2]	S1	0.40	I	U
W6	Runway rainwater harvesting (* contingent on Runway resurfacing A3)	A3, R3	8.00	I	U
W7	Additional large community rainwater storage tanks (15x100kL)	W2	0.80	I	U
W8	Rehabilitation & filling of bulk storage tanks (golf course) for emergencies	W2	0.40	I	U
POWER & WATER					
PW1	O&M spare parts store and workshop (shared with Utilities and Menen Hotel)	W4	3.00	P	U
POWER & ENERGY					
P1	Jet Fuel Supply		0.40	F	AusAID
P2	Bulk Saltwater Emergency Response	S4	1.00	P	U
SANITATION & WASTE MANAGEMENT					
S1	Mainstreaming IWRM	W2, W3	0.30	F	GEF
S2	New lined Landfill & Compactor Trucks (BOT??)	S5	1.40	I	U
S3	Pump Out "Alternative Disposal Options" Recycling Project	S3	0.50	P	U
S4	Location Saltwater flush (* contingent on P2)	P3	0.30	I	U
S5	Hospital Hazardous Waste Incinerator	BH2	0.30	C	?
TELECOMMUNICATIONS & MEDIA					
T1	New Telecom Towers		0.15	C	AusAID
AIRPORTS					
A1	PAPI System		0.10	F	AusAID
A2	Runway Resurfacing & Fencing	W6, R3	3.80	P	U
A3	Nav aids - DME		0.40	I	U
A4	Nav aids - VOR		0.40	I	U
ROADS & ROAD TRANSPORT					
R1	Solar Street Lighting	W2	0.30	F	ROC
R2	Fleet Augmentation		0.15	F	Azerbaijan
R3	Road Rehabilitation (* contingent on Runway resurfacing (A3) & (R4)	W6, A3	1.00	P	
MARITIME					
M1	Omega 65 tonne Crane		0.50	P	AusAID
M2a	New Quay wall - Scenario 2 & Anibare Mooring		14.40	P	
M2b	All Season Berthing Facility - Scenario 4 (Stage 2 contingent on M2a)		32.00	P	Long term
M2c	All-vessel quay wall - - Scenario 3		14.00	P	long term
BUILDINGS - ADMINISTRATIVE					
BA1	Police HQ		2.70	F	AFP
BA2	Police Youth Club		0.20	C	AusAID
BA3	Indoor Stadium and sports field		0.60	C	U
BUILDINGS - HEALTH					
BH2	Annual Refurbishment to Hospital		1.10	C	AusAID
BH3	New Hospital		12.00	P	U
	Hospital refurbishment funds (2011 - 2015)		1.20	P	AusAID
BUILDINGS - EDUCATION					
BE1	Schools Annual Refurbishment Program		0.60	C	AusAID
BE2	Aiwo School Rebuilding and Disability Access		14.10	P	U
BE3	Learning Village Project		3.60	P	U
	School Refurbishing Funds (2011 - 2015)		0.60	P	AusAID
I	Identification			C	Committed
P	Planned			F	Funded

IV. PRIORITIZING INFRASTRUCTURE INVESTMENT

175. The full list of identified investment projects for the next five years includes more than \$12 million in projects that are already underway or committed, and an additional \$52 million of proposed projects for which funding is not confirmed. It is unlikely that it will be possible to fund all of these proposed projects within this timeframe from resources available to Government. Therefore priorities need to be set.

176. This part of the NEISIP brings together the results of the analysis of infrastructure needs and challenges, planned investments and supporting measures to identify a set of initiatives that Government sees as priority areas for development of the economic infrastructure sector over the next 5-10 years. It uses a tool called Multi-criteria Analysis (MCA) to assist in the setting of priorities.

A. The MCA Process

177. The MCA prioritization process is a tool that can be used to rank projects across sectors. The objective of this tool is to enable quick prioritization of projects in the “absence” of a detailed national economic policy being in place. It is a rapid approach in lieu of a full social and Cost Benefit Analysis (CBA). It is not a substitute for objective assessment and it is not a project feasibility evaluation tool.

178. The MCA is intended to be used for the development of the NEISIP, but also as a tool that PAD can use on a regular basis to update the plan and coordinate its comments on the annual budget. Because of this, the MCA needs to be simple but not simplistic, with only the minimum but necessary criteria to achieve agreed results. In order for it to be sustained in the future it must also be easy to apply, able to be improved, transparent and repeatable. It needs to be a tool that is owned by the stakeholders.

179. The MCA process includes steps shown in Table 11.

Table 11: The MCA Process	
i.	Initial screening to separate those that are underway or committed, from those that are in the planning stage;
ii.	Criteria selection - Develop, outline and discuss weighting for key criteria
iii.	Scoring - Key Stakeholders individually score (1-4) each project using Q&A matrix.
iv.	MCA Rating - Each project achieves a final Project Rating of High, Medium or Low, based on the banding of scores.
v.	Sanity checking - the final list is subject to a group discussion of scores, bands and ranking as a sanity check.

i. Initial Screening

180. The prioritization focuses on screening the planned investments to identify those that align strongly with national priorities and deliver significant benefits to the Nauru people, the economy and the environment. The overall pool of projects (funded, committed, proposed, identified) is first split into two components:

- Those that are funded and underway or have been committed to by development partners.
- Those that remain – planned and identified.

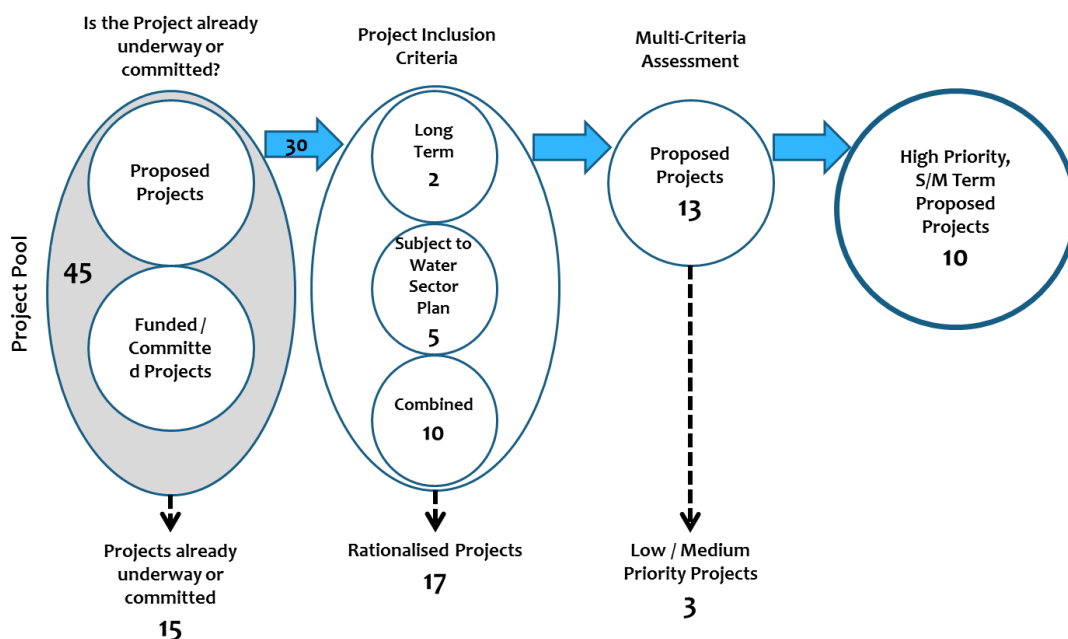
181. The immediate priority of Government is to complete investment projects already underway or committed. Therefore, those projects automatically become part of the NEISIP priorities. Of the 45 originally proposed projects, 15 are already underway or funded, leaving 30 projects to be further screened.

182. The planned and identified projects were then progressively screened and rationalized to identify projects that have the ability to proceed in the next five years. Additional screening criteria included:

- Deferral until after comprehensive master plan
- Long Term (10 + years)
- Combined with other projects

A further 17 projects were rationalized, leaving 13 projects to proceed to ranking. These are shown in Annex E. Figure 3 outlines the MCA screening process.

Figure 3: The MCA Screening Process



ii. Criteria Selection

183. The key criteria for the MCA include seven thematic areas:

- *Policy* – Link with NSDS existing plans
- *Economic* – Contribution to growth
- *Financial* – O&M costs, ability to pay
- *Social* – Basic services, level of service, living standards
- *Environmental* – Protecting or improving environment
- *Readiness* – Preparation
- *Maintenance* – Adequate

184. The criteria are assessed using a number of questions to inform an average ranking for those criteria. The detailed questions are outlined in Table 12.

185. Although the criteria can be subject to weighting to enable more emphasis to be placed on one versus another, the Government determined that each of the seven criteria should be weighted evenly, given there was already an emphasis on financial, economic and readiness factors.

Table 12 : The MCA Tool

<p>1. Policy - Will the project contribute towards meeting long term National Sustainable Development Plan goals?</p> <ul style="list-style-type: none"> • Addresses Long Term Goals • Addresses Short Term Goals
<p>2. Economic - Will the project contribute to national economic development and growth?</p> <ul style="list-style-type: none"> • Does it add to Exports – Foreign Exchange • Potential to enhance private sector activity and jobs • Is this project critical to continuing an existing essential service? • Does the project contribute to other sectors?
<p>3. Financial - Will the project contribute to national revenue?</p> <ul style="list-style-type: none"> • Is there potential for user charges to cover full cost of service? • Does the project cover O&M? • Have all other refurbishment and repair options been exhausted for this service?
<p>4. Social - Will the project lead to improved living standards?</p> <ul style="list-style-type: none"> • Contributes to meeting minimum level of service standards • Does it enhance service delivery? • Does it lead to health improvements
<p>5. Environmental - Will the project contribute to a better environment?</p> <ul style="list-style-type: none"> • Directly improves the physical environment • Has no negative environmental impacts
<p>6. Readiness - What is the Project's readiness?</p> <ul style="list-style-type: none"> • How advanced in the planning stage? • How advanced is ID of a donor. • Are there land or social owner impacts
<p>7. Maintenance will be adequate?</p> <ul style="list-style-type: none"> • Is there the current technical capability to maintain infrastructure? • Is there an appropriate organizational structure to maintain infrastructure? • Is there the financial capacity to maintain infrastructure?

iii. MCA Scoring Process

186. The scoring process was through the use of a modified Delphi Technique. This utilizes individual scoring, compiled into anonymous results. This is followed by group discussion of results where there are major outliers (e.g. One respondent scored one criteria outside 1 standard deviation). When fully discussed, the process is repeated until results are smoothed – representing consensus.

187. Each project was first presented to the group. Each member then scored the project by providing a number (1-4) against each question in the criteria. The score of 1 meant the project did not satisfy the question in any way. A score of 4 indicated that it fully or strongly satisfied the question. Scores of 2 and 3 indicated less confirmation, with no allowance for a middle score. To work consistently, each member needs to score each question for each project.

188. The final scores were entered into a spreadsheet and then averaged across all respondent for each question. The average scores for each question were then averaged for each of the seven thematic criteria resulting in 7 scores for each criteria under each of the 14 projects.

189. Within each criterion, the range between maximum and minimum scores across the projects were assessed and divided by three – allowing for a high, medium or low band. Each project's criteria were then identified in which band they fell. This allowed for project ranking to be smoothed. Projects were then ranked by the number of high, medium and low scores it received.

iv. Sanity Check

190. To complete the modified Delphi technique, the ranking process and results was reviewed by participants. The standard deviation across aggregated and averaged scores was presented to indicate where there were significant differences of opinion. Scores were discussed by the group as a whole, to ensure that everyone understood the questions and was happy with the resultant score. The final ranking was discussed as to whether it made sense within their own understanding of the needs of Nauru.

191. The final list of high priority projects and actions was ranked into high, medium and low categories.³⁰ Ten projects were ranked as high, and prioritized for development in the next 5-7 years. They included (in no specific order):

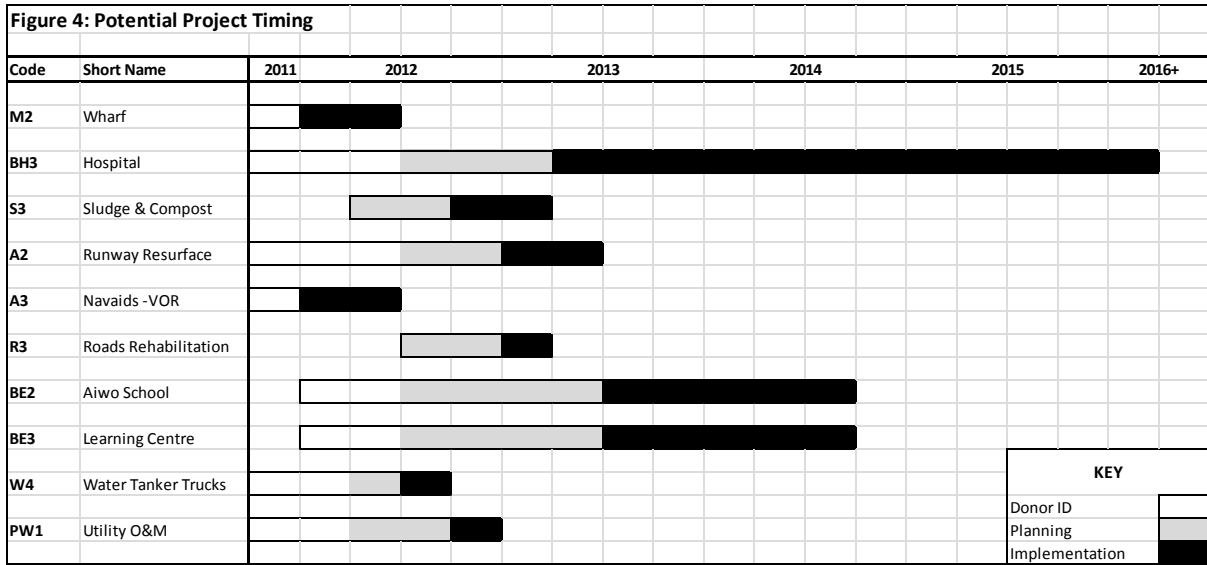
Investment Projects

- M2** New Quay wall - Scenario 2 & Anibare Mooring
- BH3** New Hospital
- S3** Sludge "Alternative Disposal Options" Project
- A2** Runway Resurfacing & Fencing
- A3** Nav aids – Distance Measurement Equipment (DME)
- R3** Road Rehabilitation (contingent on runway resurfacing)
- W4** Water Delivery - Additional Water tankers (1 x 10 m³ & 2 x 4 m³)
- BE2** Aiwo School rebuilding and disability access project
- BE3** Learning Village Project
- PW1** O&M spare parts store and workshop for NUA

B. Options Development

192. The final ranked projects were then subject to timing and funding implications. Some projects have significantly longer lead times (planning and design) than others. Some required significant funding commitments, while others could be spread over numerous years. Figure 4 shows the potential project timing for the highest ranked projects.

³⁰ Refer to Annex F for a full list of the project rankings.



193. Requirements for funding options and investment strategies were then developed, and are outlined in Section V.

V. LIFE CYCLE COSTS

194. This section outlines the life cycle costs of infrastructure and the current situation in Nauru. It examines the current balance between maintenance needs and maintenance expenditure and contrasts that with the potential operational and maintenance implications of the NEISIP infrastructure investment program.

A. Whole of Life Costs

195. The costs associated with new infrastructure; do not end with the purchase or construction. It is one step in the life cycle of an asset that begins with the initial identification of needs through to the disposal of the asset at the end of its useful life. The stages of the asset life cycle are set out below. Each stage requires planning and coordination; and involves costs and time.

- **Concept and planning:** the costs and time involved in planning and investigations, development of the design concept, and associated studies such as environmental impact assessment.
- **Detailed design specification:** the costs and time required for preparing detailed designs and/or specifications and contract documentation.
- **Construction/supply:** includes an allowance for contingencies and cost escalation over the period of supply. For a major infrastructure project, the combined duration of planning, detailed design/specification, contracting and delivery can amount to several years to over a decade.
- **Contract supervision:** includes the technical, financial and legal costs to ensure that the work is carried out to the required standard and in compliance with contract requirements
- **Operation and maintenance:** operating costs over the life of an asset include labor, energy and consumables. Maintenance costs are required to keep it in good condition. This includes small scale routine activities to minimize wear and tear, and larger scale activities such as the routine replacement of moving parts to maintain operational status. The economic life of infrastructure can range from 5-10 years for plant and equipment to 100 years for major civil works
- **Disposal/decommissioning:** costs include demolition or dismantling and removing the asset from the site and disposing/recycling materials. Significant environmental costs may occur such as removal of toxic wastes.

196. When all these costs are combined, the total may be more than double the cost of the initial purchase/construction price. This fact is often overlooked in decision making on new assets, particularly in developing countries. The outcome is under-budgeting of on-going costs, with key maintenance not being undertaken, resulting in a much shorter life than expected. This is wasteful of scarce resources and imposes an unnecessary burden on future budgets where money could be better utilized elsewhere. Typical lifecycle costs are shown in Table 13.

Stage	Rate (%) ^a	Construct/ Supply only	+ other up front	20 year Operating & maintenance
Concept & planning	2-5		\$2-5	
Detailed Design Specification	5-10		\$5-10	
Construction/ Supply		\$100	\$100	
Contingency/ escalation	10		\$10	
Contract supervision	2-5		\$2-5	
Operating ^b	0-20			\$0-400
Maintenance – Routine ^c	0-5			\$0-100
Maintenance – Periodic ^d	5-10			\$10-20
Disposal & Decommissioning ^e	0-100			\$0-100
TOTAL		\$100	\$119-130	\$10-620

- Notes:
- a. Based on typical infrastructure costing parameters
 - b. Varies from zero (e.g. for buried pipes) to 20% pa for mobile plant and equipment
 - c. Varies from zero to 5% pa for routine maintenance of assets such as roads
 - d. Based on 20 year asset life with periodic maintenance every 7 years
 - e. Varies from zero to 100% (e.g. clean up of toxic chemical sites)

B. Current Operating and R&M expenditure

197. The concept of life cycle costs is new to Nauru. It will take some years and a concerted effort to change old habits, where the expectation is that donors will provide new infrastructure and when it breaks down they will replace it. In the present environment, budgeting for life cycle costs beyond the initial capital purchase or construction is not given the necessary priority in Nauru. Short term considerations over-ride medium to long term thinking in most cases.

198. Information available to assess current allocations to operating and repairs and maintenance (R&M) expenditure is limited to that contained in the 2009-10 and 2010-11 Budgets. The Budget does not include the state owned enterprises (SOEs); none of which were able to provide expenditure data that could be analyzed for comparative purposes.

199. Seven sub-heads in the Budget can be related to total domestic expenditure within years and compared with the same sub-head between years for both initial Budget and Revised Budgets. Table 14 shows available expenditure data along with the percentage of each sub-head compared with total domestic expenditure³¹.

³¹ A further breakdown of expenditure by cost centre within departments was not possible as data was not available from Finance. It is expected that technical assistance to Finance over the coming months will result in better financial information with a breakdown by department for the cost centers related to infrastructure management.

Table 14. Operations and R&M expenditure by Sub-head: 2008-09 to 2010-2011 (\$)

Sub Head	2008-09		2009-10				2010-11	
	Rev. Budget	% of Dom Exp	Budget	% of Dom Exp	Rev. Budget	% of Dom Exp	Budget	% of Dom Exp
311 R&M office equipment	17,205	0.0%	22,690	0.0%	7,297	0.0%	16,578	0.1%
312 R&M office premises	13,600	0.0%	13,034	0.0%	13,157	0.0%	56,213	0.2%
353 R&M plant	186,793	0.3%	256,246	0.4%	2,755,658	8.7%	328,634	1.1%
354 R&M buildings	300,600	0.5%	166,600	0.3%	183,600	0.6%	205,865	0.7%
355 Fuel & oil	11,664,037	20.8%	6,633,050	11.5%	6,499,664	20.6%	4,780,353	16.4%
452 R&M Aerodrome	38,362	0.1%	38,362	0.1%	38,362	0.1%	50,000	0.2%
502 Plant & Equip	3,184,897	5.7%	2,108,300	3.7%	2,117,514	6.7%	2,095,439	7.2%
Sub-total	15,405,494	27.5%	9,238,282	16.5%	11,615,252	20.8%	7,533,082	13.5%
Domestic Exp Total	55,969,789	100.0%	57,749,902	100.0%	31,583,988	100.0%	29,070,699	100.0%

200. Confounding the analysis is a 45% decrease in total domestic expenditure between the Budget and Revised Budget 2009-10 brought about by the necessity to balance the Budget as a result of the global financial crisis impacting negatively on Nauru.

201. The most significant change in dollar terms between the Revised Budget 2008-09 and the Budget for 2009-10 was a cut back on imported fuel and oil expenditure by \$5.2 million or 44% reducing its share of total domestic expenditure from 20.8% to 11.5%. On the other hand, R&M on plant increased by \$2.6 million, up from \$187,000. This is an example of delayed maintenance catch up. Plant and equipment expenditure was also cut back by 34% (see Table 15 below). Other items including R&M on office equipment, office premises, plant, buildings and the airport are very small in comparison with none over 0.5% of domestic expenditure (see Table 14). At these levels there will be a considerable under-spend to ensure these assets are properly maintained.

Table 15. Revised Op and R&M expenditure by Sub-head: 2009-10 compared with 2008-09 (\$)

Sub Head	2008-09	2009-10	% change RB'10 cf RB'09
	Rev. Budget	Rev. Budget	
311 R&M office equipment	17,205	7,297	-57.6%
312 R&M office premises	13,600	13,157	-3.3%
353 R&M plant	186,793	2,755,658	1375.2%
354 R&M buildings	300,600	183,600	-38.9%
355 Fuel & oil	11,664,037	6,499,664	-44.3%
452 R&M Aerodrome	38,362	38,362	0.0%
502 Plant & Equip	3,184,897	2,117,514	-33.5%
Domestic Exp Total	55,969,789	31,583,988	-43.6%

202. The leap in R&M on plant in the revised budget for 2009-10 from 0.4% to 8.7% of domestic expenditure highlights the impact of unforeseen R&M expenditure (see Table 16 below) can have on the Budget. More emphasis on a planned maintenance program would go a long way to avoiding such budget blow outs.

Table 16. Op and R&M expenditure by Sub-head: 2009-10 Revised compared with Budget (\$)

Sub Head	Budget 2009-10	Rev. Budget 2009-10	% change RB'10 cf B'10
311 R&M office equipment	22,690	7,297	-67.8%
312 R&M office premises	13,034	13,157	0.9%
353 R&M plant	256,246	2,755,658	975.4%
354 R&M buildings	166,600	183,600	10.2%
355 Fuel & oil	6,633,050	6,499,664	-2.0%
452 R&M Aerodrome	38,362	38,362	0.0%
502 Plant & Equip	2,108,300	2,117,514	0.4%
Domestic Exp Total	57,749,902	31,583,988	-45.3%

203. Comparing the Budget for 2010-11 with 2009-10 shows a 28% decrease in expenditure of fuel and oil (see Table 17 below). The reduction from \$11.7 million budgeted in 2008-09 to \$4.8 million budgeted in 2010-11 is a function of a change in the tariff structure with consumers reacting to price signals provided by the installation of pre-paid meters as well as the global downturn.

