Initial Environmental Examination

March 2017

NAU: Port Development Project

Prepared by the Nauru Port Authority for the Nauru Government and the Asian Development Bank.

Initial Environmental Examination
Nauru Port Development Project PPTA

TA-9009

Submitted to ADB 24 March 2017 (Version 2)

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Tables and Figures

Acronyms and Abbreviations

ADB	Asian Development Bank
BOM	Bureau of Meteorology
cm	Centimeters
CEMP	Construction Environmental Management Plan
DCIE	Department of Commerce, Industry and Environment
0C	Degrees Celsius
DWT	Deadweight Tonnage
EA	Executive Agency
EEZ	Exclusive Economic Zone
EHSG	Environmental Health and Safety Guidelines
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ENSO	El Niño/La Niña-Southern Oscillation
EOD	Explosive ordnance Disposal
ERLI	Environmental Risk and Likely Impact
ERMF	Environmental Risk Management Framework
GRM	Grievance Redress Mechanism
GoN	Government of Nauru
HSE	Heath, Safety and Environment
HSO	Health and Safety Officer
HSP	Health and Safety Plan
IA	Implementing Agency
IEE	Initial Environmental Examination
ISPS	International Ship and Port Facility Security
IUCN	International Union for the Conservation of Nature
JICA	Japanese International Cooperation Agency
Km	Kilometer
m	Meters
MCIE	Ministry of Commerce, Industry and Environment
mm	Millimeters
MoF	Ministry of Finance
MoT	Ministry of Transport
MOU	Memorandum of Understanding
NBSAP	National Biodiversity Strategy & Action Plan

NEMS	National Environmental Management Strategy
NFMRA	Nauru Fisheries and Marine Resource Authority
NPA	Nauru Port Authority
NPDP	Nauru Port Development Project
NRC	Nauru Rehabilitation Corporation
NSDS	National Sustainable Development Strategy
NUC	Nauru Utilities Corporation
NWSHP	National Water, Sanitation & Hygiene Policy
OH&S	Occupational Health and Safety
PACCSAP	Pacific-Australia Climate Change Science and Adaptation Planning
PAD	Planning Aid Division
PDA	Project Design Advance
PES	Pre-Feasibility Study
PPE	Personnel Protective Equipment
PPTA	Project Preparatory Technical Assistance
PMU	Project Management Unit
PRIF	Pacific Regional Infrastructure Facility
PSF	Pre-Feasibility Study
REA	Rapid Environmental Assessment
RONPHOS	Republic of Nauru Phosphate Company
SOPAC	South Pacific Applied Geoscience Commission
SPS	Safeguard Policy Statement
TOR	Terms of Reference
UXO	Unexploded Ordnance

Note: All photos undertaken by ADB consultant during December 2015 in country visit.

CURRENCY EQUIVALENTS

(February 2017)

Currency unit	-	Australian dollar
USD 1.00	=	AUST 0.75
AUST 1.00	=	US 1.35

WEIGHTS AND MEASURES

Metric system except for land areas (1 acre = 0.4 hectares)

Executive Summary

Introduction and background

The Asian Development Bank (ADB) is assisting the Government of Nauru (GoN) to upgrade and improve the infrastructure and services of the Nauru Port and the Nauru Port Authority (NPA).

The current port facility is extremely run down and has Occupational Health and Safety (OH&S) issues, capacity limitations and is vulnerable to extreme and seasonal weather events. These poor port facilities induce high cost of consumables in the domestic market due to high cost in port handling and adversely affect bulk transportation of current and potential exports (phosphate, limestone aggregate and fish) and imports. The consequences of the failure of the port facility would be dire for the local economy, workplace and public safety, regional connectivity and the habitability of Nauru, as the port receives all cargo and bulk fuel vessels into Nauru and provides a critical link in a broader Pacific maritime network.

The Government of Nauru identified the upgrade of the existing port as a key priority to improve turnaround of vessels, reduce demurrage and improve safety, and requested development partner assistance on undertaking options identification and assessment. The ADB through formal requests from the GoN has initiated the process to assist in the development of the nation's Port and as such has undertaken a number of studies identifying development options for the Port.

Through this work several additional options were developed (refer CARDNO, 2016) resulting in a final agreed design that includes a new protected harbor constructed to the north of the existing facility allowing vessel access, safe mooring and protection from oceanic waves. This final preferred design option comprises a 30m wide wharf approximately 170m long, adjacent to a minimum 50m wide berth pocket dredged to a 10 m depth into the intertidal reef flat with an approximately 170m long breakwater on the seaward side. The concrete wharf will be a suspended slab on steel piles and is expected to be approximately 4 m above the intertidal reef level to suit the berthing of general cargo vessels, as well as accommodating sea level rise of 0.6 m over the next 50 years.

This report therefore presents the detailed environmental assessment and potential environmental impacts that may result from the Pre-Construction (design), Construction and Operational phases of the Nauru Ports Development Project (NPDP) and provides a detailed Environmental Management Plan (EMP) that outlines specific actions that will be required to be undertaken to ensure minimal environmental impacts (marine & terrestrial) will arise from the project.

Categorization

The NPDP was separately categorized through the Rapid Environmental Assessment (REA) 'Port Development' checklist, as environment **Category B** in accordance with ADB Safeguard Policy Statement 2009 (SPS). The site has a number of small scale, but nevertheless potential adverse construction environmental impacts that are site-specific all are reversible, and mitigation measures can be designed and implemented readily.

Objectives of the study

The objective of this report includes the environmental assessment of the proposed pre-construction/design, construction and operation of a new port facility for the island of Nauru. The assessment is required in order that an EMP for each phase of the project can be detailed to avoid, mitigate and/or manage the anticipated environmental, health and safety impacts.

Nauru does not have any environmental laws or regulations and therefore the consultant will closely follow the ABD SPS 2009 in preparing the assessment.

Project description and scope

The purpose of this project is to upgrade the existing Nauru Port infrastructure. This will directly result in improved operational systems for international shipping access and services to Nauru whilst increasing efficiency of the port, health and safety to all workers and users and assist in the sustainable development of the Nauru economy and improve lives of its citizens. Current port facility issues include (PRIF 2015- Nauru Port Prefeasibility report);

> **Unique hostile geography without a protected harbor –** Nauru does not have the benefit of a protected port facility, due to the unique geography of the island. The extremely deep water (3,000 m within 7 km of the coastline) and the existing port's exposed mooring location, very close to the fringing reef, make shipping and port operations difficult;

> **Condition and vulnerability of the existing mooring system, and associated delays and costs –** Overzealous mooring practices when anchoring general cargo vessels to the outer buoys have occasionally caused damage to components of the mooring system, which then requires costly repair and/or replacement work to be requisitioned from specialist overseas-based contractors. These incidents result in unscheduled closure of the mooring system, thereby delaying the berthing of phosphate vessels, fuel ships and general cargo ships, which causes unnecessary delays to the delivery of essential supplies such as fuels and general cargo goods, as well as delaying the export of phosphate with its attendant financial consequences.

> **Congested land area and backlog of empty containers –** The port land utilized for container storage is congested because a substantial area is occupied by derelict buildings serving no useful purpose. The remaining available space is predominantly occupied by empty containers which can't be exported because of poor ship loading/unloading efficiencies. A significant backlog of empty containers clogs both the port and vacant land across the island; and

> **Existing poor condition –** Existing poor condition of infrastructure and equipment such as vessels, workboats and rafts, and lifting equipment, creates operational inefficiencies and occupational health and safety issues.

The proposed project will permit all vessels visiting Nauru except dry bulk phosphate vessels to be relocated to the dedicated berth north of the existing boat harbor. This new berth will provide a facility that is suitable for loading/unloading containers and general cargo using ship's gear, directly to the wharf. Yard equipment will then transfer containers to the container yard where they will be stacked awaiting pick-up by the customer. Phosphate vessels will continue to operate at the existing cantilevers, using the existing mooring/buoy system. Hence, continued maintenance of the moorings and buoys to maintain this phosphate loading capability.

The main features included in the proposed project include:

> The preferred option comprises a 30m wide wharf approximately 170m long, adjacent to a minimum 50m wide berth pocket dredged 10m into the reef with an approximately 170m long breakwater on the seaward side;

> The concrete wharf will likely be a suspended slab on steel piles and is expected to be approximately 4m above the intertidal reef level to suit the berthing of general cargo vessels, as well as accommodating sea level rise of 0.6 m over the next 50 years;

> Backfilling of the triangular area between the wharf and the existing boat harbor for a temporary laydown area for containers.

> A rock causeway connecting the port land adjacent to the boat harbor with the south eastern end of the wharf (adjacent to the desalination pump station) for access to move containers and general cargo directly from ship to shore, and to support new fuel pipelines to the tank farm;

> Retention of the anchored mooring system and buoys for phosphate vessels;

> Supply of appropriate equipment for transferring containers to/from the container yard;

> Demolition of old and derelict sheds and buildings, including disposal of asbestos cement cladding and fencing; (this scope of work is expected to be a separate NPA contract to be completed before the NPDP commences);

> Heavy duty pavement across the entire container yard area;

> New Harbormaster's office and administration, staff amenities, gatehouse and plant workshop;

> Site power reticulation, including reefer points and security lighting; and

> Fire ring main and hydrants.

The proposed project has been designed to ensure provisions are made for future expansion if and when required.

Environmental impacts

The IEE concludes that there are no identifiable significant environmental impacts nor is the project deemed environmentally sensitive. Impacts arising from the construction and operational phases of the project are minor, localized, and acceptable, providing that the set of mitigations measures set out in the EMP are incorporated in the design, implemented, and monitored properly. Key impacts include;

> The NPDP is located within the existing land parcel of the Port that has been highly modified (cleared, filled, built on) and does not support any terrestrial ecological or biological (flora or fauna), endemic, endangered or significant biodiversity.

> The Nauru Port land site does not have any freshwater (rivers, streams), forests or agriculture.

> The NPDP includes the coastal foreshore, intertidal reef flat and sub tidal reef slope. The coastal foreshore and intertidal reef flat areas have been highly modified (dredged, built on, rock walls) whilst the sub tidal shallow water reef areas have been impacted by port activities (e.g. mooring chains, existing harbor entrance) resulting in the degradation of benthic habitat and resources.

> The intertidal reef flat ecosystem associated with the NPDP does not support any marine shallow water ecological or biological (flora or fauna) endemic, endangered or significant biodiversity. Hard coral is all but absent in this area.

> The subtidal reef edge, and upper slope ecosystem associated with the NPDP does not support any marine shallow water ecological or biological (flora or fauna) endemic, endangered or significant biodiversity. Hard coral percent coverage in the region proposed for the NPDP is very low.

> Impacts on the terrestrial and shallow water marine ecosystems and their environments resulting from the project's construction activities are expected to be very minor.

> Impacts on the environment associated with the intertidal reef resulting from the physical dredging of the area and subsequent increased short lived sedimentation has a low impact on the marine fauna and flora due to the scarcity of resources located within and adjacent to the projects area of influence.

> The NPDP site does not impact any terrestrial or marine conservation and/or protected area, sites of cultural, customary or heritage significance nor any national or international endangered or protected species.

> Due diligence and proactive management of all pre-construction, construction and operational activities will ensure limited disturbance to the daily business activities undertaken within the Port and surrounding business and community activities.

> Nauruan laws and regulations associated with labor, employment, OH&S need to be adopted by the pre-construction contractors monitored by the NPA.

> Climate change adaptation measures have been included in the pre-construction design and implemented activities.

The pre-construction, construction and operational EMP identifies potential environmental impacts arising from the project along with a corresponding schedule and monitoring of mitigation measures to ensure potential impacts are maintained at insignificant levels. It also includes the institutional arrangements for implementing the EMP to ensure its effectiveness.

Environmental benefits

The proposed works associated with the NPDP are environment-friendly and will result in the substantial increase in the efficiency and safety of the Nauru port operational functions. This will result in more frequent inbound and outbound movement of shipping containers and commodities providing increased business opportunities and income generation for the nation and foreign trade.

Environmental management plan

The NPDP EMP, mitigation measures, environmental monitoring and capacity development, are required to minimize the environmental impacts in the preconstruction, construction and operational phases of the project. The Design, Supervision and Capacity Development (DSCD) consultant and Contractor will be tasked to finalize the detailed design and compilation of an updated CEMP and the contractor will be responsible for implementing the EMP. The mitigation actions identified in this report need to be implemented by the contractor. The EMP is presented as Section 6 of this report.

The proposed EMP for the NPDP is based on documented and verbal information provided to the consultant and utilizes the ADB pre-construction IEE as a basis for this report. It has been developed to outline the measures that are to be implemented in order to minimize adverse environmental impacts and serves as a guide for the contractor and the workforce on their roles and responsibilities concerning environmental management on site and outlines the potential environmental impacts, their mitigation measures, roles and responsibilities and timescales.

The EMP provides a set of mitigation, monitoring and management measures to be applied during pre-construction, construction and operational phases and implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts. Three, fourteen and four potential pre-construction, construction and operational management, mitigative and monitoring actions respectively, were recorded. Most importantly, during the pre-construction phase will be the distribution of the environmental documentation, including the EMP to all stakeholders including the successful contractor(s) and the completion of a pre-construction briefing/workshop for the Nauru Port Authority (NPA). During the construction period, environmentally responsible construction practices and management of all activities including construction wastes will be essential.

Implementation of internationally recognized good construction environmental practices form the basis of the EMP which covers issues such as sedimentation control, noise and air quality, materials sourcing and spoil management, minimization of habitat disturbance, and worker and community health and safety.

Implementation arrangements

The Executing Agency (EA) for the NPDP will be the Planning Aid Division (PAD) under the Ministry of Finance (MoF) and the project's Implementing Agencies (IA) will be the Nauru Port Authority (NPA), which will report to a board and to the Ministry of Transport (MoT). The Division of the Environment (DCIE) under the Ministry of Commerce, Industry and Environment (MCIE) will be the lead agency for ensuring environmental compliance to the nation's legislation and issuance of development consent for project development.

Further discussions will need to be undertaken once the project is approved, to finalize the location of the NPDP and whether a small Project Management Unit (PMU) will be established to be responsible for financial control, procurement, and reporting of the NPDP project. Staffing of the PMU and specific roles and functions will also need to be articulated.

Policy, legal and administrative framework

There are no legal instruments that govern environmental impact assessment in Nauru. A draft Environment Bill is still in its development stage and rests with the GoN. The draft Bill does not include specific requirements that clearly define the procedures and guidelines to undertake an Environmental Impact Assessment (EIA).

The MCIE through its Environment Division (DCIE) is the lead agency in the planning, administration and management of environmental matters for both public and private sectors. The DCIE was established in 1995 and is the Nauru government's legal entity that has the authority to request an EIA to be undertaken on a project basis. The DCIE is also the government agency responsible for the review and approval of EIA's and/or IEE's. Due to the absence of EIA regulations, guidelines and specific codes of practice within the nation all past EIA have utilized regional and/or international best practices and guidelines. Therefore for all environmental safeguard requirements associated with the NPDP should refer to the ADB safeguards guidelines.

The objectives of the IEE are to: (i) assess the existing environmental conditions; (ii) identify potential environmental impacts; (iii) evaluate and determine the significance of the impacts; (iv) develop an EMP detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities to address adverse environmental impacts; and (v) carry-out public consultations to document any issues/concerns; and (vi) to ensure that such concerns are addressed in the project design.

Conclusion and recommendations

The IEE concludes that there are no identifiable environmental significant impacts nor is the project deemed environmentally sensitive. Impacts arising from the construction and operational phases of the project are minor, localized, and acceptable, providing that the set of mitigations measures set out in the EMP are incorporated in the design, implemented, and monitored properly. The findings of the IEE evaluation suggest that significant improvements to the port's operational activities, its efficiency and health and safety to workers will be greatly improved and provide improved environmental and port service facilities to the nation.

Information disclosure, consultation and participation

The NPDP IEE planning and environmental concerns were discussed with relevant GoN Ministries, GoN Division/Departments, semi government and autonomous authorities and the general public stakeholders resulting in an agreement for the support of the scope of works. A project communication plan has been developed and stakeholder consultation for the IEE followed this format. The process

also gathered information on relevant concerns of the stakeholders and where relevant incorporated into the IEE.

This report draft will be submitted to PAD who will forward the document to the relevant GoN Ministries and Departments for their evaluation and clearance and to the ADB to ensure their safeguard policies are met. The final approved document will be disclosed to the public and included into the PAD document register and uploaded on the ABD web site.

Reporting will be completed regularly during the project development and should include monthly reports from the contractor to the PAD and NPA, as detailed in the EMP.

Grievance redress mechanism

A Grievance Redress Mechanism (GRM) has been developed to receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievances about the environmental and social performance of the project. The GRM is based on accepted practices and government protocols in Nauru and provides an accessible, time-bound and transparent mechanism for the affected persons to voice and resolve social and environmental concerns linked to all projects undertaken within the NPDP activities

1 Introduction

The Micronesian small island state of Nauru (Figure 1) is located in the dry belt of the equatorial oceanic zone and is bordered by the Republic of Kiribati in the east, the Republic of the Marshall Islands (RMI) in the northeast (700 km), the Federated States of Micronesia (FSM) in the northwest (700 km), Papua New Guinea (PNG) in the west (1600 km), the Solomon Island in the south west (1200 km), Vanuatu in the south (1300 km) and Fiji (2600 km) to the south east. Based on the 2011 census (GoN Bureau of Statistics, 2013), the total population of Nauru was 10,084 (5,105 males and 4,979 females) with an average annual growth rate of 1.8 percent that is equivalent to an increase of 170 people per year.

Nauru is a raised coral limestone island and is one of the smallest independent nations in the world. It is composed of only one island which is 21 km^2 in area, roughly 6 km by 4 km in length and width respectively, has a coastline of 24 km, possesses an Exclusive Economic Zone (EEZ) of 309,888 km^2, lies just 41 km south of the equator (0°32'02.5 South and 166°55'57.8 East) and is divided into 14 districts of varying sizes and number of inhabitants.

Nauru is surrounded by a fringing coral reef ranging from 80 m to 300 m wide, which includes a distinctive shallow water intertidal reef flat (exposed at low tide in most locations) and a sub tidal reef slope that drops away sharply on the seaward edge to a depth of approximately 3 km. The coastal plain is a zone of sandy or rocky beach on the seaward edge, and a beach ridge or fore-dune, behind which is either relatively flat ground or, in some places, low-lying depressions or small lagoons filled by brackish water (e.g. Buada lagoon) where the surface level is below the water table (freshwater lens). The raised central plateau (Topside) generally lies between 20-45 m above sea level with occasional elevations of up to 50-70 m. The central plateau comprises a matrix of coral-limestone pinnacles and limestone outcrops, between which lie extensive deposits of soil and high-grade phosphate rock covering approximately 1600 ha (over 80% of the island). This area has been extensively mined with the ecosystem drastically altered (SPC, 2005 and Fenner, 2013).

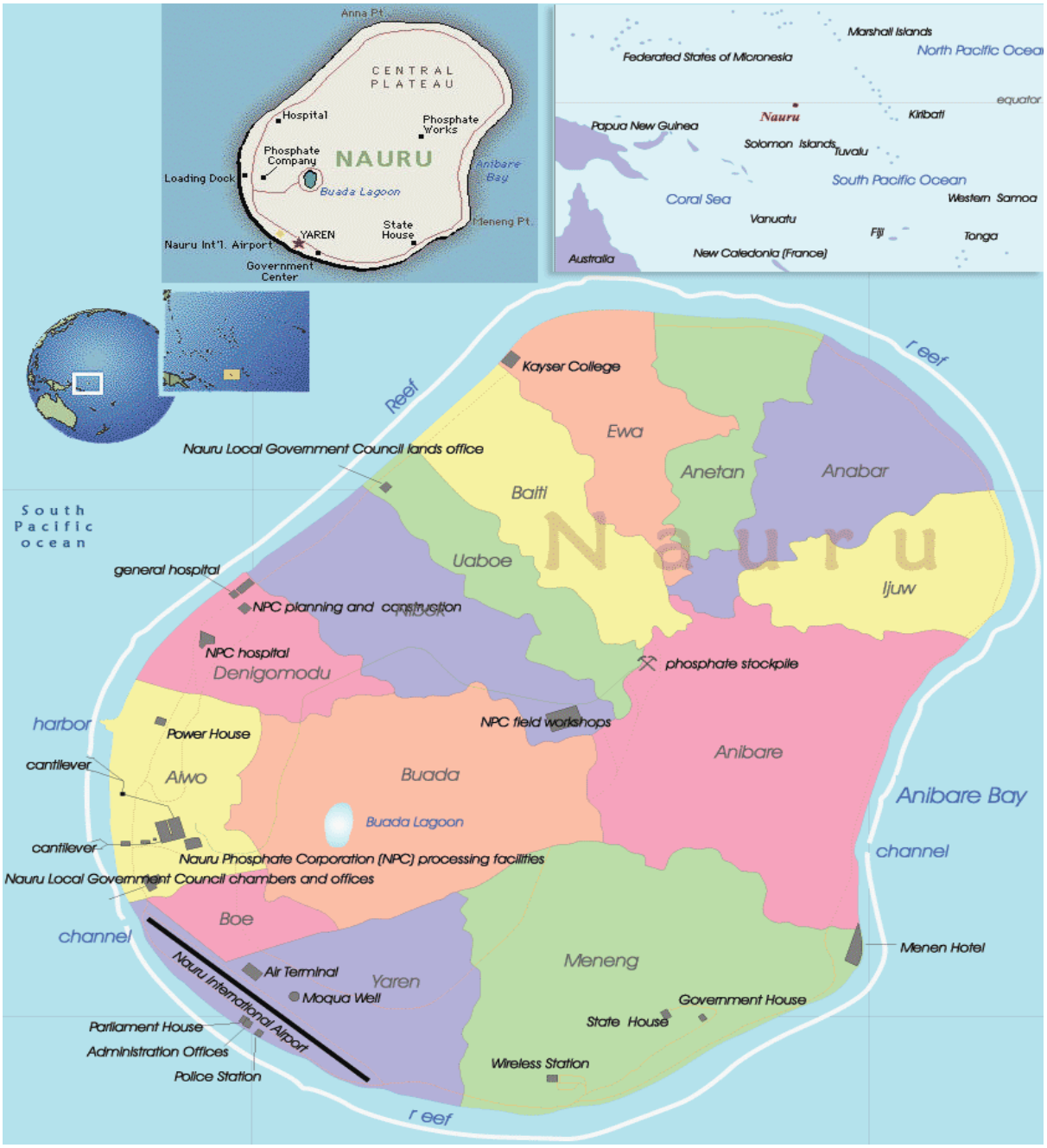
Phosphate mining provided the main source of the nation's income until the late 1980's. However, the industry contracted significantly over the 1980's, with the performance of other industries becoming relatively more important to the economy. Phosphate exports reached a peak in the 1970's at approximately 2,300,000 metric tons, falling to 500,000 metric tons by the early 1990's and were virtually zero by 2004.