Table 17. Op and R&M exp by Sub-head: 2010-11 Budget compared with 2009-10 Budget (\$)

Sub Head	2009-10	2010-11	% change B'11 cf B'10
	Budget	Budget	
311 R&M office equipment	22,690	16,578	-26.9%
312 R&M office premises	13,034	56,213	331.3%
353 R&M plant	256,246	328,634	28.2%
354 R&M buildings	166,600	205,865	23.6%
355 Fuel & oil	6,633,050	4,780,353	-27.9%
452 R&M Aerodrome	38,362	50,000	30.3%
502 Plant & Equip	2,108,300	2,095,439	-0.6%
Domestic Exp Total	57,749,902	29,070,699	-49.7%

204. Such large variability in expenditure highlight a number of critical infrastructure issues. Firstly, the vulnerability of Nauru to external forces; secondly, the lack of resilience in the economy to accommodate them; and thirdly, the budgeting problems caused by the lack of a planned maintenance program.

205. Overall government expenditure on R&M is very low and falls far short of that necessary to ensure capital assets provide the services that could be expected over a standard lifetime. Lack of maintenance and preventative maintenance in particular, has resulted in substantially shortened life times of service in Nauru with much higher costs to keep assets working towards the end of their shortened lives. The perception that donors will replace capital assets when they no longer perform, is well entrenched.

206. In general, cost recovery has not been a feature of Nauruan government budgeting. The recent change in electricity tariffs is a step in the right direction, but there is still some way to go before full cost recovery is achieved. Other sectors have yet to address cost recovery in any tangible way.

207. At the beginning of this section, reference was made to short-term thinking. As well as the government, donors also need to take a longer term view. In Nauru where the Budget is severely constrained, life cycle costs should be a serious consideration in all capital purchases. If life cycle costs cannot be accommodated within the budget for a particular capital asset, then consideration should be given to down grading the functionality of capital expenditure until these costs can be accommodated. If this is not done, then lack of maintenance will inevitably be perpetuated in the future.

208. Potential implications for the NEISIP are a function of external and internal factors. External forces, including global economic cycles, will continue and impact negatively on Nauru at times. Improving the resilience of the economy to these shocks is very dependent on the performance of the mainstay of the economy, the phosphate industry, generating the funds to invest in activities that will broaden the base of the economy. Better management of assets will ensure that what scarce capital to which Nauru has access, gives the greatest economic and social return. Ensuring that new infrastructure is engineered to the needs of Nauru will be a good start. It should be functional and recognize that Nauru does not have a culture of maintenance. Changing that culture to one that recognizes the benefits of preventative maintenance and timely and regular maintenance will take some time and will take a concerted effort at all levels.

VI. FUNDING STRATEGY

209. The funding strategy outlines the projected demand for infrastructure related finance; the capacity of Government and SOEs to address total costs; and the interventions that Government can make to improve the infrastructure financing environment.

A. Demand for Infrastructure Finance

210. The overall demand for financing new projects is divided not only between financing new projects but also maintaining and operating these new projects.

211. Table 18 shows the total projected demand for infrastructure financing over the next five years, covering projects that are underway or committed, and high priority investments. Total demand for finance over the next five years amounts to \$83.4 million, of which 7.9% is for maintenance, 3.9% is for operating expenditure and 88.1% is for new capital investment.

Table 18: Projected expenditure by activity (\$m)

	Total	2011	2012	2013	2014	2015
Capital*	73.11	11.81	28.60	9.45	16.35	6.90
Maintenance	6.89	0	1.27	1.83	1.83	1.97
Operating	3.40	0	1.20	1.69	1.69	-1.19
Total	83.40	11.81	31.07	12.97	19.87	7.68

Note * Capital includes concept planning and detailed design plus supervision and contingency escalation

i. Maintenance

212. Maintenance and the broader issues of asset management and sustainability are critically important issues for the Government and are a key focus of the NEISIP. There is a history of under-performance in this area (shared with other Pacific Island Countries) which in Nauru's case appears to arise for the following reasons:

- Intergenerational cultural factors that stem from the natural basis of island infrastructure (e.g. houses built of local materials had a finite life unless destroyed by weather and when that point came a new house was built).
- Experience that if a donor-provided asset became unusable, eventually the donor would replace it.
- Budget policies that do not allow for all operating and maintenance expenses from revenues based on fully costed tariffs
- Insufficient cash in the budget after salaries and other fixed costs (in the short term) are met and often leaving urgent preventative maintenance delayed for another day or year or decade.
- A culture of "fix it when it is broken" rather than applying preventative maintenance practices.
- Budgets that do not allow for fully-funded maintenance from revenues.
- Service prices that do not adequately provide for maintenance.

- Investment decisions being made on the basis of the supply price only and not whole of life costs, leading to the purchase of cheaper, poor quality assets with a shorter economic life.

213. In order to have an efficient and effective infrastructure program, changes are needed in a way that addresses the above factors. Ideally, this means that at least the full cost of operating and maintaining economic infrastructure should be funded from operating revenues and recovered through user charges. This will involve strengthening the financial performance of SOEs and Ministries. It could also involve setting aside money in a reserve account for known periodic major maintenance events. In the short term the priority is to cover routine operating and maintenance costs. This should be followed by the replacement of smaller capital items. In the medium to long term the Government needs to take increasing responsibility for infrastructure. This will extend full cost recovery to the replacement of smaller infrastructure leading to major items as capacity grows. The Government has already started on this process by implementing market related pricing policies for electricity, bus fares, telecommunications, and Our Airline tickets. By charging realistic prices consumers are better able to manage their demand for government services and at the same time it provides funding for O&M.

214. As part of this process of taking full responsibility for infrastructure the following seven point plan is proposed as a possible basis to start improved maintenance performance and be adopted by all those in control of economic assets in Nauru:

1. Each asset owner should conduct (with expert assistance if necessary) a review of their operations, investment plans and tariffs to ensure that adequate service prices are planned;
2. Submission and review of these plans to an independent regulator to make a determination of appropriate tariffs;
3. Establishment of a maintenance reserve account (with appropriate controls on how the money can be used) for periodic major maintenance;
4. Provision of advice on planning and implementing improvements in operational efficiency;
5. Application of whole of life investment planning principles;
6. Development of asset management plans that provide for preventative maintenance, including training; and
7. Conversion of accounting standards to International Financial Reporting Standards (IFRS) to ensure maintenance spending is recorded properly.

215. Implementation of these measures is expected to be largely funded from existing resources in the short term. Successful implementation will require leadership from the Government and technical assistance grants from development partners, at least in the short to medium term.

ii. Capital expenditure

216. Nauru's capital expenditure requirements are set out in Section V. This expenditure is divided between projects that are underway or committed and NEISIP priority projects. Table 19 shows the projected capital expenditure by project category over the next five years.

Table 19: Projected capital expenditure* by priority (\$m)

	Total	2011	2012	2013	2014	2015
Committed and/Funded	12.14	10.79	0.45	0.45	0.45	0
High priority	60.97	1.02	28.15	9.00	15.90	6.90
Total	73.11	11.81	28.60	9.45	16.35	6.90

Note * Capital includes concept planning and detailed design plus supervision and contingency escalation

217. Funding for the high and medium priority projects is uncertain as they are either at the planning or identification stages.

iii. Life cycle costs

218. The capital cost of the NEISIP over the first five years amounts to \$63.06 million and when concept planning and detailed design plus supervision and contingency escalation are added the sum increases to \$73.11 million (as shown in Table 18). Maintenance and operating costs in the first five years are small in comparison at \$6.9 million and \$3.4 million respectively. However, when maintenance and operating costs are taken over the 20 year life of the projects, the total life cycle costs of the NEISIP amount to \$198.97 million with maintenance amounting to \$60.88 million and operating expenditure amounting to \$64.98 million. This highlights the hidden cost of infrastructure, which over the lifetime of the projects in the NEISIP amounts to almost four times the initial capital cost. Details of the breakdown of these life time costs project by project are set out in Table 20 with a further breakdown separating out Capital, Maintenance and Operating costs in Appendix E.

219. Just adding the dollar amounts over a 20-year period to give a total is misleading from a capital budgeting perspective, because a dollar today is worth more than a dollar in 20-years' time. This is because the dollar today can be used for consumption or investment while the dollar in the future is less certain to be available and cannot be used until a number of years have passed. The way that this time value of money is accounted for is to discount future cash flow streams. The choice of discount rate is controversial. From the perspective of an investor the appropriate rate is the expected return on investment given by the weighted average cost of capital. Typically this would give a real discount rate of 8% or higher. Another perspective is to adopt a social time preference rate, which is usually taken to be the long term sustainable growth rate of the economy. Typically, this would give a rate of around 2%. Adopting a high discount rate implies a high regard for dollars in the near term while adopting a low rate implies a high regard for the longer term future.

220. In Nauru's present situation, where capital is severely constrained and there are many competing users for scarce capital it may be appropriate to use a high discount rate as this puts emphasis on the near term. On the other hand, investment is also required for a long term sustainable future implying a low discount rate. In order to highlight the real cost over a 20-year life for the NEISIP cash flows are discounted at 8% and 2%. This shows the effect of taking a short term view in contrast to a long term view. The undiscounted total cost of the NEISIP over 20 years is \$194.91 million. At a discount rate of 8% the present value (PV) is \$104.09 million.

Table 20 Nauru Infrastructure Priority Scheduling																				
TOTAL COST	Ref	Project	Estimated Capital Cost (\$m)	Estimated life cycle costs (\$m)	Status	Funding Source	2011 - 2038													
							11	12	13	14	15	16	17	18	19	31	32	33	34	35
Committed and Funded																				
	W2	Solar Power RO Unit	3.00	24.36	F	PEC	3.36	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05				
	W3	Supply and commissioning of 300kL RO Unit	0.60	4.87	C	AusAID	0.67	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21				
	W1	EU Envelope B - Risk Reduction Project (C1-C6) & water tankers (1@10kl)	0.76	2.36	F	EU	0.84	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08				
	P1	Jet Fuel Supply	0.40	1.64	F	AusAID	0.44	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06				
	S1	Mainstreaming IWRM	0.30	0.63	F	GEF	0.33	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
	T1	New Telecom Towers	0.15	0.53	C	AusAID	0.17	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
	A1	PAPI System	0.10	0.33	F	AusAID	0.11	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01				
	R1	Solar Street Lighting	0.30	0.63	F	ROC	0.33	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02				
	R2	Fleet Augmentation	0.15	1.07	F	Azerbaijan	0.17	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05				
	BA1	Police HQ	2.70	8.37	F	AFP	2.97	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27				
	M1	Omega 65 tonne Crane	0.50	2.56	P	AusAID	0.56	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10				
	S5	Hospital Hazardous Waste Incinerator	0.30	1.24	I	U	0.00	0.05	0.05	0.05	0.38	0.05	0.05	0.05	0.05	0.05				
	BA2	Police Youth Club	0.20	0.82	C	AusAID	0.22	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03				
	BH2	Annual Refurbishment to Hospital	1.20	1.32	C	AusAID	0.42	0.30	0.30	0.30										
	BE1	Schools Annual Refurbishment Program	0.60	0.66	C	AusAID	0.21	0.15	0.15	0.15										
	Sub-total		11.26	53.11			10.79	2.50	2.50	2.50	2.05	2.05	2.05	2.05	2.05	2.02	0.00	0.00	0.00	0.00
	PV			29.69																
Priority	High																			
	M2a	New Quay wall - Scenario 2 & Anibare Mooring	14.40	30.82	P				9.00	9.00	-2.74	-2.74	-2.74	-2.74	1.58	1.58	1.58	1.58		
	BH3	New Hospital	12.00	55.80	P	U			6.90	6.90	0.00	0.00	0.00	0.00	3.00	3.00	3.00			
	S3	Pump Out "Alternative Disposal Options" Recycling Project	0.50	4.08	P	U		0.58	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18		
	A2	Runway Resurfacing & Fencing	3.80	12.05	P	U		4.45	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38		
	A3	Nav aids -VOR	0.40	1.34	P	U	0.46	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04		
	R3	Roads Rehabilitation	1.00	3.14	P			1.24	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10		
	BE2	Aiwo School Rebuilding	12.60	16.02	P			14.52	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08		
	BE3	Learning Centre	3.60	9.61	P			4.21	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27		
	W4	Water Delivery - Additional Water tankers (3 x 4kl)	0.50	3.50	P	U	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.00	0.00		
	PW1	O&M spare parts store and workshop (shared with Utilities and Menen H	3.00	8.36	P	U		3.36	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25		
	Sub-total		51.80	145.86			1.02	28.57	10.47	17.37	5.63	-1.27	-1.27	-1.27	3.05	5.88	5.73	4.86	0.25	0.25
	PV			74.40																
	TOTAL	Ongoing and Priority Projects	63.06	198.97			11.81	31.07	12.97	19.87	7.68	0.78	0.78	0.78	5.10	7.90	5.73	4.86	0.25	0.25
		TOTAL PV		104.09																
		Discount rate	8.0%																	

Note: PV is the present value of the cash flow over time discounted at 8%
 F – Funded; C – Committed; P – Planned; I – Identified; U – Unfunded

221. What this means for the NEISIP is that a long term sustainable future requires a focus on maintaining infrastructure assets, as these are the costs that occur in the future and impose a real burden on society. The estimated maintenance costs in the NEISIP are based on a planned approach. If actual maintenance is neglected, then costs will be higher due to the shortened life of the assets and the costs imposed on the economy of poor performance or non-performance.

222. The next section looks at the overall capacity for funding the NEISIP investments from local or other sources.

B. Current Capacity of Capital Markets

i. National Situation

223. The Nauruan Government prepared its budget for 2010-2011 with the world slowly climbing out of the deepest global recession since the Great Depression. Nauru is not immune to the ongoing negative effects, a key one of which was the abrupt reduction in demand for phosphate.

224. As the Minister of Finance said in his Budget speech, the Nauruan economy is in a fragile state. The Government is not in a position to fund a stimulus package or to run a deficit to maintain high levels of expenditure. Rather, the Government's Budget must be fully funded through cash reserves. Nauru's limited and volatile revenues from non-donor sources, like fisheries license revenue and phosphate related payments, continue to be difficult to forecast; and, both are subject to forces that are beyond the control of the Government. A major priority of the Government is to broaden Nauru's economic base to insulate against these forces.

225. The 2010-11 Budget adopts an overall balanced stance, continuing the prudent fiscal management that has been maintained since 2004. Expenditure continues to be focused on core areas of basic and essential public services, consistent with NSDA goals. The 2009-10 approved Budget allowed for domestic expenditure of \$31.6 million along with donor funded expenses of \$29.2 million, leading to an overall net financial position of \$460,000 after drawing on cash reserves of \$3.4 million. The actual outturn was a net cash position of \$7.7 million after domestic expenditure of \$20.2 million and donor funded expenditure of \$11.2 million. Actual domestic revenue in 2009-10 was down by 31% to \$18.7 million and donor revenue down 45% to \$17.0 million compared to Budget (see Table 21).

Table 21. Budget Summary 2009-10

	2009-10 Approved	2009-10 Actual
Domestic Revenue	27.11	18.66
Donor Revenue	30.74	16.99
Total Revenue	57.85	35.65
Domestic Expenditure	31.58	20.16
Donor Expenditure	29.19	11.16
Total Expenditure	60.77	31.32
Net Budget Position	-2.92	4.33
Cash Reserves	3.39	3.39
Net Financial Position	0.46	7.71

Source: 2010-11 Budget

226. The 2010-11 Budget is estimated to generate total revenue of \$28.9 million (including general budget support but excluding donor revenue) and total expenditure of \$29.0 million

(excluding donor funded projects), a decrease of 9% on the previous year. This results in a small projected deficit of \$144,000 that will be funded from cash reserves of \$900,000 brought forward from 2009-10, leaving an overall net financial position of \$756,000. Donor funded budget support is expected to be \$32.8 million and donor expenditure \$31.0 million. Without this generous level of support, Nauru's already low standard of living (GDP per capita in 2009 was estimated by ADB at US\$2,240) would be more than halved.

227. In addition, Nauru faces an enormous burden of debt. Previous Nauruan administrations spent recklessly and borrowed excessively in areas that provided no long-term benefits to the Nauruan people. Beginning in November 2006, the Government has worked with AusAID funded consultants to develop a debt management strategy and is now addressing this burden. In 2010, the estimated external debt owed is \$261 million. There is a further \$265 million of internal debts owed mainly to depositors in the insolvent Bank of Nauru. Also, debts of about \$368 million are owed between and among SOEs and the Government of Nauru. This situation precludes Nauru from further borrowing for the foreseeable future.

228. This means that Nauru will remain dependent on external relationships with its donor partners. Ideally, appropriate support from these parties will be in the form of grants and technical assistance, which would be best directed towards financing complementary activities and those projects that are financially viable. In the long term, Government reforms, debt repayments and a revitalized mining and quarrying sector along with a broadening of the basis of the economy should result in opportunities for local funding.

ii. Debt Management

229. The debt situation of the country is dire, with Nauru being described as a small island state in severe debt distress.³² This is due to the accumulation of massive amounts of debt relative to its size, all being in arrears or default. By the usual ratios (Net Present Value of debt to exports, debt service to GDP and debt service to government revenue excluding grants), Nauru's debt is overwhelming, being more than 2,500% on the debt to GDP ratio. The estimated sustainable debt burden is equivalent to 185% of GDP, but this assumes a net Budget surplus of \$2.2 million. This does not seem feasible without reductions in government services from their already low levels.

230. In general, ability to service debt is based on projected free cash flows from operations and the value of assets that can be liquidated. In Nauru's case, there are no assets that can be liquidated to satisfy creditors. Action over the past two decades by creditors has stripped away any marketable assets. Remaining significant assets including Our Airline's aircraft, Bank of Nauru's advances to individuals, SOE plant and machinery, and NRC's funds and future NACOS payments due from the legal action against Australia can be assumed to be safeguarded against claims. Other less-tangible assets such as Government investments in PHILPHOS, long-term fishing and mining rights, and land are also in this category.

231. Free cash flows from operations do not hold promise either, except possibly in the long term. Currently, and for the foreseeable future, the Government will rely heavily on its donor partners to balance the Budget and maintain core services. Also, the future dividends of SOEs are needed to fund core services.

232. As Nauru does not qualify for any of the debt relief provisions of the major multilateral finance organizations (IDA, IMF, Paris Club), the debt management strategy will have to rely

³² Storkey, I. and T. Robinson (2007). Comprehensive debt management strategy for the Government of Nauru, prepared under AusAID contract No. 39878, April 2007.

on negotiations with individual creditors or with groups of creditors where possible. The basis of a negotiating strategy may include creditors making deep concessions on write-downs, extending repayment schedules, refinancing, debt swaps and possibly netting off of Bank of Nauru liabilities after deep discounting. Experience in the Solomon Islands shows that an important component of a strategy is robust and comprehensive communications with all creditors and regular information on debt reduction progress, backed by good record keeping.

233. The Government is severely constrained as to its ability to balance debt obligations against ability to pay, while providing services to its people. It faces a formidable ongoing balancing act. In this context, the NEISIP will rely heavily on the support of Nauru's donor partners.

iii. State Owned Enterprises

234. Significant progress in service delivery has been made by the SOEs in recent years, but all rely on significant donor support to make further progress. The capacity and capability of key staff is inadequate and struggles without technical assistance. This situation is expected to continue for the foreseeable future. Set out below is an overview of the financial status of each of the SOEs and where possible an indication of their ability to self-finance maintenance of assets and growth over the next five years.

235. The NRC estimates of revenue and expenditure indicate that the SOE should be profitable over the next five year period.³³ This is despite a poor performance in 2009-10 due to low productivity, lack of demand for phosphate rock and much lower than projected sales of aggregates and boulder rock resulting in an operating loss after depreciation of around \$2 million. Sales of primary phosphate rock in 2010-11 are projected to be around 320,000 tonnes (wet basis) up from 280,000 tonnes in 2009-10 and tapering off to 60,000 tonnes in 2013-14 and zero thereafter. Secondary phosphate sales are expected to rise from 120,000 tonnes in 2009-10 to 600,000 tonnes by 2014-15. Aggregate and rock sales are expected to rise from 20,000 tonnes in 2009-10 to a little over 100,000 tonnes by 2013-14, of which around 50,000 tonnes is expected to be from exports. Earnings after provision for depreciation are projected to rise from about \$1 million in 2010-11 to \$2.8 million in 2014-15. Net cash flow (operating revenues less operating costs less capital expenditures) is projected to rise from \$1.2 million in 2010-11 to \$4.1 million in 2014-15.

236. NRC estimate that after allowing for a dividend to the Government, cash reserves (including the NACOS payments) are expected to be more than sufficient to finance operating costs and replacement expenditure. Capital expenditure in 2010-11 is expected to be around \$1.6 million then fall to around \$0.9 million for the remainder of the five year period. Purchase costs of a bulldozer, rollers, tractors and a service truck boost 2010-11 expenditure by \$0.7 million. The revenue projections are based on significant improvements in productivity and demand for phosphate and aggregate.

³³ NRC estimates of revenue and expenditure for FY 2010-11.

Table 22. NRC Production and Earnings estimates

Financial year	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Sales Primary P (wet t)	280,000	320,000	233,000	147,000	60,000	0
Sales Secondary P (wet t)	120,000	216,000	312,000	408,000	504,000	600,000
Sales Aggregate/Rock (t)	20,000	40,000	60,000	80,000	100,000	100,000
Earnings Depreciation (\$m)	-2.0	1.0	na	na	na	2.8
Net cash flow (\$m)	na	1.2	na	na	na	4.1
Capex (\$m)	na	1.6	0.9	0.9	0.9	0.9

Source: NRC and project interpellations
na – not available

237. RONPHOS, which relies on NRC to deliver rock phosphate to its screening, grading and drying facilities before export, teeters on the edge of collapse. Its buildings, plant and machinery are run down and well past that for an efficient and effective operation. It is kept running by stop gap measures and the skill and experience of its engineers making do with minimum resources. It will probably be able to continue operating for a further five or so years before a complete rebuild is required.

238. The NUA reported a nominal surplus of \$0.2 million in 2009-10 based on income of \$1.9 million and expenditure of \$1.7 million³⁴. Subsidies amounted to \$2.3 million. Outside this, fuel to run generators (which is donor funded) amounted to \$7.8 million. Budgeted R&M amounted to \$1.2 million and actual R&M \$0.2 million. Budgeted income for 2010-11 amounts to \$3.1 million, slightly more than budgeted expenditure. Subsidies are expected to double, increasing to \$4.6 million (see Table 23). The replacement cost of the 10MW generating capacity is estimated at \$6 million and is required every ten years. This equates to around \$0.5 million per annum as a contribution to a capital replacement fund, which is currently not budgeted. The current domestic tariff of 10 cents/unit for up to 300 units/household/month, is 38% of full cost recovery; and for more than 300 units (at 20 cents/unit) it is 76% of full cost recovery. Average household consumption is around 400 units/month. Industrial users are not subsidized, but commercial users pay the same as the higher domestic rate. As the NUA is currently running at about 20% of full cost recovery there is a long way to go before basic utilities of electricity and water are self-sustaining from tariffs³⁵.