Mining recommenced in the late 2000's due to new technology and in 2010-2011, it is estimated that exports of phosphate were approximately 440,000 tonnes, up from 319,000 tonnes in 2009-2010. However, poor infrastructure and exchange rate and market price fluctuations have meant that export earnings from phosphate have failed to meet government forecasts, aside from problems with the moorings, which have prevented phosphate ships from visiting Nauru regularly.

More recently, fishing licenses issued to Japan, China, South Korea, Taiwan and USA have become an important source of revenue for Nauru. Pelagic fish abound in Nauruan waters, but Nauru has not been able to establish a commercial fishing industry of its own.

Due to the long history of phosphate mining the 'Topside' of the island, at least 80 percent of the island is deemed uninhabitable and unsuitable for any kind of livelihood. Given the extensive phosphate mining on the Topside area, the majority of Nauru's population is concentrated along the coast with many settlements along the coastline resulting in a population density of over 1,500 persons per km^2 (GoN Bureau of Statistics, 2013). This has considerable implications and consequences for sustainable land and water management, in terms of the availability and suitability of land and water for future settlement, health, and safety, biodiversity conservation (including marine ecosystem) and the possible effects of climate change.

Figure 1 **Location of Nauru**



Nauru does not have the benefit of a protected port facility, due to the unique geography of the island and thus is entirely reliant on sea and air transportation for its trade in goods and services. The extremely deep water (3 km within 7 km of the coastline) and the existing port's exposed mooring location, very close to the fringing reef, make shipping and port operations difficult. The outer mooring buoys are anchored in this deep water, at a depth of about 540 m, and the ship mooring zones are vulnerable to westerly monsoon winds and waves. The maximum capacity of Nauru's moorings is 42,000 Deadweight Tonnes (DWT) (fully loaded) and this limits the size of the dry bulk vessels handled for the phosphate trade.

The effective and safe operation of the Nauru Port facilities and equipment are therefore central to maintaining trade and commerce with the outside world and essential to the nation's sustainable development and economy.

The current port facility is extremely run down and has occupational health and safety issues (OH&S), capacity limitations, and is vulnerable to extreme and seasonal weather events. These poor port facilities induce high cost of consumables in the domestic market due to high cost in port handling and adversely affect bulk transportation of current and potential exports (phosphate, dolomite aggregate and fish) and imports.

Prior to the loss of the mooring system facilities, an average of two to four vessels per month visited Nauru port, including one container/general cargo ship using the Nauru port facilities, a diesel tanker to supply the island's fuel and one to two bulk vessels loading phosphate for export. Thus, even if a container or cargo vessel is discharging, it is normally required to move off the mooring buoys and stand off until the phosphate ship has been loaded. Since the mooring system has become inoperable, container vessels drift off the reef near the existing boat harbor and unload single containers into pusher barges for transfer to the boat harbor. Arrangements have been made for the rehabilitation of the mooring system by March 2017.

The consequences of the failure of the port facilities would be dire for the local economy, workplace and public safety, regional connectivity and the habitability of Nauru, as it receives all cargo and bulk fuel vessels into Nauru and is a critical link in a broader Pacific maritime network.

The Government of Nauru (GoN) identified the upgrade of the existing port as a key priority to improve turnaround of vessels, reduce demurrage and improve safety, and requested development partner assistance on undertaking options identification and assessment. The ADB through formal requests from the GoN has initiated the process to assist in the development of the nation's Port. This has included a scoping study of potential development options in 2009 (Scoping Study for Nauru Port Development, 2013), additional detailed work in 2014 by the Japan International Cooperation Agency (JICA) and the completion of a Prefeasibility Study (PFS) of the recommended options by the ADB in 2015 (ADB a & b. 2015) which was funded through the Pacific Regional Infrastructure Facility (PRIF) resulting in the identification of the preferred technically and economically feasible options (ADB Nauru Port Pre-Feasibility Study, 2015a & b).

The ABD PFS (Feb, 2015) included preliminary level engineering, technical (wave climate), economic, and safeguards information and provided a clear recommendation on the preferred option, which at the time was the development of a new quay wall constructed on the edge of the reef north of the existing harbor, and accessible by causeway, upon which the government and its development partners can base project preparatory work and detailed engineering design.

Based on this work the ADB has continued to support the government to review and provide a finalized preferred option utilizing a Project Preparatory Technical Assistance (PPTA) and Project Design Advance (PDA) facility to undertake more detailed investigations and design investigation prior to the project approval. The Initial Environmental Examination (IEE) is part of this process.

Through this work several additional options were developed (refer CARDNO, 2016) resulting in a final agreed design that includes a new protected berth constructed to the north of the existing facility allowing vessel access, safe mooring and protection from oceanic waves. This final preferred design option comprises a 30m wide wharf approximately 170m long, adjacent to a minimum 50m wide berth pocket dredged to a 10 m depth into the intertidal reef flat with an approximately 170m long breakwater on the seaward side. The concrete wharf will be a suspended slab on steel piles and is expected to be approximately 4 m above the intertidal reef level to suit the berthing of general cargo vessels, as well as accommodating sea level rise of 0.6 m over the next 50 years.

2 Institutional, Policy and Legal Framework

2.1 Institutional framework

The Executing Agency (EA) for the NPDP will be the Planning Aid Division (PAD) under the Ministry of Finance (MoF) and the project's Implementing Agency (IA) will be the Nauru Port Authority (NPA), which will report to a board and to the Ministry of Transport (MoT). The Division of the Environment (DCIE) under the Ministry of Commerce, Industry and Environment (MCIE) will be the lead agency for ensuring environmental compliance to the nation's legislation and issuance of development consent for project development.

Further discussions will need to be undertaken once the project is approved, to finalize whether a small Project Management Unit (PMU) will be established to be responsible for financial control, any further procurement, and reporting of the NPDP project. Staffing of the PMU and specific roles and functions will also need to be articulated.

The PAD was established under the government's Ministry of Finance (MoF) in order to mainstream and harmonies developmental projects and plans in all sectors of government. The PAD oversees the implementation of the National Sustainable Development Strategy (NSDS) and coordinates all donor funded projects and is the link between bilateral partners and government entities in order to harmonies development projects to ensure that assistance received is not duplicated between sectors. The NPDP is one of the projects the PAD managers.

2.2 Legislation framework

The implementation of the NPDP will be governed by the laws and regulations of Nauru and the Safeguard Policy Statement (SPS) of the ADB.

There are no legal instruments that govern environmental impact assessment in Nauru. A draft Environment Bill (December 2016) is still in its development stage and rests with the Government of Nauru (GoN). The draft Bill does not include specific requirements that clearly define the procedures and guidelines to undertake an Environmental Impact Assessment (EIA).

The National Environment Management Strategy (NEMS) for Nauru has identified the inadequacy or non-enforcement of environmental legislation, and the need for the integration of existing legislation for environmental management and protection is a major constraint to the promotion of environmentally sustainable development in Nauru.

The MCIE through its Environment Division (DCIE) is the lead agency in the planning, administration and management of environmental matters for both public and private sectors. The DCIE was established in 1995 and is the Nauru government's legal entity that has the authority to request an EIA to be undertaken on a project basis. It is also the government agency responsible for the review and approval of EIAs. Due to the absence of EIA regulations, guidelines and specific codes of practice within the nation all past EIAs have utilized regional and/or international best practices and guidelines. Therefore for all environmental safeguard requirements associated with the NPDP should refer to the ADB safeguards guidelines.

Within the Nauru legislation each current law is referred to as an 'Ordinance' if it was enacted prior to 1968, or as an 'Act' if it was enacted after Independence. Proposed laws are termed 'Bills'. Laws which contain provisions related to the principles and elements of the environmental safeguards in ADB's SPS include:

> Disaster Risk Management Act 2008 – 15/08 (principal) Statute Law Revision Act 2011 – 8/11.

> Lands Act 1976 – 13/76 (principal) Statute Law Revision Act 2011 – 8/11.

- Nauru Fisheries & Marine Resources Authority Act 1997 – 17/97 (principal) Nauru Fisheries & Marine Resources Authority (Amendment) Act 2004 – 18/04.
- Fisheries Act 1997 – 18/97
- Fisheries Regulations 1998 (as amended) Fisheries (Parties to the Nauru Agreement – PNA Third Implementing Arrangement) Regulations 2009 Fisheries (Amendment) Regulations 2010 Fisheries (PNA Third Implementing Arrangement) (Amendment) Regulations 2010.
- Litter Prohibition Act 1983 – 6/83 (principal) Interpretation (Consequential Amendments) Act 2011 – 18/11.
- Antiquities Act 1935. Nauru Antiquities Ordinance 1935 – 3/35 (principal) Executive Council Ordinance 1966 – 3/66 (repealed by 8/11) Ordinances Revision Ordinance 1967 – 25/67 (repealed by 8/11) Statute Law Revision Act 2011 – 8/11.

In addition laws that are relevant to the NPDP include;

- Nauru Rehabilitation Corporation Act 1997 in effect 13 June 1997.
- Port Authority (Amended) Act 2016 and Regulations 2016.
- Marine Pollution Prevention Bill – drafted in 2000 but yet to be gazetted.
- Wild Birds Preservation Ordinance 1937 – 14/37 Ordinances Revision Ordinance 1967 – 25/67 (repealed by 8/11) Statute Law Revision Act 2011 – 8/11
- Land Act 1976, and
- Explosives Ordinance 1924 – 3/24 (principal). Ordinances Revision Ordinance 1967 – 25/67 (repealed by 8/11) Statute Law Revision Act 2011 – 8/11 Interpretation (Consequential Amendments) Act 2011 – 18/11.

2.3 Policy framework

National policy documents that contain provisions related to the principles and elements of the environmental safeguards in ADB's SPS and are directly relevant to the NPDP include:

- National Biodiversity Conservation Strategy 1999
- National Water, Sanitation & Hygiene Policy (NWSHP)
- National Sustainable Development Strategy (NSDS 2005-2025)
- National Biodiversity Strategy and Action Plan (NBSAP, 2010)
- National Action Programme (NAP, 2012) which supports the UN Convention to Combat Desertification (CCD)
- Nauru Energy Roadmap 2013
- Nauru's Fifth National Report to the Convention on Biological Diversity 2014
- Nauru's Submission to the UNFCCC – Workstream 2, May 2014
- National Fisheries and Marine Resources Authority (NFMRA) Corporate Plan 2014.

2.4 Relevant international agreements

Nauru is signatory to a number of international conventions, treaties, agreements and Memorandum of Understanding (MOU's) that relate to terrestrial, coastal and marine species habitats and

environmental issues which signify the interest in the protection of global and Pacific environments for the benefit of future generations. These are listed in Annex 1.

2.5 ADB safeguard policy

The ADB's Safeguard Policy Statement 2009 (SPS) has the objectives to (i) avoid adverse impacts of projects on the environment and affected people; (ii) where possible; minimize, mitigate, and/or compensate for adverse project impacts on the environment and affected people when avoidance is not possible; and (iii) help borrowers/clients to strengthen their safeguard systems and develop the capacity to manage environmental and social risks.

Safeguard policies are the cornerstone of the assistance provided to developing countries by their development partners. The safeguards included within the ADB's policy relate to the environment, involuntary resettlement, and indigenous peoples. The environment safeguard requires due diligence which entails addressing environmental concerns, if any, of a proposed activity in the initial stages of project preparation. The current inadequacies of the Nauru environmental legislation, regulations and procedures require that the ABD safeguard strategies be used as the primary environmental reporting format.

The SPS categorizes potential projects or activities into categories of impact (A, B or C) to determine the level of environmental assessment required to address the potential impacts. To categories a project one or more Rapid Environmental Assessments (REA) are undertaken.

The NPDP has been categorized as environment **Category B (**refer Annex 2) using the Port Development Rapid Environment Assessment (REA) which was triggering because there are potential adverse environmental impacts. These impacts are site-specific, none are irreversible, and mitigation measures can be designed and implemented readily (refer below).

A category B determination of a project is judged to have some adverse environmental impacts all of which are of low significance and through due diligence manageable with no long term significant effect on the environment.

ADB's SPS applies pollution prevention and control technologies and guidelines consistent with international best practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines (EHSG). The EHSG provide the context of international best practice and contribute to establishing targets for environmental performance. Standards incorporated into the EHSG will be used in parallel with local Nauru environmental standards (where they exist) throughout this document with the principals of due diligence and a precautionary approach adopted. Application of occupational and community health and safety measures, as laid out in the EHSG is required under the SPS.

3 Project Description

Environment Category. The proposed project site location of the Nauru Port Development Project (NPDP) is located on land that has been highly disturbed and modified to meet the requirements of a fully operational port that has been in existence for over a century. This site has little if any resemblance to its original coastal marine, foreshore and terrestrial natural state and is almost exclusively devoid of natural vegetation. The intertidal reef flat has also been highly modified. The proposed decommissioning of existing port buildings, the construction of new port infrastructure both on coastal land, foreshore and primarily the shallow water intertidal reefs system within the port land is categorized as environment **Category B** in accordance with ADB Environmental Categorization Form (refer Annex 2). The site has a number of small scale, but nevertheless potential adverse environmental impacts, which are site-specific, all are reversible, and mitigation measures can be

designed and implemented readily. These potential environmental issues associated with the pre-construction, construction and operational phases of the project are assessed. The proposed terrestrial and inshore marine sites are currently utilized by the NPA with no residential or community housing, thus greatly reducing any social implications to the project. Traditional family and/or communities own parcels of land adjoining the port leased land and as such extensive community stakeholder engagement has been undertaken. The Social Safeguard reports should be referred to for additional information.

Objectives of the study. The objective of this report includes the environmental assessment of the proposed design, construction and operation of a new port facility for the island of Nauru. The assessment is required in order that an EMP for each phase of the project can be detailed to avoid, mitigate and/or manage the anticipated environmental, health and safety impacts. Nauru does not have any environmental laws or regulations, as such the consultant will closely follow the ABD SPS 2009 in preparing the assessment. The TOR of the environmental Consultant is attached in Annex 3.

The Proposed Project. The purpose of this project is to upgrade the existing Nauru Port infrastructure. This will directly result in improved operational systems for international shipping access and services to Nauru whilst increasing efficiency of the port, health and safety to all workers and users and assist in the sustainable development of the Nauru economy and improve lives of its citizens. Current port facility issues include (ADB 2017- Nauru Port Prefeasibility report);

> **Unique hostile geography without a protected harbor –** Nauru does not have the benefit of a protected port facility, due to the unique geography of the island. The extremely deep water (3,000 m within 7 km of the coastline) and the existing port's exposed mooring location, very close to the fringing reef, make shipping and port operations difficult.

> **Condition and vulnerability of the existing mooring system, and associated delays and costs –** Overzealous mooring practices when anchoring general cargo vessels to the outer buoys have occasionally caused damage to components of the mooring system, which then requires costly repair and/or replacement work to be requisitioned from specialist overseas-based contractors. These incidents result in unscheduled closure of the mooring system, thereby delaying the berthing of phosphate vessels, fuel ships and general cargo ships. This causes unnecessary delays to the delivery of essential supplies such as fuels and general cargo goods, as well as delaying the export of phosphate with its attendant financial consequences.

> **Congested land area and backlog of empty containers –** The port land utilized for container storage is congested because a substantial area is occupied by derelict buildings serving no useful purpose. The remaining available space is predominantly occupied by empty containers which can't be exported because of poor ship loading/unloading efficiencies. A significant backlog of empty containers clogs both the port and vacant land across the island.

> **Existing poor condition –** Existing poor condition of infrastructure and equipment such as vessels, work boats and rafts, and lifting equipment, creates operational inefficiencies and occupational health and safety issues.

The proposed project will permit all vessels visiting Nauru except dry bulk phosphate vessels to be relocated to the dedicated berth north of the boat harbor. This new berth will provide a facility that is suitable for loading/unloading containers and general cargo using ship's gear, directly to the wharf. Yard equipment will then transfer containers to the container yard for stacking awaiting pick-up by the customer. Phosphate vessels will continue to operate at the existing cantilevers, using the existing mooring/buoy system. Hence, the NPA must continue to maintain the moorings and buoys to maintain and continue the phosphate loading capability.

The new wharf has been designed for vessel larger than currently calling at Nauru whose principal characteristics are i) on overall length (LOA) 126.4m, ii) beam of 20m, iii) draught of 8.1m and iv) deadweight tonnage (DWT) of 8115 t.

The main features included in the proposed project are illustrated in Annex 4 and specifically include CARDNO 2017- Draft Final Report (Feasibility Report):

> The preferred option comprises a 30 m wide wharf approximately 170 m long, adjacent to a minimum 50 m wide berth pocket dredged 10 m into the reef with an approximately 170 m long breakwater on the seaward side.

> The concrete wharf will be a suspended slab on steel piles and is expected to be approximately 4 m above the intertidal reef level to suit the berthing of general cargo vessels, as well as accommodating sea level rise of 0.6 m over the next 50 years.

> Backfilling of the triangular area between the wharf and the existing boat harbor for a temporary laydown area for containers.

> A rock causeway connecting the port land adjacent to the boat harbor with the south western end of the wharf for access to move containers and general cargo directly from ship to shore, and to support new fuel pipelines to the tank farm.

> Retention of the anchored mooring system and buoys for phosphate vessels.

> Supply of appropriate equipment (probably large forklifts) for transferring containers to/from the container yard.

> Demolition of old and derelict sheds and buildings, including disposal of asbestos cement cladding and fencing; (this scope of work is expected to be a separate NPA contracting to be completed before the NPDP is commences).

> Heavy duty pavement across the entire container yard area.

> New Harbormaster's office and administration, staff amenities, gatehouse and plant workshop.

> Site power reticulation, including reefer points and security lighting.

> Fire ring main and hydrants.

The proposed project has been designed to ensure provisions are provided for future expansion if and when required.

The Objectives of the Nauru Port. The *Port Authority Act 2006*, amended in 2015, sets down all the requirements for managing and operating the Nauru Port Authority (NPA) for the benefit of Nauru. The Act states that the functions of the Port Authority are to: '*establish, improve, maintain, operate and manage port, services and facilities in connection with the operation of the port, including, but not limited to*':

> management and maintenance of adequate and efficient port, facilities, services and security in the port;

> provision of goods and services necessary to give effect to the objectives of the Authority;

> regulation of navigation and maintenance of navigation aids within the port;

> marketing and promotion of the use, improvement and development of the port; and

> coordination of all operations within the port.

The requirements of the Port Authority Act, if correctly and diligently undertaken, should provide for a well-managed port. However, because the existing infrastructure and operational constraints do not enable the NPA to deliver its functions, improvements are urgently needed.

Cost estimates. Detailed cost estimates for the proposed port are provided in the Draft Final Feasibility report (CARDNO, 2017) and should be referred if required. At the time of preparation of this report, the total infrastructure costs were estimated to be 62.5 million US dollars.

The Site. The Nauru Port is situated on the western side of the Islands within, the district of Aiwo (Figure 2a).

The port is situated on community leased and public land and consists of a semi protected small boat harbor (Figure 2b & c) and land based facilities. It is reported that the boat harbor was first constructed around 1907 and the site has been continually used since. Ocean going vessels do not enter the harbor; rather they either attach to mooring buoys located offshore or drift whilst offloading or backloading products (principally shipping containers, petrochemical products or outgoing phosphate). Access to the harbor during inclement weather conditions from storm events and during the monsoon season producing swell waves is problematic and impossible under certain circumstances greatly reducing efficiency and increasing costs of the port operations.

Containers and general cargo are transferred offshore from the vessel to barges and brought to the harbor and unloaded using a shore based mobile crane. Phosphate is loaded onto ships via the cantilevers located to the south of the boat harbor whilst attached to deep sea mooring buoys. Similarly, fuel (aviation gas, petrol and diesel) is transferred from tankers to shore via fuel pipelines located on the foreshore behind the phosphate cantilevers whilst the vessel is attached to mooring buoys.

A number of buildings occupy land within the port area all of which are in very poor or derelict condition. This includes (i) Harbormasters Office, (ii) Barge Shed and the (iii) Hardware and Bulk Store Shed (Figure 3a & b). A separate tender to demolish these buildings before commencement of the NPDP is being arranged by the NPA and as such are not included in the project scope of works.

Figure 2 a, b & c General layout of the Boat Harbor looking north, barge entering the boat harbor looking west and container unloading at the wharf

Figure 3 a & b **Dilapidated condition of the Hardware and Bulk store shed and Harbormasters Office**

The total area of the marine port site is approximately 2.5 km^2 with a total area of 2.8 km^2 of land available for container usage. However, over 35% of this available space is currently occupied by the derelict buildings and therefore unavailable for use greatly hindering the efficiency of the ports operations.

The proposed project site including the land and foreshore above high water mark has been cleared of all natural vegetation, backed filled, compacted and developed (flattened) to accommodate buildings and other associated infrastructure requirements for the port for over a century (refer Figure 2 a & b). Similarly, the adjacent shoreline, intertidal reef flat and to a lesser degree reef edge and slope have been heavily modified to meet the requirements of the boat harbor and impacted by the port activities (Figure 4). The site is therefore highly modified from its original state.