³⁴ NUA Proposed Budget, 2010-11.

³⁵ The NUA budget for water is constructed from estimates of output and there is an urgent need for real performance data, especially metering of all production units, to determine efficiency levels, leakage and non-payment for service.

Table 23. NUA Budget 2009-10 and 2010-11 (A\$m)

	2009-10 Estimated	2010-11 Budget
Income		
Electricity sales		2.816
Water sales		0.700
Tank Farm income		0.204
Other		0.017
Total income	1.900	3.107
Expenditure		
General & Admin		0.400
Employment		1.415
Occupancy		0.171
R&M	0.200	1.024
Total Expenditure	1.700	3.008
Nominal Surplus	0.200	0.099
Subsidies		
Electricity		2.699
Water		0.947
Tank Farm		0.703
Other		0.300
Total Subsidies	2.300	4.649

Source: NAU Proposed Budget FY 2010-11

239. Nauru Airline Corporation, trading as Our Airline, is recovering from a slump in revenues in 2007 and expects to reach breakeven on an EBIT basis in 2010-11.³⁶ This is based on receiving a capital injection to secure additional profitable revenue streams from charter and scheduled operations. Critical to the airline's operation are upgrades to supporting infrastructure which are the responsibility of the Directorate of Civil Aviation including the recommissioning of Aviation fuel storage, and immediate stop-gap repairs to the runway followed by a full resurfacing within 2-3 years. In addition, landing safety aids are required to ensure a safe operating environment.

240. Eigigu Holdings, comprising Eigigu Enterprises (a construction, civil engineering, project tendering, furniture making and warehousing operation), Eigigu Imports, Eigigu Civic Centre and Menen Hotel has a long history of poor profitability. Estimated revenue in 2010-11 amounts to \$2.4 million, with expenditure of \$2.7 million leaving a net loss of around \$300,000.³⁷ All the operations are staggering along with insufficient revenues to cover the full cost of services plus a profit on capital invested. Assets are in a run-down state, with a backlog of serious deferred maintenance issues.

241. The arrival of Digicel in Nauru has transformed telecommunications on the island. There is now an excellent cellular phone and wireless internet service, replacing the slow and erratic land line and cable system. Digicel took over the telecommunication assets of the Government in exchange for a 20% share of the company. Further developments in the service will require additional contributions from the Government to retain its share of the company. As the company is a private sector monopoly provider a careful watch will be needed to ensure the operation remains competitive with other regional telecommunication systems in terms of price and service delivery.

³⁶ Nauru Airline Corporation 2010-11 Budget submission.

³⁷ Eigigu Holdings 2010-11 Budget.

242. In summary, the SOEs, apart from Digicel which is largely offshore owned and operated, are all struggling to be viable and sustainable. Service delivery has significantly improved over the last few years due to the reforms of the Government, the efforts of staff and inputs from donors. Financially, it is difficult to assess sustainability as the NEISIP team was unable to view balance sheet information. Good information on the financial position of the SOEs is a prerequisite to the establishment of sound operating and maintenance policies.

C. Overall Funding Strategy

243. It is clear that Nauru does not have the capacity to finance infrastructure projects from its own resources and it will have to rely on donors and off-shore investors. The latter group includes businesses associated with the phosphate industry. In addition, there is a place for investors that can deduct payment for services at source or on pre-paid basis as has been demonstrated by Digicel in the telecommunications sector. In summary:

- The Government Budget is already heavily supported by donors with internal sources of funding severely constrained
- Government debt is at extremely high levels leaving no margin for additional borrowing for the foreseeable future
- The SOEs are a long way from being commercial propositions for funding
- The local business environment lacks fundamental banking, insurance and other critical services.

244. Given these constraints, Nauru is seeking to adopt reforms that will improve the performance of existing infrastructure assets as well as adopting measures that will see future infrastructure expenditure better utilized. The aim is to progressively take responsibility for the operation and maintenance of infrastructure. The benefits of reforms can occur quite quickly as seen by the immediate and major reduction in electricity demand following the introduction of pre-paid metering of domestic electricity along with a progressive tariff structure. In this case, a basic block of power was provided at heavily subsidized rates with consumption in excess of this charged at a much higher rate. Such reforms not only provide price signals to consumers about purchasing decisions, but also provide revenue for operating, maintaining and improving services. Nauru has just begun the move to full cost recovery and still has a long way to go. Nevertheless, the benefits of these initial reforms have been impressive and highlight the need to continue the process of reform as the economy grows.

245. In sectors where government already charges for services including electricity, bus fares and Our Airline tickets, there will be a progressive move to full cost recovery. Water is a key sector where reforms are urgently needed. Currently there is no metering of water produced by RO units or water delivered to consumers by tanker, which makes it impossible to gauge efficiency levels and determine what full cost recovery would be. There is a huge gap between the expected level of water production and sales revenue. Considerable quantities of water appear to be lost through leakage, but lax implementation of charging for water and non-payment are also important factors. Proper monitoring procedures are the first step towards establishing the real cost of water production and distribution.

246. Service provision for these important social services will be structured in such a way that households will receive a basic level of service at reduced rates and those who use additional quantities will meet the full cost on an increasing scale. Not only will this ensure basic needs are met, but assets will be maintained and demand moderated. The experience in the electricity sector shows that this strategy can have immediate benefits in reducing demand by sending signals on the real cost of service provision thus easing the pressure on stretched resources. Where it is difficult to directly charge for service provision in areas such

as roads and buildings, alternative charging mechanisms need to be sought. For example, a fuel tax collected at the pump could be considered as a way of raising revenue for the upkeep of roads.

247. Nauru will need the support of donors to follow through on this strategy. It will require a close working relationship between government, public enterprises, private sector providers, donors and investors. There are a number of areas where improved efficiencies can be made through the contracting out of services to the private sector, such as road maintenance, airport and port management and the collection and disposal of solid waste. It is important to ensure that there is an open competitive bidding process with regular contract reviews so that an efficient and effective service is provided on an ongoing basis. The government should consider a review to determine where the greatest gains can be made from the involvement of the private sector and progressively move in this direction. There will be benefits not only in a more efficient and ultimately more cost effective service delivery, but also it will help expand the role of the private sector in providing jobs and growing the economy.

248. In the medium to long term what can be done will depend on the success of the phosphate industry. The more successful this is the sooner Nauru can contemplate taking a greater role in funding infrastructure. While exports of phosphate will continue to occur using the cantilever/mooring system there is the possibility in the medium to long run that the mooring system will be replaced by ships docking alongside a sea wall and being loaded from there. In addition, the export of aggregate and dolomite rock could be undertaken directly from trucks unloading on to ships docked at the sea wall. This raises the possibility of NRC being a co-financier of port construction and operation. An alternative that is likely to be preferable to NRC (as port ownership is not core business) is for each tonne exported to be levied based on a capital charge for construction and provision for ongoing operation and maintenance costs. With such a system in place this would encourage donors to contribute to components of port construction as referred to previously.

VII. SECTOR PRIORITY PROGRAMS

249. This section combines the prioritization, timing and investment analysis, and outlines the key program requirements and necessary supporting activities for each sector over the coming five years.

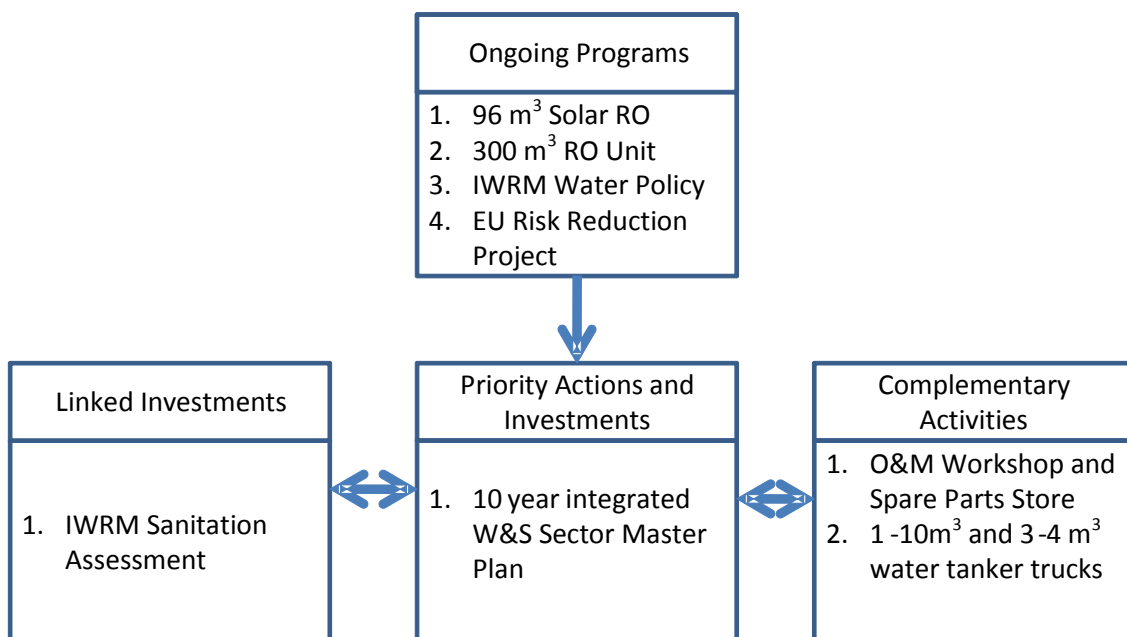
A. Water

250. A Water & Sanitation Sector Master plan is essential for the comprehensive assessment of the sector, and the detailed analysis of investment alternatives. It should begin with filling in the baseline information gaps (such as volumes of water produced, stored and delivered; household usage benchmarks, water quality etc) so that policy can be based on realistic figures. A range of investment alternatives (such as rainwater tanks; reticulated supply, gravity-fed supply lines) should be analyzed using economic, financial and community criteria and integrated into an overall master plan for implementation. Financial sustainability, cost recovery, O&M and management capacity should be carefully considered in the plan. Government should approve each stage of the planning process and ensure that cost recovery and tariff structures are adequate for ongoing maintenance and sustainable future investment.

251. Figure 5 outlines the proposed water investment program. As outlined above, the key program activity for the water sector is to prepare a master plan for the sector. Furthermore investment is needed in providing NUA with an Operation and Maintenance Workshop and a secure store for adequate spare parts, and a revolving fund for procurement of non-stocked items. It is critical that this project be coordinated with improved staffing capacity and funding for maintenance. A review of tariffs and funding will be part of the water & sanitation sector master plan.

252. Given the enhanced RO water production and rehabilitated storage capacity projects currently underway, water delivery becomes the critical path. The proposal to augment delivery capacity with new trucks does not impact proposals that may eventuate from the master plan, and provide a means for addressing critical household demand for water.

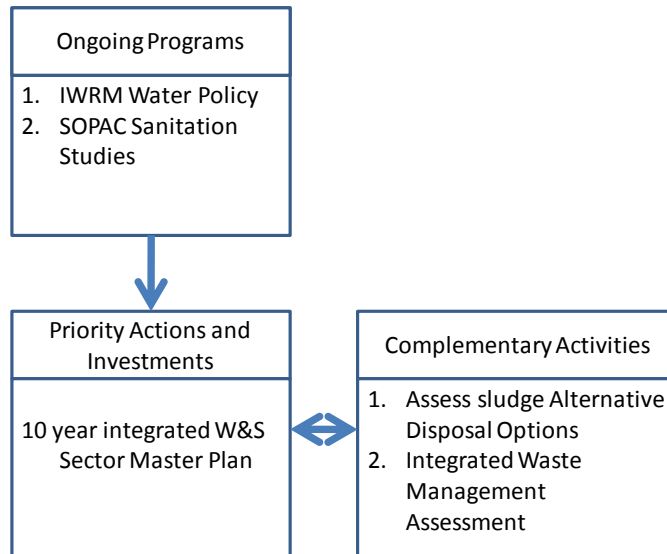
Figure 5: Water Investment Program



B. Sanitation & Waste Management

253. Figure 6 outlines the proposed sanitation and waste management investment program. The program rests on a range of proposed and on-going studies and planning activities. The IWRM policy project will complement the development of the Integrated Water and Sanitation Master Plan, ensuring that investments, operations and practices are within a coordinated water resource management framework. Financial sustainability, cost recovery, O&M and management capacity will be carefully considered in the plan.

Figure 6: Sanitation and Waste Investment Program



254. Following the conclusion of the policy and planning development, the logical next step is the development of alternative solutions for sludge disposal. This has environmental, health and business benefits and will be used by CIE to develop longer term solutions for sanitation in Nauru.

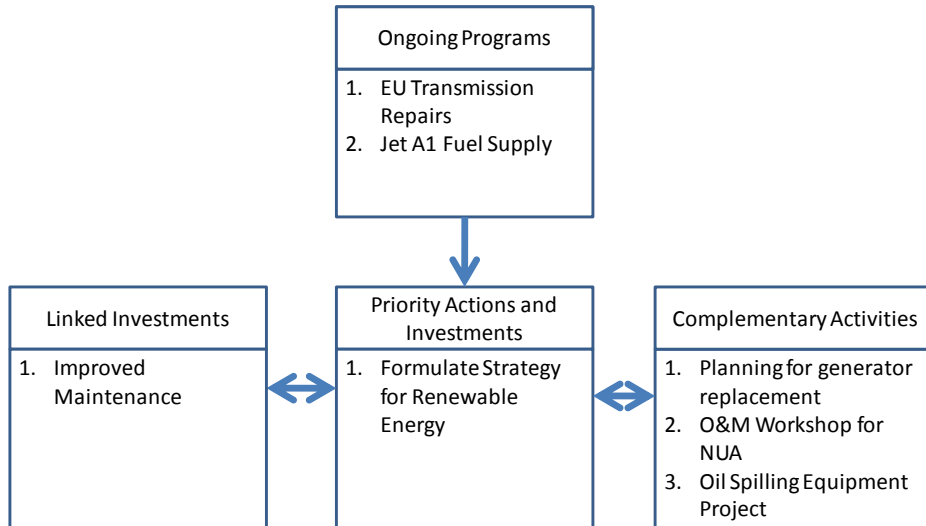
C. Power

255. Figure 7 outlines the proposed power investment program. Based on the government policy to achieve 50% Renewable Energy Target by 2015, a strategic priority for the Government is to assess the feasibility and develop a strategy to achieve this goal. Given NUA’s long term program to rehabilitate the current generators, the focus of the sector program is to maintain those gains. Improved maintenance will be facilitated by the development of an O&M workshop that includes a spare parts store. The store will stock critical and often used parts for the generator and associated equipment which will then need to be re-inventoried. A designated fund will be used to rapidly order infrequently-replaced critical parts rather than waiting for long administrative processes. The program will require dedicated support from NUA to ensure that personnel, resources and security arrangements are in place to complement the workshop. Government should ensure that tariffs and NUA subsidies are reviewed so that O&M funds are adequate to maintain the resourcing of the workshop and store. Also, there is a need to assess the feasibility of purchasing oil spill response equipment as described in Annex A.

256. It is expected that given the current rehabilitation and maintenance program, the NUA generators will supply adequate reliable power for the next 10-15 years. However, given their substantial cost, future revisions of the infrastructure strategy should begin to

plan for funding and securing replacement. This should take the form of a comprehensive engineering assessment of the current power generation capacity given expected future demand, and to map out a long term strategy to address this issue.

Figure 7: Power Investment Program



D. Telecom

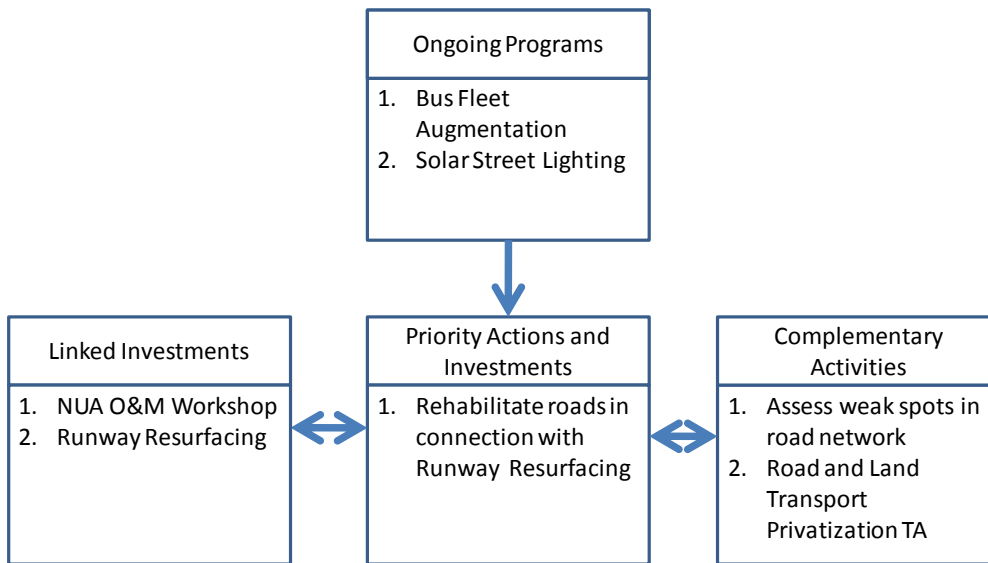
257. Nauru has a telecom system that, for a small island country, is reliable and efficient but relatively expensive. Given that there is a monopoly provider, the Government’s main program is to develop policy and regulations to ensure that consumers are protected. It is envisaged that the policy will develop some form of consumer watchdog (such as a Telecom Ombudsman) that would be responsible for addressing service complaints and determining tariff structures and management.

E. Road & Land Transport

258. Figure 8 outlines the proposed road and land transport investment program. It is hoped that Transport will be able to purchase workshop time and space and service from NUA in order to assist with maintaining its newly acquired buses and street lights.

259. Given the proposed airport runway resurfacing is a priority, the Government has decided to also prioritize road rehabilitation, given its potential to be easily integrated and save costs. The Ministry of Transport is considering options for funding roadway upgrades utilizing the equipment that is due to be on-island during the runway resurfacing. This should be part of an overall road and land transport technical assistance that assesses the potential for private sector involvement in O&M and transport services; develops policy & governing regulations; and facilitates the establishment of those mechanisms.

Figure 8: Road & Land Transport Investment Program



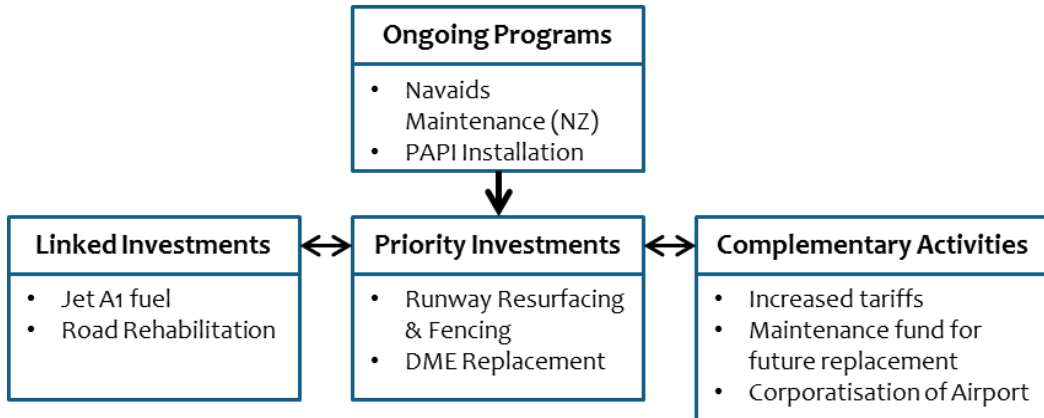
F. Air

260. Figure 9 outlines the proposed air transport investment program. The key for DCA is to maintain air safety to international standards. The provision of navigational aids will enhance landing safety, and the replacement of the DME equipment will ensure that high altitude airspace fees are maintained.

261. The critical infrastructure is the runway resurfacing and re-fencing, which needs to occur by 2013. That means planning for funding and procurement needs to begin immediately. While the runway is a relatively simple technical matter, the re-fencing will require significant community involvement in its design, including the style and siting of gates.

262. In the longer term, DCA needs to be able to sustain its investments in navigational aids, airport buildings and runway. It cannot let these items depreciate without having appropriate funding available for their eventual replacement. Consideration needs to be given to increasing fees and charges for aircraft movements, and placing these funds into a long term maintenance fund. The corporatization of DCA could be considered as a means to achieve these outcomes, and could draw upon the experience by many other airports in the Pacific. It could also utilize the experience gained in the current SOE reviews by ADB.

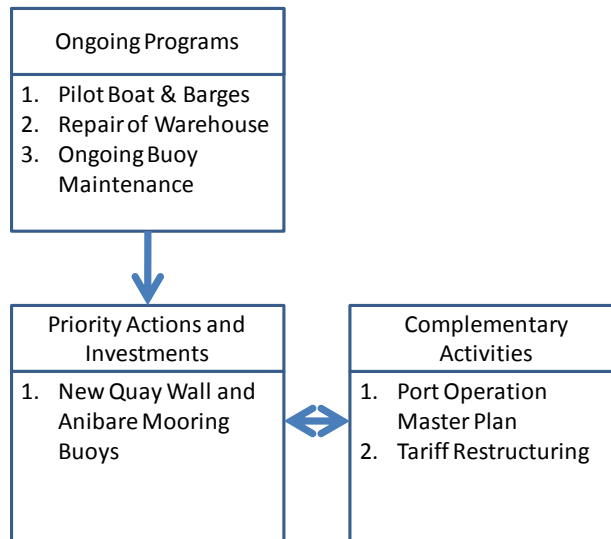
Figure 9: Air Transport Investment Program



G. Maritime

263. Figure 10 outlines the proposed maritime transport investment program. The critical program for this sector is the development of the new quay wall. While this is already in the planning stages, it has been ranked the highest priority for Government, but is still subject to donor support. The Government is considering the potential for multiple donors to support discrete sections of the wharf construction, or implementation process. To complement the wharf, significant institutional capacity and capability improvements need to occur. These include administration and finance sections, O&M capability and revised operations and tariff structures. While the development of these processes can be part of the detailed design, Government must commit to establishing and maintaining these functions in the long term.

Figure 10: Maritime Transport Investment Program



H. Government Buildings

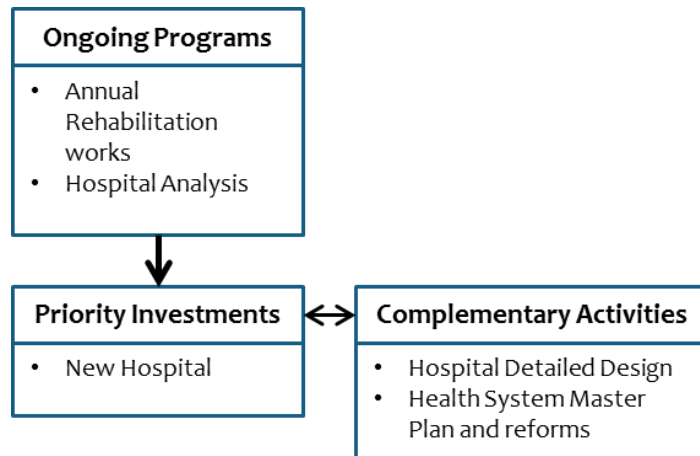
264. Apart from the ongoing development of the police and youth centers, there are no plans for further rehabilitation or construction of new Government buildings. While the concept of an indoor stadium has some financial and public health merits, the need for infrastructure that strongly contributes to the economy is paramount.

265. Of critical importance for all buildings, including those newly constructed, are adequate maintenance capacity and funds. Even if these are available, there must be some designated authority within Government that ensures critical maintenance regularly occurs. Donors are now less willing to replace infrastructure that has deteriorated due to inadequate care. Given the primacy of other key infrastructure, no significant proposals for building rehabilitation or climate change adaptation have been considered at this time.

I. Health Buildings

266. Figure 11 outlines the proposed Health buildings investment program. A detailed assessment of hospital development options is already underway. Although, AusAID has given in-principle support for its eventual funding and development, this will be heavily reliant on a realistic, efficient and cost-effective option being developed and agreed. In the interim, the proposed annual rehabilitation funding program by AusAID is not necessarily a foregone conclusion, requiring instead annual justification and demonstrated achievement of performance targets (including routine maintenance, funding, operations etc).

Figure 11: Health Buildings Investment Program

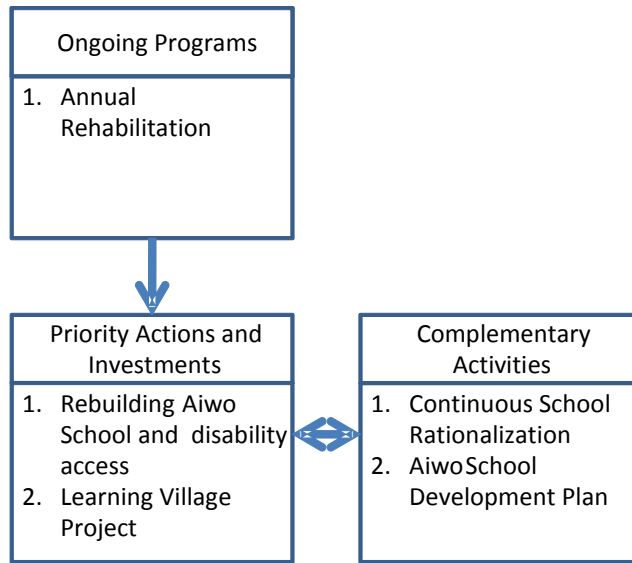


267. The detailed design of the hospital would provide a good juncture to re-examine and develop a sustainable health sector program that would address issues of staffing, funding and revenue-raising. This should form an integral part of the new hospital design, so that it can achieve the large cost savings that are projected over the current situation.

J. Education Buildings

268. Figure 12 outlines the proposed education buildings investment program. The Aiwo School rebuilding is due to begin in 2012 together with the Learning Village Project. Planning is already occurring, including the rationalization of classes and schools across the island, ensuring that a regionally appropriate curriculum is delivered, utilizing appropriate infrastructure and following relevant regional and local standards.

Figure 12: Education Investment Program



VII. THE WAY FORWARD

269. Apart from the integrated planning and cross sectoral investments, the overall infrastructure sector requires additional development. This section outlines the key supporting activities that Nauru needs to undertake to plan, manage and deliver the infrastructure over the short- to medium-term.

A. Improved Coordination

270. Government heads of Department formed a steering committee to guide the development of the NEISIP. This group was an unofficial reformation of the National Infrastructure Coordinating Committee, which has not met for over 18 months. The value this group has provided advising the coordinated technical development of the NEISIP was immense and indicates the need for the NICC to be officially reformed. The NICC should meet at least quarterly and comprise ministerial/ministry decision makers supported by relevant technical heads of department. The NICC would be responsible for monitoring progress of the NEISIP, ensuring that it is regularly reviewed, and guide its integration with national planning and the annual budget process.

271. Specialist sub-sector groups of the NICC would be tasked with developing sector master plans, overseeing complex infrastructure planning and development processes, and ensuring that sector baseline information and performance targets are collected and reviewed. The sub-committees would comprise a policy/decision making group, supported by a technical working committee. The working committee would become the first meeting contact for any donors or researchers when they arrive in Nauru – thereby ensuring continuity and cooperation within the sector.

272. The secretariat to the NICC and sub-committees should be PAD who would ensure support for the coordination and planning activities. PAD's key achievement over 2011/12 would be to ensure coordination at the sector and sub-sector level, and re-establish their mission as the manager of aid. This would entail Government requiring **all** agencies to coordinate any donor contact through AMU; and specifying that Foreign Affairs ensures **all donor and research missions** are first coordinated and managed by AMU prior to their entry into the country.

B. Improved Sector Planning

273. Nauru has virtually no comprehensive sector planning, apart from the privatized telecom, Digicel. The other sectors have very brief overviews of needs, driven by the NSDS, but no detailed agreement on planning, investment and implementation. The NEISIP has outlined a range of sector plans that are necessary and complementary to proposed investments, however, each sub-sector should also develop a rational and defined master plan.

274. The plans should include:

- Detailed asset register and management plans
- Key baseline and performance data
- 10-year infrastructure strategy that addresses NSDS targets
- 3-year rolling investment plan that outlines capital, operational and R&M costs, versus incomes, tariffs and subsidies.

275. Better planning will ensure that project investment is more rational and supported by a sound business case. The development of this NEISIP and enhancement of the NPPs (using the Project Outline Briefs – See Annex B) is a first step. Government will require that all projects submitted for its funding or support are presented in the new format with full and

adequate explanations for each section. The project briefs provide information that supports the ability for the NICC to undertake future MCA processes and re-define sector priorities. This is expected to produce a more systematic approach to project preparation and allow better comparisons to be made between proposed projects.

C. Strategic Asset Management

276. As part of the overall sector planning processes, Government will be initiating the development of asset management programs, providing forward estimates of rehabilitation and maintenance activities and costs. While this will aid the budget cycle, it will also provide transparency in service performance and sustainability.

277. While there is an emphasis in this NEISIP on facilitating improved supply-side, asset management (maintenance, operations management and billing), there is considerable scope for improving demand-side asset management. Already EU and SOPAC are addressing rainfall harvesting, water and waste conservation methods; all of which influence consumer behavior to reduce demand. In addition to direct education and regulation, Government can also manage demand through the transparent and careful re-allocation of subsidies (such as to water supply) so that they encourage more economic asset demand. This has been effective in the energy and telecom sectors, and a number of donors are willing to support further demand-side management studies in the water, sanitation and transport sectors.

278. Another area that is to be considered for improved infrastructure management is the exhausting of all other alternatives to the current situation. Too often, services are decayed and Government and Donors provide new capital, without thought to improved institutional, planning, regulatory or financial alternatives. Often there are other structures that could be rehabilitated, alternative ways of delivering services or optimizing the use of existing infrastructure through technology and infrastructure management.

279. Each of these alternatives are now incorporated in the revised project briefs.

D. Streamline Processes

280. The Government is committed to ensuring that the NEISIP priority program is delivered as quickly and effectively as possible. With current administrative blockages, and poor inter and intra-sector cooperation, this will prove to be a challenge. The re-establishment of planning and coordinating mechanisms as outlined above will go some way to addressing this problem.

281. However, the capacity and capability in PAD and the systems that are currently in place are not adequate. Procedures need to be reviewed, clarified and simplified, without foregoing relevancy and completeness. As DPPD is the central agency for managing proposals for funding support and dialogue with development partners about support for economic infrastructure projects, this is an area that should attract additional support. Consideration of planning capacity building, procurement process support, and strategic re-structure of aid management processes should be undertaken. It would link closely with the reformation of the NICC and improved coordination processes outlined earlier.

282. The NEISIP (and its regular review) is also a means for Government to streamline the development of economic infrastructure by providing clear direction and information about its infrastructure development priorities to its own department, the private sector and donor community. It provides a starting point for dialogue with donors, who have their own development agenda, and provides strength for productive discourse and negotiation. The involvement by sector decision makers and planners in the NEISIP development process

has already ensured that sub-sector planning is broader and more encompassing of cooperative initiatives. The NEISIP itself will provide further clarity to sector decision makers, and provide a defined means for incorporating new projects within a rational and balanced investment process.

E. NEISIP Review

283. As part of the ongoing Government commitment to improving infrastructure development, it will be important to update this NEISIP on a regular basis to align with the revised planning and budget priorities, and reflect implementation progress.

284. The NEISIP 2011 has highlighted the development of a few sector master plans, particularly in the water and sanitation sectors. With their completion expected in early 2012, it would provide an ideal opportunity for Government and DPPD to undertake a “soft” revision and re-ranking of projects based on any newly identified and prioritized sector investments. This would provide information regarding the appropriate timing and interval for a more detailed “hard” NEISIP review and revision.

285. In any case, Government agencies and Public Enterprises will be required to annually report project implementation progress and changes in sector performance. This information, together with consultation with community representatives, the private sector, and development partners, will help to shape future updates of the NEISIP and allow DPPD to monitor progress and performance. It is expected that this will be facilitated and coordinated by the NICC.

ANNEXES

Annex A

NAURU ECONOMIC INFRASTRUCTURE STOCKTAKE REPORT

I. WATER STOCKTAKE

A. Assets

1. The Nauru Utilities Authority (NAU) is responsible for production, storage and distribution of potable water. It was officially commissioned in 2007/2008 and assumed responsibility of existing assets and infrastructure which were previously within the Nauru Phosphate Corporation (NPC). The NPC has since been reformed and re-structured to RonPhos (Republic of Nauru Phosphate Corporation).

2. Although the official and legal transfer of assets is still unclear, the operational and maintenance burden is on NUA. Cost recovery is extremely difficult with Government of Nauru (GON) subsidies for domestic users and the only commercial entities being RonPhos and Nauru Rehabilitation Corporation (NRC), which also assist delivery by providing their own trucks. During the visit, a delivery charge of \$100 for 10kL for businesses, and \$5 for 5kL for residential deliveries has been levied.

1. Intake

3. The source is a sea-water intake located within the Nauru Ports Authority boundaries, approximately 200m from the desalination plant location within the NUA boundaries. Although details and drawings were not available for the intake, it consists of two large pumps, one of which is for standby. At this stage the NUA personnel estimate that one of these pumps intakes more sea-water than what can be handled by the RO units. A crude estimate of 60% was made for the volume actually pumped towards the RO units. Since the intake pumps were installed with the larger Multi-Effect Distillation Desalination unit in 1992, these have had to be re-connected to the RO Units.

4. The MED Desal Unit had a production capacity of 1200kL/day. Since the RO units in full capacity produce 360kL/day, it can be estimated conservatively that only 50% of the intake is used by current processes.

5. The MED Desal Unit used the waste heat from the Power Generators to produce steam, and due to operational and maintenance problems was producing only 650kL/day in 2002¹. As the Generators were changed and improved efficiency, and less heat being available, this unit has not been in use and ancillary equipment and connections re-arranged to feed the RO units.

2. Filtration

6. Normally the three Veolia Containerised RO Units are working 24/7 to meet increasing demand. Each of the current units has the capacity to produce 120kL/day. These were installed in 2003-2004. One of these has been relocated to NUA from the Menen.

¹ Pacific Islands Applied Geoscience Commission (SOPAC) 2010. Country Implementation Plan for Improving Water Security in the Republic of Nauru, Funded by European Commission EDF9 National B-Envelope, January 2010.

7. They are all powered by 1 x 100Psi retro-fitted compressor to pressurise the intake water, with the concentrate being gravity-fed to the sea without any further treatment. The RO units are serviced locally with twice-a-year technical inspection by the suppliers. This inspection agreement has come to an end. The RO cartridges are monitored and usually changed every 3months, while the membranes are replaced on an annual basis.

8. The units are directly powered from the Power Station which is next door, and no metering exists to assess power usage. However it has been estimated that 3 dedicated RO units use up to 20-30% of the 2.5-3.3MW produced daily on a 24/7 operation, producing 360kL/day. This equates to about 21kWh or 7kWh per RO Unit.

3. Distribution

9. The filtered water is usually stored in three concrete tanks (out of the 6 available), and thereafter pumped into trucks for delivery around the island, on a user-pay system. Other tanks and pipelines used for storage and reticulation at other areas have been either de-commissioned, not maintained or left out due to inadequate supply.

10. There are three 6kL Community tanks in each district, a total of 45. These are occasionally used for some storage but the water quality is a major concern, due to contamination. Leakages are profound and therefore these have to be re-filled on a twice-a-week schedule in most cases.

11. The larger distribution tanks are concrete or steel, both types needing urgent maintenance to be of any use. The table below summarises the tank assets and their capacities over the years. The volumes are approximate in ML/day, as the original data is unclear between UStons and British tons, UStons are assumed. Used Capacity refers to storage for potable RO water.

Intended Purpose	Type	Size (approx) External Dimensions	No	Location	Total Design Capacity ML	Used Capacity ML			
						2002	Sept 2009	Jan 2010	Oct 2010
Operational	RC	8.8mdia x 4.8m	6	NUA Storage Shed	1.756	1.6	0.5	0.03	0.03
Operational		9.4mdia x 4.7m	6	Golf Course	2.064	2.0	0.5	NIL	NIL
Operational		9.3m x 12.3m x 3.3m	1	RON Hospital	0.378	0.35	0.35	0.35	0.35
Operational		Avg Size 9.1m x 4.6m	15	LOCATION area	3.88	Mostly used for Rainwater Storage			
Operational		16.5mdia x 4.2m	1	LOCATION	0.895	Mostly used for Rainwater Storage NIL			
Operational		12.2mdia x 3.5m	2	NRC	0.826	Current Use is unclear, but originally was not part of public network			
Bulk Storage	MS	19.5mdia x 15.8m	12	Around No.3 Unit except B10	56.723	6.8	2.1	2.1	NIL* - B13 only
Secondary Storage	RC/S6&S7 MS	Various sizes and shapes	9	RonPhos areas and S6&S7 at RONHospital	9.6	U	U	U	NIL* - S6/S7 only

RC – Reinforced Concrete; MS – Mild Steel Lap-welded; U – Unclear, or no data available. NIL* - not sufficient production

12. The piping system information is also difficult to ascertain. From an old layout (NPC Drawing No. 93-N32C/N1), the main materials are Galvanised Iron and Fibre RC, with sizes of 75mm, 150mm and 200mm. These materials are old and therefore losses including head and quality, are likely.

13. The Trucks used to distribute water are listed below with deliveries for the week 11 to 16 October 2010.

Truck Name	Owned by	Capacity kL	Total Delivery in kL/day					
			*Not for Public Consumption/Totals do not tally					
			Mon	Tue	Wed	Thur	Fri	Sat
Big Red	NUA	10	80	90	40	85	50	U
Hino	NUA	4	44	8	40	Servicing - Nil		
NRC	NRC	6	24	12	60	48	24	U
Ronphos	RonPhos	11.2	33.6	U	U	U	U	U
Capelle	Capelle	11.4	34.2	U	U	U	U	U
Big White	NUA	10	Nil	20	28	32	24	100
Fire Truck	DCA	11.2	22.4	U	U	U	47.6	U
Total Delivered			247.6*	158.4*	U	U	U	U

B. Current Status

14. Only one tank (B13-Steel) is usable and was last filled up to 10m height in November 2009 (approx 2.9ML or about 50% of its capacity). This used to be the fill-up point for the delivery trucks. The storage and supply tanks S6 and S7 at the Ron Hospital are no longer in use due to low supply and losses within the distribution system if pumped from the RO units at NUA.

15. Only three out of the six concrete tanks available for storage at NUA have been in use since 2005. During the visit only C4 was in use at 10% due to increased demand and reduced production. C4 is also leaking considerably above a height of 1.5m so can only be filled to this level. Tanks C5 and C6 can be filled and have no leaks, but there are no pumps to load the delivery trucks and they cannot supply to B13 or other larger storage tanks.

16. Other tanks are not structurally sound, are leaking or contaminated, or the associated piping and pumps are not working. Tanks B6 to B9 do not exist, and usage of other tanks around RonPhos and NRC is unclear. Tanks C14 to C29 are within the Location area and are used for storage of rain water but are contaminated.

17. Losses of around 15-20% are experienced within the current production/storage/delivery cycle, based on estimates by NUA personnel. There are no reliable flow-meters to provide sufficient data.

18. A recent survey implemented by SOPAC (January 2010 EDF9 B Envelope) notes that the full production capacity of RO Units is 360kL/day, while the total possible distribution per day is 180kL/day. The total potable water demand for Nauru is estimated at 800kL/day with possible increases during dryer spells. The production is less than half of demand, while the supply is less than a quarter per day. In addition there are serious doubts that the RO units are working to full capacity as they are pressure fed by only one 100psi Compressor. During the visit, one RO unit was awaiting repairs, increasing the burden on other units, as well as creating a delivery backlog.

19. The Intake, filtration and distribution pumps are so old that there is very limited information is available on their ratings. The electrical system associated with these are either damaged, not maintained, or currently would not meet regional standards of safe installation or use. The piping system exists but much has since been damaged, changed, diverted or forgotten about since they are connected to un-usable tanks.

20. On the morning of Monday 20 October 2010, the storage was expected to be 320kL in concrete storage tank C4, based on the production (and no-delivery) on Sunday 19 October 2010. Only 90kL was estimated as being available for delivery on Monday morning. No explanation was available for this event, and the shortfall was attributed to tank leakages, RO shut-downs and lower production.

21. Operators and supervisors have no choice but to overload the production and distribution equipment and processes to meet the demand. A back-log of up to six-weeks delivery has been experienced in the current year. Only a maximum of 26 residential orders can be supplied within a day. Active servicing/maintenance schedule cannot be implemented without adding to the backlog, and all maintenance is generally re-active to break-downs. General maintenance and overhaul is not on this schedule however, due to difficulty in obtaining necessary spares in time.

22. The demand for potable water increases during dryer spells when ground water and rainwater reserves run-out. This is when storage is limited, as demand exceeds what can be supplied, and the trucks are overworking and unable to meet the daily delivery schedule. However, the ineffectiveness of meeting is demand is partly a result of delay in ensuring scheduled maintenance and servicing of equipment, as well as inadequate storage capacity. In addition, there is reduced production capacity from the existing RO's. It is necessary to boost the production capacity, while improving maintenance and asset management as well as increasing storage capacity.

23. In totality, the water production and distribution network and equipment is mostly old and being operated and maintained with increasing difficulty. In addition, the delivery truck with the largest capacity of 14kL has been out of action for over a year. A part was finally received for this at end of October 2010, but was not the correct one, and therefore had to be returned. In the meantime, the truck is deteriorating, and other mechanical and electrical components would have to be overhauled before the truck is workable again.

24. Pumps and components are quite old or provided under aid arrangements and therefore vary in make and models. Delivery Trucks are in the same situation. Therefore only limited parts are available worldwide, and most have to be made-to-order, modified and/or machined to suit and then shipped to Nauru.

25. Even if additional RO units are installed to increase production, storage and delivery, equipment and plant issues remain. Increasing storage capacity will assist to some extent, but if this is affected, than the current situation remains. Additional delivery trucks will also be affected by the in-ability to maintain them and have them operational within a quick turn-around time.

26. For instance a 5kL tank is located outside the gates of the NUA Water Section. This is filled up and the public has access to this free of cost. This tank empties out every hour and needs to be refilled up to 8 times a day. Using RonPhos and NRC trucks is under mutual understanding, but these are also not sufficient to meet the backlog as their priorities continuously shift towards their own employees. From figures obtained from NUA Water Delivery personnel, the current delivery on a good day is 240kL/day with some larger trucks (NUA, RonPhos, NRC, Capelle) doing at least 8-10 trips. This is still less than the demand estimated at 800kL/day. Operations for 24/7 to produce/store and deliver water is still unable to meet the demand during dry spells at current levels of production.

27. The Fire Station has additional requirements especially during flight-days and have to be in readiness during dry spells, so fire trucks fill-up almost every morning as well. During the visit, the RonPhos truck was twice observed at the Fire Station as back-up supply during flight times.

C. Proposals

1. Additional RO's

28. A larger RO will ensure dedicated supply to other industrial and corporate uses while ensuring adequate supply for emergency services such as Hospitals (new or existing), the Airport and Fire Services.

29. A proposal to acquire and install a 265kL/day RO has been submitted by NUA for budgetary allocation. If approved and installed, the total production capacity will be 625kL/day. The O&M cost of this proposal and its load on electricity supply is unclear and information unavailable. It is necessary to consider other larger and possibly more energy efficient units.

30. A 4kL/Hr solar powered model has also been proposed by CIE, based on a Hitachi Plant Technologies Ltd Proposal for PIC's under the PEC Fund. This unit requires a 1200sqm area, 50% of which will be occupied by solar panels.

31. A RO unit which does not require diesel generated electricity, can be installed at other locations on the island, and this can be linked to increased storage capacity outside of the NUA boundaries. The reverse linkage is also viable i.e. if there is adequate storage and rainwater harvesting, and RO water is not in demand, the renewable energy can be added to the NUA-Power grid. This may need further analysis to determine the actual kW output of solar panels during the rainy and cloud-covered season.

2. Workshop and Stores

32. The current operation is a juggling exercise and testament to the hard-work and resilience of the NUA staff in this sector. A non-existent support system in the way of a dedicated stores and workshop only adds to the operational burden. There is a storeroom but most of the spares and materials belong to RonPhos. Very few parts are stored for the water sector leading to mis-n-match fitouts to generators, pumps, compressors and trucks to ensure continuous operations.

33. A dedicated workshop will not only provide necessary and timely support to the water sector, but can also be used for the Power Sector. The GON Bus Transport fleet could also make use of this facility, as well as the Airport, the Fuel Tank Farm, Nauru Ports Authority and other entities. The possibility of linkages with NRC and Ronphos workshops should be further studied.

34. A detailed assessment has to be made for the needs of the numerous components and their maintenance/overhaul or replacement. Pumps in intake, filtration, storage and on trucks, compressors and generators, and associated electricals, trucks, and hosing, piping and valves for reticulation all have to be assessed to determine the spares/parts to be in stock in a dedicated workshop. The workshop and stores can also ensure RO units are maintained with shorter down-times.

35. The workshop should offer as a minimum: adequate spares, readily available machined/made-to-order Truck parts and accessories, pump, pipe and valve requirements, fleet and special-use vehicle maintenance, auto-winding, tyre repair, and machining capacity. Other uses will dictate final list of services provided.

II. POWER

A. Assets

36. The NUA is responsible for generation and transmission and distribution of electricity for the whole country. It was officially commissioned in 2007/2008 and assumed responsibility of existing assets and infrastructure which were previously within NPC. The NPC has since been reformed and re-structured to RonPhos.