The Port has been used to store petrochemical products (Figure 5a), has had wide use of asbestos roofing (Figure 5b) and workers septic toilet systems with a ground leach field is presently adding to the modified landscape and its potential contamination.

Figure 4 Reef flat and foreshore modifications associated with the boat harbor and port

Figure 5 a & b Petrochemical products and asbestos roof sheeting associated with the terrestrial environment of port

Impacts, outcomes and outputs of the project. The impact of the project will be an increase in the efficiency and effectiveness of the port services to the nation. This will directly contribute to a higher level of social and economic development including improved occupational health and safety within the existing Port facility. The outputs of the project will include the development of a multi-purpose port facility capable of meeting the shipping requirements of the nation.

Scope of this report. The scope of this report includes the environmental assessment of the design, construction and operation phases of the project, the environmental due diligence associated with the environment of the project and an EMP of all design, construction and operational activities. The NPDP site location, final design and configuration of the project has been agreed. As such, the environmental due diligence assessments and subsequent environmental management and monitoring plans are based on this design and are included in this report.

Limitations of this report. This preliminary IEE is based on the scope of works detailed in the NPDP documents provided to the environmental consultant and the collection of information through an in country mission which included key stakeholder meetings/discussions and field visits to the proposed site accompanied by PAD and Port Authority staff. This information included a pre-construction IEE (ADB 2015) that provided detailed information associated with a number of key surveys and investigations that were required to ensure the detailed design and subsequent costing's are correct. This included UXO, bathymetric, topography and geotechnical assessments. Therefore the IEE is based on the information attained during the in country field assessment, anecdotal information provided by stakeholders met and information detailed in the documents provided. The consultant has made the assumption that both written and verbal information provided is correct. Key documents utilized can be found in the reference section of this report.

4 Description of the Environment

The section below provides the baseline conditions of the physical, biological and socio-economic environment of Nauru and specifically the proposed NPDP site. Information presented in this report is based on site visits during the consultant's in country mission in November 2016 and reports provided and acquired during the visit. Much of the information below has been derived from the ADB 2015 '*Nauru Port Pre-Feasibility Study*' and ADB 2016 *Preparing the Nauru Port Development Project – Assessment of Pre-Construction Impacts* reports, the authors are fully acknowledged.

Due to its geographic isolation Nauru once possessed a unique and biological diverse ecosystems that would have possessed relatively high levels of endemism in both flora and fauna with restricted populations and locations within the island making them particularly vulnerable to loss from over exploitation and habitat degradation. Due to the past century of mining these natural ecosystems and biological communities have been severely impacted resulting in significant terrestrial ecosystems and biological resource loss. The nations 'National Biodiversity Strategy and Action Plan (NBSAP, 2011) provides a detailed description of the environmental and biological resources and communities of the nation. Information in these reports has been used when required below.

The offshore topography of the island of Nauru is unique in the Pacific region and possibly the world. From the shoreline of the essentially oval-shaped island, a narrow fringing reef transitions to a seabed which drops away at an abrupt 45 degree slope, down to depths of more than 3 km offshore. There is no lagoon or area of sheltered water inside the fringing reef, which could provide sheltered water for a safe anchorage or harbor, as, is typical of other Pacific Island countries. Hence, the island is extremely exposed to Pacific Ocean swells and winds, particularly from the northwest during the monsoon season (October to March), and no natural harbor exists around Nauru's coastline. Port facilities are limited currently to two small boat harbors, one on the western coast (Aiwo commercial port) and the other (a small fishing boat harbor on the east coast at Anibare). There has historically been no opportunity to construct a safe harbor capable of berthing ships carrying general cargo, fuels and for the export of phosphate. The mooring system has been the only facility capable of mooring ships visiting Nauru since the middle of the 20th century.

The NPDP site location, its past usage (e.g. industrial) and highly modified terrestrial and foreshore environment (e.g. clearing, compacted, flattened, land fill and built on) is almost devoid of natural vegetation resulting in an extremely low terrestrial flora and fauna biodiversity. Similarly, the intertidal shallow water reef flat and to a lesser degree the subtidal reef edge and slope have been highly modified in areas associated with the boat harbor and impacted by the daily activities associated with the port that have greatly reduced benthic and sessile marine flora and fauna coverage and biodiversity. The intertidal reef flat is horizontal and exposed during periods of low water. There are no freshwater ecosystems, mangroves or sea grass ecosystems associated with this site nor is the site high in marine biodiversity. The paucity of terrestrial and shallow water marine flora and fauna at the proposed site, especially the intertidal reef flat is as expected and is consistent with an industrial port site and neighboring marine ecosystems north and south of the port. Therefore, in general terms, habitat alteration and building construction at the proposed site have no biological impacts of any significance. The lack of a diverse biological community associated with the proposed site greatly reduces the environmental assessment required for the IEE.

4.1 Physical environment

4.1.1 Regional ocean-atmosphere dynamics influencing Nauru

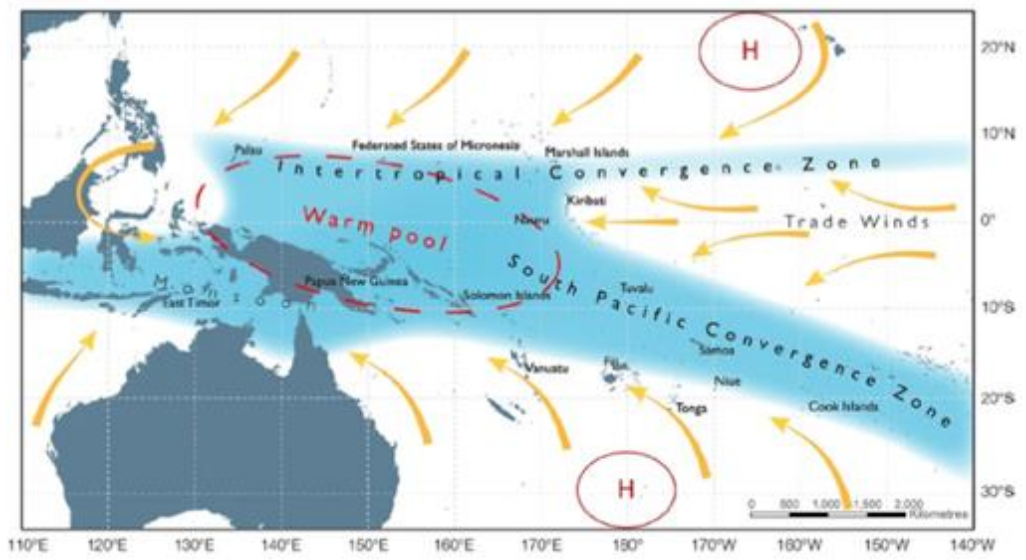
Wave climate and climate change trends around Nauru are affected by processes occurring over large areas of the Pacific Ocean, from the northern to the southern subtropical zones (35°N to 35°S), and

across the equator, so it is instructive to understand the regional patterns that affect local conditions around Nauru, especially when designing for a 50 year lifespan.

The most important driver of global climate as well as Pacific wave climate is the El Nino Southern Oscillation (ENSO), whose ocean-atmosphere mechanisms play out in the equatorial Pacific. ENSO oscillates with a period of 2-7 years between El Nino, which brings lower than normal sea levels, weaker trade winds, cooler ocean temperatures and higher barometric pressures across the western equatorial Pacific, and La Nina, which brings the opposite conditions. As of April 15, 2015, the Australian Bureau of Meteorology (BOM) has issued a notice regarding a highly likely occurrence of El Nino as early as June 2015. Depending on the strength of the phenomenon, there may be ramifications for fishing, disruptions of current rainfall trends, and extra-tropical cyclones (Figure 6). The BOM ENSO tracker provides daily updates at http://www.bom.gov.au/climate/enso/#tabs=Overview.

Cyclones do not occur within a band of approximately +/- 5 degrees of the equator ad therefore no cyclone activity has been reported for Nauru based on information dating from 1969 in the Southern Hemisphere and 1977 for the Northern Hemisphere. However, recent research has indicated that extra-tropical cyclones from as far as 35 N can bring extreme sea swells leading to destructive impacts on some equatorial islands thousands of kilometers away from the storm origin. Five inundation events within the region were identified for 2014, which were a consequence of extra-tropical storm generated waves propagating into the region, resulting in coastal flooding.

Figure 6 **Major climatic features of the western tropical Pacific**



Predominant trade winds and easterlies shown with yellow arrows, Convergence zones with rainfall shown in blue, Warm pool of near surface water that oscillates in depth and extent across the equator during ENSO shown in red along with high pressure systems indicated with 'H' (PACCSAP, 2014).

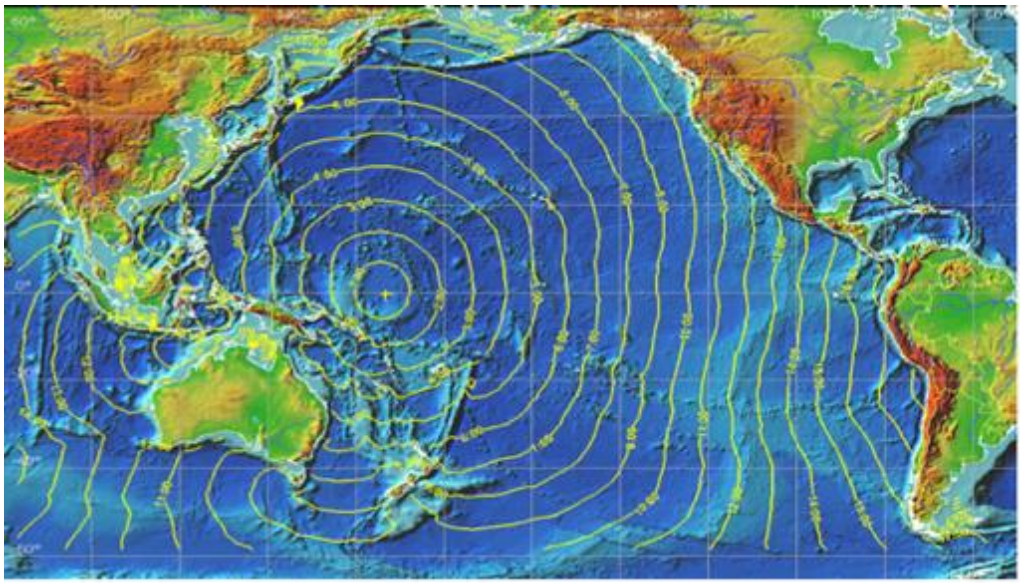
4.1.2 Tsunami and earthquakes

The historical tsunami database, dating back several centuries including anecdotal evidence, contains very few reported incidences at Nauru. Since its installation in 1993, the SEAFRAME tide gauge at Nauru has detected seven separate tsunami events, none damaging. The largest tsunami recorded by the SEAFRAME at Nauru since installation is a signal of trough-to-peak height 16 cm following a magnitude Mw8.2 earthquake near Irian Jaya on 17 February 1996. The U.S. National Geophysical

Data Center archives the global tsunami database:
http://www.ngdc.noaa.gov/nndc/struts/form?t=101650&s=167&d=166.

No earthquakes originating on Nauru have been recorded, and there was no anecdotal evidence from stakeholders of earthquakes found during the consultant's field mission during November 2016. If a submarine earthquake did occur along the Marianas Trench offshore of the Japanese islands, the ensuing tsunami would reach Nauru in approximately six hours (Figure 7).

Figure 7 Tsunami travel times to Nauru



PACCSAP Pacific Country Report Sea Level and Climate, 2010

4.1.3 Tides

The basic tidal parameters for Nauru include a twice daily maximum tidal variation of 1.8 meters (meso-tidal). Small seasonal and daily tidal fluctuations have been recorded, which have been related to sea conditions associated with weather patterns existing at the time of the recording. Inclement weather conditions e.g. tropical low do have a marked impact on the tidal height and can cause increased coastal erosion and in extreme events inundation if they coincide with high water periods.

4.1.4 Climate

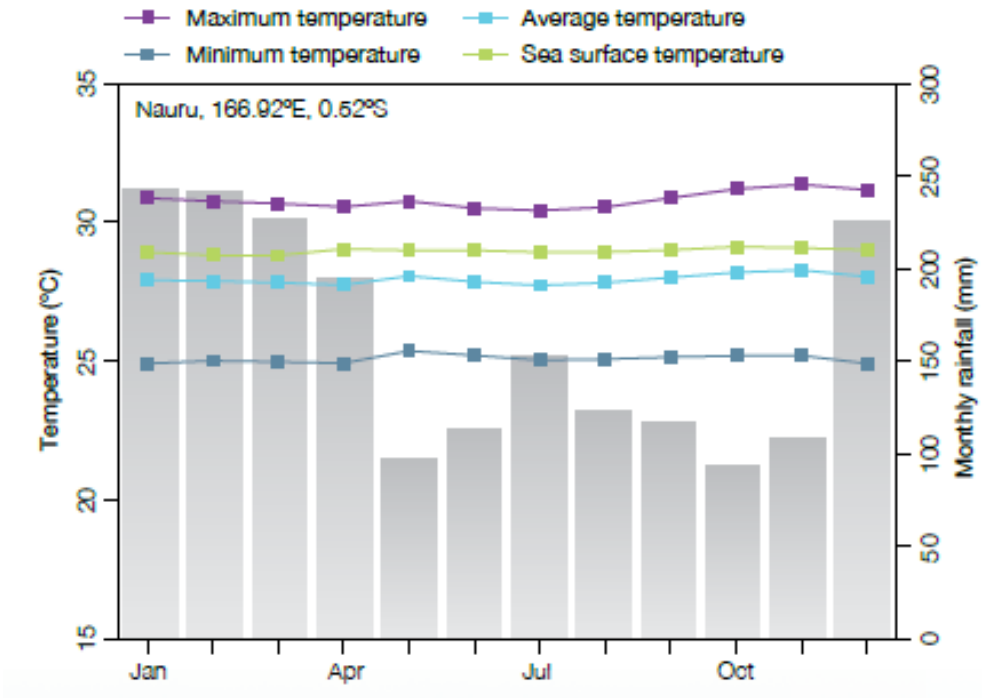
Nauru experiences a tropical maritime climate, with very little seasonal variability in air temperature. Mean minimum temperatures range from 25 to 25.5 ˚C throughout the year and mean maximum temperatures range from 30.5 to 31 ˚C (Table 1). Sea surface temperatures are quite consistent at about 29 ˚C throughout the year. The average annual rainfall total is about 109 cm, but there is seasonal variability in this, with minimum rainfall amounts occurring from May to November of about 100 mm per month (Figure 8). There is also considerable inter-annual variability in annual rainfall amounts; for example from a low of 300 mm in 1950, and 359 mm in 1999, to a high of 4,572 mm in 1940 (PCCSP data). During La Nina events, Nauru can experience drought, which leads to stress on trees, such as coconuts and breadfruit.

Table 1 Seasonal variability in temperature and precipitation in Nauru

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean max temp	31	31	31	30.5	31	30.5	30.5	30.5	31	31	31	31
Mean min temp	25	25	25	25	25.5	25	25	25	25	25	25.5	25
Ave temp	28.5	28.5	28.5	29	29	29	29	29	29	29	29	29
Precipitation (mm)	240	240	230	190	95	110	150	120	110	90	105	230

PACCSP

Figure 8 Seasonal rainfall and temperature in Nauru



Source: PCCSP

While there are no clear spatial variations in temperature and rainfall within Nauru, the seasonality in wind speed and direction has implications for sea conditions on the west and east coasts of Nauru (detailed descriptions are detailed in the ADB 2015, Nauru PFS and CARDNO, 2015b). During the wet season (December-April), winds are primarily from the north (northern trade winds), which lead to greater wave heights on the west coast of Nauru (and smaller waves on the east coast). Extra-tropical storms can produce quite high winds and increased swell heights (for example, a cyclone in March 2015). During the dry season (May-November), winds are generally from the northeast and southeast (trade winds), which produce larger waves on the east coast, and relatively calm conditions on the west coast.

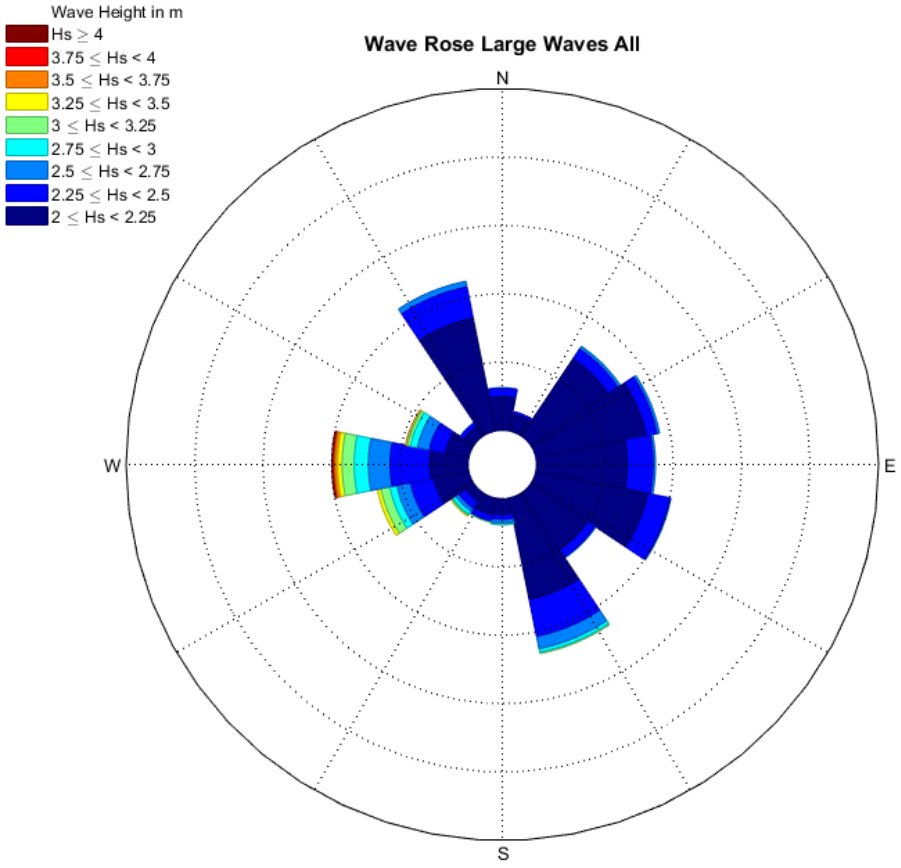
Waves are generated by a forcing wind, but continue to travel away from the area of generation as swell. The observed wave field at any point therefore reflects both the locally generated waves (the wind sea) and waves which may have been generated a great distance away and travelled to that location (the swell). Thus, variability of the wind-wave climate at any location is not only a property of the local wind field, but also the integrated variability of the wind field across large areas of the ocean over which the waves have been generated.

The wave climate in the vicinity of Nauru is dominated by waves from the east, generated by the north-east and south-east trades winds. These trade wind generated waves have little direct impact on the port, which is situated on the western side of the island. Wind generated from the west is

extremely variably, in some years, there are almost no winds generated whilst in other periods they are relatively frequent and tend to be stronger than those from the east. Therefore at the Nauru port, wave and swell conditions disrupting port operations occur year-round and intensify during the monsoon (Dec-Mar) season.

Wave data analyzed over a period of 35 years (CARDNO, 2016a) and plotted as a wave rose for waves larger than 2 meters indicates that the highest waves originate from the west (Figure 9). The distribution of mean wave period with wave height shows that the highest are associated with a mean wave period of 708 seconds. This information has been used in the design phase of the NPDP. Detailed description of the wave and wind climates of Nauru are reported in CARDNO, 2016a and should be referred for additional information.

Figure 9 **Wave rose for significant wave heights exceeding 2m from CAWCR hindcast data**



CARDNO, 2016a

4.1.5 Climate change

There have been several well-documented events that show the increase of extreme weather events such as tropical storms and typhoons in the Pacific. Most climate change modeling shows that tropical storms will increase in frequency and severity, and will be a characteristic of the project area in the future. Many of these extreme weather events can be linked to the El Niño/La Niña-Southern Oscillation (ENSO) pattern, but ENSO is predicted to also have an effect in modifying trade winds in the Pacific, strengthening of tropical deep convection, and alteration of monsoon flow. Nauru is not directly impacted by tropical cyclones, as it lies on the equator; however, indirect impacts resulting from these weather systems do have a direct impact on the nation's weather, especially sea conditions (waves swell size and direction).

It is anticipated that with global warming trends, increased intensity, albeit less frequency, of extreme weather events may be expected. Adopting an integrated 'all hazards' approach to disaster risk management will be vitally important for the future development of the Nauru.

The main vulnerabilities faced by the people of Nauru can be summarized as (i) sea-level rise which exacerbates the severity of sea surges, increased rates of coastal erosion and heightened risks to public and private infrastructure (ii) more intense and more frequent storms which increase risks of damage from sea surges, high winds and strong inundation on public and private infrastructure and (iii) more frequent and longer periods of drought: which cause both intense short term difficulty and, of greater concern, long term damage to the freshwater lenses.

Climate change adaptation measures have been considered and integrated into the design and program of works for the NPDP and have been integrated into the projects final design and scope of works (CARDNO, 2016a). Increases in extreme weather patterns and events specifically associated with increased oceanic wave and swell events will have a direct impact on the NPDP to manage these events and have been factored into the design.

It is anticipated that the NPDP facility will itself not contribute significantly to greenhouse gas emissions. Energy requirements of the facility will use electricity supplied from the grid and on site generation will be used only as a backup when grid power is not available (e.g. outages). Considerations for alternative power generation sources (e.g. solar, wind) are being considered for the NPDP and are dependent on funding availability.

Some of the identified risks posed by climate change and natural hazards in the Pacific are indicated in Table 2, which has been adapted from the ADB report 'Climate Risks and Adaptation in the Agro-Industrial Sector' to meet Port requirements. It includes various adaptation options that could be considered for the risks identified in respect to the NPDP.