37. Although the official and legal transfer of assets is still unclear, the operational and maintenance burden is on NUA. Cost recovery is difficult with GON subsidies for domestic users and the only commercial entities being RonPhos and Nauru Rehabilitation Corporation (NRC). The distribution network consists of three ring mains and a smaller dedicated feeder to RonPhos.

38. The current system comprises of a diesel powered generation room, with controls and switchgear controlling outputs of 11kV and 3.3kV. Distribution around the island is via three ring mains of 11kV, and one dedicated 3.3kV feeder main to RonPhos. The three ring mains consist of two OH lines (North and South Ring Mains) and one UG (East Ring Main) cable to serve the Aiwo and Yaren districts for airport, GoN offices and parliament, and connects to the OH grid at Menen Hotel.

1. Generation

39. The Table below summarizes the main generators currently on the island, and their capacities.

Location	Make & Operational Name	Model	Speed RPM	Design Output MW	Limits on Output/ MW	Status 22 October 2010/ Production MW
NUA Power Station	Rushton Unit#1	12RK270MarkI	750	2.50	80%/ 2.0	Operational 1.6
	Rushton Unit#4	16RK3C	750	2.08	80%/ 1.66	NIL – Awaiting Maintenance
	Rushton Unit#5	8RK3C	750	1.00	80%/ 0.8	Operational 0.8
	Rushton Unit#6	16RK3C	750	2.00	80%/ 1.6	Operational 1.6
	Rushton Unit#7	12RK270MarkII	750	2.96	80%/ 1.6	Operational/ Stand-by
Ex IOM Complex Gen 1				0.56	No Data Available, Possible Standby	
Ex IOM Complex Gen 2				0.44		
Menen Hotel				0.56		
Ronphos Office/Workshop				0.56		
TOTAL				12.66		4.0

40. Although the models at the Power Station are the same, their sizes and capacities vary and therefore parts and components are different as well. It is also unclear whether other generators are actually connected to the grid for standby supply.

41. The Generation building, although having been patched up, still has a leaking roof in parts, although most of these leaks are away from the actual generators. However, the current state of the asbestos cement tiled roof is a concern. The building is structurally sound and has been modified internally to house the control rooms, NUA offices and stores. Other parts of the building still leak and in urgent need of maintenance, and are vacant.

2. Controls

42. These are mainly located at the Power Station and within the control room next to the Generation room. The 3.3kV switchboard consists of eight Generator Breakers, three inter-bus transformer breakers, eight feeder breakers, three LV services transformer breakers, and one bus-section breaker. The 11kV Switchboard consists of three inter-bus breakers, three main feeder breakers, and four bus-section breakers. Most of these appear to be Merlin Gerin and the availability of components and specialist personnel is a concern.

43. Both sets of switchgear were replaced in 2000 but due to the outages and load shedding their operations in the short period have been surcharged. Although maintenance concerns have been raised over the years about gas pressures and leaking roofs and cable joints, it is unclear how many of these have been rectified. The balance of the equipment seems to be at least 50 years old.

44. The inter-bus transformers connecting the switchboards are rated at 2.5MVA. The LV services transformers are 2 x 1MVA and 1 x 500kVA. The status of these are unclear but power station supervisor advised that oil changes and scheduled maintenance is difficult due to production demands and the lack of standby transformers for diversion. No information was available on the status of the UG cables and OH distribution lines outgoing from the power station complex.

3. Distribution

45. The transmission on the 11kV OH lines are controlled by 11 Pole Mounted Transformers, 27 Air Break Switches, 7 ground-type transformers and 4 pad-mounted transformers. Grid connection points are controlled by 3 or 4-way ring main units. Generally the grid and poles are in satisfactory condition, however there are isolated poles and most of pole-mounted equipment show signs of corrosion, and possible vandalism. These have been identified as being in urgent need or replacement for some time.

46. Although the feeder controls are connected, the RMNorth feeder does not trip when there is a fault. This has been raised as a concern for some time by the personnel, and a fault had to be actually reported after a heavy –rain event during the visit, and rectified. The 3.3kV Feeder and equipment is reported to be in acceptable condition with minimal maintenance requirements, apart from the annual wayleaves clearance necessary.

B. Current Status

47. The equipment, plant, generators, instrumentation and controls, switch-gears, transformers and distribution network is old and being operated and maintained with increasing difficulty. Skill-sets are lacking locally, outages still occur although reduced, and obtaining parts is very difficult. In some instances the ordered parts arrive six-months later.

48. For instance, although 4 out of 5 generators are in operation most of the time, these are not utilized to their full capacity. There is an operational limit of 80% capacity enforced to limit risk to the Rushton Generators. Since Rushton models are not in commercial production, only limited parts are available worldwide, and most have to be made-to-order, modified and/or machined to suit and then shipped to Nauru. Operators and Supervisors ensure reduced loading per generator by hourly monitoring (no alarms), and an active servicing/maintenance schedule is under way with a limit of 3,000 hrs per generator. General maintenance and overhaul is not on this schedule however, due to difficulty in obtaining necessary spares in time.

49. The installation of pre-paid metering to most house-holds (EU Project) has increased energy-efficiency while reducing the demand on generation by as much as 20-25%. This has reduced the load on the generators, allowing timelier servicing/maintenance. However the fact that demand is constant is only due to limited economic activity and reliable supply is only possible as a result of this constant and manageable demand.

50. A slight increase in demand or slippage in regular servicing, mechanical failure or breakdown can affect this balance considerably and reliable supply will be affected. It must be noted that in-direct demand can also affect this balance. For example, due to increased demand for potable water, and with the possibility of installation of further RO units, demand on power is expected to increase. Presently, three dedicated RO units use up to 20-30% of the 2.5-3.3MW produced daily on a 24/7 operation, producing 360,000L of potable water.

51. Based on observations during the visit, Generator #4 was awaiting the arrival of parts ordered some 4 months earlier. This was expected to be in-country later in the year with the Generator going on-line by December 2010. The capacity is 2.4MW but will only be producing 1.6MW daily as before. By this observation, only one generator can realistically be maintained/overhauled completely per year. NUA has five operational Rushton Generators, and four need to be working at all times with reduced limits to meet the current levels of demand.

52. No data was available on the losses experienced under the current system and level of generation. In addition, details on outages are still forthcoming.

C. Proposals

1. Additional Generation Capacity

53. To be detailed in comparison with Renewable energy options. Current discussion of obtaining additional 1 x Rushton Generator from Singapore (Shell/Total).

2. Workshop and Stores

54. The current "managed" operation is a result of a non-existent support system in the way of a dedicated stores and workshop. An injector room was built 10 years ago but due to roof leaks, this is not in operation. The existing store-room has more RonPhos spares and only a limited and dwindling supply of gaskets and seals for the Rushton Generators.

55. A dedicated workshop will not only provide necessary and timely support to the power sector, but can also be used for the Water Sector. The GON Bus Transport fleet could also make use of this facility, as well as the Airport, the Fuel Tank Farm, Nauru Ports Authority and other entities. The possibility of linkages with NRC and Ronphos workshops should be further studied.

56. A detailed assessment has to be made for the needs of the numerous components and their maintenance/overhaul or replacement. Special components such as relays and gas monitors for switchgear, mechanical components and electronic controls, ring sets, pistons and con-rods and bearings, gaskets and seals, injectors and as well as poles and conductors, oils and line-testing, cable-joint and testing equipment, are just some of the stores requirements for the operations.

57. The workshop should offer as a minimum: adequate spares, readily available machined/made-to-order Rushton parts and accessories, pump and valve requirements,

fleet and special-use vehicle maintenance, auto-winding, tyre repair, and machining capacity. Other uses will dictate final list of services provided.

3. Equipment to respond to Oil Spills

58. Against the background of the possibility of outsourcing of management of the fuel tank farm it is important to provide essential safety and oil pollution prevention and response equipment to secure a safer, pollution free marine environment and reliable supply of fuel services to the Nauru community.

59. This proposal will contribute to securing the safe supply of fuel to Nauru and to prevent environmental calamities. It will benefit the community to the extent that the services they receive from the Port Authority will be improved, reliable and safer.

60. The supply of fuel is one of the key drivers of the national economy and maintaining safe infrastructure is critical to Nauru's economic growth and social advancement. The Nauru Port Authority would become responsible for the management of Port Services on Nauru. A more detailed proposal is presented in Appendix 1 to this Stocktake Report.

III. SANITATION

A. Assets

61. The Ministry of Commerce Industry and Environment is responsible for policy and pilot projects in this sector. It is also involved in the implementation of sanitation initiatives and has control over new developments in terms of environment.

62. According to the 2002 census, around 83% of households (HHs) used flush toilets, 12% used external tank or pour-flush toilets and 2% had no access to proper sanitation facilities. It was also determined that 55% of HHs directed sewer to cesspits. Only some houses and commercial entities as well as GoN buildings and quarters use septic tanks.

63. Currently, there is no piped sewer reticulation or treatment available on Nauru. Only at Location a sea-water flushed reticulation was in operation with outfalls to the sea. This system was recorded² as being un-operational in 2007. Sea-water was pumped to storage tanks on Command Ridge and then gravity fed to household reticulation. The outfalls are however still operational and raw sewage is gravity fed to the sea. The flushing is by pumped brackishwater and rainwater sources. The reticulation system has operational and maintenance problems and upgrading requirements, which need to be seriously considered. The Location and Denig area represented 39% of HH's in the 2002 census which discharged effluent in this manner.

64. The Pacific HYCOS³ survey team carried out the Identification of 336 domestic wells and septics in Nauru which were then promoted to a spatial database using GIS. This information is available with CIE Project personnel and is the most recent survey of its kind (April 2010). The septics identified are not twin-chamber tanks but concrete-lined or rock-lined cesspits⁴. These are usually pumped out when required. A new alarmed tank system is installed at NSS which is also connected to an existing outfall.

65. There is a Sludge pump-out truck donated by AusAID and currently with NRC. It was meant to be operated by Eigigu Holdings Ltd, but recently been "transferred" to NRC who have fixed it and are providing the service on request. This is outside the mandate of NRC. The sludge is then pumped out via an outfall located near Cantilever 2. This outfall, like others around the island, are infiltrated by tide, in disrepair and terminate within the 250m wide fringing reef. No tidal flaps or non-return valves were observed.

B. Current Status

66. CIE is working on establishing a Sanitation Policy based on a pilot project which will see 20 HHs have new twin-chamber septic-tanks. This is expected to be complete by first quarter of 2011.

67. The Pacific HYCOS survey revealed a high-level of *E. coli* contamination of groundwater resources, and this has been directly attributed to sanitary practices at the ground level, mainly cesspits mentioned earlier. The results of the survey are tabulated below:

² SOPAC 2007. National Integrated Water Resource Management Diagnostic Report, SOPAC Miscellaneous Report 640, November 2007

³ SOPAC 2010. Assessing the Vulnerability of Shallow Groundwater Domestic Wells in Nauru, SOPAC Technical Report 435, July 2010.

⁴ Usually 2m deep, no lining at the base allowing waste-water to infiltrate into the karstified Limestone substrate. According to Eigigu Holdings (SOPAC 2010), 1,000 estimated cesspits are currently in use.

Fecal contamination risk

Risk	MPN	No. samples	% of samples
Low	0-20	85	31%
Low- moderate	20-50	33	12%
moderate	51-100	26	9.5%
moderate- high	101-500	52	18.5%
high	>500	79	29%
TOTAL		275	

MPN: Most Probable Number of *E coli* Bacteria per 100ml sample
 Pacific HYCOS - www.pacific-hycos.org

68. Currently water quality is monitored only by way of chlorination⁵ of water tanks around the island. There is only a monthly quality testing done at the NUA on desalinated potable water at this stage. All other water is recommended to be boiled and the practice is widely acceptable.

69. NRC is providing the sludge truck operations as a community initiative and is not commercially inclined to continue this service, nor expand.

C. Proposals

1. LOCATION Sewer and Water Reticulation Upgrade

70. A detailed assessment is necessary of the existing systems and network. Following this, an upgrade or replacement project can be designed and implemented. Since this the most densely populated area, it is highly vulnerable from a public health point of view.

2. CIE Nauru Sanitation Policy

71. This needs to be developed for the whole of Nauru. Other Pacific island countries have some possible solutions to provide, including public health regulations and standards which can be suited to the Nauru situation.

72. Extension of support to implement more twin-chamber septic tanks with associated reticulation maybe part of the Sanitation Policy but needs a time-based plan to work with other ground-water harvesting and IWRM projects.

⁵ Community and school tanks and RoNHospital tanks are sampled and monitored once a fortnight. Chloramine slow release tablets are mostly used, as well as Chlorometers, test-kits and Sensafe products. This is provided to MoH Environmental Officer from the Nauru Country Budget by WHO based in Suva, Fiji.

IV. SOLID WASTE MANAGEMENT

A. Assets

73. The Ministry of Commerce Industry and Environment is responsible for policy and pilot projects in this sector. It is also involved in the implementation of Waste Management initiatives and has control over new developments in terms of environment.

74. The NRC controls the current un-lined dump on Topside. It also provides a weekly garbage collection service. Most of HHs have been provided to wheelie-bins up to 200L which are then hand-loaded onto a flat-deck truck and transported to the dump.

75. Recycling as a option has just been implemented and skip bins are visible around major public areas such as government buildings, Hospitals, schools and in Location. Industrial bins are available for new construction and demolishing activities.

76. In addition, there is almost an abundance of waste material suitable for dumping around the island. Recycling some of these whole items such as rolling stock (from mining operations), old vehicle shells, tanks, and structural steel is an option for nominal non-commercial purposes. However the lack of appropriate painting and treatment options must be considered in any such venture. Also around the NPA and NUA areas, substantial areas are occupied by derelict structures, materials, sheets, anchors and chains, tanks and associated items since the NPC days.

77. There is also limited personnel capacity for the removal and proper storage or asbestos cement roofing material which is quite common in houses, commercial and industrial buildings and schools. This issue is a concern with local contractors and also with rain-water harvesting by locals, although ingestion is not a health issue.

B. Current Status

78. CIE is working to establish a Waste Management Policy. A draft was prepared some years ago and the current status of this is unclear. NRC operations need to be reviewed in detail to assess future plans and programs.

79. Although locals appear to have some understanding of environmental implications, there is little effort observed to ensure proper disposal of waste, other than the use of garbage bins. This could be attributed to difficulty in transporting other waste materials to the dump, or collection of the same.

80. In addition, there appears to be little regulatory control or standard enforcement on the numerous fuel service stations located around the country. It is noted that almost all appear to have in-ground storage tanks and make or type of which is unclear. Also the heavy-fuel and waste diesel storage tanks used by RonPhos have been identified as potential sources of hydrocarbons in ground water wells around the Aiwo district.

C. Proposals

1. Upgrading NRC dump to Lined-Dump

81. A detailed assessment is necessary of the existing dump, materials collected and disposal methods employed. There is likely infiltration of leachate into ground-water but this has to be verified as well.

2. Review of Fuel Storage Tanks at RonPhos/Airport/Tank Farm/Service Stations

82. The Pacific HYCOS⁶ survey revealed hydrocarbon presence in ground-water wells mostly in the Aiwo district, closer to the main Topside road junction. An area of 400sqm and four domestic wells appeared affected, some of which have not been used for domestic purposes since 1990's.

83. Other tanks have been reported to be leaking or having leaked at some point in time, including the jet-fuel storage tank at the airport. A review (although carried out for the Tank Farm) needs to extend to all fuel handling and storage systems, to assess level of leakage/deterioration and recommend alternatives or remedial measures.

3. CIE Nauru Sanitation Policy

84. This needs to be developed for the whole of Nauru. Other Pacific island countries have some possible solutions to provide, including public health regulations and standards which can be suited to the Nauru situation.

85. Extension of support to implement more twin-chamber septic tanks with associated reticulation maybe part of the Sanitation Policy but needs a time-based plan to work with other groundwater harvesting and IWRM projects. Protection of groundwater resources should dictate direction of future sanitation programmes.

4. Deep Sea Dumping

86. Given the extent and sizes of derelict items and structures, and having a large EEZ comparative to land size, with a well functioning Port Cause-way, deep sea dumping needs to be further reviewed as a viable option. This would tie in with other projects such as NPA_DMP, NUA workshop and environment upgrades, and RonPhos streamlining its operations. Although no income maybe generated, the benefit of effective land-use and a better environment must be considered, as this is part of NSDS milestones.

⁶ SOPAC 2010. Assessing the Vulnerability of Shallow Groundwater Domestic Wells in Nauru, SOPAC Technical Report 435, July 2010.

V. MEDIA AND ICT INFRASTRUCTURE

A. Assets

87. The Ministry of Home Affairs is responsible for the set-up, operations and maintenance of the Media Department. The ICT is regulated within the Ministry of Transport, and is subject to a commercial agreement with the only mobile and internet technology provider Digicel.

88. The Media Department is housed in a concrete structure adjacent to the GoN buildings, which has been retrofitted over the years to suit the functions. With AusAID support, there are now a full range of radio, television and print media services provided. Radio coverage is island wide and with good reception in all the populated areas. Free-air Television coverage is also quite good and continues to improve. Some private households, diplomatic and business complexes have pay-tv dishes as well.

89. The mobile network coverage is island wide and generally excellent, with some isolated spots on Topside having at least minimum coverage. A Wi-Max facility has been recently launched with 90% coverage over the island. The maintenance and upgrading of related physical infrastructure is subject to this agreement. This internet facility is accessed by GoN for its operations as well.

90. The landline network has been de-commissioned since early 2010, due to high maintenance burdens. Most of this appears to be overhead and reliant on NUA OH power grid.

91. The communication towers for all media are located around Topside and Command Ridge, and monitored regularly.

B. Current Status

1. Media Department

92. The building which houses the Media Department was possibly designed and built for a multi-story facility, however only the ground floor is built and has a cast-concrete first floor decking as a roof cover. This first floor is used to mount the main transmission dish and antennae and is accessed by concrete steps. The slab is exposed to elements and being quite close to the sea (within 20m) has been subject to corrosion of exposed reo-steel which in turn has led to some cracking and slight subsidence. The structural frame is adequate to take the minimal loading on this first floor. However, the slab leaks and this is a risk to the communications equipment in the Department below.

93. No requirements have been raised for the improvement or upgrade of physical infrastructure for the radio network.

2. ICT

94. The ICT network is monitored in two parts. The GoN ICT Department is responsible for the GoN ICT services and its operations (the LAN). The Digicel network is maintained by its own staff and technical support from regional centers such as Fiji and Australia (the WAN).

95. During the visit there have been a minimum of three internet outages ranging from a few hours to 1 hour duration. These are both with the GoN intranet as well as outside Wi-Max facility. There have also been issues in accessing popular websites and downloading capacities due to the problems with Digicel's backhaul from GoN buildings through to Command Ridge. This Microwave connection is high priority on ICT to manage through to resolution. The Digicel network is maintained by its own staff and technical support from regional centres such as Fiji and Australia. How vulnerable this system is, to the provision of NUA power is not clear.

96. Power for the LAN is supported by stand-alone UPS for switches and routers located at various places around Government offices. The server room has a UPS although this is aged and therefore limited in its capability to provide a sustained power supply for more than 30 minutes. Power outages are common, thus, ICT has requested a newer UPS for the server room.

97. There are pockets of technical equipment located at various areas (such as RON Hospital) that have been installed by third parties who have not undertaken adequate knowledge transfer to existing ICT staff. These installations have a longer term impact as the specialisation required to resolve problems are off-island.

98. ICT is recommending a rolling system change-out and upgrade where necessary to allow standardisation of architecture, operating systems and applications (where possible).

C. Proposals

1. Increasing Wi-Max internet coverage to 100%

Additional towers?

2. Upgrade of Media Department Building

99. Internal refurbishment to suit studio and improve provision for sensitive equipment. Water-proofing of first floor deck for protection and leakage prevention.

VI. AVIATION

A. Assets

100. The Nauru International Airport (NIA) was officially opened in the 1970s with further upgrades in 1993, and is the home base of Nauru's Our Airline. In 2007, Our Airline was one of only three airlines in the region, which are fully owned by their country and provide international services.⁷

101. The Terminal Building is a one double-storey structure with visitor areas, check-in areas, departure and transit lounges, immigration and customs, cargo handling, and office spaces which is also used by the Ministry of Transport. There is adequate parking outside the building for the current volume of vehicular traffic. An adjoining structure is proposed for upgrade.

102. The asphalted apron area is large enough to cater for the two Boeing 737-300's in the Our Airline fleet. Under normal circumstances only one of these aircraft occupies the apron. The apron is accessed by taxiways which are adequate for the aircraft size. The direction of maneuvering from runway to apron is straight and the distance approximately 100m, and no difficulty is observed for the current aircraft.

103. Between the runaway and the terminal/apron area, and traversing the taxiway, a 2.5 km section of the main Island Ring Road is open to traffic during non-flight times. This section is closed from thoroughfare during these times by a gate across the road from the west end. Only the eastern end is accessible, which terminates to the airport car park.

104. The existing runway is 2,150m long x 45m wide x 75m grassed strips along the asphalt runway on either side. The 1993 extension of the eastern end of the runaway was only possible with reclamation and road re-alignment and substantial coastal protection work. Navigational Aids are still ground-based and visual approach systems are in use.

105. There is no firm proposal for extension or a new airport at this stage, based on current traffic volumes, and projections (data required) do not justify large investments at this stage, although 'Topside' remains an option for a larger airport complex.

106. Over the years, with various oversights carried out by ICAO, CASA, ACNZ and PIASA⁸, operational and infrastructure shortfalls have been identified (along with institutional) with varying degrees of concern. While some improvements have been made and others are considered, the lack of adequate and timely funding has delayed some identified projects by several years.

107. The NIA is located in a residential area, and in close proximity to a school. Since the Nauru International Airport (NIA) is located in a residential area, and in close proximity to a school, the airport and the runway continue to be accessed by general public and in some cases household pets. The Fire Station is outside the main aerodrome boundaries. There is no dedicated Meteorological service for the aerodrome, and weather forecast is obtained from the Bureau of Meteorology website from Australia.

⁷ Pacific Islands Forum, 2007. Proposed Joint Venture Air Services: Analysis of Socio-Economic Impacts, June 2007. Prepared by Mercury Consulting Services in association with Moncrieff Management Limited.

⁸ ICAO – International Civil Aviation Organisation; CASA – Civil Aviation Safety Authority (Australia); ACNZ – Airways Corporation New Zealand; PIASA – Pacific Islands Air Services Agreement.

B. Current Status

108. Currently NIA handles only two commercial Boeing 737-300 flights per week. Being a transit point, and the only point of air-freight and passenger exchange with the outside world, it is critical to the transport network for the country as well as the region.

ROUTE	FLIGHT FREQUENCY/WEEK & AIRCRAFT	SEATS ONE WAY	WEEKLY SEATS AVLBL	SEATS OCCUPIED
INU – TRW/NAN	2 x B737-300	130	260	
BNE/HIR - INU	2 X B737-300	130	260	

109. At the present moment, no operational difficulties are observed apart from the institutional shortfalls identified in the oversights. However, a lack of maintenance of aircraft, on and off island has been the cause of flight delays. No capacity in hardware or personnel in the island to provide such services. It is unclear if during stopovers in Nadi and Brisbane if any maintenance is carried out.