Table 2 Summary of impacts and adaptations on port infrastructure

Climate change / hazard	Potential Impact	Potential Resilience Measure	Complementary Measures
Sea-level rise	The NPDP site is located on the coastal strip of land directly adjacent and boarding the sea including a harbor constructed on the reef flat. Therefore it will be impacted from sea level rise. Increased sea levels may affect the integrity of the construction material and inundate the site.	Materials used for construction be less corrosive to salt water, built to withstand storm events and site be elevated to reduce affects from inundation.	Coastal zone protection and ensure building /construction codes to manage these events are incorporated into the facility's design.
Increase/decrease in rainfall	The NPDP will require water from the main town water system facility to clean the Port facilities. Fluctuations in the availability of water and its quality may reduce and/or disrupt the Port's production capabilities.	Ensure water systems are correctly maintained within the facility and consider additional water collection and storage facilities (rain water collected of the roof and stored on site) over and above the commercial water line.	Implement water management system to conserve and utilize water efficiently within the port and ensure all staff have the knowledge and skills.

Climate change / hazard	Potential Impact	Potential Resilience Measure	Complementary Measures
Cyclones/hurricanes and frequent strong storms	Potential flooding and salt water inundation of coastal areas could adversely affect the Ports operations.	Design more robust infrastructure for heavier flooding and extreme events and improve water discharge outlet within the port areas.	Ensure disaster management protocols and guidelines are in place and staffs are fully aware.
Increased temperatures	May stimulate increase is cooling costs affecting the economics of the NPDP and worker's OH&S.	Incorporation of insulation and cooling systems in the buildings to maximize heat exchange.	Ensure disaster management protocols and guidelines are in place and staffs are fully aware.
Earthquakes	Damage to infrastructure, fire hazards and staff safety.	Use design standards applicable to high earthquake risk areas.	Ensure disaster management protocols and guidelines are in place and staffs are fully aware.

In summary, Climate Change projections for Nauru (PCCSP, 2011) indicate that temperatures will likely continue to increase, with more very hot days expected in the future. Rainfall has not shown a clear temporal trend since 1950, but is expected that there will be more extreme rainfall days and less drought. Sea level near Nauru has risen over the last century and is expected to rise throughout the 21st century (15-20 cm by 2050). Ocean acidification is also expected to increase in the future, with negative impacts on coral reef ecosystems. A high risk project rating (7) to climate change for the NPDP was recorded using the preliminary checklist for preliminary climate risk screening for the NPDP (refer Annex 2a).

4.1.6 Geography / geology

Nauru is an uplifted limestone island, initially covered in marine sediments that had accumulated over centuries. Nauru's marine sediments are reportedly the richest and purest source of phosphate in the world and was primarily used in fertilizer. The land area consists of a narrow coastal plain or 'Bottomside', ranging from 100 to 300 meters wide, which encircles a limestone escarpment rising some 30 meters to a central plateau, known locally as 'Topside' (refer Figure 1).

Nauru is surrounded by a fringing coral reef ranging from 100 m to 300 m wide, which drops away sharply on the seaward edge to a depth of approximately 3 km. The coastal plain is a zone of sandy or rocky beach on the seaward edge, and a beach ridge or fore-dune, behind which is either relatively flat ground or, in some places, low-lying depressions or small lagoons filled by brackish water (e.g. Buada lagoon) where the surface level is below the water table (freshwater lens). The raised central plateau (Topside) generally lies between 20-45 m above sea level with occasional elevations of up to 50-70 m. The central plateau comprises a matrix of coral-limestone pinnacles and limestone outcrops, between which lie extensive deposits of soil and high-grade phosphate rock covering approximately 1600 ha (over 70% of the island). This area has been extensively mined with the ecosystem drastically altered (SPC, 2005 and Fenner, 2013). Scattered limestone outcrops or pinnacles can also be found on both the coastal plain and on the inter-tidal flats of the fringing reef.

The highest point on the island is Command Ridge in the west at an elevation of 71 m above sea-level. Buada Lagoon, a landlocked, slightly brackish, freshwater lake, and its associated fertile depression (about 12 ha in area), is located in the low-lying southwest- central portion of the island at an elevation of about 5 m above sea level.

Like other coral atolls and islands, the soil is derived from limestone which has been formed as a result of coral formation over thousands of years. There are no andesitic rock formations of volcanic origin present. The soil is alkaline and therefore it does not support the growth of certain plants and trees. The poor and infertile nature of the soil is due to its alkalinity, porosity and lack of essential

elements that limit fertility. This combined with the long history of mining and surface soil removal, has created an environment that restricts intensive agricultural activities.

The coastal soils of Nauru are among the poorest in the world. They comprise a shallow (only about 25 cm deep), alkaline, coarse-textured layer of organic matter, coral sand, and limestone fragments that overlay a limestone platform. They contain more coral gravel than sand in the lower horizons. Potassium levels are often extremely low, and pH values of up to 8.2 to 8.9 and high $CaCO_3$ levels make scarce trace elements, particularly iron (Fe), manganese (Mn), copper (Cu), and zinc (Zn) unavailable to plants. Fertility is, therefore, highly dependent on organic matter for the concentration and recycling of plant nutrients, lowering soil pH, and for soil water retention in the excessively well-drained soils. Although levels of organic matter can be relatively high in undisturbed soils under natural vegetation, it can decrease dramatically as a result of clearance by fire or replacement by coconuts and other introduced plants (Morrison 1994).

The plateau soils of Nauru vary from shallow layers on the tops of limestone pinnacles, composed primarily of organic material and sand or dolomite with very little phosphate, to deep phosphatic soils and sandy phosphatic rock up to over 2 m deep between the pinnacles. Top soils range from 10 to 30 cm in depth, overlaying a deeper material that is frequently reddish yellow and between 25 and 75 cm in depth, changing to pinkish grey at greater depth. Undisturbed plateau soils (what little remains) have a high level of organic material and are generally fertile. Calcium dominates the exchange complex and exchangeable magnesium is also high. Exchangeable potassium is low, while extractable phosphate values are generally high and sulfate moderate. The trace elements manganese, copper, cobalt and molybdenum levels are very low, and these, plus iron and zinc, are rendered unavailable to plants under pH values >6.5. Poorly developed but relatively fertile wet soils are found around Buada Lagoon and in some poorly drained swampy areas near the base of the escarpment on Nauru (Morrison 1994).

The topsoil where it remains is composed of decaying or composted organic matter mainly decaying leaves and plant material thinly spread over most of the area with plant cover and other areas covered with remnant natural vegetation, restricted in the main part to the coastal strip termed locally as the ‘bottom side’.

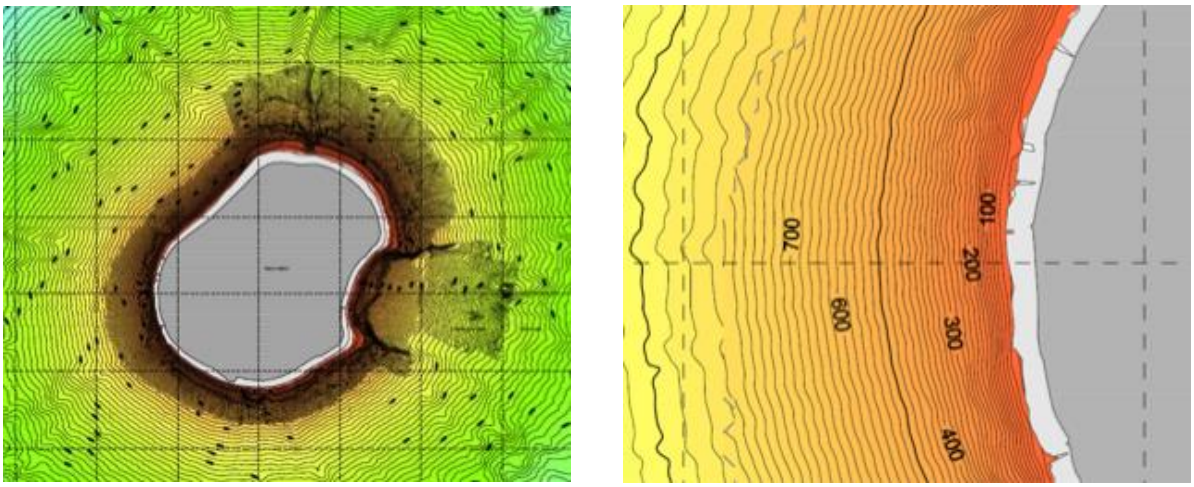
The NPDP site soil is composed of landfill derived from coastal coralline rock acquired from the ‘topside’ of the island (resulting from the mining activities), which has been compacted over the years of the ports operation. Subsequently, the ground at the proposed site is porous and surface water drains through the soil. Anecdotal information reported to the consultant and his personal observations indicated that freshwater runoff during period of high rainfall events is absorbed directly into the ground (some pooling occurs) and/or discharges into the adjacent coastal areas indicating the porous nature of the soils.

The porous nature of the soils and it direct input into the areas water table, coast line and associated coral reefs is an important issue that needs to be incorporated into the NPDP waste water management plan.

4.1.7 Bathymetry, seabed and coasts

Nauru is surrounded by a shallow subtidal and intertidal fringing reef flat ranging in width between 80 to 300 m (narrowest adjacent to the port area, and widest at the northwest tip of the island). The reef flat has a living fringing reef that then drops with an approximate 45º slope to very deep water (about 1 km deep approximately 1 km from shore), and continuing deeper (Figure 10). On the east side of Nauru, in the Anibare Bay area, the submarine slope is steeper, with north and south east/west trending cliffs (about 80º) that demarcate a relatively flat (but deep, about 500 to 600 m) submarine area quite close to shore (compared to all other parts of Nauru), reflecting a submarine slope failure at some point in geological history.

Figure 10 **Nearshore bathymetry around Nauru and in the port area**



SOPAC, 2008

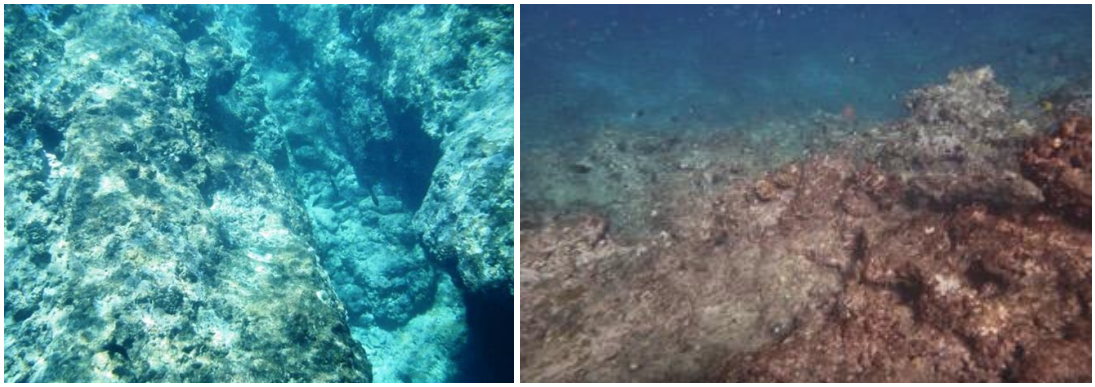
The seabed associated with the port area, starting with the intertidal reef flat, is mostly hard, concretized coral reef and rubble, except in areas adjacent to the wider beaches, where sand and small coral rubble are mixed with the reef platform and larger coral boulders. For examples, the reef flat just south of the boat harbor is a flattened hard reef with almost no protuberances and little loose sediment (there is no adjacent sand beach) (Figure 11). However, the reef flat north of the boat harbor is a mix of hard flat coral platform, coral rubble, and sand (as well as concrete outfalls and other debris); this area is adjacent to a wide sand beach (Figure 12) Unlike the east coast of Nauru, there are no coral pinnacles on the reef flat in the port area.

Figure 11 **The reef flat south of the boat harbor**

Figure 12 **Site conditions of the shoreline and reef flat to the north of the Nauru Port**

The reef edge and upper and lower reef slope adjacent to the port are composed of a hard coral reef structure, dominated by small spur and groove formation (Figure 13) which is indicative of high energy and wave action. It is also mixed with some coral rubble, the latter especially at the entrance to the boat harbor where some level of energy protection is present. The reef slope is composed of a hard reef structure with a surface veneer of living hard corals that descends vertically at 45% to the reef drop off. A detailed marine assessment of the intertidal and subtidal reef systems associated with the NPDP is documented in Section 4.2 of this report.

Figure 13 **Typical spur and groove formations on the reef edge adjacent to the Port and the seafloor at the boat harbor entrance**



4.1.8 Cross-sectional structure of reef edge and slope adjacent to the port

A bathymetric survey conducted by the South Pacific Applied Geoscience Commission (SOPAC, 2008) delivered a 1:25000 bathymetric chart of the seafloor around Nauru, beginning offshore at 50 m depth to an average distance of 3 km offshore, to depths of 1.8 km. The area adjacent to the port is shown in Figure 14. The scale of this assessment clearly identifies the vertical depth profile of the deeper water substrate associated with this reef area. To further identify the bathymetry of the intertidal and subtidal areas associated with the NPDP site, site specific bathymetry (Figure 15) assessments were commissioned by CARDNO (2016c). Key results of this assessment clearly identified that there is no seaward reef edge and/or slope undercutting as previously speculated and suitable data was collected to ensure engineering designs are suitable for the substrate located.

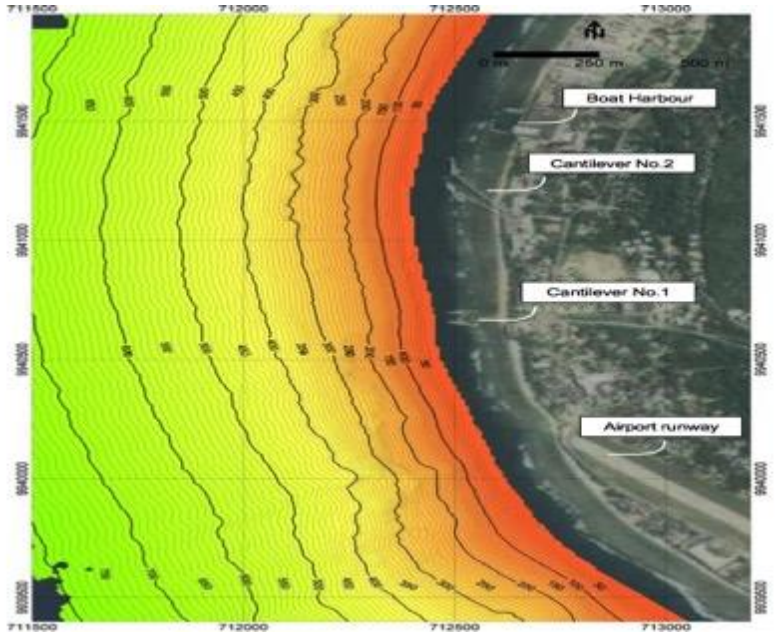
The structural integrity, hardness and physical composition of the NPDP land and reef flat site areas underlying bedrock parameters have been determined through detailed geotechnical assessment (Figure 16) (Cardno 2016). The subsurface conditions at the proposed Land site include: (i) fill typically 3-5m deep (within the confines of the onshore port container handling yards only);

(ii) holocene beach deposits typically 2-3m deep; and (iii) coral limestone rock. The subsurface conditions associated with the reef area include: (i) a crust of intact weak to moderate strong coral limestone ranging in depth between 0.8 – 2.5m; (ii) coral limestone detritus typically 2-5m thick; and (iii) moderately strong to strong coral limestone rock.

The assessment resulted in the geological conditions on the reef flat characterized as upper 5.5m (< 20 MPa – rock strength) and below 5.5m (>50 MPa rock strength). The geotechnical results indicated that most of the limestone within the proposed reef flat dredge site down to a depth of 10 m is weak to moderately strong and as such majority of the underlying coral rock can be excavated using heavy duty rippers and rock breakers. It is expected that expanding material in certain circumstances maybe required shatter large and hard coral rocks.

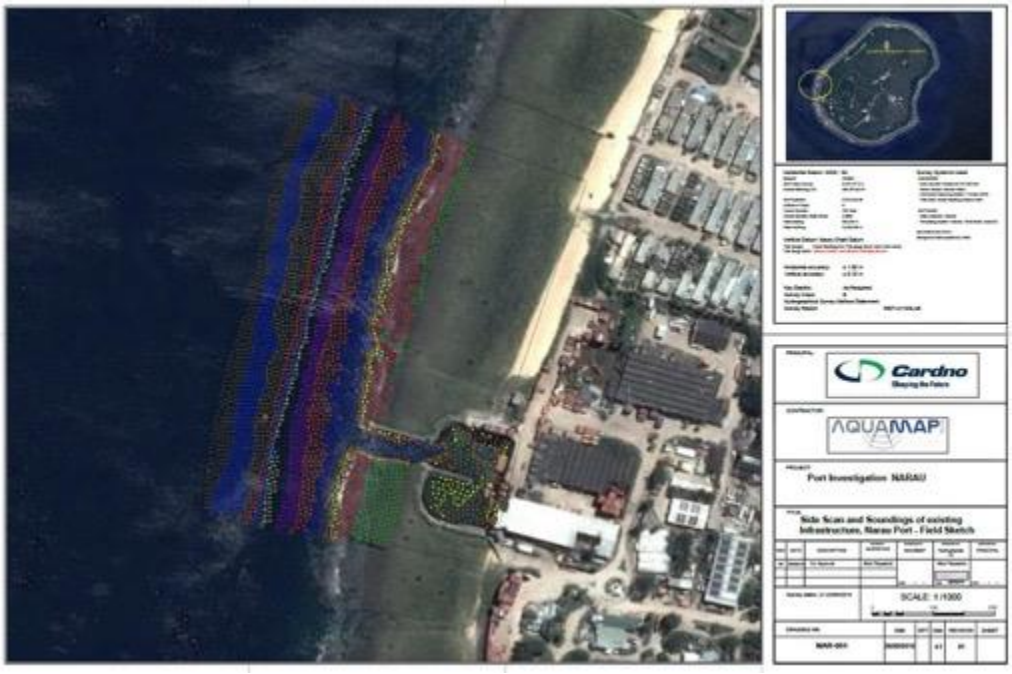
Similarly, the geotechnical assessment indicated that the reef based piles maybe drilled through the week rock, (<20 MPa) with conventional piling equipment consisting of high torque rigs with rock buckets, core-barreling, down the hole hammers or reverse circulation rigs. Drilling into strong rock (>50 MPa) is unlikely to be achieved with a rock bucket. If additional embedding is required the consultants recommend the installation of an inside the pile cage that can be drilled out later for the installation of a high stress bar.

Figure 14 **Multi-beam echo sounder bathymetric survey contours near Nauru port**



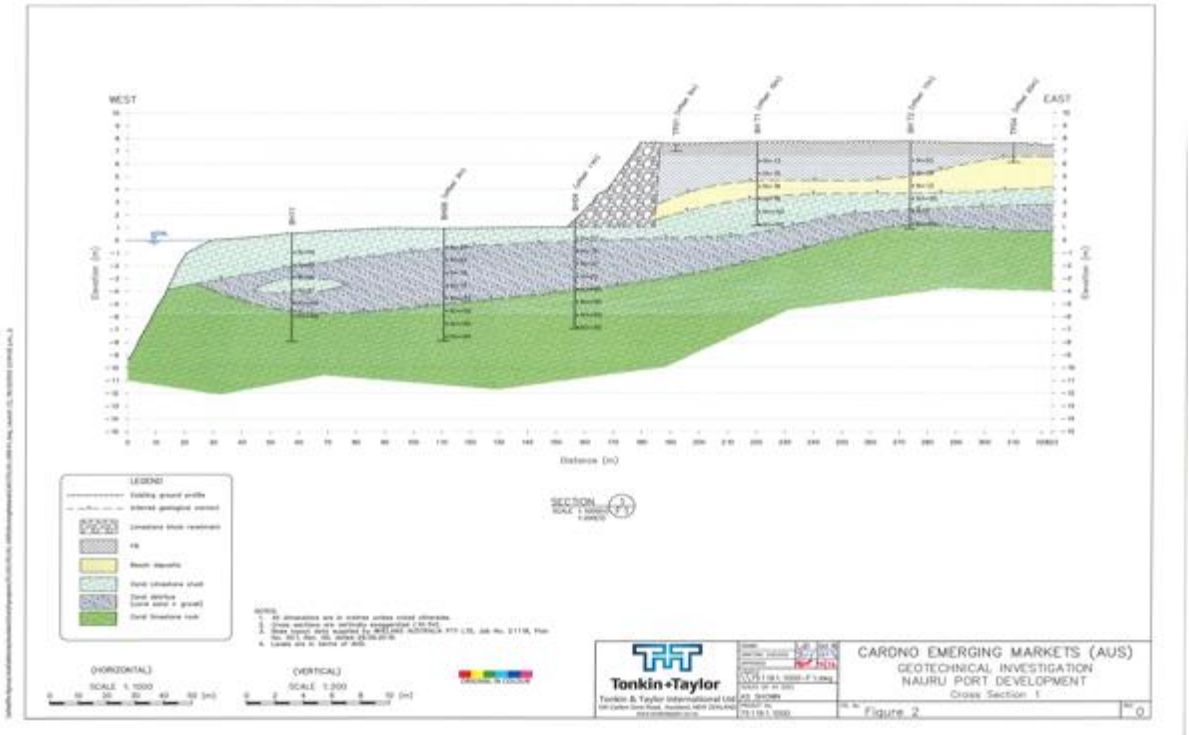
SOPAC 2008

Figure 15 **Multi-beam echo sounder bathymetric survey contours near Nauru port**



CARDNO, 2016a

Figure 16 **Geotechnical assessment of the substrate associated with the Nauru port**



CARDNO, 2016a

4.1.9 Coastal processes

Wave incidence, tidal flows, and residual currents all have an accumulating effect on coastal processes, including beach development and erosion. Beaches on the west coast of Nauru tend to be quite wide and steep reflecting a persistence of relatively high waves and beach run up (compared to

the east coast). At least some of this beach development is likely a result of the boat harbor infrastructure obstructing north-south littoral drift, with sand accumulation on the north side of the seawall. However, there is evidence of coastal erosion in the areas south of the boat harbor between the harbor and the northern most cantilever, mostly likely due to ongoing sediment starvation in this area (due to the obstruction noted above) and the scour effect of the cantilever bases and the armor rock foreshore that is too close to the wave wash zone. Figure 17 provides a time series evidence of this beach erosion. Beach erosion is also evident at other locations around Nauru, notably in the northwest area where some of this is also due to hard structures (to protect buildings) constructed in the wave wash intertidal reef flat zone.

Figure 17 **Time series beach erosion south of the boat harbor over the past 40 years**

4.1.10 Water resources and quality

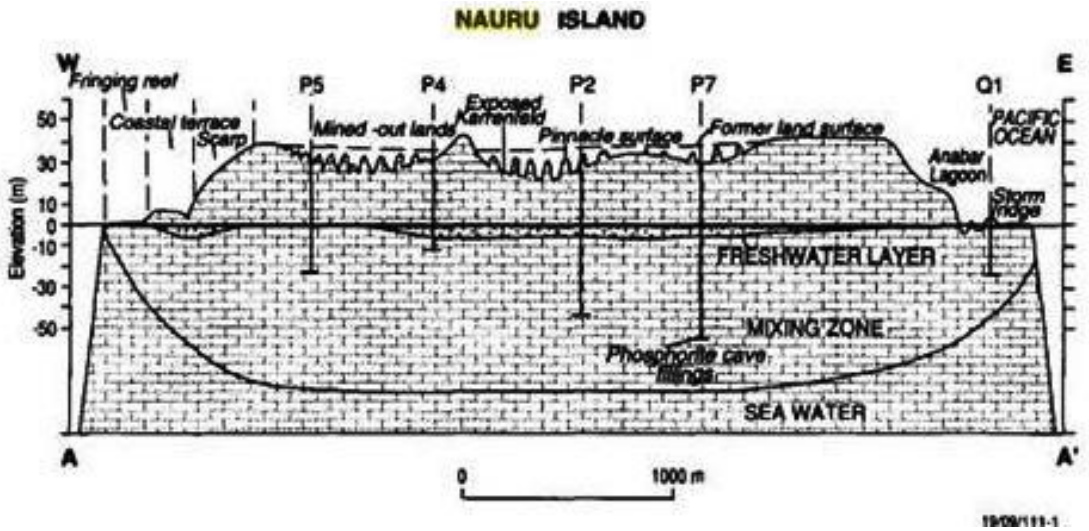
Nauru possess no rivers or surface running water features, with all surface water resources limited to the fresh water Buada Lagoon, a 14 hectare water body in the southwest part of the topside (refer Figure 1), which is not used for drinking water. Freshwater resources exist underground as water lenses float on seawater. This is derived from the infiltration of rainwater into the water table below the ground. The lens resembles the appearance of a convex lens, which is thickest at the center and thinnest on the sides facing the ocean throughout the length of island. The lens is formed where the width of the island is sufficiently wide so as to reduce the outward flow of the accumulated underground lens

There are two elements to water quality in Nauru: the freshwater supply on the island and the nearshore marine water. Figure 18 shows the vertical structure of water on Nauru, indicating a very shallow freshwater lens (only about 5 meters deep) perched on top of a mixing zone (which is about 80 m deep), which is then sitting over the seawater layer (within the carbonate structure of the island). The influence of tides is evident in a 0.5 m vertical fluctuation in the freshwater lens, and rainfall percolation including other contaminants (e.g. septic leach fields) into the residual limestone recharges the freshwater lens. The Nauru Rehabilitation Corporation (NRC) Underground Water Project (NRC, 2008) indicated that the freshwater lens is evident in about 50% of the island, with two main zones (the thickest parts) located in the center of the northern end of the island and in the center of the southern end of the island (not in the port area). The salinity of the groundwater increases significantly with depth and it is too high for water potability just 2 m below the base of the freshwater lens. As a consequence, freshwater wells are generally not practicable, and rainwater collection and reverse osmosis are the main sources of usable freshwater on Nauru.

Potable water on Nauru is supplied by limited household rainwater collection catchments and reverse osmosis desalination plants. The desalination plant used around 30% of the energy generated by Nauru Utilities Corporation (NUC) in 2008. The intake and discharge pipelines for the desalination plant are trenched into the intertidal reef flats located directly north and south, respectively within the NPDP. Groundwater is not used for drinking water.

Originally (since the 1950s) household and business sewage was collected and treated in a centralized treatment plant before being discharged on the reef through a number of steel discharge pipes anchored onto the reef flat. These systems have been poorly maintained with a few exceptions are blocked and not in use. During recent upgrades to the nation's hospital (December 2016) sewage and waste water treatment, one of the original pipe lines has been made operational and discharges treated effluent from the hospital and untreated sewage and waste water from neighboring households directly onto the reef approximately 700 m north of the NPDP. Septic tanks with pump out facilities and/or soakaways are the main source of sewage management in Nauru. These systems may be poorly maintained and as a result contribute to groundwater contamination. Similarly, septic tank wastes are collected and raw effluent is discharged into a number of disused wastewater pipe lines that directly discharge onto the reef. A major site is south of the NPDP located at the base of the cantilevers.

Figure 18 **Freshwater seawater profile of Nauru**



Vacher & Quinn, 1999

The freshwater lens and groundwater are extremely vulnerable to negative environmental influences. The National Assessment Report (Republic of Nauru, 2006) indicated that, in addition to high salinity water (brackish in most parts of the freshwater lens), there are other potential sources of contamination, including:

> fecal coliform and *E. coli* from septic tank overflow and soakage pits (contributing to a very high incidence of diarrhea);

> polychlorinated biphenyls (PCBs) associated with the power station (near the port);

> metals from blasting and mining (cadmium, lead, zinc);

> petroleum hydrocarbons (including polycyclic aromatic hydrocarbons; PAHs) associated with storage and disposal of fuel;

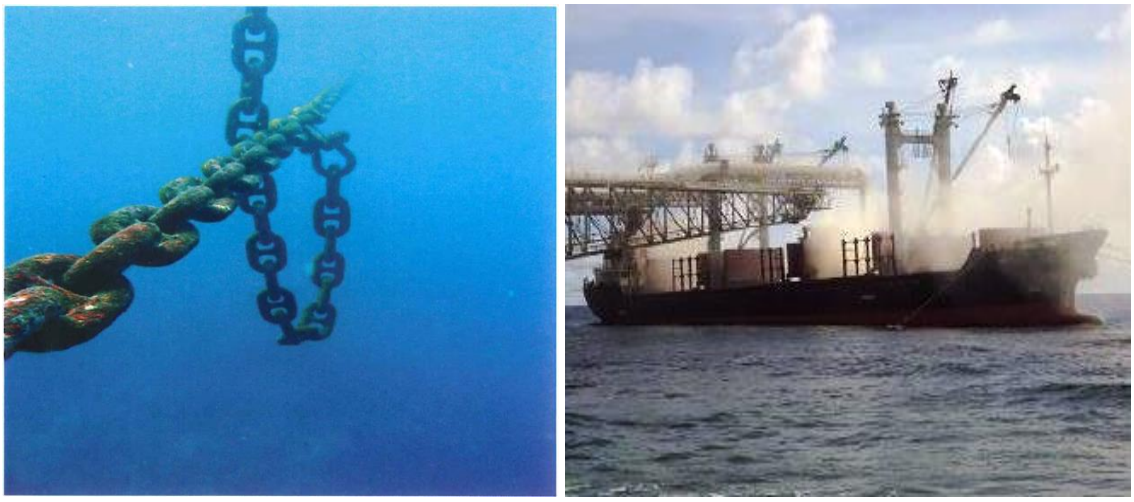
> ordnance compounds and heavy metals associated with bombing during the war; and

> leachate from uncontrolled landfill practices.

These issues are compounded by the deforestation of the island due to mining and human habitation.

Marine water quality around Nauru is expected to be generally very good (especially water clarity), reflecting the lack of terrestrial sediment inputs. Even near the port, water clarity is good (Figure 19a). However, visual observations and anecdotal evidence suggest that there may be some transient contamination of nearshore water in the port area, due to phosphate dust at times (Figure 19b) and runoff from the port area, where hydrocarbons are evident. Despite occasional 'pulse-type' contamination (for example, runoff during rain storms, and phosphate dust during loading operations), and more prevailing seepage from septic tanks, there is a very high rate of water exchange in the port area and over the reef flat, and it is expected that water quality will remain high for the majority of the time.

Figure 19 a & b Clear oceanic water and phosphate dust from loading operations opposite the NPDP site



4.1.11 Foreshore / backshore

Nauru's backshore and foreshore areas are defined by the geology of the coastal fringe, the degree of development (in the backshore area), and coastal processes. Almost all of the natural backshore in the port area (the coastal fringe from the high water mark going inland beyond the influence of seawater) has been disturbed by very dense infrastructure associated with port operations over the last 100 years, construction of shore protection works, and dumping of scrap metal and other debris (Figure 20). The foreshore areas (exposed to spring high tides) comprise a sand beach north of the Boat Harbor (not reported as a turtle nesting beach), which is backed by a seawall, and armor rock protection and debris south of the boat harbor. There is no location anywhere near the port that has natural vegetation on a beach crest or dune that grades into the ocean, although beach pea (*Ipomoea* sp.) has colonized some of the armor rock in some locations. There is much more natural foreshore and backshore habitat on the east side of Nauru, but even there, in some areas, the coastal ring road and houses between the road and the shore impinge on the foreshore / backshore area. Soil in the backshore area in Nauru is very thin (about 25 cm deep at most) and comprises mostly coral gravel, and some sand. Soil fertility is generally low, due to lack of organic matter.

Figure 20 Foreshore / backshore development directly north of the boat harbor

Directly south of the NPDP new and old cantilevers and a coral rock and aggregate causeway have been constructed by the NRC to connect the foreshore to the outer reef edge across the reef flat. The causeway is used to export coral aggregate derived from the NRC mining operations to neighboring island nations (e.g. for runway extensions in the Republic of the Marshall Islands). This causeway has further altered the natural movement of water along the coastline adjacent to the port and has deposited significant amounts of coral rocks, aggregate size fragments and sand along the intertidal reef flats adjacent to its location (Figure 21).

Figure 21 Location of the NRC intertidal reef flat causeway to the south of the Nauru Port: the old cantilevers can be seen behind the causeway

4.1.12 War ordnance (unexploded ordnances UXO)

Significant volumes of ordnance were used on Nauru by the US forces during WWII. These originated both from US air force bombers and naval vessels (see Figure 22 green area on the map). The bombing targeted the area between the Nauru Port (boat harbor), within the vicinity of Arijejen / Orro, which is believed to be the Japanese troop accommodation area, to the airfield (Yaren) and including Command ridge (Boe) with all areas to the south and southwest targeted (the airfield). UXO have been located in other areas of the island and have been located during topsoil disturbance associated with the mining operations. UXO detection associated with mining operations is still a threat in areas that have not been previously mined (this is a small percentage of the topside).

Figure 22 **Location of WWII US forces bombing target area on Nauru**

Remnant bomb craters are found throughout this area including the reef flat adjacent to the NPDP (Figure 23). Although this area has undergone significant physical changes and construction since the war, UXO continue to be located throughout this area and therefore remain a serious threat to humans during all construction activity, including the proposed NPDP site activities.

Similarly, the Japanese forces stored ordnances on the island during the war and these have been found throughout the island, most buried underground or in caves associated with the area of the island between ‘bottom side and ‘topside’. Recent discoveries include a Japanese 6 inch brass cartridge cases and a Japanese 500lb bomb case. It is believed that the majority of these storage areas have been located, especially in areas that have been industrialized and built on around the coastal areas of the island including the NPDP site and therefore threats are perceived to be very small in these areas. There may be, however, Japanese ordnances remaining in unexplored and remote locations on the island.

CARDNO, (2016b) commissioned a UXO assessment of the terrestrial and intertidal reef systems associated with the NPDP. No UXO were located; however due to a high number of unidentified items recorded throughout the terrestrial, foreshore and intertidal reef flat it is recommended that all construction activities associated within NPDP project that disturbs the ground and/or reef flat will require UXO assessment to ensure safety.

Figure 23 **WWII bomb craters located on the reef flat adjacent to the NPDP project site**

The Nauru government has guideline provisions to address any UXO finding based on public safety and safe UXO handling and disposal. These guidelines and/or protocols have not as yet been documented or gazetted into a legal document by the GoN; however, they are understood by individuals and agencies responsible. These guidelines need to be strictly adhered to during the construction period of the NPDP. The UXO assessment needs to be undertaken by a suitably qualified consultant specializing in UXO assessments (discovery, safe handling and decommissioning).

The coordination of a UXO finding falls under the Disaster Risk Management Act, 2008 (refer section 2.2 for additional information), the National Disaster Management Plan 2008 and falls to the National Emergency Services Department to implement. UXO located during mining follow the same set of guidelines, but are managed by the NRC in collaboration with the Nauru Government. The process to manage a UXO finding includes (obtained from personnel discussions with National Emergency Services staff);

> The site of the finding is cleared of all people and if unearthed during work all work is stopped.

> The site is secured and all people removed to a safe distance.

> The National Emergency Service is contacted and alerted of the finding.

> The President's office is contacted and alerted of the finding.

> The Nauru Police force is contacted, alerted of the finding and mobilized to secure the site and manage public safety (evacuation of buildings and areas may be required).

> The Australia High Commissioner is contacted and alerted of the situation and a formal request for assistance to provide suitable qualified members of the armed forced to help (arrive on island to assess and manage the UXO). If, however skilled UXO people are on island (which has been the case in recent times) they are contacted and an assessment of the UXO is made. If the UXO is located within the NRC mining areas a qualified staff member assists in this process.

> UXO is assessed (active or not) and a clearance plan is developed. The UXO may not be moved and remains in situ (protected and cordoned off – no access) until qualified personnel are on island to dispose of it or the UXO is moved by qualified personnel to a storage bunkering location to be disposed of when qualified people are on island. The bunker site is situated on the 'topside' in a secure area (old mining area).

> UXO are normally detonated at an agreed location on island under professional advice.

These protocols form part of the NPDP construction EMP and will be incorporated into the scope of works for the project.

4.2 Ecological resources

4.2.1 Marine and coastal resources

Nauru has an open marine tenure systems that allow anyone to fish the inshore waters (high water mark to 12 nautical miles offshore) and is subsequently managed by the national government, although historically and currently, communities claim some authority (which varies between districts) over adjacent community marine and coastal areas with respect to resource extraction.

Nauru's main fisheries zones include: the fresh to brackish water ponds, including Buada Lagoon and the systems of sinkholes found inland from the coast; the shallow fringing coastal reef or intertidal zone; the sub-tidal areas and reef slope including fissures or canyons in the reef slope (to about 25 m depth); the deep reef and near-shore deepwater areas below 25 m; and the open ocean or pelagic fishery. All of these areas are of critical subsistence importance, as well as being a local income generation opportunity. The first four zones are usually considered to be part of the 'inshore fishery' and the latter referred to as the 'offshore fishery'. Commercial fishing (foreign fishing licenses focusing on pelagic resources – tuna species specifically) is permitted between 12 nautical miles from the coast to the nation's EEZ boundaries some 200 nautical miles out from the shoreline. Only the communities of Nauru under the management of the Nauru Fisheries and Marine Resource Authority (NFMFA) use the waters associated with the intertidal reef flat, out to the 12 nautical mile zone.

Nauru's marine systems, especially the first three zones (intertidal and sub tidal, and inshore reef areas) have been heavily exploited for subsistence and small scale artisanal livelihood activities whilst the deeper water slope benthic fisheries are becoming increasingly targeted. These activities have used a wide range of traditional and modernized fishing gear and techniques targeting a wide range of resources. The boat harbor is used daily by local fishers to either fish directly from the port's quays or to launch small canoes to access the ocean and fish the waters directly off the port utilizing the mooring buoys as anchors and Fish Attracting Devices (FAD).

SPC (2005) undertook an extensive assessment of finfish, invertebrate and social economics of the fisheries of Nauru. The findings of this study provide valuable background information to understand the nation's fishers and fisheries. Of the households surveyed, 97 percent are engaged in some form of fishing and includes both genders. Female fishers are normally associated with the collection of invertebrates within the inshore intertidal reef systems and reef flats whilst their male counterparts undertake this type of fishing as well as target finfish outside of the intertidal reef systems. Fish and marine resources play a significant role in the daily diet of the communities with an estimated 47 kg and 15 kg of fresh and canned fish respectively, consumed per capita annually. Fish however plays a minor role in the nation's household income. The assessment estimated 590 tonnes of finfish are consumed annually with the majority caught for subsistence purposes.

The survey found a total of 18 families, 49 genera, 129 species, and 45,000 fish were recorded in 50 sites around the island associated with the reef crest, edge, and slope. Acanthuridae and Balistidae families dominated fin fish located throughout the assessment with low to very low recorded population numbers of the larger food fish families such as Lethrinids, Lutjanids, Serranids and Scarids. The authors concluded this population structure clearly indicates intense fishing pressure targeting food fish families has occurred for an extended period of time.

Similarly, the invertebrate assessments indicated heavy fishing pressure on all groups and species that have some form of dietary, commercial or customary/handicraft use, resulting in very low population of these resources.

4.2.2 Threatened and protected marine species

As with other Pacific Nations, data associated with threaten and protected marine species of Nauru is restricted in general, to larger well known and studied iconic species that are of regional and/or of a global concern. Information pertaining to other species is limited or non-existent. Therefore, at present there is no definitive national resource documenting all species that exist and/or are threatened within the nation.

The International Union for Conservation of Nature & Natural Resources (IUCN) undertakes a global assessment (Red List) to commonly classify species as to their conservation status. Classifications (form most to least concern) include critically endangered, endangered, near threatened, vulnerable, or least concern.

The IUCN records four species of marine mammals for Nauru all of which have been recorded as data insufficient. This includes two beaked whales (Blainvilles Beaked whale, *Mesoplodon densirostris* and Gingo-toothed Beaked whale, *M. ginkgodens*), Frasers dolphin (*Lagenodelphis hosei*) and the piggy killer whale (*Fersa attenuate*). Anecdotal information gathered through consultation with stakeholders during the in country visit indicated that there are a number of other species of whales and dolphins that are seen in Nauru waters, however their identification and official recordings are not documented.

The red listed fauna recorded for the oceanic environment of Nauru includes a number of sharks of which the oceanic white tip *Carcharhinus longimanus*, and the silky shark *C. falciformis* are considered endangered and the shortfin mako (*Isurus oxyrinchus*) vulnerable. In addition, the whale shark (*Rhincodon typus*) and big eye tuna (*Thunnus obesus*) found in the pelagic zone are also red-listed as vulnerable.

Two species of marine turtles have been recorded for Nauru, the green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) which are recorded on the IUCN red list as endangered and critically endangered respectively, both of which are seen rarely foraging on the reefs today (Backlin and Fisher, 2013). Anecdotal information gathered during the assessment indicates that the green turtle has been seen on the beaches, presumable to be nesting, however this event is very rare. Harvesting of turtles in the past and degradation of shoreline and suitable nesting habitat have severely depleted nesting stock resulting in very low numbers in Nauru.

The majority of the IUCN marine species are inshore corals none as yet have been recorded for Nauru. There is limited information available on the coral reef systems and resources of Nauru especially on structure, distribution, and temporal changes quantifying coral coverage and mortality rates. Deiye (in Lovell et. al., 2004) documented that reef development in Nauru is generally poor and coral communities are either sparse or contain mostly dead corals, especially in areas near populated and developed coastal areas, including the boat harbor located within the commercial port area. Changes to the morphology and species dominance of Nauru reefs were reported after a bleaching event in 2004 resulted in high mortality rates for branching Acropora species resulting in encrusting and massive forms dominated the reefs systems (Lovell et al, 2004).

Fenner (2013) reported a total of 51 species in 18 genera of stony corals (including 46 species in 13 genera of zooxanthellate Scleractinina) in Nauru and highlighted the dominance and abundance of *Porites rus*, and documented that this species *'completely dominates almost all reef slope sites assessed*'. Other hard coral species reported to be dominate in Nauru include in decreasing abundance *Pocillopora eydouxi*, *Distichopora violacea*, *Heliopora coerulea*, and *Montipora grisea*. The author summarized that the coral reef slopes of Nauru revealed a number of features that can be interpreted as indicator of a healthy reef system, including very high coral cover, healthy corals, no macroalgae other than *Halimeda*, high cover of coralline algae in areas not covered by coral, very limited sea grass areas and very high calcifying cover. However, he concluded that Nauru reefs show very low diversity for their geographic location, with much higher diversity in surrounding archipelagos.

A review of the literature indicates that there is no sea grass species recorded for Nauru. None were recording during the on island marine assessment.

Two species of mangrove (*Bruguiera gymnorhiza and Rhizophora stylosa*) are found in an isolated pocket on the eastern side of the island of Nauru. These species are not recorded on the western side of the island nor were they located within the area of influence of the Nauru port.

4.2.3 Marine protected area

There are no marine protected areas nor is there any legislation in place to warrant the specific conservation of biodiversity and promotion of sustainable marine management practices in Nauru. Preliminary discussions have been undertaken to develop marine management and conservation areas but as yet been implemented. The recommended areas are quite remote from the NPDP site with the marine areas focused on the marine ecosystems and habitats located in the southeastern corner of the island. This area has been reported to have the highest marine biodiversity and healthy reef ecosystems for the island. Through discussions with the DCIE staff (November 2016), it was indicated that they have no particular concern for protecting any marine environmental attributes adjacent to the port area, due to more than 100 years of industrial and shipping activity in the area.