110. Since the NIA is located in a residential area, and in close proximity to a school, the airport and the runway continue to be accessed by general public and in some cases household pets. The existing fence was installed around 10 years ago and consists of steel and timber posts, mostly cast in concrete, with a 1200mm high chain-link mesh. There are gates and entry points for locals, which are meant to provide a pedestrian and motor-bike thoroughfare to access the government-building/ fire station side as well as terminal side of the runway.

111. Since there is presently only two flights per week, the runway is almost used daily for recreation by nearby residents. Garbage and rubbish is an on-going pre-flight problem as a result. In addition, there are instances of vandalism which contribute to the breaking down of posts, mesh and gates. In recent times, certain sections (approx 25m) of the fence have been removed or flattened. Although maintenance has been observed, this has been only to remove vegetation and clear drains alongside the fence.

112. The runway surface is in need of urgent maintenance to curb further deterioration as observed by Fulton Hogan (NZ) in 2009⁹. Neither of the options provided have been carried out a year later, and although the pavement surface is holding up, this is only due to easier weather conditions and lower traffic volumes.

113. There is no further land available for lengthwise extensions. A height restriction on buildings is imposed on the western approach hence, the Aiwo Primary School future buildings are affected.

C. Proposals

1. Airport Development Master Plan

114. Given the operational and institutional shortfalls identified by the ICAO oversights, a Master Plan (NIA_DMP) is deemed necessary to provide a time-based road-map for further and necessary development. Such a plan would also enable easier planning for the GON.

115. It is intended that the NIA_DMP will include the entire aerodrome upgrade requirements (e.g., Infrastructure, NavAids, Terminal Buildings and Services, Security, Meteorological, land availability) as well as institutional capacity-building to meet current and

⁹ Hogan, F. 2009. Nauru Runway Inspection Report, July 2009.

appropriate regional/international standards. The Plan should also take stock of current projects and studies in place or underway.

2. Safety Fence

116. The ICAO USOAP¹⁰ of 2008 stated the need for the DCA to provide a fence suitable to aerodromes. Although a previous Universal Security Audit of August 2007 and a later follow up to the USOAP in September 2009 both raised the concern for a proper safety/security, the fence has not been upgraded and continues to deteriorate.

117. According to the DCA, this has been a major issue during the USOAP's in the last three years. It must be noted the fire-station will still require a dedicated access through any new fence due to its present location.

118. Given the uniqueness of the airport location, the possible use of the runway as a run-off catchment, the standards required by ICAO and other regional regulatory bodies, a replacement fence would have to be designed specifically for NIA, and thereafter priced.

3. Runway Maintenance and PAPI

119. Last runway upgrade and extension was done in 1993, by Fulton Hogan (FH) of New Zealand. Since the ICAO Universal Safety Oversight Audit Programme of March 2008, further assessment and inspection has been carried out of the runway surface and two options were priced by FH. A total asphalt overlay option was given which can be included with the Airport Master Plan Development Project. The maintenance option could be implemented within a year and would see the continued used of the runway for a further two years at least.

120. While active maintenance and vigilance has ensured the survival of the current T-VASIS (Visual Approach Slope Indicator System) lights, safety and technical oversights over the years have highlighted the need for replacement. These lights were installed in the 1970s and maintenance, including the availability of parts is proving difficult. Other PIASA countries are also installing the PAPI (Precision Approach Path Indicator) as a replacement, which ensures better light intensity and reduced operational and maintenance burden. An Instrument Guided Approach System is not required at this stage, but can be included in the Airport Master Plan Development Project.

¹⁰ ICAO Universal Safety Oversight Audit Programme, March 2008. AGA/07 Aerodromes, p67.

VII. TRANSPORT – LAND TRANSPORT

121. As most of the population and activities are concentrated on the coastal plains and distributed around the island, the transport linkages necessary for daily activity are achieved by means of transportation on the coastal front.

A. Assets

122. It is unclear which department of GoN was responsible for the road network on Nauru. Apparently, the Government has just returned O&M to the Department of Transport and allocated a minimal budget. However, it was reliably established that the roads used for the mining operations remain under the responsibility of RonPhos and NRC.

123. The coastal regions are serviced by a sealed two-lane carriageway which is about 21.9km¹¹ long, and runs mostly at a minimum of 40m and a maximum of 200m (at the airport) parallel to the coast line. There are other sealed internal roads of around 8.6km in total which service residential and business areas such as Aiwo business area, Bouda Lagoon area, Denig RonPhos Offices, workshops and Harbour, the Domestic and IOM Topside locations and others. All other roads are unsealed and well maintained if within the mining and haulage routes.

124. The roads are 12m wide nominally, with carriageway widening in populated or more trafficked areas. Most of these areas have form-cast kerbs and footpaths on both sides. In areas where the population is less, there are form-cast drain kerbs on either or one side, with adequate cross fall. Around 11km of carriageway is boarded by these drain kerbs on at least one side.

125. The Ministry of Transport operates a public transport system with a fleet of 10 buses of various capacities. These are tabulated in the next section along with the level of service. A mechanical workshop is also established and this is situated in a building space rented out from Eigigu Holdings Ltd, next to the football field adjacent to the Ron Hospital. During the visit, this was in operation and a glassed area was also used to hold vehicles for other purposes.

126. There is no Land Transport regulatory body and the MoT is looking into establishing such an institution. Traffic safety is not a concern at this stage however, there is an absence of adequate street lighting and signage; road markings appear to have weathered in most cases. There appears to be an understanding amongst most road users on traffic behavior and etiquette, and this order prevails in absence of stricter control measures.

127. The most common type of vehicle appears to be the motorcycle or scooter which most Nauruans have access to. There are some re-fitted Landrover Jeeps which are for family or recreational uses. Most of the heavier traffic is confined to the mining areas with 10-wheeler haulage trucks and tankers. The larger-sized water delivery trucks are infrequent users at this stage. Side-lifter trucks for transportation of 20-foot shipping containers around the island are in minimum use as most containers are emptied at NPA¹² or are transported from the Harbour to the main shopping or industrial areas of Yaren, Aiwo, Denig or Anetan¹³ only once a month at nominal payload of around 7¹⁴ tonnes per axle.

¹¹ Included the duplication of the Main ring Road, on either side of the NIA runway, approximately 2.5km.

¹² Nauru Ports Authority.

¹³ Capelle & Partners Warehouse and Stores.

¹⁴ The containers offloaded onto motorized lighters (from ship) to the Harbour with the Omega Cranes are within the 16-18 tonne range.

B. Current Status

128. As most of the roads are two-coat bituminous seal around the coastal areas, there is evidence of oxidation on the surface with loss of coating. Since the aggregate in the seal is also limestone, there is a high incidence of polishing along the wheel paths. It is noted that the operational design speed is 50 km/h, and because during the visit it was generally dry, no skidding or loss of tread-friction was observed. There was also no severe loss of chip-seal or pavement cracks. The cracks observed were within 2-3mm wide and about 2mm deep and in some cases, patterned where wheel-paths were clearly rutted. Although the pavement and seal are generally intact, because: (i) where heavier vehicles traverse, the pavement is farthest from the coastline; and (ii) where the pavement is closest and most exposed to the elements, there is minimal traffic, mostly scooters and/or motorbikes.

129. The design of the pavement is appropriate/modified to Australian standards with at least 300mm of kerb concrete protecting the pavement material on both sides. There is little incidence of runoff or groundwater infiltration and therefore no potholes. However, in areas where the footpath is severely broken, or the drain-kerbs are exposed due to erosion of shoulder, this is likely to be an issue in the near future. There is however serious subsidence in several locations¹⁵, but with no associated break in seal or apparent loss of pavement material. The Main Ring Road is generally in good condition. The only break in seal and pavement was observed at the cut/fill lines on the roads to Domestic and TopSide.

130. At least 8.9km¹⁶ of the Main Ring Road is in a lesser populated area on the Eastern to North Eastern coastline. These sections are generally covered by vegetation which is encroaching on the pavement and drainage and therefore needs to be removed immediately. In addition, all gully pits were observed to be full of silt or rubbish, and the outfalls points could not be identified. The status of the culverts from the gully pits could not be determined. However during the visit there were two major rain events, and in almost all culvert outfall locations, there was ponding and significant and unacceptable delay (up to a minimum of 48hours) in runoff removal. The lack of infiltration or loss in pavement structural properties is attributed to the integrity of the seal and the concrete kerbs.

131. It is noted that from the east-end of Aiwo Bridge/Overpass over pipelines to the north-western boundary of the Ron Hospital, the kerbs and footpath are older and constructed from pre-cast units of 900mm length. This almost 2km road section appears to have been re-sealed during the remaining road upgrade, but the status of the pavement substructure is difficult to determine. The pavement structure of roads leading to the RonPhos Offices, Harbour and NUA is broken and damaged, needing maintenance or upgrade. It is unclear if these pavements are of the same age as the remaining 80% of the roads on the island.

132. The 200m section fronting the Ron Hospital is therefore perceived to be an older vertical alignment and with the newer upgrade, this section is now lower and prone to flooding. The culverts and storm water systems in place are either blocked or silted up, and this section of road is always inundated during rain events. The Fire Brigade and RonPhos trucks are used to pump the water away. Upgrades at the Hospital and main road have been done including raising the carpark and courtyard, with no obvious benefit. The last flood event of February 2010 resulted in at least 300mm of water in the entire Ron Hospital complex.

¹⁵ 50mm deep x 300mm square in Anabar (1 Location); 75mm deep maximum across entire one lane in Meneng; group of patched potholes near West Taxiway at Airport.

¹⁶ Most of Meneng, all of Anibare, Ijuw, Anabar, and parts of Anetan

133. The MoT also is responsible for the operation of the Public Transport which comprises of buses only. There is no national or regional taxi service as most households have at least a motorbike or a scooter. These buses have numerous uses but the nominal daily uses are tabulated below.

MINISTRY OF TRANSPORT BUS FLEET

Capacity	No. in Fleet	Donor/Supplier	Status
52 seater	1	S. Korean Government	Out of action, possible disposal
52 seater	1	“	Operational, School Bus
52 seater	1	“	Under repair
20 seater	5	AusAID	“Coaster”, operational for Public, Workers and Students
20 seater	1	“	Under Repair

134. The school and worker trips are scheduled to leave at 7am from the Eigugu Holdings Ltd. Denig Depot, with the larger buses going southward, and smaller ones travelling northward. There are two dedicated trips to Bouda/Topside and Domestic. According to the Transport Fleet Officer, two additional larger buses are required. Some time ago, there was a community service bus from 6pm to 11:30pm daily at a fare of 50c round the island, which yielded approximately \$30,000.00 per annum of revenue. Two buses were usually adequate and generally full in the weekend. Buses are also hired out for Bingo nights and church services, with \$65 for the larger and \$55 for the smaller buses. It is reported that more revenue is earned this way than by having a community bus service.

135. The Transport Office also reported that a well-equipped workshop was located at Topside at the former IOM complex but was inaccessible. The MoT workshop had no tyre repair facilities or hoist or compression equipment. This affected the extent of repairs which could be carried out at the MoT workshop. In addition, there was a likely delay of 6 months to a year between ordering and receiving parts, and although some belts and filters were available locally, other components such as batteries, motors and hoses had to be imported. Some of the maintenance work has to be outsourced subject to budget provisions.

136. During the visit, it was noted that the volume of traffic was high in the morning before school which starts at 9am and in the afternoon, after 5pm. On Bingo¹⁷ nights, traffic including pedestrians increase around and in locations where bingo was being held. Minimal police monitoring was observed.

C. Proposals

1. Road Rehabilitation

137. As mentioned earlier, the Main Ring Road is generally in good condition. However, urgent maintenance is required to increase its design life. This will involve removal of vegetation encroaching on pavements and kerbs, general clean out of all gully pits, and rehabilitation of culvert outfalls. In areas where footpath and kerbs are severely damaged or broken, urgent repairs and replacement are necessary. Bituminous re-surfacing is required all throughout and can be carried out with the Airport Runway re-surfacing activity.

138. This project can also include a review and assessment, design and construction of appropriate measures to prevent flooding at the Ron Hospital section of the main road.

¹⁷ Bingo must be noted as a major social event as this generates traffic, trips and also pedestrian occupation of road sides and surrounds, often at night with minimal lighting.

2. Ministry of Transport Fleet Augmentation

139. Additional buses are needed to provide adequate capacity. The MoT has a budget approval for two new larger buses but the status of this is unclear. Maintenance of these buses remains an issue.

VIII. MARITIME

140. Nauru is highly dependent on sea transport for most inputs and shipping is the only link for vital supplies such as food, diesel fuel, general equipment and machinery, and consumer goods. The port also facilitates the country's exports of phosphate and coral aggregate. There is a project to increase fish exports by setting up a cannery or loining plant, but the current status is unclear.

A. Assets

141. Nauru Ports Authority (NPA) assets have been inherited from the old NRC, and there is still some confusion on asset ownership between NPA and RonPhos.

142. The following table details the main assets whose maintenance are NPA's responsibility and current conditions are based on previous studies carried out and site investigations during the visit. The NPA landside operations cover an area of about three acres, but due to old structures and waste material, the operations are restricted to the seaside strip of about 40m wide x 200m long.

Asset	Supplier and date	Current Condition/Remarks
Sheds 1 & 2 with OH Gantry	Built during 1960's	To be demolished. Unsafe, structure is unsound, collapse is imminent. Roofing has been changed in 1990s. Corroded runway for Gantry - not in use.
Shed 3 (Transit Shed)	Built 1980's	Paint treatment to portals and cladding changes required. Can be used for Harbour operations while Sheds 1 & 2 are demolished.
Adjoining Sheds (Old Hardware Buildings)	Built during 1960's	To be demolished. Unsafe, structure is unsound, collapse is imminent. Building layout is not suitable. Area can be used for container storage.
Container Area	North side of boat-harbour	Area needs to be defined. Demolished buildings will provide more area on Southern side.
Harbour Offices	Affected by Sheds 1 & 2 conditions.	Can be housed in Shed 3 when remodeled.
Boat Harbour	Date not clear	Usable for most of the workboats in most conditions. To be retained as structurally sound. Old barge/raft wreck should be removed to provide additional draft and room.
Concrete Deck and Ramp	Date not Clear	No structural defects noted from surface inspection. Will require detailed assessment for fixed crane installation.
Cantilever #2 North & South Arm	Built during 1960's	Both arms currently under repair and upgrade. North expected to come online with the mooring upgrade completion.
Mooring System	Currently being replaced with new system ¹⁸ .	New system to have cathodic protection of buoys, higher strength rigging and chains, Quick-release hooks, and load tested. Expected completion Mid November 2010. Older buoys to be used where possible with appropriate treatment. Older system had 12 buoys. New System has 10.
2 x New Motorised Lighters	Cuddon Ltd NZ March 2010	1 motorised Lighter is still in serviceable condition although requires extensive treatment. Optimum operations need 3 container lighters.
1 x New Raft	Shipbuilding Fiji Ltd, May 2010	Motorised barge still required. New Raft needs continuous maintenance
1 x Pilot/ Tug Boat	Date not Clear	Extensive corrosion. Replacement needed.

¹⁸ Mooring system upgrade had to be spearheaded by RonPhos as NPA lacked capacity for maintenance. RonPhos financed new motorized lighters, hire of tugs and led the design for the new system.

		Quotations sought.
1 Forklift	Kalmar 32 tonne, supplier and date unclear	Good condition. Used for all container movements on Land side.
2 x Omega 65 Ton P&H Mobile Cranes	Ronphos hires out one crane for port operations The older one is NPA, date not clear	Ronphos crane provides all carnage services. NPA crane usually out of service for various maintenance issues.
Gantry Units, 1 Raft and 2 x lighters	Date Not Clear	Extensive corrosion or maintenance requirements. Currently abandoned.

143. In the absence of an all-season berthing facility or dedicated harbor, the ships were moored for loading operations by a system of 12 buoys positioning the vessel under the cantilever arms and approximately 200m south-west of NPA Boat Harbor. With anchors set in the sea-bed at around 450m and off the reef, a system of chains and shackles provide a sturdy berth. The last upgrade to this was completed in 2006 and although expected to last five years with nominal maintenance, by 2008 one of the four outer buoys had detached and was lost. Replacement of chains is necessary mostly on the reef edge where the greatest deterioration occurs and this is programmed for every two years. Annual inspections are necessary however, it is unclear whether NPA has the capacity to carry these out.

144. The cantilever structure was completed in the 1960s and used rivet technology. Given the exposure conditions, the structure is reasonably sound due to older gauge steel members. With expected increase in phosphate output and lack of maintenance from NPA, RonPhos has led the upgrade and repair of cantilevers.

145. A causeway/loading bridge is also used to load and unload barges and bring in construction equipment and other atypical cargo. This causeway is also maintained by RonPhos and NRC mostly for the growing aggregate export market. With a crusher capacity of 1,500 tonnes/day established on Topside, expected export volumes are 120,000 tonnes/annum or 60,000m³. The causeway is in very good condition which is attributed to NRC having appropriate equipment and personnel for maintenance.

146. Only the Transit Shed or Building #03 is structurally sound for any further fit-out within limits, for the interim time. However, repairs to column bases and some steel treatment and suitable paint work are necessary to increase its useful life. The cladding has to be changed and the existing concrete wall on the sea side must be retained for protection.

147. All other buildings are structurally unsafe and should be demolished with immediate effect. This has been highlighted since early 2009¹⁹, and it is understood the GoN now has the budgetary provisions to undertake the demolition.

B. Current Status

148. The ADB Nauru Travel Report of November 2009 stated that, “According to Government statistics, an average of 5-7 vessels visit Nauru per month. The shipping services are composed of a mixture of container ships (1-2), diesel tanker, and 3-5 vessels loading the bulk phosphate for export.” The following table indicates the characteristics of the vessels.

¹⁹ Reeves Construction Services, 2009. Nauru Port Infrastructure Project – Review of Nauru Ports Facility April 2009. Part A by Reeves Construction Services Pty Ltd, Part by BMT WBM Pty Ltd for RCS.

Table 2 – Visiting Vessel Characteristics

	<i>Scarlett Lucy (general cargo/containers)</i>	<i>Atom 7 (bulk fuels)</i>	<i>Heracles (bulk fuels)</i>	<i>Phosphate Dry Bulk Vessels (Various)</i>
Year built	1993	1985	2006	
Length x Beam	97.8 m x 17.3 m	98.1 m x 15.5 m	90.0 m x 14.7 m	175m max
Draft	6.0 m	6.4 m	5.3 m	
Deadweight	4,739 tonnes	5,170 tonnes	3,620 tonnes	45,000 tonnes
Container capacity	224 TEU	not applicable	not applicable	
Volume capacity	not applicable	5 447 m ³	3 628 m ³	
Load-out rate, maximum	not applicable	2 400 m ³ /hr (300 mm dia discharge)	1 500 m ³ /hr (250 mm dia discharge)	

149. The frequency of ships had reduced for the months of October and November 2010 due to upgrades to the cantilever and mooring system. It is expected that with the upgrade of the Fuel Tank Farm, ship calls may increase for refuelling options.

150. With the new motorised lighters, 8 x 20ft containers can be offloaded within an hour under optimal sea-state²⁰. This operation is restricted to daylight hours only, due to lack of lighting options at the harbour and on the lighters. On the last trip of Scarlett Lucy²¹, 45 containers were offloaded in two days, and backloading of empty container took 10 hours. The containers were emptied out within Shed 2 and stored in the container area to the north of the boat harbour.

151. The current Mooring System upgrade which was underway during the visit is nearly complete and subject to load test at completion to determine appropriate vessel characteristics. Conservative estimates by Ronphos indicate a 30-35DWT vessel under expected normal sea-state conditions could be moored under the Cantilever 2 North Arm. There is limited clarity on a maintenance plan, warranty or material treatment requirements. The new system consists of eight suitable existing buoys and six new buoys. All other components of the system are new. Some of reef staples and deep-sea anchors are used again, subject to design suitability.

152. Only Cantilever 2 is being repaired – South Arm (\$2 million) under repair, expected to completed by mid-2011. The North Arm was also under repair (\$1 million) during the visit and expected to be operational by end-November 2010. Cantilever No.1 is out of action and there are no plans to upgrade this. The cantilevers have an output of 1,500 tonnes/hour.

C. Proposals

1. Port Development Master Plan

153. Given the operational and infrastructure difficulties identified by the various studies over the years, a Master Plan (NPA_DMP) is deemed necessary to provide a time-based road-map for further and necessary development. Such a plan would also enable easier planning for the GON which is the main funding agency.

154. It is intended that the NPA_DMP will include the entire harbor and port upgrade requirements (e.g., Infrastructure, NavAids, Buildings and Services, Security, Meteorological,

²⁰ Optimal conditions are usually with northerly winds of 2-3knots. Westerly winds are deemed to unsafe for berth/mooring and operations. The “Draft Guidance to Pilots of Ships in the Port of Nauru” notes a 25 knot westerly to be considered unsafe. Better weather also allows for larger vessels to be moored, although tension on mooring lines have to be maintained to avoid reef-ward displacement.

²¹ Scarlett Lucy arrived on 12 October and departed on the evening of 13th October 2010.

land availability) as well as institutional capacity-building to meet current and appropriate regional/international standards. The Plan should also take stock of current projects and studies in place or underway.

155. It should be noted that the current operations are within an area also used by NUA (Water RO Intake, Fuel Tank Farm Pipelines) and RonPhos (Cantilevers, mooring). A land use plan is critical.

2. Replacement Pilot Boat and Omega 65tonne Crane

156. These can be replaced without much planning and would assist in the current operations, given that containerised traffic is not expected to increase in the short time.

3. Capacity Building

157. Capacity building to inspect and maintain the mooring system is needed.

4. All Season Berthing Facility

158. A detailed design and economic feasibility study is required as a follow-through to the ADB Nauru Port Scoping Study which discussed berth structure and options for the Harbour development. This could also be the first stage of the NPA_DMP.

IX. BUILDINGS - ADMINISTRATIVE

159. The Ministry of Finance is responsible for the operations and maintenance of infrastructure in the Government Buildings Complex. The organizational structure is unclear although servicing and regular maintenance is underway.

A. Assets

160. The main GoN offices are housed within a two acre area, with direct road access from the Main Ring Road, and between the Yaren District School and the Parliament Building.

161. The buildings are single- to double-storey timber-framed structures with weather-board external cladding and klip-lok profile roofing. The timber appears to be treated and is mostly in good condition, although fixtures such as single-unit air conditioners have been added. The roofing and guttering are mostly in good condition. The Media Department is housed in an adjacent concrete building and this has been identified in the Communications Sector Report.

162. Some GoN offices are located at the former IOM complex, where buildings are sound, although internal refurbishment is required in some instances. Others are housed within the respective operations such as Health, Ports and Transport²².

163. There is no centralised heating, ventilation and air conditioning (HVAC) system except at the NIA Terminal Building which has the DCA and MoT offices. Fire services are existent but not serviced or inspected in recent times. The location of the Fire Station close by is useful however. Brackishwater is used to flush the toilets while potable water and rainwater tanks provide the balance of water needs.