4.2.4 Marine resource assessment of the NPDP

A detailed marine assessment of the intertidal and subtidal marine ecosystem, specific habitats and resources adjacent to the NPDP site was undertaken during December 2016 by the PPTA consultants marine ecological expert. This assessment is documented fully in a separate report titled: '*The shallow water marine assessment of the reef systems adjacent to the Nauru Port*' and summarized below. The information detailed by this assessment identifies key potential environmental impacts associated with the construction and operational phases of the NPDP, which are discussed within this report and articulated in the projects EMP.

In total, nine intertidal reef transects were undertaken adjacent to the port site, three to the south and six to the north of the Nauru port channel entrance (Figure 24). These transects included the reef benthic habitats from the exposed foreshore beach to the reef crest in all locations. All intertidal assessment transects were undertaken at low water thus allowing walking access to all sites.

A total of 1.5 hectares of subtidal reef from the reef crest, edge to the 15 m depth mark within the lower reef slope was assessed adjacent to the port site (Figure 25) including the reef directly adjacent to the port entrance and small man-made harbor. In total, four subtidal reef assessment sites adjacent to the port were documented. The assessment was undertaken using free diving by the assessment team.

Figure 24 **The location of the nine intertidal reef assessment sites in relation to the existing port site**

(not to scale).

Figure 25 **The location of the subtidal area assessed in relation to the existing port site**

(not to scale)

4.2.5 Intertidal Reef Flat Environment and Resources

The intertidal reef flat (Figure 25) adjacent to the NPDP site (the area between high water mark and the crest of the fringing reef edge) is characterized by the presence of year round oceanic swells resulting in a high energy wave system dominated by a barrier reef comprised of small spur and groove formations, breached by a number of small natural open water reef channels that are directly linked to a shallow intertidal reef flat that is strongly influenced by wave and tidal currents.

The intertidal marine area is characterized by a distinctive reef system that remains similar throughout the area. The reef flat is homogenous, horizontally flat averaging 0–1.5 meters of water depth and is totally exposed during low tides and is composed almost entirely of hard calcium carbonate reef structure.

The reef flat terminates landwards onto a calcium carbonate derived foreshore beach and seaward to the reef crest which is characterized by constant wave activity and tidal currents. The intertidal reef crest extends seaward through a relatively narrow reef edge (1-4 m) and upper (4-8 m) and lower reef slopes (8-20 m) that extends almost vertically to the depths of the Pacific ocean (refer section 4.2.4). The foreshore beach terminates at all locations onto a man-made retention wall 4-8 meters (m) in height either side of the port whilst within the port harbor the wall is concrete (Figure 26).

Figure 26 **Intertidal reef flat north and south of the NPDP existing port site**

This reef flat adjacent to the port is divided into two sections (north and south) split by the small harbor and entrance that has been blasted and dredged through the upper reef slope (down to about 6 meters), reef edge, reef crest and intertidal reef flat.

The boat harbor's original reef flat has been completely removed through dredging and port construction operations whilst the reef flat south of the Boat Harbor has been severely impacted for many years by heavy construction equipment (used to test the loading of the mooring system) and by anchor chains that are attached and have been dragged over the reef flat. The reef flat north of the boat harbor is characterized by hard reef flat, with rubble and sand constantly scouring the area, due to strong wave action.

The reef flat associated with the port extends approximately 250 m and 120 m north and south, respectively and is roughly 100 meters in width in the northern sections whilst it is 125 m wide in the south.

The reef flat in all areas assessed is almost devoid of reef derived coral rubble, rocks and sand clearly indicating the presence of high wave action and strong tidal currents.

The reef flat to the north of the port harbor has a number of World War II bomb craters that remain visible and create the only vertical relief (rugosity – three –dimensional complexity) within the intertidal reef flat adjacent to the port and as such hold water at all tidal heights. It is these small areas that possess small and few individual colonies of hard corals (*Pocillopora sp*. and *Porities sp.).*

The intertidal reef flat possess an intake and discharge pipeline for the nations desalination plant (Figure 27). The intake line (Figure 28a) is positioned within the reef crest/reef edge and is located directly to the north of harbor (50 m). The pipeline is positioned perpendicular to the foreshore and is trenched and concreted into the reef flat terminating through the foreshore concreted boundary and connects to the desalination plant directly east (250 m) of the port site. The pipeline is buried

underground through the port boundary. The desalination discharge pipeline (Figure 28b) is located to the south (50 m) of the harbor (Figure 26) and is trenched from the desalination plant running outside of the port boundaries through the foreshore retaining wall and trenched and concreted into the reef flat discharging close to the reef crest. The discharge water has elevated salinity levels that through wave action disperse quickly. There is no evidence of increased salinity affecting the benthic organisms associated with this area.

Figure 27 **The location of the subtidal area assessed in relation to the existing port site**

(not to scale)

Figure 28 a & b **Desalination intake (a) and discharge (b) pipeline associated with the NPDP existing port site**

The intertidal reef flat to the north and south of the ports terrestrial boundaries possess a number of waste water drainage pipelines that are secured to the reef flat that were constructed in the 1970s to discharge terrestrial wastewater (both fresh and salt water) and sewage from the neighboring communities directly into the sea. A number of these pipelines remain operational.

The pipeline north (700 m from the harbor) of the port boundary (Figure 29a) collects treated wastewater and sewage from the new wastewater treatment plant (commissioned December 2016) at

the hospital and a number of dwellings within the Aiwo district called ‘Location’ and directly discharges into the marine environment at the reef crest. Water discharging from the hospital wastewater treatment plant has no environmental health issues (treated on site). However the wastewater and sewage collected from the households within ‘location’ is untreated and as such raw sewage and household grey water is directly discharged onto the reef. Impacts on the marine resources associated with the NPDP are very minor due to the physical distance away from the port and the diffusion associated with wave and currents.

The wastewater discharge pipeline to the south (370 m from the harbor) of the port boundary, located next to the new cantilevers is not operational due to terrestrial blockages. However, the pipeline directly at the shoreline through a cement pit is the receiving location for sewage collected (pumped) from household septic storage units that then discharges through the broken pipe (Figure 29b) onto the intertidal reef flat. The sewage discharged is not treated. Impacts on the marine resources associated with the NPDP are very minor due to the physical distance away from the port and the general water current movement away from the port.

Figure 29a & b **Waste water pipe lines located on the intertidal reef flat to the north (a) and south (b) of the NPDP existing port site**

The intertidal reef flat either side of the harbor has a number of anchorage support structures (Figure 30a) embedded into the reef flat close to the reef crest where large mooring chains (Figure 30b) are permanently attached to secure buoys that are used to moor the large phosphate vessels. The chains rest on the reef flat and reef crest, edge and upper and lower reef slope. The chains due to movement from the vessel moorings and heavy wave action scour the reef surface and as a result remove all benthic organisms in the area of impact.

Figure 30 a & b **Mooring structures (a) and chains (b) on the intertidal reef flat within the port boundaries**

To the south, well outside the port's boundary, new and old large cantilevers used by the phosphate company to discharge phosphate into the vessels moored offshore are secured to the intertidal reef flat. The moorings used by these vessels in part are located within intertidal and subtidal reef systems associated with the port.

Further south of the cantilevers, a coral rock and aggregate causeway has been constructed by the NRC that connects the foreshore to the outer reef edge across the reef flat (Figure 31). The causeway is used to export coral aggregate derived from the NRC mining operations to neighboring island nations (e.g. for runway extensions in the Republic of the Marshall Islands). This causeway has altered the natural movement of water along the coastline in close proximity to the port and has deposited significant amounts of coral rocks, aggregate size fragments and sand along the intertidal reef flats adjacent to its location. Sessile benthic resource in close proximity to the causeway have been impacted.

Figure 31 **Old cantilevers and rock causeway located to the south of the port boundaries**

There are no freshwater streams associated with the port location; however during periods of high rainfall natural ground water springs enters the intertidal reef flat through the foreshore beach along the entirety of the port boundary (anecdotal information by NPA staff and personal observations of the consultant). High densities of benthic green and brown algae are present associated with the inner intertidal reef areas adjacent to freshwater entry point locations indicating nutrient sources. The high levels of nutrients in the groundwater due to poor sanitation management on the island are a significant contributing factor.

The intertidal reef flat is almost devoid of hard corals with very low percentage (less than 1%) of colonies located within the WWII bomb craters and encrusting forms located on the reef crest. There are no soft corals. The intertidal reef flat is dominated by a number of species of macro algae (e.g. *Padina sp*.). There are no sea grasses or mangroves present within the NPA or present along the coastline either side of the Port. A limited number of invertebrates were recorded, with the highest populations consisting of the small mobile black tropical sea cucumber *Holothuria atra*, and several species of gastropods and crab. Population numbers of *H. atra* are low within the NPDP when compared to other intertidal areas on the eastern and north eastern areas of the island (Fenner, 2013).

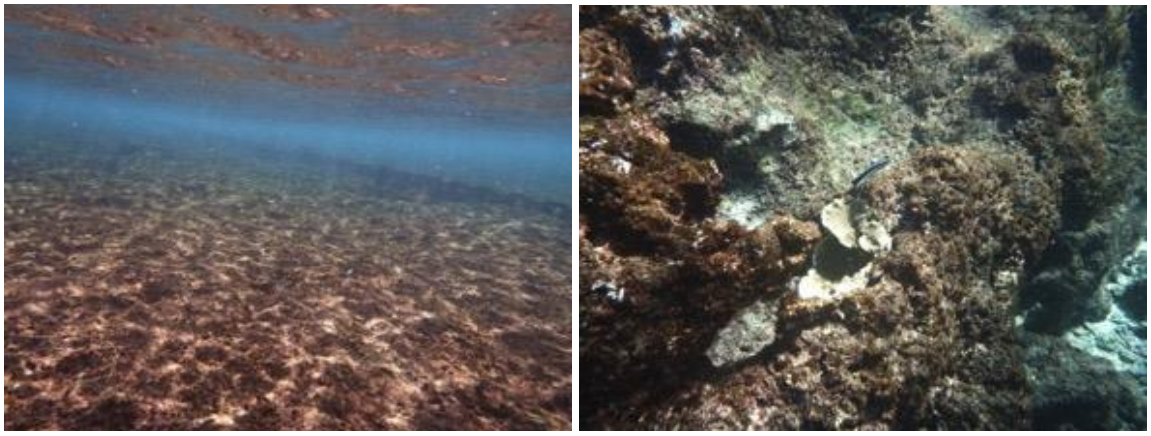
4.2.6 Subtidal reef environment and resources

The subtidal reef system adjacent to the port is characterized by a distinctive wave dominated reef crest, a small but distinctive sloping and, in some areas, a vertical reef edge (1-4 m), upper (4 – 8m) and lower (8-25m) reef slopes that extend almost vertically to the depths of the Pacific ocean.

The reef crest is the highest point of the reef facing the ocean and is the area of the reef that has the highest energy zone and is influenced by oceanic swells, breaking waves and is influenced by tidal currents. The reef crest is in some parts exposed during low tide and includes the natural small reef channels and small spur and groove formations. Due to wave action and exposure, hard coral colonies are rare (less than 1 percentage live coverage) and only encrusting and small digitate forms are present. The reef crest has an underlying hard calcium carbonate reef structure that is dominated almost exclusively by a living veneer of coralline algae in the surf zone and a mixture of coralline and macro algae as water depths increase (Figure 32a).

The reef edge is small (up to 10 meters wide) with a distinctive slope almost vertical in some areas dominated by oceanic waves and strong tidal water currents at times. Coralline algae dominate the benthic substrate creating a thin veneer across the hard coralline rock. Live hard coral cover increases in this zone (ranges between 2-10%) and is characterized by encrusting (*Porities sp.*, *Acropora sp.*), digitate (*Acropora sp.* and *Pocillopora sp*.) and small massive (*Porities sp.)* morphological forms. Biodiversity of hard corals and general reef resources are very low (Figure 32b).

Figure 32 a & b **The reef crest and reef edge adjacent to the NPDP**



The reef crest and edge have been dredged in the past for the entrance of the harbor and desalination intake and discharge pipelines (refer Figure 27). Considerable physical impacts to the reef flat, crest, edge and slope have and continue to occur due to the anchored position of mooring chains and their position directly onto the substrate. The continued movement of the mooring chains has chiseled tracks into the bedrock preventing settlement of benthic reef organisms (Figure 33). The impact of the mooring chains extends further into the upper and in some cases the lower reef slope in this area.

Figure 33 **Mooring chains located within the reef crest and reef edge adjacent to the NPDP**

The upper reef slope is similar throughout the reef area assessed and is roughly 20-30 m in width with a gentle decreasing slope with a vertical relief of 4–8m. This zone possesses significant hard coral coverage (up to 70%) including small and medium size digitate, encrusting and massive hard coral (Figure 34). Including the families Pocilloporidae, Acroporidae (*Montipora sp*., *Acropora sp*, *Astreopora sp*.) Poritidae (*Porities sp*, *Goniopora sp*. *Alveopora sp*.) Faviidae and Milleporidae (*Millepora sp).* Percent hard coral cover increases towards the south of the harbor; however diversity and morphological form remains similar. Hard coral coverage and diversity within the harbor entrance and directly opposite the existing harbor location is greatly decreased in this zone.

Considerable port derived rubbish (mostly old vehicle tires) was located in the harbor entrance and on the upper reef slope directly adjacent (Figure 35). Port derived rubbish including equipment (e.g. old container barges) was located throughout the harbor, which in some cases appears to hinder harbor functions. The upper and lower reef slopes possess household and port rubbish that include large parts of steel machinery.

Figure 34 **Hard coral colonies located within the upper reef slope adjacent to the NPDP**

Figure 35 **Rubbish located outside the entranced and within the port of the NPDP**

The lower reef slope is similar throughout the reef area assessed and is roughly 20-40 m in width with a significant decreasing slope with a vertical relief of 8–20 m. The decreasing slope increases in some areas almost vertically at greater depths. This zone possesses significant hard coral coverage (up to 95%) including medium to large size digitate, branching and massive hard coral. This zone possesses the highest diversity of corals and is dominated by the hard coral families Pocilloporidae, Acroporidae (*Montipora sp*., *Acropora sp*, *Astreopora sp*.) Poritidae (*Porities sp*, *Goniopora sp*. *Alveopora sp*.) and Faviidae. Throughout the area low number of macro algae (e.g. *Halimeda sp.*) is present (Figure 36).

Figure 36 **Hard coral colonies located within the lower reef slope adjacent to the port of the NPDP**

The reef extends vertically outside of the lower reef slope to considerable depths. Hard coral presence in this zone is restricted to surface light penetration. The deeper water areas were not assessed during the survey. Due to the oceanic nature of these deeper water sites physical impacts from the port development activities will be very minimal due to dispersion of sediments from the dynamics of the oceanic conditions.

The sub tidal reef systems adjacent to the port harbor and north to the desalination intake line possess low to very low hard coral coverage (less than 10%) and diversity (Figure 37). It is this area that the proposed port harbor expansion program will trench the entrance to the berth pocket. Hard coral percent coverage and diversity are highest in the south and north of the port harbor.

Figure 37 **Hard coral colonies located within the lower reef slope directly adjacent to the port entrance and north towards the desalination intake pipeline**

Throughout the subtidal assessment area there was a distinct lack of reef associated predator finfish and editable invertebrates (e.g. giant clams, gastropods). Dominant finfish species were the small algal grazers (e.g. Acanthurudae).

Local fishers use the protection of the existing harbor to launch fishing canoes and access the reef and offshore fishing grounds. Fishers utilize the reef flat associated with the port during periods of low water to fish (predominately rod and reel, nets) for subsistence purposes.

There are no marine or coastal designated marine protected areas or areas of significant biodiversity within the costal ecosystems adjacent to the port site or in close proximity to the north or south.

The field survey visual information documented during ADB February 2015 assessment team and information provided by Undersea Construction Ltd. in the last five years has been corroborated by

more detailed scientific surveys undertaken at various locations around Nauru. These other surveys indicate that most of the coral reef in Nauru (about 80%) is made up of *Acropora*, *Montipora*, and *Pocillopora* (SPC, 2008). Overall coral diversity is only about 7-8 species in Nauru (very limited, compared to other Pacific islands). These other surveys noted the relatively degraded reefs on the west side of Nauru, quite good coral development at the northern end of Nauru (60-80% live coral cover), and then low live coral cover (about 5%) at the northeast side of Nauru, which experiences relatively large waves much of the time (SPC, 2008). The north and east side of Nauru has the highest amounts of live coral cover, including *Acropora*. There is a developing trend (over the last 15 years) of enveloping corals (such as *Porites*, which can accommodate more stressed conditions) increasing in abundance, apparently at the expense of branching corals, such as *Acropora*. Recent surveys (GoN, 2014) have indicated a total of 51 hard coral species, with *Porites* dominating at all sites that were surveyed.

4.2.7 Terrestrial resources of Nauru

Nauru is located in the dry belt of the equatorial oceanic zone resulting in almost constant mean daily temperatures of 26 to 32° ^{0}C and extremely variable and unpredictable rainfall that averages 1500 mm per year and a highly variable range of 300 to 4572 mm. Nauru is subjected to harsh and prolonged droughts that severely stress even the most hardy coastal strand species, leading to the death of non-coastal exotics (such as breadfruit), and severely restricting the production of even coconut palms (Catala 1957 and Whistler & Thaman, 2013).

The island has no surface freshwater resources (e.g. rivers, streams, lakes) but possesses several small brackish anchialine ponds in the northwest; the largest brackish water pond is the Buada Lagoon, and an underground lake in Moqua Cave in the southeast. The only significant permanent freshwater resource is the islands groundwater, replenished only from rainfall. Freshwater is in the form of a lens of often slightly brackish freshwater hydrostatically ‘floating’ on higher density saltwater beneath it (Thaman et al. 2008).

The coastal soils of Nauru are among the poorest in the world. They comprise a shallow (only about 25 cm deep), alkaline, coarse-textured layer of organic matter, coral sand, and limestone fragments that overlay a limestone platform. They contain more coral gravel than sand in the lower horizons. Potassium levels are often extremely low, and pH values of up to 8.2 to 8.9 and high $CaCO_2$ levels make scarce trace elements, particularly iron (Fe), manganese (Mn), copper (Cu), and zinc (Zn), unavailable to plants. Fertility is, therefore, highly dependent on organic matter for the concentration and recycling of plant nutrients, lowering soil pH, and for soil water retention in the excessively well-drained soils. Although levels of organic matter can be relatively high in undisturbed soils under natural vegetation, it can decrease dramatically as a result of clearance by fire or replacement by coconuts and other introduced plants (Morrison 1994).

The plateau soils of Nauru vary from shallow layers on the tops of limestone pinnacles, composed primarily of organic material and sand or dolomite with very little phosphate, to deep phosphatic soils and sandy phosphatic rock up to over 2 m deep between the pinnacles. Top soils range from 10 to 30 cm in depth, overlaying a deeper material that is frequently reddish yellow and between 25 and 75 cm in depth, changing to pinkish grey at greater depth. Undisturbed plateau soils (what little remains) have a high level of organic material and are generally fertile. Calcium dominates the exchange complex and exchangeable magnesium is also high. Exchangeable potassium is low, while extractable phosphate values are generally high and sulfate moderate. The trace elements manganese, copper, cobalt and molybdenum levels are very low, and these, plus iron and zinc, are rendered unavailable to plants pH values >6.5. Poorly developed but relatively fertile, wet soils are found around Buada Lagoon and in some poorly drained swampy areas near the base of the escarpment on Nauru (Morrison 1994).

Thaman et al. (2008) recorded 573 species of plants or cultivars present on Nauru of which 63 (11%) were possibly native species, no endemic species were located and several species were possibly locally extinct. The authors noted that half of the native flora was '*severely restricted in distribution, endangered or possibly extinct, due to removal and severe* housing area, as well as some scrub vegetation and weeds. There are no mangroves on the west coast of Nauru (there are a few *Bruguiera gymnorhiza* and *Rhizophora stylosa* trees around the anchialine ponds in Anabar on the north coast, which have a subterranean connection to the se/sea-oaka (GoN, 2014).

Whistler and Thaman (2013) reported that there are several plant communities that can be distinguished on Nauru, but since the landscape has been so severely disturbed by mining (and earlier by human occupation), only remnants of this remain. The plant communities they recognized as occurring on the island include: littoral strand; limestone forest and woodland; mangrove forest; freshwater marsh; managed land vegetation; secondary scrub; and secondary forest.

Buden (2008) recorded 34 bird species in Nauru of which 25 were indigenous; however, only 7 breed on the island, the remainder are migratory sea and shore birds. Only two species of land birds were recorded. This includes the regionally located Micronesian Pigeon (*Ducula oceanica*) and the endemic Nauru reed –warbler (*Acrocephalus rehseil*). The author identified that past and current hunting and habitat degradation and/or removal have greatly decreased the bird populations and bird biodiversity in Nauru.

Buden and Tennent (2008) recorded only four species of butterflies in Nauru, none of which are endemic and indicated that the biodiversity and population of butterflies recorded for Nauru is similar to that found on other small, remote, low lying Pacific Islands. Similarly, Edwards (2013) identified 47 species of moths of which 42% are indigenous to Nauru, 13 species of land snails of which 38% are indigenous, 17 species of exotic ants, six species of dragonfly/damselfly of which only 6% are indigenous and ten families of wasps.

Backlin and Fisher (2013) recorded a total of eight species of reptiles which included three species of ground skinks (one of these species was reported to be undescribed and therefore maybe a new species endemic to Nauru), four species of gecko (one of these invasive), and one invasive snake species. Neither amphibians nor native land mammals have been reported for Nauru.

Agriculture, since the introduction of mining in Nauru, has played a minor role in the nation's subsistence and cash income economy, with the community reliant on imported goods. This trend has changed over the past decade, due mainly to the economic crisis in the early 2000s when mining ceased, greatly reducing incomes to the populations and an insurgence and local awareness of the social and environmental benefits of productive environmental crop and livestock systems. Small family based livestock production units, mainly pigs and chickens and individual home gardens including both root crops and trees, are being replanted; however, local knowledge and technical skills are limited. In general, Nauru has had one of the lowest per capita rates of subsistence production for own consumption in the Pacific region.

The vegetation and flora of Nauru, although highly disturbed and outnumbered by introduced exotics, still constitute a critical ecological and cultural resource to the people of Nauru. This is particularly true for the indigenous species, virtually all of which had wide cultural utility within the traditional subsistence economy. The most important ecological functions of Nauru's plant resources include the provision of shade to humans and animals, animal and plant habitats, protection from wind, erosion, flood and saltwater intrusion, land stabilization, protection from the desiccating effects of salt spray, soil improvement and mulching. Similarly many endemic species had a traditional, spiritual and medicinal use for the Nauruan society. All of these functions are seen as critical to the sustainable habitation of Nauru. Preliminary analysis indicates some 174 purposes or use categories for 40 indigenous species, an average of over four uses per species. There are 434 uses for 354 exotic species, an average of 1.2 uses per species. This gives a combined total of 608 use/purpose

categories for 394 species (1.5 uses per species). Twenty (20) indigenous and 80 exotic species had no reported uses (Whistler and Thaman, 2013).

4.2.8 Terrestrial resources associated with the NPDP

The NPDP land site has been cleared of all natural vegetation, levelled to accommodate the port buildings and associated concrete floors and roadways. The foreshore areas have been cleared of natural vegetation, while artificial rock and concrete walls have been constructed to protect the port's assets from unfavorable marine weather conditions. Within the NPDP, one she-oak (*Casuarina equisetifolia)* (Figure 38a) and one Screw pine (*Pandanus sp.)* (Figure 38b) trees have grown within the NPDP boundary and will be removed during the construction phase. These trees have grown and survived due to the lack of maintenance within the port. Given the lack of natural habitats at the NPDP site, there is a noticeable lack of fauna in the port area (with the exception of rats, dogs, cats, pigs, and chickens).

Figure 38 a & b She oak (a) and Screw pine (b) trees currently within the NPDP site

The endemic Nauru reed-warbler (Buden, 2008) was recorded by the pre-feasibility study team in February 2015 during initial surveys and was observed on the 'Topside' plateau and on the north coast (in coastal vegetation), but was not seen anywhere in the port area (no dense vegetative cover). Other birds that occur on Nauru are mostly evident on the coastal terrace north of the port, south of the port, and all around the other coasts. The 'noddies' –white cap back terns) (Anous minutus) nest in the large trees at the escarpment, which is located quite far from the port area. Shorebirds are evident throughout Nauru, but are not commonly seen in the port area, except for some migratory sandpipers and plovers, which may frequent the beach area north of the boat harbor (depending on the season and the state of the tide). Other fauna likely to occur throughout Nauru, and not necessarily only occurring in the port area (if at all), include moths, land snails, ants, dragonflies, and several species of skinks and geckos (lizards).

4.2.9 Terrestrial protected area sites

There are no terrestrial protected and/or managed areas nor is there any legislation in place to warrant the specific conservation of biodiversity and promotion of sustainable land management practices in Nauru. Preliminary discussions have been undertaken to develop terrestrial conservation areas within the island but have as yet been implemented. The recommended terrestrial protected and managed area is associated with the Buada Lagoon located on the 'topside' of the island well outside the area of influence of the Nauru Port. Through discussions with the DCIE staff (November 2016), it was indicated that they have no particular concern for protecting any terrestrial environmental attributes in the port area, due to more than 100 years of industrial and shipping activity in the area.

4.2.10 Ecological significance

The NPDP site location is a highly modified industrial area and has no significant impacts or value on neither native biodiversity nor individual terrestrial, or coastal / marine ecosystems of Nauru. No rare, endangered or threatened terrestrial or marine flora or fauna have been recorded nor located during the PPTA consultant's assessment of the project area. Similarly, the proposed site area has no impacts on community or individual food security.

4.3 Social and cultural resources

4.3.1 Land-use and ownership

Individuals and/or Nauruan families own the majority of land on Nauru, although much is leased out to Government and other institutions / agencies for other than residential usage. There is a small proportion of public land all of which has been land that has been reclaimed associated in most part with the coastal foreshore. Land law of Nauru is to be found primarily in the *Lands Act 1976* and, by and large, continues the regime in force previously with the exception that if three quarters in number of the joint owners of a property agree to lease it for public purposes then the Minister may override the refusal of the minority. Ownership of land included such things as rights to grant life interests and profits and extends to ownership of wells, the reef, fishing rights and in land lagoons. Nauruan customs concerning title to land (other than by lease) rights to transfer or by will or other testamentary disposition and succession are given statutory recognition and have full force and effect of law.

The Nauruan government has acquired small parcels of land for its own purposes, which does not include the NPDP site, however in general all government infrastructure buildings are located on leased land. Land leased for mining is the largest income generation source for the nation.

Traditional Nauruan society was divided into 12 tribes, with the land shared between them and passed down through the female line (matrilineal). Land ownership remains very important to Nauruans, and no activities can take place on any piece of land without the consent of the traditional owners.

The island is divided into two plateau areas: 'bottom side' a few meters above sea level, and 'topside' typically 30 meters higher. The bottom side area is generally less than 1 km wide, has been heavily developed, and is considered to be urban as it is home to most of the population. For administrative purposes the island is divided into 14 districts.

The land adjacent to the port area has the highest density of settlements, extending inland at least 600 meters and, in correlation, the highest density of buildings, including residential, industrial, and commercial. In contrast, the east coast of Nauru is very thinly populated, and there is much more natural coastal habitat there.

There are 630 individual plots of land owned by Nauruans. Figure 39 shows the land ownership distribution in the port area, which includes at least 24 individual lots extending in about 200 meters from the coast (these being leased for various port operations, Republic of Nauru Phosphate Company (RONPHOS), and the derelict houses north of the boat harbor). In the area north of the boat harbor, recent local information suggests that up to 2,000 people may be living in the approximately 100 derelict old mining residences scattered over this area (a proper survey is required; not all buildings are inhabited).

Figure 39 Individual land plots in the port area

Data from ADB 2015 – PFS Report

4.3.2 Population

Demographics. The 2011 census shows a population of 10,084 persons with 5,105 males and 4,979 females and indicated a crude birth-rate of 27.2 and crude death rate of 7.5 (for the period 2007–2011). The median age is 25.3 years with 92% of the population being 54 years or younger. The ethnicity of the population is Nauruan 58%, other Pacific Islander 26%, Chinese 8%, and European 8%.

Detailed population surveys in the NPDP area have not been undertaken. As noted above, the only residential area near the port is north of the boat harbor, where up to 2,000 people may be living, apparently renting from the landowners. The demographics of this group are not known,

Health and education status. Adult obesity was 71% in 2008, the second highest in the world after American Samoa. Health expenditures accounted for 9.8% of gross domestic product in 2011. Life expectancy is 59.7 years (56.8 years for men and 62.7 years for women), ranking 169th in the world. Public education is available; the average period of school attendance is nine years for males and ten years for females. There is one general hospital for the island (GoN, 2013).

Living standards and wellbeing. Nauru became independent in 1968, and took control of mining operations in 1970. From that time onwards all profits were retained by Nauru, and until the early 1990's Nauruans derived one of the highest average per capita incomes in the world from the export of phosphate rock. Mining extended across a large part of the island, so the royalties received as payment for mining rights were shared among many families in proportion to the amount of land they owned. During the peak years of phosphate mining virtually all Nauruans enjoyed a high standard of living and had plenty of opportunities for education and personal development. Virtually all household needs, including food and drinking water, were imported from overseas. Although residual mining continues, both government revenue and average household income have been reduced dramatically. Insufficient revenue now limits capacity to maintain public and private buildings, and periodically the

capacity to pay public service salaries. Slow growth in the public and private sectors means few opportunities for young people entering the labor market.

Some Nauruan families that were once highly privileged in comparison with much of the world's population are now finding it difficult to provide for their day-to-day needs. Food security is a significant issue, as very little land is suitable or available for agricultural production, and most food is imported. Social surveys conducted for the poverty and social assessment noted that only 13% of households kept a kitchen garden and livestock production was low. Most households rely on imported frozen poultry for protein needs and supplemented by marine resources. About half (51%) of households undertake fishing, with 'own consumption' reported as the primary objective (GoN, 2013).

4.3.3 Infrastructure

Power supply and electricity use. For residential and normal commercial activities, Nauru is 100% electrified, with electricity provided by Nauru Utilities Corporation (NUC) when sufficient generating capacity is available. The majority of households and commercial consumers receive electricity supply via a pre-paid meter. NUC provides a subsidized residential tariff of US$0.10 per kWh for the first 300 kWh per month, with the tariff increasing to US$0.25 per kWh above that.

The phosphate mining operations, Refugee Processing Centre, some contractors' bases and new accommodation blocks have captive generation units. Backup generators are common. The majority of the households use liquefied petroleum gas or electricity for cooking, with some preference for gas due to the unreliability of electricity. Freezers and refrigerators are common, as is home ownership of fans and air conditioners.

Water supply. Drinking water is supplied generally by a desalination plant located east of the Port with intake and discharge pipelines located to the north and south, respectively of the Nauru harbor. Rainwater harvested from household roofs and catchments is also used for drinking water. Groundwater is generally not utilized as it is not suitable for drinking, although some wells are present which are mainly used for showers, toilets and household gardening requirements. Most people have access to improved water supply (96% of the population) and sanitation (65.6%) (GoN, 2013).

Transport and access. A road encircles the island, with a limited network of roads and trails into the topside area. An airport with a single 2 km runway is located on the south coast. There are no natural harbors. Two harbors have been created; a small-boat harbor on the east side of the island at Anibare Bay, and a larger commercial Port Facility, which handles container shipments and other bulk cargo. Two phosphate loading facilities have been constructed to the south of the main shipping Port.

4.4 Cultural and physical heritage and resources

There are no cultural or physical cultural heritage sites associated with the NPDP. Although the area has phosphate mining history (very dilapidated buildings), which includes an old locomotive, from the original phosphate mine operations near the southern port entrance and there is a cemetery located well north of the derelict housing area.

5 Anticipated Environmental Impacts and Mitigation Measures

5.1 Introduction – screening of potential impacts

The proposed NPDP is categorized, through the ADB REA for 'Port Development' checklist, as Environment Category B (Annex 2) in accordance with ADB Safeguard Policy Statement (SPS) 2009 (ADB, 2009). The checklist was prepared during the project pre-feasibility stage following a review of previous relevant studies and finalized following field inspection and community consultations during

the early half of 2015. The REA has been reviewed during this assessment resulting in the same conclusions. The majority of potential impacts associated with this project rest within the construction phase of the project, and to a much lesser degree, the operational phase.

Three distinctive potential environmental impacts were highlighted through the REA for the NPDP. These can be summarized as impacts associated with the pre-construction/design phase, (ii) the construction phase and (iii) operational/management phase of the Port. These potential impact issues and mitigation measures were identified and thus were screened to determine the level of environmental risk. These potential impacts were analyzed through a standard Environmental Risk Management Framework (ERMF) (see below) and key issues documented in this report.

It is noted that the REA highlighted a number of specific impacts associated with the pre-construction phase of the project. As part of the PDA a pre-construction IEE was prepared to guide the environmental monitoring of a number of specific site assessments as required as part of the projects Feasibility study. This included assessments for the presence of Unexploded Ordinances (UXO), Geotechnical, Topographical and Bathymetric information required to provide empirical evidence to assist with the design of the project. Each specific assessment included a SEMP and subsequent CEMP was developed and monitoring for compliance for each of the specific assessments. All assessments had been completed before the drafting of this IEE and as such the outcome and findings have been included in the IEE where relevant.

Therefore, the only pre-construction requirements to be brought forward into this document relate to requirements on the IA/PMU and contractor in respect of EMP updating and incorporation into bid documents, obtaining government approvals and clearances, and preparation and review of the CEMP and induction to the site. Any background information required on the pre-construction phase should refer to the Pre-Construction IEE.

Similarly, the NPA, at the writing of this report has commissioned a contractor to prepare the NP site for the initiation of the NPDP. This includes infrastructure removal and a general project site physical clean. These activities will be finalized before the NPDP is commissioned and, as such all activities undertaken are not part of the NPDP scope of works. However, the project's environmental safeguards expert was involved in discussions with the NPA to ensure environmental best practices were included in the scope of works. Particular information was exchange associated with the removal and management of waste petrochemicals and asbestos roofing.

5.2 Environmental risk management framework

The environmental risk for the projects activities is based on international best practices. Annex 5 provides a detailed description of the processes undertaken to evaluate the risks associated with the activities of the NPDP and provides a risk assessment matric presenting the assessment results.

5.3 General impact assessment

The impact assessment is based on an Environmental Risk and Likely Impact approach ('ERLI'). This approach is used to justify the risk ratings assigned to each of the elements identified. For each potential pre-construction, construction and operational phase impact on the environment identified in this report, two key areas in the impact assessment process have been addressed:

1. **Environmental risk –** This essentially considers the risk of irreversible change to natural ecological processes and community interaction; and
2. **Likely impact –** This considers the likely impact of the proposal, as modified and undertaken in accordance with mitigation strategies (including any environmental management plan).

The significance of the impacts is placed in an appropriate context in which to justifiably determine the impact's significance. In particular, the duration of the impact (temporary versus permanent) and reversibility have been considered and the ability of natural systems (including population, communities and ecosystems) to accept or assimilate impacts is addressed. Mitigation strategies are listed for each aspect recording a risk level; these factors have been pre-determined by the REA.

5.4 Overview of the project's environmental risks

A total of 21 potential environmental risks were screened through the ERMF (Annex 5) for the NPDP. Three associated with the pre-construction (design) phase, fourteen (14) associated with the construction phase and four associated with the operational phase of the NPDP.

The Risk Management Framework (RMF) (Annex 5) identified that there are no identifiable significant environmental risks for the NPDP project scope of works; however a high level of risk was recorded for four construction phase activities. This includes two major scope of work activities for the terrestrial component of the project including; Site Contamination – Land Based Hazardous Material (specifically residue petrochemicals on site) and Site Contamination – Land Based Asbestos (roof sheeting) and two associated with the marine component of the project including; Site Construction – Marine Environment (physical disturbance of the intertidal reef flat for the proposed NPDP scope of works) and Flora and Fauna Removal – Marine Environment (associated with the scope of works).

The two terrestrial high level risks are included in the scope of works for the NPA site clearance and preparation for the NPDP and as such environmental impacts pertaining to these issues will be rectified before the NPDP is initiated. Nevertheless, these impacts are included herein as they existed during the IEE assessment and need to be considered during the delivery of the NPDA.

The two marine high level risks includes the expansive scope of works to be principally undertaken on the intertidal reef flat including the removal of the reef flat for the berthing pocket, the construction of the breakwater, wharf including the piles required to support the structure and the backfilled area between these structures and the foreshore. The scope of works for these activities is considerable with approximately 150,000m^3 of material to be removed from the intertidal reef flat to create the berth pocket and alteration to the reef flat to construct the breakwater and suspended wharf. These activities have a direct negative impact on the sessile benthic marine resources located in these areas, however due to the paucity of sessile flora and fauna these impacts to these resources in the wider area and biodiversity value are low, and as such not seen as significant.

The high level recorded for these activities when appropriate mitigation measures are implemented decreases the level of risk in all cases to low. Subsequently with the careful implementation of the recommended mitigation actions (detailed in the EMP) there are no significant environmental concerns for the project.

Of the other 10 construction phase risks assessed four recorded medium levels of risk, all of which are associated with elevated noise, dust and vibration levels during construction, and the potential waste materials and site contamination resulting from the scope of work and the remaining six recorded very low levels of environmental risk.

The four operational environmental risks assessed resulted in low levels of risk associated with the long term operational aspects of a commercial port including; noise and dust generation and general cleaning and maintenance of the Port facilities. All risks associated with the operational aspects of the port can be mitigated through due diligence and careful planning during the projects development cycle.

The main environmental risks as identified in the ERMF are associated with potential impacts to the shallow water marine environment, specifically the intertidal reef flat and associated marine resources. The proposed NPDP scope of works will physically impact the structural component of the coastal

foreshore, intertidal reef flat, the sub tidal reef edge and shallow water reef slope (down to a maximum depth of about 12 m) directly adjacent to and to the north of the existing boat harbor. The major primary physical impacts include (i) the removal of the reef flat to accommodate the new port berthing pocket (excavation of 165 m long, 50 m wide, and 10 m deep), (ii) the construction of a breakwater (170 m long and 10 m wide) directly north of the berthing pocket onto the intertidal reef flat using the dredged material from the berth pocket (iii) the construction of a wharf (30 m wide, 170 m long and 4m high) directly south of the berthing pocket to be constructed above water including supporting piles driven into the substrate and (iv) the backfill of material derived from the berth pocket to further secure the foreshore south of the wharf.

The impact of these activities on benthic sedentary and sessile marine flora and fauna in the construction zones will be high resulting in high mortality, whilst all mobile (free-swimming) marine organisms will have limited if any impact as they can move away. However, due to the paucity of marine life (the area of impact is almost exclusively devoid of hard coral colonies and other benthic organisms) associated with the project's construction areas the impact on marine life will be very low and impacts to the biodiversity of the nation negligible.

Secondary impacts resulting from suspended sediment and rubble resulting from the scope of works will have a minor impact on the marine coastal resources associated with the adjacent intertidal reef areas and subtidal upper and lower reef slope due to the oceanic conditions (waves and currents) associated with the NPDP site which daily remove suspended particles offshore quickly and rubble size particles either deposited onto the foreshore beaches and/or offshore through the subtidal shallow water habitats to deeper water. The preventive management measures outlined in the EMP to contain and remove coral rubble and finer sediments will further ensure the containment and removal of these construction by products reducing potential impacts to the living resources, especially the hard coral communities living in the deeper subtidal reef slope.

It is recommended that all work undertaken within the intertidal coastal marine environment should be undertaken during periods of low water where appropriate, allowing access to the area and subsequently reducing the distribution of potential sediment impacts on the neighboring environment. Major excavation and construction works are to be undertaken during the calmer and drier months of (April–October) the year.

Impacts to the terrestrial environment associated with the NPDP will be very insignificant as the environment existing at the site has already been highly modified and the presence of terrestrial flora and fauna extremely low. The decommissioning of the existing port infrastructural components and the disposal of existing asbestos roofing material, petrochemical and other harmful/toxic waste material currently existing at the NPDP will be completed by the NPA before the NPDP commences and as such greatly minimize potential environmental impacts of the project. Nevertheless due diligence is required to ensure if these substances are located during the NPDP they are managed through internationally accepted safeguard protocols as described below to ensure minimum further disturbance and contamination of the port's facility grounds.

There are no perceived issues pertaining to community or general public inconvenience or restrictions associated with the terrestrial scope of works as the NP area is fenced and is understood to be a no enter area for communities. Minor temporal and spatial interference to daily fishers (targeting both intertidal and offshore resources) utilizing the existing intertidal reef channel and harbor to access the reef and open water is expected during the construction phase; however, it is not expected to have any significant impact on their ability to access and acquire marine resources. Future consideration of port management procedures may in time restrict access to the port area for non-port related activities due to International Ship and Port Facility Security (ISPS) requirements.

Each risk identified through the ERMF is temporary and completely reversible over time. If UXO ordnances are located there is a very small but realistic potential impact to the environment if the UXO

ordnance needs to be detonated in situ, rather than being removed and disposed of in a safe and secure location. Procedures detailed in the projects pre-feasibility IEE have been adopted and included in the EMP to address and manage the potential impacts.

Nevertheless, for each potential risk identified due diligence, compliance to Nauru and international environmental codes and careful management of the pre-construction, construction and operational activities of contractors as outlined in the EMP need to be fully implemented to mitigate environmental impacts. A precautionary approach will need to be incorporated during all aspects of the NPDP, with special consideration to reduce and mitigate potential impacts associated with site erosion and sedimentation impacts on the marine and foreshore environments.

The potential environmental risks identified above and mitigation actions are detailed in the EMP. In addition, a summary of key potential construction and operational environmental issues and their likely impacts on biological, physical and socio-economic and physical cultural resources and specific mitigation measures were identified to ensure all such environmental impacts can be avoided or managed to reduce impacts to acceptable levels. These are documented in sections 5.5 and 5.6 below. These risks need to be carefully managed through GoN regulations and due diligence to ensure all activities associated with the construction and operational phases of the NPDP are managed. Thorough due diligence and compliance to GoN protocols and regulations will ensure these potential risks remain very low.

The potential environment risks and their mitigation measures identified in the ERMF and below (sections 5.5 and 5.6) have been provided as background information to support the specific details identified in the project's Environmental Management Plan (EMP) which is presented in Section 6.

5.5 Construction period

Biological – Ecological

5.5.1 Coastal intertidal marine habitat and resource protection

Impact

> Construction activities will cause considerable physical disturbance and alteration to the intertidal reef flat environment and associated marine resources directly north of the existing port. This will include (i) the removal of the intertidal reef flat base rock to develop the new berth basin (excavation 165 m long x 50 m wide x 10 m deep), (ii) the construction of a breakwater (170 m long and 10 m wide) directly north of the berthing pocket onto the intertidal reef flat using the dredged material from the berth pocket (iii) the construction of a wharf (30 m wide, 170 m long and 4m high) directly south of the berthing pocket to be constructed above water including supporting piles driven into the substrate and (iv) the backfill of material derived from the berth pocket to further secure the foreshore south of the wharf.

> All living marine resources associated with the construction area will be impacted resulting in mortality of all sessile flora and fauna resources directly within the excavation and construction areas (e.g. breakwater) of the project. However, impacts in terms of population's numbers and diversity are expected to be minor due to the paucity of resources residing in the projects area of influence and the very low biological, biodiversity and subsistence value of these resources to the nation.

> The coastal and shallow water marine project area of influence is almost devoid of hard coral colonies and as such impacts to the coral communities will be negligible.

> Mobile marine organisms (e.g. fin fish) will have minor impacts due to their ability to move away from the construction zone.