164. The parking areas are gravelled and accessible to the public; only at the former IOM complex, a security check was compulsory. The offices at the NIA are reliant on airport security, while the main GoN office blocks are un-manned and usually very accessible to the public.

B. Current Status

165. As mentioned earlier, the buildings are generally in good order and only minor repairs and refurbishment are required. Except for the Harbour Offices which are part of the Port Building upgrades being proposed, no further building construction is earmarked for the near future.

166. The new Police Headquarters is expected to be completed by end of 2011, and the police offices will be relocated here from the current set-up at the Civic Centre Complex.

167. Concerns have been raised by some departments on space constraints within the main GoN complex. Some Ministries are cramped within the space allocated and with expected further staffing, this will be an issue. The services for these buildings need to be reviewed and analyzed in detail. There are instances when pumps are not working, and there is no back-up generator for power outages. The use of energy efficient lights and air-conditioning needs to be encouraged as well.

²² MoT offices are at the Nauru International Airport Terminal Building.

C. Proposals

1. Review of Building Services

168. With the increased usage of GoN buildings, services such as ventilation, toilets and water are under heavier loading than probably originally designed. A review needs to be undertaken to assess the current status and load levels, and provide suitable solutions for further development.

X. BUILDINGS - EDUCATION

169. The NSDS milestones within the Social Sector highlight education as critical to the socio-economic development of Nauru.

170. The Ministry of Education is responsible for the operations and maintenance of infrastructure in schools. There are school Environment Officers who report to the Education Buildings Manager (EBM) with weekly updates for infrastructure status and needs.

171. The education system comprises of Infant, Primary, Senior Primary, Junior Secondary and Secondary Schools. In addition, there is an Able-Disable Center located at the ex-IOM complex, which is also funded from the Ministry of Education budget. The Kayser College is owned by the Catholic Parish Convention, but is also largely supported by the Ministry of Education. The Education Bill dictates the minimum service standards for the facilities in schools.

A. Assets

172. There are four Infant Schools situated around the country, and have 3-5 year olds. These schools provide playcentre, pre-school and preparatory curricula. They are located at Meneng, Boe, Nibok and Anetan. Most are timber frame structures with some blocks such as toilets made of rendered concrete. In addition, there are water pumps, gravity water systems, cesspits, fencing and lighting. The play areas are usually on natural ground within the fenced compounds of the schools.

173. The Yaren Primary School is situated adjacent to the GoN buildings in Yaren District, and across the road from the "fenced" NIA runway. This school caters for Years 1-3 of primary education only. The main building is of timber frame and some buildings are metal framed. The play area is in the central courtyard with some grass and surrounded by school buildings. A brackishwater well supplies water for flushing requirements, with cesspits providing appropriate disposal. Solar panels are located on the Computer Room roof.

174. After a major fire earlier in 2010, the Aiwo Primary School for Years 4-6, has been relocated from Aiwo District to the Topside former IOM complex in the Meneng District. The facilities at the IOM complex are still in good condition with pre-fabricated timber structures, but subject to increased usage. The old school site still has three buildings remaining including a toilet block. The Ministry of Education wishes to have this school in operation in the short- to medium-term due to its central location and accessibility.

175. The Kayser College located in Ewa District is maintained mostly by the Catholic Parish. It is made up of timber framed and concrete block structures. The EBM advised that these buildings are "seriously deteriorated" and in urgent need of repair and refurbishment. It is unclear what portion of this will be taken up by the Parish. The play area is covered with a steel-frame structure.

176. The Nauru College is a Junior Secondary School for Years 7-9 in the Denigomedu District. The buildings are timber framed with cement sheet cladding, and are in good condition. The central courtyard is concreted and has brackishwater for flushing with cesspits. There are solar panels on the North and South roofs, which are connected to the NUA grid, producing at least 4,500 kWh per month on average²³.

177. The Nauru Secondary School (NSS) caters for Years 10-12 and is located in the Yaren District, across from the NIA Runway. This has just been completed in March 2010,

²³ Analysis of the Nauru College PV system, October 2008 – February 2010. May 2010.

and has concrete block construction for the two-storey blocks and a timber framed structure for the Sports Barn. Rainwater is harvested into tanks and five septic tanks with the “Steritron” wastewater treatment system which is alarmed and connected to a sea outfall. There is also a brackishwater system and other ancillary services such as fire protection, generators and air-conditioning. Concerns have been raised that more sustainable designs could have been employed as well as the use of materials specified by designers outside of Nauru where their warranties are not applicable²⁴.

178. As part of Phase 2 of the NSS Project, a Learning Village is being proposed. There is space available on the west of the NSS and the aim is to have a Public Library, USP and other tertiary outlets, community learning, and possibly other trade and TVET provisions.

179. The Able-Disable Centre is also located at the former IOM complex. There are access concerns raised by Ministry of Education staff and although the NSS has these provisions, other schools need to be remodelled to suit these requirements. Maintenance at the IOM complex is the responsibility of the OPC management according to the EBM.

B. Current Status

180. The smaller schools have reduced play areas due to a lack of adequate provision of land. The schools were started off in the 1950s with available land and minimal buildings. With the increase in the younger population over the years, most buildings have been added to the same areas resulting in a reduced play area in most cases.

181. The buildings are in need for urgent repairs or maintenance, and in some cases refurbishment to meet the curriculum needs and minimum levels of service. At Kayser College, the main double storey structure is in urgent need to refurbishment and possible structural upgrade. A maintenance plan is being prepared at this stage. The current process of weekly reports and inspections by EBM is highlighting areas of attention quite well and with a well-defined plan, the scheduled planning of maintenance will be possible.

182. Potable water is scheduled for delivery to the school tanks at the rate of 10kL/week/school via NUA trucks. It is unclear if these are actually delivered with reliability however, Ministry of Education staff mentioned that in some cases, all the delivered water is used up within 48 hours. There are also concerns on security for water. This is billed at \$25/month for each school.

183. Electricity costs range from \$350 to \$1,950 per month, the highest being at Nauru College with adequate solar panels. No discount arrangements exist with the NUA, however, with the increasing maintenance burden to Ministry of Education, this needs to be investigated.

184. Spare parts for machinery and pumps are not available on the island and these have to be ordered through the GoN processes, which can take up to six-months in delivery. It must be noted that this problem is prevalent in other sectors as well, especially with NPA and NUA. The EBM has indicated that dedicated stores with adequate spares will result in quicker maintenance and lesser deterioration of equipment lying idle.

185. Waste management and cesspit bail outs cost around \$100 for three months with weekly garbage collection by NRC. Concerns have been raised by Ministry of Education

²⁴ Alexander and Lloyd Group, 2009. Independent Technical Review Report No.4: Planning and Implementation Review of the End-of-Project Phase, November 2009.

staff on transportation issues with the delays by public buses. The need for more sustainable designs in future buildings is also seen as a way to reduce reliance on NUA services.

C. Proposals

1. Aiwo Primary School Redevelopment

186. A TA is being formulated to review and carry out a feasibility study on the four options developed so far. It is expected to be undertaken in 2011. This needs to tie-in with the Airport Development plans as the school is within the western approach path.

2. School Refurbishment Program

187. Most of the schools²⁵ need refurbishment of various components and at varying magnitudes. As part of this program, a minor project to install Solar Panels and remove reliance on NUA. These panels can be connected to the NUA grid and provide necessary support during non-school periods.

3. Disability Access Project

188. Increase access to existing schools and facilities. NSS has an extensive access ramp, walkway and provisions. An appropriate design can be adapted to all schools.

²⁵ Except NSS which is still under a defects liability period.

XII. BUILDINGS – HEALTH

189. The NSDS strategy of providing quality and effective service delivery through infrastructure development and upgrading and milestones within the Social Sector cover the provision of better health services to Nauru.

190. The Ministry of Health (MoH) is responsible for the operations and maintenance of infrastructure at all health care facilities. These are monitored by a Maintenance Department headed by an Infrastructure Manager. Budgetary provisions from MoH are used for operations, upgrading, repairs and maintenance.

A. Assets

191. There are two main hospital complexes providing health services. The Republic of Nauru Hospital (RonH) is located at Denigomodu District, across from Location settlement. It provides accident and emergency, acute clinic and operation theatre, and other curative services, as well as the standard clinical support services (laboratory, blood bank, x-ray, pharmacy, physiotherapy). The administration offices are also located here. The capacity is 56 beds spread over the whole operation.

192. The older buildings are mostly of brick construction and were built by NPC at least 50 years ago. The roofing is made of asbestos tiles. Later buildings have fibre-reinforced concrete sheets with metal roofing. The carpark has recently been raised to reduce flooding however, this has failed to address the problem. A sump pump was installed to divert excess water and the pump is an increased maintenance burden.

193. The concrete water tank C13 is partly in ground and has rainwater infiltration at times. In addition, there are leaks so it is only filled up to 93% by NUA delivery trucks on order. A reverse osmosis unit is used to convert brackishwater to potable water for hospital use, and stored in polyethylene tanks. The reverse osmosis unit is locally maintained. Two reserve Mild Steel tanks, S6 and S7, located behind the complex on the hill side are not in use as there are significant leaks when directly pump-fed from NUA. Rainwater is also harvested and stored in polyethylene tanks. All sources of water are not enough to meet the hospital needs.

194. The RonH has its own back-up generator and this is maintained by a local contractor so outages do not affect operations.

195. The Naoero Public Health Centre (NPHC) is located at the north western borders of Denigomodu District and about 250m from RONH. It provides preventative and public health services. The only dialysis unit for Nauru is located here as well.

196. The main building is of brick construction and has been renovated in 2009 at a cost of \$15,000.00²⁶. Other two buildings are timber-framed with fibre-reinforced concrete sheets and metal roofing. There is also a recently constructed covered concrete patio for physiotherapy and other services. In addition, a concrete block fence surrounds the complex and is located only 20m from the buildings, although the land area available to MoH appears larger. It appears to have been designed for coastal protection as this complex is within 40m from the coastline.

²⁶ GoN, Project Proposal Format, 2009. Republic of Nauru Hospital and Public Health Service Building Repairs and Maintenance Funded through AusAid PPD Budget for Financial Year 10-11

197. The NPHC's reverse osmosis unit is dedicated to the dialysis operations and converts seawater. Potable water is provided through tanks and rainwater harvesting. A generator provides backup power to the NPHC when needed.

198. A health centre is also refurbished and rented from the community at Bouda Lagoon but this is not operational due to lack of water supply. There are plans to have one health centre per district in the future.

B. Current Status

199. The MoH has highlighted the ongoing refurbishment requirements for the buildings at both sites in recent budget proposals. According to the redevelopment plan for a new Multi-purpose Health facility, a total of approximately \$1 million has been spent over the last three years in various repairs, refurbishment and building improvement projects.

200. There are still critical areas of operations which require urgent attention and these have also been raised by MoH. In addition, the operational and logistical difficulty in having two sites has been highlighted as a problem. Visiting medical specialists have also suggested a single medical facility to cater for all health needs of Nauru as a better solution.

201. There are services problems with the building, including the need for a clean environment. The toilets and critical areas such as labs and blood banks are located close to each other. Ceiling-mounted air-conditioning units are causing condensation and molding problems. The Operating Theatre is in need of better access arrangement to prevent infections.

202. Lack of water storage capacity is highlighted as a problem and this needs to be rectified with NUA. The flooding issue is also critical as services and accessibility to hospitals is a worry. A rain event in February 2009 caused about 300mm of inundation and while pumps had been installed, these failed to work. The fire trucks and Ronphos water truck were used to remove the water from the main road and RonH area. The pump is currently with Ronphos for repairs.

C. Proposals

1. Nauru DOH Multi-Purpose Health Facility

203. With the high level of maintenance requirements at the current sites and given operational difficulties, it is proposed to have a complete health care facility at a site to be determined. A suggested capacity is 40-beds. Sustainable design options need to be considered strongly as well as disaster risk reduction in planning for the new facility. A feasibility study is required.

GOVERNMENT OF NAURU

Project Proposal Format

1. Title

Installing an Environmental Pollution Infrastructure and Oil Spill Response Equipment and Tug Hire.

2. Objectives

To provide Nauru's Port Authority with essential safety and oil pollution prevention and response equipment to secure a safer, pollution free marine environment and reliable supply of fuel services to the Nauru community.

3. Sector

This proposal will contribute to strengthening Nauru's infrastructure services, within the transport sector. It will benefit the community to the extent that the services they receive from the Port Authority will be improved, reliable and safer.

The infrastructure sector is one of the key drivers of the national economy and maintaining a port infrastructure is critical to Nauru's economic growth and social advancement.

4. Implementing Agency

Nauru Port Authority – the Authority responsible for the management of port services in Nauru.

5. Background

Nauru published its strategy for Infrastructure Reform in 2006, and amended in October 2009 in which fuel receipt, storage and distribution were priority areas requiring support. The outcome of major work involved is expected to lower the risk level of unforeseen explosions, oil spills and other potential fuel-related catastrophic disasters.

Nauru has been receiving fuel tankers and phosphate vessels regularly without any level of compliance of marine pollution prevention at Port level. The country has to-date not ratified IMO-MARPOL convention on oil spill prevention nor OCIMF (Oil Companies International Marine Forum) and ISGOTT (International Shipping Guide for Tankers and Terminals), all of which prescribes standards for port activities relating to fuel import and expert activities anywhere in the world.

Nauru has over the years imported approximately 8 million litres of fuel and it is looking to increase this capacity through fuel transfers and bunkers in the coming years when the private operator (Pacific Energy) takes over the fuel supply and management of the Tank Farm Terminal. It is paramount that the Government secures oil spill equipment capable of up to potential 100 tonnes of Oil Spill Response (Tier 1 level), as a minimum requirement to reduce risks and damages to the economy and the environment. The Government is

currently negotiating with a private operator (Pacific Energy) and a contract is expected to be signed in the coming weeks as part of the fuel reform. The transition between the Government of Nauru to private run operations in this financial year means numerous international standards require compliance.

In this transition, the major changes which require full compliance lies within Marine/Shore Interface operations. These include ports infrastructure standards; Conventional Buoy Mooring (CBM) berth, tug facility, cantilever structure, fuel pipelines, and fuel discharge hoses.

Today, the Government CBM berth, cantilever, fuel pipelines and hoses are questioned whether in compliance without the marine oil spill prevention equipment and tug facility held in port. This is raising a lot of questions with potential fuel suppliers and ship owners expressed openly by their reluctance to engage. This will certainly bring about serious impact on Government's plans to privatize the national fuel supply and tankfarm operation before end of year 2011. The set back will also have serious implication on the implementation of the national budget and fuel costs for the nation.

Presently, the lack of marine pollution prevention equipment and plans has directly impacted on imported fuel landed cost which happens to be continually high as a result of fuel supplier's growing freight costs.

6. Benefits

The benefits of providing Nauru (through Nauru Port) with funding to support ongoing fuel management and marine pollution prevention equipment include the following:

- Security to the local economy and environment.
- Sustained fuel supply.
- Compliance with international standards regarding fuel handling and distribution environmental risk prevention measures.
- Reduced level of risks for unforeseen safety, security, environmental and costs catastrophes, and provide an environment that is pollution free.
- Provide assurance to the people and stakeholders that the fuel handling facilities, port terminal operational procedures and personnel are equipped to deliver reliable and safe service as expected.
- The fuel freight costs will be reduced as a result of the Port having to comply with World Scale Association's World Scale 96. It means the Port is registered a compliant port, commanding lesser marine fuel freight and meeting certain compliance for certain size vessels (30000 dwt) through monthly Average Freight Rate Assessment (AFRA rate) at a time the product is sold as published by the London Tanker Brokers limited.
- Provide safe berthing and mooring to vessels bringing trade into Nauru.

Also, having the marine oil spill equipment will help Nauru directly comply with other critical international oil industry and transport standards such as OCIMF and ISGOTT. This also provides Nauru a head start despite its slack to ratifying the Marine Pollution Prevention Convention. Having the equipment can firmly support the overlying core principles on marine pollution for any country to ensure:

- (a) **Prevention of marine pollution and Collision** - through improved awareness, improved planning and operational practices and systems in ports and on vessels and through risk analysis and reduction initiatives.

- (b) **Control of marine pollution and Safety** - through the adoption of IMO Conventions and Legislative Framework and educational programs.
- (c) **Monitoring of marine pollution and Safety**- through improved surveillance, enforcement, training and new technology developments.
- (d) **Mitigation of marine pollution and Safety** – through more effective response planning, incident support, response equipment, systems and training.
- (e) **Management of marine pollution and Safety** – through the development, funding, implementation and completion of prevention, preparedness and response projects and initiatives.

Most importantly, the oil Industry which moves fuel in and out of the Nauru can be assured that NPA discharges its responsibilities with high level of professionalism.

7. Inputs

The port facility has been opened to operate to new international standards and without any oil spill equipment and tugs put in place, raises potential marine shore interface risk. Nauru has not been able to command better supply costs on fuel landed due mainly to lack of environmental and safety prevention equipment at the marine front. The Transport Department together with the oil supplier will be required to put together the Port Tug and Marine Pollution Equipment Plan and push for Nauru Oil Spill Contingency Plans, Manuals and training of staff to be completed.

The Tug and Oil spill equipment requirement for Nauru is listed below with most recent costing:

Item	Total Cost (US\$)
------	-------------------

1. Marine Oil Spill Response Equipment & Procedures

Minimum Tier 1 Fuel Oil spill Management and Equipment

\$720,000

- 3 x 25 M Ro Booms
- 3x 25M Guadian Booms
- 1x Wier Skimmer
- 1x Disc Skimmer
- 2x 20kl Fast Tank
- 3x Boom Inflator/deflator
- 1x 20FT , fabricated container with shelving & Storage
- 2x portable diesel pumps
- 1x diesel generator
- 1x air compressor
- 1x welding/air pump
- 10 x Miscellaneous equipments and spare parts
- 1x Commissioning Training
- 1x Technical Service Agreement-Management, with AMOSC
- 2 x Level 1 Oil spill Response Training in, Corio-Geelong
- 1x Consultant for Oil Spill Contingency planning
- Freight from Supplier to Nauru

2. Tug Hire for one year Supply

Hire of Twin Screw Tug with minimum capacity of 33T Bollard Pull and 2000BHP

2 Hire of Tug @ \$200,000 per round trip \$400,000

TOTAL COST OF ITEMS: \$1,100,000

8. Costs and Revenue

The total cost of the assistance being sought is **AUD1.1 million**.

The operational cost savings can be realized on fuel freight and insurance alone by 32% on current fuel landed costs after taking into equipment upkeep costs.

The savings on current landed costs of fuel can be expressed between \$0.650 - \$1.2 million annually, depending on the vessel displacement capacity at any given time. This is a value adding project which will be able to provide viable economic and social gain for the Republic of Nauru.

9. Project Implementation

The project will be implemented by the Nauru Port Authority – the Authority responsible for the management of fuel and provision of port operations and services, and ably supported by the Nauru Fuel Tankfarm Operator.

European and Australian service providers have shown interests and will be contracted to do this supply and commissioning work through normal Government tender processes.

Annex B PRIORITY PROJECT INFORMATION SHEETS

A2	Runway Re-Surfacing & Fencing			
Sector:	Air Transport			
Responsible Agency:	Department of Civil Aviation			
Background/ Rationale:	<ul style="list-style-type: none"> • Although runway refurbishment will temporarily allow continued operations; a full runway resurfacing is required within 3 years. • Detailed technical studies show that runway degradation could now result in engine malfunctions leading to catastrophic consequences. • Construct a low fence with adequate gates to stop animals 			
Social Benefits:	Short Term:			
	•			
Economic Benefits:	Long Term:			
	•			
Economic Benefits:	Short Term:			
	<ul style="list-style-type: none"> • Use of on-island aggregate reduces costs • Construction equipment could allow road upgrades and water runoff collection projects to proceed at more efficient costs 			
Environmental benefits:	Long Term:			
	<ul style="list-style-type: none"> • Limited tourism, fisheries exports 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> • Potential water collection from runway 			
Alignment with National Corporate Objectives:	Long Term	<ul style="list-style-type: none"> • Reliable and economical passenger and freight services provided • ICAO Standards maintained 		
	Short Term	<ul style="list-style-type: none"> • Refurbish and develop civil aviation infrastructure • Airport safety and security standards meet minimum international requirements 		
	Cross Sector	<ul style="list-style-type: none"> • Limited tourism, fisheries exports 		
Project Type:	<input type="checkbox"/> New Infrastructure <input checked="" type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input type="checkbox"/> Planning	<input checked="" type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: No change in existing.			
Land Requirement:	None			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Operating	Whole of Life
		\$110,000	\$3,800,000	\$370,000	\$	\$
Potential Charges?	User	% of Full Cost Recovery			% of O&M	
		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No				
Implementation Timing:	<input checked="" type="checkbox"/> Immediate <input type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input type="checkbox"/> None <input checked="" type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

A3	Replacement of Distance Measuring Equipment (DME)			
Sector:	Air Transport			
Responsible Agency:	Department of Civil Aviation			
Background/ Rationale:	<ul style="list-style-type: none"> The Distance Measuring Range provides guidance to aircraft approaching Nauru. It is currently close to the end of its serviceable life and needs immediate replacement 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> Air services Safety for all passengers and residents. 			
Economic Benefits:	Long Term:			
	<ul style="list-style-type: none"> Improved air connection 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> 			
Alignment with National Corporate Objectives:	Long Term			
	<ul style="list-style-type: none"> Reliable and economical passenger and freight services provided ICAO Standards maintained 			
Project Type:	Short Term			
	<ul style="list-style-type: none"> Refurbish and develop civil aviation infrastructure Airport safety and security standards meet minimum international requirements 			
Project Stage:	Cross Sector			
	<ul style="list-style-type: none"> Limited tourism, fisheries exports 			
Project Type:	<input type="checkbox"/> New Infrastructure <input checked="" type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input checked="" type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact			
Land Requirement:	None			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Operating	Whole of Life
		\$20,000	\$400,000	\$50,000	\$5,000	\$
Potential User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery		% of O&M		
	<input type="checkbox"/> No					
Implementation Timing:	<input checked="" type="checkbox"/> Immediate <input type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					

Financing Stage	<input type="checkbox"/> None <input checked="" type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor
Financing Source	Capital: O&M:

M2	All Vessel Quay Wall & Anibare Moorings		
Sector:	Maritime		
Responsible Agency:	Ports Authority		
Background/ Rationale:	<ul style="list-style-type: none"> • While the current moorings have been upgraded, an enhanced harbor would be safer and more reliable and efficient for operations. • Design allows for quay and causeway for all ships. • An All-vessel quay wall (M2c) constructed on the edge of the reef beneath the phosphate cantilevers. • Accommodates all vessels visiting Nauru. • Cannot provide an all-weather port , so existing moorings would be moved to Anibare for reduced number of days where port operations are not possible • It dispenses with the need for the current mooring buoys for all ships • This solution is not able to serve as an initial stage for a larger enclosed harbor (M2b) because of space limitations at this site. 		
Social Benefits:	Short Term:		
	<ul style="list-style-type: none"> • Reduced prices for goods due to lower demurrage 		
Economic Benefits:	Long Term:		
	<ul style="list-style-type: none"> • Improved access for regular shipping line 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> • Visual amenity 		
Alignment with National / Corporate Objectives:	Long Term		
	<ul style="list-style-type: none"> • Wharf and port infrastructure completed and effective vessel and cargo handling operations established 		
	Short Term		
Project Type:	<ul style="list-style-type: none"> • Sector Goals- Reliable and economical passenger and freight services provided • Strategy: Refurbish and develop port infrastructure for vessel handling 		
	Cross Sector		
<ul style="list-style-type: none"> • Economic, mining 			
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing		
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design <input type="checkbox"/> Ready to Start
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Impact on reef. May be positive if cleanup also occurs		
Land Requirement:	None		

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Operating	Whole of Life
		\$725,000	\$14,500,000	\$120,000	\$	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input type="checkbox"/> None <input checked="" type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

PW1	O&M spare parts store and workshop			
Sector:	Water and Power			
Responsible Agency:	Nauru Utilities Authority			
Background/ Rationale:	<ul style="list-style-type: none"> • Currently, there is no storage for much needed major spare parts and a proper workshop to maintain heavy equipment and machinery • Cost recovery is difficult with GON subsidies for domestic users • The equipment, plant, generators, instrumentation and controls, switch-gears, transformers and distribution network is old and being operated and maintained with increasing difficulty. • Skill-sets are lacking locally, outages still occur although reduced, and obtaining parts is very difficult. • Much needed major parts sometimes arrive six-months later. • The workshop should offer as a minimum: adequate spares, readily available machined/made-to-order Ruston parts and accessories, pump and valve requirements, fleet and special-use vehicle maintenance, auto-winding, and machining capacity • Other users will dictate final list of services provided • No more delays of waiting for ordered spare parts • A dedicated workshop will not only provide necessary and timely support to the power sector, but also be used for the Water Sector. • Multi stakeholder users; GON Bus Transport fleet could also make use of this facility, as well as the Airport, the Fuel Tank Farm, Nauru Ports Authority and other entities. 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> • Less down time with power and water facilities 			
Economic Benefits:	Long Term:			
	<ul style="list-style-type: none"> • 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> • 			
Alignment with National / Corporate Objectives:	Long Term		<ul style="list-style-type: none"> • Desalination plant operational • 50% Water from R/O 	
	Short Term		<ul style="list-style-type: none"> • Restore capacity for water production 	
	Cross Sector		<ul style="list-style-type: none"> • 	
Project Type:	<input type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input checked="" type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input checked="" type="checkbox"/> – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: Improved			
Land Requirement:	None			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Annual Operating	Whole of Life
		\$20,000	\$3,000,000	\$150,000	\$20,000 saving	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery		% of O&M		
	<input type="checkbox"/> No					
Implementation Timing:	<input checked="" type="checkbox"/> Immediate <input type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

S3	Pump Out "Alternative Disposal Options" Sludge Recycling Project		
Sector:	Sanitation		
Responsible Agency:	CIE / NRC		
Background/ Rationale:	<ul style="list-style-type: none"> • Despite the success of the sludge truck operated by NRC, the inherent health and environmental risks of pumping out the sludge near Location are enormous. • The project will develop alternatives for disposal of the sludge, including implementing the utilization of sludge in a composting and biogas facility adjacent to the dump, to be operated by NRC or a private entity. • Additional Sludge Trucks required as IWRM Demonstration Project is increasing the numbers of households with improved designs of enclosed Septic Tank to reduce groundwater contamination • Waste Water recycling for Nurseries and other industrial needs reducing over extraction of ground water resources • Reduce water demands from utilities • Better design sewage outfall for sludge disposal and Location. 		
Social Benefits:	Short Term:		
	<ul style="list-style-type: none"> • Immediate improvement to the environment 		
Economic Benefits:	Long Term:		
	<ul style="list-style-type: none"> • Healthy community, clean environment and good living 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> • Minimising cost of living 		
Alignment with National Corporate Objectives:	Long Term:		
	<ul style="list-style-type: none"> • Provide cost-effective measures through conjunctive water use • Cost-effective alternative form of energy • Improved quality of locally grown produce • User Pays services • Opportunity for Micro Business 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> • Building communities resilience • Immediate improvement to the environment 		
	Long Term:		
Alignment with National Corporate Objectives:	<ul style="list-style-type: none"> • Improved quality of groundwater supply • Healthy and sustainable Marine resources • Healthy and cleaner environment 		
	Long Term	<ul style="list-style-type: none"> • Raw sewerage and grey water properly managed 	
	Short Term	<ul style="list-style-type: none"> • Sewerage treatment and grey water recycling options determined 	
Project Type:	Cross Sector	<ul style="list-style-type: none"> • 	
	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing		
Project Stage:	<input checked="" type="checkbox"/> Concept	<input type="checkbox"/> Planning	<input type="checkbox"/> Design
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact		
	Explain: Positive Impact		
Land Requirement:	Yes - NRC		

PROJECT FINANCING:S3

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Annual Operating	Whole of Life
		\$100,000	\$500,000	\$50,000	\$30,000	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

W4	Water Delivery Upgrade - Additional Water tankers		
Sector:	Water Supply		
Responsible Agency:	Nauru Utilities Authority		
Background/ Rationale:	<ul style="list-style-type: none"> • During dryer spells, storage is limited, as demand exceeds what can be supplied, and the trucks are overworking and unable to meet the daily delivery schedule • To procure an additional of 3 water tankers trucks (1x 10k, 2x 4k) to enable and accommodate the water demand, production and storage • Direct access of potable water to the individual water tank storage • No individual pumping system required 		
Social Benefits:	Short Term:		
	<ul style="list-style-type: none"> • Increased delivery of water, and can reduce delivery backlog with improved or augmented delivery fleet and networks. • No more queuing for potable water collection at NUA 		
Economic Benefits:	Long Term:		
	<ul style="list-style-type: none"> • Decrease potable water demand with NUA 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> • 		
Alignment with National Corporate Objectives:	Long Term	<ul style="list-style-type: none"> • Regular supply of water available to each household and business 	
	Short Term	<ul style="list-style-type: none"> • Regular supply of water available to each household and business • Easy access and reliable water supply 	
	Cross Sector	<ul style="list-style-type: none"> • Other sectors can benefit e.g. Transport – Aviation, Power Sector. 	
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing		
Project Stage:	<input checked="" type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design <input type="checkbox"/> Ready to Start
Environmental Category:	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact		
Land Requirement:	No		

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Annual Operating	Whole of Life
		\$10,000	\$500,00	\$75,000	\$100,000	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery			% of O&M	
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

BE 2	Redevelopment of Aiwo Primary School			
Sector:	Social			
Responsible Agency:	Department of Education			
Background/ Rationale:	<ul style="list-style-type: none"> • Destruction of Aiwo Primary school in 2010 has resulted in relocation of school to State House site. The Department of Education commissioned a scoping study and this was conducted in early 2011. A number of options were presented to Cabinet. Cabinet's preferred option was the amalgamation of Yaren and Aiwo Primary schools and the Able Disable Centre onto one site (State House site). • Such an option clearly meets the NSDS priority of rationalisation of schools. 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> • Appropriate facilities that meet the Minimum service standards for Education • Delivery of NSDS priority activity • Greater opportunity for assimilation of students with special needs into mainstream education 			
	Long Term:			
	<ul style="list-style-type: none"> • Infrastructure facilities that support current technology requirements and pedagogical practice 			
Economic Benefits:	Short Term:			
	<ul style="list-style-type: none"> • . Potential savings in overhead costs such as utilities, waste collection • Consolidation of workforce through rationalisation • Reduced load on transport as only 1 site instead of 3 separate sites 			
	Long Term:			
	<ul style="list-style-type: none"> • Decrease in maintenance costs as funds for refurbishment of old facilities can be directed to maintenance program for single modern facility. 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> • High quality facilities providing safe and healthy learning environments 			
	Long Term:			
	<ul style="list-style-type: none"> • Consolidation of delivery service on one site with appropriate and efficient waste and sanitation systems versus 3 sites that do not have efficient and safe waste, water and sanitation systems that contribute to ground water contamination, waste disposal and water wastage. 			
Alignment with National Corporate Objectives:	Long Term	<ul style="list-style-type: none"> • Rationalisation of schools completed 		
	Short Term	<ul style="list-style-type: none"> • Rationalisation reviewed 		
	Cross Sector	<ul style="list-style-type: none"> • Reduced trips for transport with drop off at one site. • Improved facilities contributing to health through improved sanitation and clean, consistent water supply. 		
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input checked="" type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact			
Land Requirement:	No			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Annual Operating	Whole of Life
		\$1 569 500	\$12 538 400	\$30,000	\$45,000	\$
User Charges?	<input checked="" type="checkbox"/> Yes	% of Full Cost Recovery		% of O&M		
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

BE3	Learning Village		
Sector:	Social		
Responsible Agency:	Department of Education		
Background/ Rationale:	<ul style="list-style-type: none"> In 2006, the Republic developed the concept of a Learning Village. The Learning Village is a concept that fits the social and economic profile of Small Island States. The Nauru Learning Village integrates the facilities of the Nauru Secondary School, TVET Facility, University Campus, Public Library and Teacher Training Centre on the same site or Village A scoping activity has been completed by Mr Rhys Gwilliam and draft sketches completed. 		
Social Benefits:	Short Term:		
	<ul style="list-style-type: none"> Appropriate facilities that meet the Minimum service standards for Education Delivery of NSDS priority activity Provision of a community based learning hub that provides educational services to whole community 		
Economic Benefits:	Long Term:		
	<ul style="list-style-type: none"> Infrastructure facilities that support educational technical and vocational training requirements (as per our Registered Training Organisation and Australian Qualification Training Framework requirements) 		
Environmental benefits:	Short Term:		
	<ul style="list-style-type: none"> High quality facilities providing safe and healthy learning environments 		
Alignment with National / Corporate Objectives:	Long Term		
	<ul style="list-style-type: none"> TVET revived to provide employment opportunity for youth and skilled people for private sector development 		
	Short Term		
Project Type:	Cross Sector		
	<ul style="list-style-type: none"> Increased access for people with a disability to education services 		
Project Type:	<input checked="" type="checkbox"/> New Infrastructure <input type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing		
Project Stage:	<input checked="" type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design
Environmental Category:	<input checked="" type="checkbox"/> A – No impact <input type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact		
Land Requirement:	No		

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Annual Operating	Whole of Life
		\$122,500 (phase 1 only)	\$3.5 million	\$70,000	\$200 000	\$
User Charges?	<input checked="" type="checkbox"/> Yes		% of Full Cost Recovery		% of O&M	
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input checked="" type="checkbox"/> None <input type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

BH3	New Hospital			
Sector:	Health			
Responsible Agency:	Health			
Background/ Rationale:	<ul style="list-style-type: none"> The design and age of the current hospital is not adequate Engagement of specialist health planners has been approved by AusAID, ensuring that the design will adequately address the key projected health demands of Nauru's population. 			
Social Benefits:	Short Term:			
	<ul style="list-style-type: none"> Improved health Ability to undertake better procedures 			
Economic Benefits:	Long Term:			
	<ul style="list-style-type: none"> More efficient procedures, and coordination of administration and patient management 			
Environmental benefits:	Short Term:			
	<ul style="list-style-type: none"> nil 			
Alignment with National Corporate Objectives:	Long Term	<ul style="list-style-type: none"> New Hospital by 2015 		
	Short Term	<ul style="list-style-type: none"> Adequate health facilities for all Nauruans 		
	Cross Sector	<ul style="list-style-type: none"> 		
Project Type:	<input type="checkbox"/> New Infrastructure <input checked="" type="checkbox"/> Upgrade/Replace Existing <input type="checkbox"/> Refurbish Existing			
Project Stage:	<input type="checkbox"/> Concept	<input checked="" type="checkbox"/> Planning	<input type="checkbox"/> Design	<input type="checkbox"/> Ready to Start
Environmental Category:	<input type="checkbox"/> A – No impact <input checked="" type="checkbox"/> B – Minor impact <input type="checkbox"/> C – Severe Impact Explain: May require new land areas, with subsequent impact. Facilities may produce hazardous waste			
Land Requirement:	Possible if new site is determined as necessary			

PROJECT FINANCING

Capital estimate:	Cost	Pre-Construction	Construction	Annual R&M	Operating	Whole of Life
		\$600,000	\$12,000,000	saves \$1,000,000	\$	\$
User Charges?	<input type="checkbox"/> Yes	% of Full Cost Recovery		% of O&M		
	<input type="checkbox"/> No					
Implementation Timing:	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> 2012-2014 <input type="checkbox"/> 2014+					
Financing Stage	<input type="checkbox"/> None <input checked="" type="checkbox"/> Committed Government by <input type="checkbox"/> Funded by Donor					
Financing Source	Capital: O&M:					

Annex C LIST OF PERSONS MET

<u>Name</u>	<u>Position</u>	<u>Organisation</u>	<u>Phone Office</u>	<u>Phone Mobile</u>
Tai'atu Ataata Ivan Batiouk Berylynn Jeremaia	Director Planner Planner	DPPD / Aid Management Unit Aid Management Unit Aid Management Unit	5576446	5565933
Rainer Kleffel	UNV	UN Joint Mission		
Charmaine Scotty Rodney Henshaw Anne Henshaw Sharain Hiram Dominic Appi Max Gadaroa	Secretary Director of Media Media Consultant Asst. Director of Media Director of Radio & Broadcasting Technician	Ministry of Home Affairs Nauru Television/Radio Nauru Television/Radio Nauru Television/Radio Nauru Television/Radio Nauru Television/Radio	5573033	
Tryphosa Keke Calistus Cain Bob Agigo Johanne Bryd	Acting Secretary for Education Director of Administration Infrastructure Site Manager Consultant	Ministry of Education Ministry of Education Ministry of Education Ministry of Education		
Seve Paeniu	Secretary for Finance	Ministry of Finance and Economic Planning		
Ta'aitu Ataata	Deputy Secretary for Finance	Ministry of Finance and Economic Planning		
Marissa Cook Giedo Garabwan Mr. Norman Powell	Acting Secretary for Health Infrastructure Manager Strategic Planner	RON Hospital RON Hospital	5573056 5573059 5573057	
Roland Dabwido	Location Resident			
Russ J Kun	Secretary	Ministry of Commerce, Industry & Environment	4443133	
Haseldon Buramen Bryan Star	Integrated Water Resource Management Director of Projects	Ministry of Commerce, Industry & Environment		
Vinci Clodumar	CEO	Nauru Rehabilitation Corporation		
Peter Crowler	Consultant	Nauru Rehabilitation Corporation		
Dempsey Detenamo John Gray - Rene Olsson - Jackson Davis	Waste Management Officer Engineer Manager Road Maintenance		5573247 5573240	
Apisake Soakai Robert Leo Raphael Ribauw	CEO Manager - Fuel Tank Farm Senior Supervisor - Water Distribution	Nauru Utilities Authority Nauru Utilities Authority Nauru Utilities Authority		
Mark Hiram	Senior Supervisor - Water Desalination Plant	Nauru Utilities Authority		
Andre Adun	Senior Supervisor - Power Generation Station	Nauru Utilities Authority		
Geoffrey Thoma	Supervisor - Water Distribution	Nauru Utilities Authority		
Remi Chadd Kemp Detenamo	Harbour Master Harbour Administrator Director of Maritime Transport	Nauru Ports Authority Nauru Ports Authority Nauru Ports Authority	5573090	

Nauru Economic Infrastructure Strategy & Investment Plan

Chris Stephens	Secretary of Transport	Ministry of Transport
Allan Debao	Director of Land Transport	Ministry of Transport
Melani Bill	Director of Civil Aviation	Ministry of Transport
Norman Kapun	Director of ICT	Ministry of Transport
John Tagilima,	EU Disaster Risk Reduction Project	SOPAC
Warren Nitschke	EU Disaster Risk Reduction Project	SOPAC
Mark Skinner	First Secretary	AusAID
JP Dixon	Manager, Digicel Nauru	Digicel
Maurie Williams		Treasury

Annex D

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**Annex E
BREAKDOWN OF THE NEISIP INTO CAPITAL, MAINTENANCE AND OPERATING COST COMPONENTS**

Nauru Infrastructure Priority Scheduling																			
Capital	Ref	Project	Estimated Capital Cost (\$m)	Estimated life cycle costs (\$m)	Status	Funding Source	2011 - 2038												
							11	12	13	14	15	16	17	18	19	31	32	33	34
Capital																			
Committed and Funded																			
	W2	Solar Power RO Unit	3.00	3.36	F	PEC	3.36												
	W3	Supply and commissioning of 300kL RO Unit	0.60	0.67	C	AusAID	0.67												
	W1	EU Envelope B - Risk Reduction Project (C1-C6) & water tankers (1@10kl)	0.76	0.84	F	EU	0.84												
	P1	Jet Fuel Supply	0.40	0.44	F	AusAID	0.44												
	S1	Mainstreaming IWRM	0.30	0.33	F	GEF	0.33												
	T1	New Telecom Towers	0.15	0.17	C	AusAID	0.17												
	A1	PAPI System	0.10	0.11	F	AusAID	0.11												
	R1	Solar Street Lighting	0.30	0.33	F	ROC	0.33												
	R2	Fleet Augmentation	0.15	0.17	F	Azerbaijan	0.17												
	BA1	Police HQ	2.70	2.97	F	AFP	2.97												
	M1	Omega 65 tonne Crane	0.50		F		0.56												
	S5	Hospital Hazardous Waste Incinerator	0.30	0.34	I	U					0.34								
	BA2	Police Youth Club	0.20	0.22	C	AusAID	0.22												
	BH2	Annual Refurbishment to Hospital	1.20	1.32	C	AusAID	0.42	0.30	0.30	0.30									
	BE1	Schools Annual Refurbishment Program	0.60	0.66	C	AusAID	0.21	0.15	0.15	0.15									
	Sub-total		11.26	12.14			10.79	0.45	0.45	0.45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PV			11.06															
Priority	High																		
	M2a	New Quay wall - Scenario 2 & Anibare Mooring	14.40	18.00	P				9.00	9.00									
	BH3	New Hospital	12.00	13.80	P	U			6.90	6.90									
	S3	Pump Out "Alternative Disposal Options" Recycling Project	0.50	0.58	P	U			0.58										
	A2	Runway Resurfacing & Fencing	3.80	4.45	P	U			4.45										
	A3	Navalids -VOR	0.40	0.46	P	U	0.46												
	R3	Roads Rehabilitation	1.00	1.14	P	U			1.14										
	BE2	Aiwo School Rebuilding	12.60	14.49	P	U			14.49										
	BE3	Learning Centre	3.60	4.14	P	U			4.14										
	W4	Water Delivery - Additional Water tankers (3 x 4kl)	0.50	0.56	P	U	0.56												
	PW1	O&M spare parts store and workshop (shared with Utilities and Menen H	3.00	3.36	P	U			3.36										
	Sub-total		51.80	60.97			1.02	28.15	9.00	15.90	6.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	PV			48.61															
Priority	Medium																		
	P2	Bulk Saltwater Emergency Response	1.00	1.14	P	U				1.14									
	S2	New lined Landfill & Compactor Trucks (BOT??)	1.40	1.68	I	U				1.68									
	S4	Location Saltwater flush (* contingent on P2)	0.30	0.38	I	U				0.38									
	TOTAL	Ongoing and Priority Projects	63.06	73.11			11.81	28.60	9.45	16.35	6.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
		TOTAL PV		59.67															
		Discount rate	8.0%																

Nauru Economic Infrastructure Strategy & Investment Plan

Maintenance only																				
Ref	Project	Estimated Capital Cost (\$m)	Estimated Maintenance Cost (\$m)	Status	Funding Source	2011 - 2038														
						11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	31.00	32.00	33.00	34.00	35.00	
Committed and Funded																				
W2	Solar Power RO Unit	3.00	9.00	F	PEC		0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.00				
W3	Supply and commissioning of 300KL RO Unit	0.60	1.80	C	AusAID		0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.00				
W1	EU Envelope B - Risk Reduction Project (C1-C6) & water tankers (1@10kl)	0.76	1.52	F	EU		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00				
P1	Jet Fuel Supply	0.40	0.40	F	AusAID		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00				
S1	Mainstreaming IWRM	0.30	0.30	F	GEF		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00				
T1	New Telecom Towers	0.15	0.30	C	AusAID		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00				
A1	PAPI System	0.10	0.20	F	AusAID		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00				
R1	Solar Street Lighting	0.30	0.30	F	ROC		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00				
R2	Fleet Augmentation	0.15	0.30	F	Azerbaijan		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00				
BA1	Police HQ	2.70	2.70	F	AFP		0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00				
BA2	Police Youth Club	0.20	0.20	C	AusAID		0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00				
M1	Omega 65 tonne Crane	0.50	1.50	P	AusAID		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00				
S5	Hospital Hazardous Waste Incinerator	0.30	0.57	I	U		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00				
BH2	Annual Refurbishment to Hospital	1.20	0.00	C	AusAID		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
BE1	Schools Annual Refurbishment Program	0.60	0.00	C	AusAID		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00				
Sub-total		11.26	19.09			0.00	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.93	0.00	0.00	0.00	0.00	
	PV			8.68																
Priority	High																			
M2a	New Quay wall - Scenario 2 & Anibare Mooring	14.40	2.74	P						0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00	
BH3	New Hospital	12.00	21.60	P	U						1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	0.00	
S3	Pump Out "Alternative Disposal Options" Recycling Project	0.50	0.50	P	U			0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00	
A2	Runway Resurfacing & Fencing	3.80	7.60	P	U			0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.00	
A3	Navaid's -VOR	0.40	0.80	P	U		0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00				
R3	Road Rehabilitation (* contingent on Runway resurfacing (A3) & (R4)	1.00	2.00	P			0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00				
BE2	Aiwo School Rebuilding and Disability Access	12.60	0.60	P	AusAID		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
BE3	Learning Village	3.60	1.40	P	AusAID		0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.00			
W4	Water Delivery - Additional Water tankers (3 x 4kl)	0.50	1.43	P	U		0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.00				
PW1	O&M spare parts store and workshop (shared with Utilities and Menen H	3.00	3.00	P	U			0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.00		
Sub-total		51.80	41.79			0.00	0.32	0.87	0.87	1.01	2.21	2.21	2.21	2.21	2.14	2.00	1.37	0.00	0.00	
	PV			16.21																
Priority	Medium																			
P2	Bulk Saltwater Emergency Response	1.00	1.90	P	U						0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00	
S2	New lined Landfill & Compactor Trucks (BOT??)	1.40	1.33	I	U						0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.00	
S4	Location Saltwater flush (* contingent on P2)	0.30	0.86	I	U						0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	
TOTAL Ongoing and Priority Projects		63.06	60.88			0.00	1.27	1.83	1.83	1.97	3.17	3.17	3.17	3.17	3.07	2.00	1.37	0.00	0.00	
TOTAL PV				24.90																