> Consideration for government (NFMA), port staff and/or community to walk the intertidal reef areas within the area of influence of the project and physically collect and remove the small population of sea cucumbers and relocate to reef systems to the north or south. This species (*H. atra*) is of very low commercial value however plays an important ecological role and as such the relocation would be beneficial. Natural populations would be expected to recruit naturally back into the project area once construction is completed.

> There are no sea grasses, mangroves or marine protected species or protected areas within or adjacent to the projects area of influence and as such no actions are required for these resources.

> Secondary impacts, although expected to be minor will result in physical disturbance of resources from suspended sediments and/or rubble derived from the excavation (trenching) activities. As such rubble and/or sediment resulting from these activities need to be contained and removed from the marine environment.

> However, very limited long term environmental impacts are expected as this environment has been highly modified due to port activities in the past and possesses very low biological diversity and resource stock populations. Hard coral colonies are all but absent in the proposed trenching and construction areas.

Mitigation Measures

> Due diligence when operating the machinery and general awareness of the environment is to be implemented.

> All shallow water mechanical equipment used to be coordinated and undertaken during low tide periods.

> Sediment traps and/or silt nets are to be positioned (mandatory) around the intertidal reef site work areas at all times with all material physically collected and removed from the marine environment and disposed of in a GoN terrestrial approval location/s. The disposal site must be at a minimum 100 meters from the foreshore.

> All excavated material not being used at the site (breakwater or backfill) to be collected and removed from the marine environment and disposed of in a GoN terrestrial approval location/s. The disposal site must be at a minimum 100 meters from the foreshore.

> Ensuring that all equipment used below the high water mark is in sound and well maintained condition, and free of any leaks of any fluid at all times. All efforts must be made to prevent petrochemical spills.

> Physical collection of sea cucumbers (*H. atra*) in the area of influence by hand by government (NFMA), port staff and/or community and relocate to suitable habitats to the north or south of the project area of influence. This is expected to be undertaken at low tide and would require one low tide period.

5.5.2 Terrestrial habitat and resource protection

Impact

> Construction activities will cause very minor physical disturbance and alteration to the land based terrestrial environment and associated resources associated with the existing port.

> Two trees will be removed (entangled into the buildings infrastructure).

> There are no nesting's birds within the site nor are there any terrestrial protected species or protected areas within or adjacent to the projects area of influence and as such no actions are required.

> Impacts are expected to be very low to the terrestrial environment as the NPDP site is an industrial zone.

Mitigation Measures

> Due diligence when operating the machinery and general awareness of the environment is to be implemented.

> Sediment traps are to be positioned (mandatory) around all work areas were potential sediment/rubble will be accumulated at all times. All excess material physically collected and removed from the site and disposed of in a GoN terrestrial approval location/s. The disposal site must be at a minimum 100 meters from the foreshore.

> All excavated material not being used at the site to be collected and removed from the marine environment and disposed of in a GoN terrestrial approval location/s. The disposal site must be at a minimum 100 meters from the foreshore.

Physical

5.5.3 Hazardous material and waste disposal – terrestrial and marine sites

Impact

> Use of hazardous substances during construction, such as oils and lubricants can cause significant impacts if uncontrolled or if waste is not disposed correctly.

> Legacy issues of ground contamination from petrochemical storage/spillage and asbestos roof sheeting can cause impacts. However the NPA is cleaning the site of these impacts before the NPDP commences, nevertheless potential legacy issues may remain.

> The contractor through the Contractor's Environmental Management Plan (CEMP) will articulate mitigation measures that will control access to and the use of hazardous substances such as oils and lubricants and control waste disposal.

Mitigation Measures

The contractor shall ensure implementation of such measures to include;

> Ensure that safe storage of fuel, other hazardous substances and bulk materials are agreed by DCIE and follow internationally recognized good practice;

> Hydrocarbon and toxic material will be stored in adequately protected site/s consistent with national and local regulations and codes of practice to prevent soil and water contamination;

> Asbestos roofing (if still present at the site) to be stored in shipping containers and managed according to national protocols and codes of practices to prevent exposure to staff.

> Segregate hazardous wastes (oily wastes, used batteries, fuel drums, asbestos sheeting and ensure that storage, transport and disposal shall not cause pollution and shall be undertaken consistent with national regulations and code of practice;

> Ensure all storage containers are in good condition with proper labeling;

> Regularly check containers for leakage and undertake necessary repair or replacement;

> Store hazardous materials above possible flood level and 100m from the foreshore;

> Discharge of oil contaminated water shall be prohibited;

> Used oil and other toxic and hazardous materials shall be disposed of off-site at a facility authorized by the DCIE;

> Adequate precautions will be taken to prevent oil/lubricant/hydrocarbon contamination of drainage channel beds;

> Spill clean-up materials will be made available before works commence (e.g., absorbent pads, etc.) specifically designed for petroleum products and other hazardous substances where such materials are being stored;

> Spillage, if any, will be immediately cleared with utmost caution to leave no traces;

> All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all the applicable statutory stipulations;

> Develop a Material and Spoil Management Plan (MSMP), approved and implemented in accordance with the above recommendations; and

> The environmental impacts associated with hazardous waste management are expected to be negligible.

5.5.4 Construction material and spoil waste management – terrestrial and marine sites

Impact

> Moderate amounts of limestone aggregates, sand and cement and other equipment and materials will be required for the upgrade and replacement the port land based construction activities.

> Significant amounts of limestone aggregates, sand and cement and other equipment and materials will be required for the construction of the marine intertidal port facilities upgrade.

> It is envisaged that a dedicated borrow pit /quarry will not be required for the NPDP. The majority of limestone aggregates required by the project will be sourced principally from excavation activities within the project site, (e.g. intertidal trench required for the berth pocket) or sourced from the ‘topside’ mining activities.

> Materials sources will be identified by the contractor and will be detailed in Materials & Spoil Management Plan (MSMP) as part of the CEMP. Key issues required to develop these management plans for the NPDP are highlighted below.

> The contractor will be required to prepare and implement a MSMP to minimize the use of non-renewable resources and provide for safe disposal of excess spoil. As a first priority, where surplus materials arise from the removal of the existing surfaces these will be used elsewhere on the project for fill (if suitable) before additional rock, gravel or sand extraction is considered. The MSMP will include as a minimum consideration of the following:

> Required materials, potential sources and estimated quantities available;

> Impacts related to identified sources and availability;

> Excavated material for reuse and recycling methods to be employed;

> Excess spoil to be disposed of and methods proposed for disposal endorsement/Permit from DCIE for the disposal of excess spoil; and

> Methods of transportation to minimize interference with normal traffic.

Moreover the contractor will be responsible for;

> Identifying suitable sources and obtaining all agreements associated with the sources;

> Fill requirements to minimize need for aggregates from other sources;

> Managing topsoil, overburden, and low quality materials so they are properly removed, stockpiled short term near the site (covered to prevent runoff and dust), and preserved for reuse; and,

> Arranging for the safe disposal of any excess spoil including provision for stabilization, erosion control, drainage and re-vegetation provisions at the disposal site, if required.

Mitigation Measures

> Contractor to prepare MSMP as part of CEMP;

> Construction materials, such as sand and aggregate needed for concrete should come from existing quarries, in compliance with government regulations;

> All waste material collected by sediment traps or silt nets removed daily/weekly to prevent dispersion – especially important for intertidal marine scope of works.

> All excess spoil and construction waste material not to be dumped;

  - On wetlands, forest areas, coastal and other ecologically sensitive areas;
  - On private property without written consent of the owner;
  - Into any water course and should not contaminate any water course;

> The vehicles used should be fitted with spill proof equipment;

> There should be direction boards that are easy to read and accessible to all construction staff providing the route to be used to the disposal site; conformity using this route needs to be ensured.

> All workers at the disposal yard should be provided with;

> Safety attire (Personal Protective Equipment – PPE);

> Proper training and knowledge associated with health hazards associated with the work.

> Effective implementation of the MSMP by the contractor as outlined above will ensure that potential environmental impacts associated with the management and disposal of construction materials will be negligible.

5.5.5 Noise and vibration – terrestrial and marine sites

Impact

> Temporary impacts in the immediate vicinity of the port due to noise generated from machinery used during the construction phase of project. These activities will be superimposed on existing machinery and vehicular noise associated with the normal operations of a commercial working port facility. Noise levels in this area will increase due to the activities of the project and are expected to range between 80 to 90 dB (A). The magnitude of impacts will depend upon specific types of equipment to be used, the technical construction methods employed and the scheduling of the work.

> The largest noise impact will be generated from the operations of construction machine and equipment on site and to a lesser degree resulting from traffic transporting materials and equipment to the site. This will be temporary and sporadic over the construction period.

> Implementation of good practice construction methods such as using well maintained powered mechanical equipment equipped with silencers would ensure impacts are minimized and acceptable.

> Construction operations associated with the intertidal reef flat where possible will be restricted to periods of low tide to allow access and as such some operational activities will need to be scheduled outside normal working hours (7am – 6pm). The scope of works is limited to the NPDP and will have limited impacts on the communities surrounding the port especially to the north in 'Location'.

Mitigation Measures

> Machinery and vehicles will be maintained regularly, with particular attention to silencers and mufflers, to keep construction noise levels to minimum;

> Protective devices (ear plugs or ear muffs) will be provided to the workers operating in the vicinity of high noise generating machines;

> Advance notification to neighboring residence and businesses (including signage) announcing work activities, especially when work is being undertaken outside normal working hours.

5.5.6 Air Quality – terrestrial and marine sites

Impact

> Air quality conditions within the NPDP site during all construction activities are expected to be temporally reduced through increased dust production resulting from mechanical movements and work activities. The existing terrestrial site, especially internal and roads entering the NP are not sealed and generate considerable dust during vehicle usage.

> Impacts will be sporadic, short lived and subject to the existing weather conditions prevailing at the time of machine usage. Increased dust resulting from the construction activities will be minor compared to the dust generated during phosphate production activities and vessel loadings.

> The implementation of best practices, mitigation and management measures will greatly reduce potential impacts. Dust breathing facemasks are to be used by all staff working in high dust areas.

Mitigation Measures

> Reduce the speed of all vehicles entering and working within the Port to reduce potential dust;

> Speed limit signboards to be erected and fixed within the NPDP site.

> The material/machinery carrying trucks should be covered with a tarpaulin so that any material will not be spilled while transporting to the project site from the construction yard.

> Facility for regular cleaning and wetting of access areas for machinery within the NPDP site should be provided to limit the dust emission where required and practical.

> Regularly cleaning (washing) of construction vehicles in a dedicated location to reduce dust on site.

> All machinery, equipment and all vehicles used should be well maintained and emission level should be kept low.

> All terrestrial construction debris covered and if not reused within the NPDP will be removed to a dedicated waste disposal sites.

> All intertidal shallow water marine construction debris removed from the coastal environment and either stored on land and covered (see above) for later use or removed from the site.

5.5.7 Water quality – terrestrial and marine sites

Impact

> During the construction phase of the project there is the potential, if not correctly managed, for localized and short-term terrestrial water contamination resulting from runoff during high rainfall events including suspended sediments, plastics and construction contaminants entering the surrounding environment and specifically the inshore coastal marine areas. Access is through the existing waste water drainage pipe systems were working and across the land surface. There is also the potential of hazardous chemicals (e.g. petrochemicals) resulting from the construction activities being involved.

> Construction activities that may result in degrading the water quality include;

- Clearance of the project site and temporary stockpiling of excavated materials;
- Excavation and resurfacing works associated with the:
- Road and carriageways associated with the port;
- Drainage systems; and
- Foreshore redevelopment.
- Spoil disposal from excavation works.

> Implementation of good practice construction methods will ensure impacts are minimized and acceptable.

Mitigation Measures

> A range of proven mitigation measures associated with good construction practice will be implemented during the NPDP to avoid or minimize sedimentation impacts in the project area. As a minimum these mitigation measures will include:

- Minimizing the vegetation clearance where possible;
- Cover/stabilize all exposed surfaces and excavated materials during construction;
- Implementing effective construction site drainage such that runoff is directed to sediment traps before discharge to the environment and/or into the coastal marine ecosystem;
- All waste water should not be directed nor spilled onto the coastal foreshore strip;
- Close construction supervision to ensure the above measures are implemented; and
- Provisions of stop work during periods of heavy rainfall.

> Effective implementation of the above mitigation measures will ensure that the potential short term impacts on water quality resulting from the construction phase of the Project will be of reduced and managed.

5.5.8 WWII ordnance – terrestrial and marine sites

Impact

> UXO assessment is to be undertaken both on land and intertidal reef areas that require excavation of the substrate before any construction activity is to commence, as detailed in the pre-construction UXO site assessment.

> Minimal, if any impact to the environment during assessment survey; however potential impact if UXO located through removal (e.g. ground disturbance).

> All work to conform to the GoN existing Ordnances guidelines in conjunction with the standards required for mine clearance, issued by the Mine Clearance Policy Unit, Department of Humanitarian Affairs, United Nations, New York.

> Implementation and adherence to international standards of marine shallow water ordnance survey including suitable safety stations.

> Implementation of international standards on safety procedures if an UXO located, management and disposal.

Mitigation Measures

> An Explosive Ordnance Disposal (EOD) expert will be contracted to undertake the assessments as required utilizing a range of equipment to ensure all sites are clear of UXO. The expert will provide the clearance for work to proceed,

> The UXO EOD will use the findings, guidelines and protocols developed through the pre-construction PDA UXO assessment of the NPDP site.

> If UXO is located, contractor in conjunction with the GoN will be responsible for the direct disarming/defusing, transport and final placement operations and have sole responsibility to declare areas site safe.

> Additional local staff engaged to assist contractor in the detection and clearance of UXO shall receive formal and recognized training and be provided with suitable Personnel Protective Equipment (PPE).

> Where collateral property damage is likely to occur as a result of disposal activity, the Contractor will advise the NPA and PAD.

> Provision for medical treatment and emergency evacuation will be provided, to be detailed in a site safety plan as required by the EMP, with the addition of special provisions for eye and face protection (confirming to US NIJ 01012.03 standards) and protective jackets (conforming to US NIJ 0101.03 standards).

> The Contractor will use nominated search instruments, either models deemed acceptable following trails by the UN or alternatives, for which suitable documentation will be submitted for consideration of effectiveness and suitability to Nauru conditions shall be confirmed.

> Clearance work will proceed according to a detailed method statement setting out procedures for clearance, work plans, structure of the clearance team, type of equipment and quality control provisions. The method statement will cover disarming, transport and final disposal of the ordnance, will allocate responsibility for decision making for these operations, and will be cleared by the NPA, PAD and GoN National Emergency Service Department.

> Items of ordnance detected shall be removed from the site and transported to a dedicated bunker to be identified by the contractor in discussions and agreement with the GoN.

> Public safety guidelines for UXO transportation strictly adhered to including Police assistance with roadblocks and GoN community safety protocols implemented.

> All non UXO staff are to remain at a safe distance (to be determined by the NPA in consultation with the contractors) during the survey.

Social – Economic

5.5.9 Occupational health and safety

Impact

> A Health and Safety Plan (HSP) as part of the CEMP is required to be developed by the contractor/s to establish (i) routine safety measures and reduce risk of accidents during the construction; (ii) include emergency response and preparedness; and (iii) accidental environmental instance (e.g. spill) procedures highlighting the sizes and types of impacts that may occur, and the resources (onsite and/or offsite) that will be required to handle and treat the spill.

> The HSP will cover both occupational health and safety (OH&S) (workers) and community health and safety. The HSP will be appropriate to the nature and scope of activities and as much as reasonably possible meet the requirements of good engineering practice and national regulations.

> The HSP will include agreement on consultation requirements (workers), establishment and monitoring of acceptable practices to protect safety, links to the complaints management system for duration of the works (in accordance to the Grievance Redress Mechanism – GRM) and system for reporting of accidents and incidents. The NPA will ensure these actions are enforced.

Mitigation Measures

> Before construction commences the contractor/s will conduct training for all workers on environmental safety and environmental hygiene. The contractor will instruct workers in health and safety matters as required by good engineering practice and national regulations;

> Ensure an adequate spill response kits are provided, accessible and that designated key staff are trained in their use;

> Ensure that first aid, including the provision of trained personnel, is available on site and arrangements in place to ensure the removal for medical attention of workers who have suffered an accident or sudden illness at the construction site;

> The manner in which first aid facilities and personnel are to be provided should be prescribed by national laws or regulations, and drawn up after consulting the competent health authority and representative organizations of employers and workers concerned;

> Regular meetings will be conducted to maintain awareness levels of health and safety issues and requirements;

> Legal working hours and official holidays to be respected;

> Nauru minimum wage requirements to be observed, if local staff are required for the assessments;

> Workers shall be provided (before they start work) with appropriate Personnel Protective Equipment (PPE) suitable for civil work such as safety boots, helmets, gloves, protective clothes, goggles, and ear protection at no cost to the workers. Instructions on their use around the construction site will be delivered as part of the safety introduction procedures and site agents/foremen will follow up to see that the safety equipment is used and not sold on;

> The NPA site office and works yard will be equipped with first aid facilities including first aid kits in construction vehicles;

> Provision of potable water supply at the work site;

> Child labor will be strictly prohibited for all activities supported by this project;

> There should be proper enforcement of the labor laws at the work place;

> All signboards should be in Nauruan and repeated in English;

> All measures related to workers' safety and health protection should be free of charge to workers. The worker OH&S plan is to be submitted by the contractor before construction commences and should include public safety and approved by NPA and PAD.

> Consideration for 'no go areas' within the NPA grounds during the assessments and erect boundary fences to prevent the public from entering the NPA during assessments (including after-hours access to the reef flat).

5.5.10 Construction site workforce

Impacts

> The workforce is expected to be small and it is unlikely that there will be need for accommodation at the site. However, a site storage/maintenance area is likely to be established for the duration of the construction period.

> Workers' access to portable toilets and associated sanitation facilities will be provided at the Ports site.

> The contractor will be required to adopt good management practices to ensure that both physical impacts and social impacts associated with a storage/maintenance area are minimized. All fuels, wastewater effluent, and construction debris associated with the construction storage/maintenance area are disposed of appropriately. Social impacts have not been identified as an issue with the project; however measures need to be in place to address potential conflict issues between (i) workers, (ii) workers and the contractor and (iii) the contractor and workers with the general public. The port is located within an area that has high density housing to the north and therefore interaction between the general public and contractor/workers is expected to be medium to high. Public understanding and support are required to ensure the success of the project.

Mitigation Measures

> The contractor will erect notice boards regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions;

> The facilities (storage and maintenance) will be fenced and sign-posted and unauthorized access or entry by general public will be prohibited;

> All notice board to be written in English and Nauruan;

> For unskilled activities and labor, every effort to hire local people (including women) for these positions should be a priority:

> Accidental damage to utilities will be minimized by (i) obtaining plans from the Public Utilities identifying locations of pipelines, conduits and power cables and (ii) consultation with staff on the location of utilities prior to commencing excavation operations.

5.5.11 Coastal resource users access – terrestrial and marine sites

Impacts

> Access to all terrestrial sites and projects area of influence to be restricted to only authorized personal (NPA staff, construction staff and associated project staff) for the duration of the project.

> Access to all marine sites, especially the intertidal reef flat and directly adjoining shallow water reef slope areas adjacent to the port and within the greater area of influence to be restricted to only authorized personal (NPA staff, construction staff and associated project staff) for the duration of the project.

> Exclusion areas need to be developed and fully understood by all local canoe fishers prohibiting access within the projects terrestrial and shallow water intertidal areas during construction period. Alternative canoe landing exit and entry points need to be arranged outside of the projects area of influence.

> Physical barriers, information signage and public awareness and information exchange required on all land boundaries of the project to inform public of restricted access areas. Exclusion areas for intertidal marine areas will require mobile signage and safety personal to ensure compliance to restricted areas.

> Intertidal reef gleaning and fishing (pole and line) from shore needs to be prohibited within the projects area of influence during the construction phase.

> Offshore reef fishing, specifically canoe bottom hand line fishing directly opposite the projects area of influence should be prohibited during construction.

> Water sports e.g. snorkeling and/or scuba should be prohibited in all areas associated with the projects area of influence.

Mitigation Measures

> The deployment of physical barriers and information signage required on all boundaries of the project site to ensure community and public awareness of the restricted access areas.

> Community and public awareness (community workshops, leaflets etc.) and education is required to ensure understanding of the project and compliance to the projects scope of works.

5.6 Operational period

Biological – Ecological

5.6.1 Coastal intertidal marine habitats and resources

Impacts

> Continued negative impacts on the shallow water resources associated with the area of influence of the port expansion including; (i) increased population coverage of marine macroalgae due to disturbance of the reef system during construction and the potential continued release of land based nutrients, (ii) increase presence of cyanobacteria associated with the sediments trapped within the port area producing anoxic environment (sulphur), (iii) potential colonization of marine invasive species resulting from suitable habitats provided by the port developed (alien species derived from the vessel entering the port) (iv) habitat alteration that prevents natural resources recolonizing the affected area.

> Physical damage to the reef and resources due to vessel collision with the reef.

Mitigation Measures

> Ensure compliance to the EMP during the construction period will ensure reduction of the above potential impacts.

> Undertake periodic inspections of the port facilities for invasive species and instigate a proactive management and eradication program

> Continue to implement the ports operational waste management plan to reduce pollution entering the marine environment.

> Provision of suitable mooring systems, pilot guidance and information awareness to all vessel captains and crew entering the port berthing channel and processes in place to manage situations as they arise.

5.6.2 Terrestrial habitats and resources

Impacts

> Continued negative impacts on the terrestrial resources associated with the area of influence of the port expansion reducing the abundance of natural vegetation and subsequent habitat for nesting sea birds and sediment management during rain all events. These issues have been associated with the port for many years.

Mitigation Measures

> The restoration and replanting of trees and other vegetation where appropriate to increase the aesthetic of the port facility but also provide habitat shelter for terrestrial flora and fauna.

Physical

5.6.3 Increase pollution (marine and terrestrial)

Impact

> Pollution derived from port activities, machinery usage, port spillage (especially petrochemicals) and port waste not managed resulting in entry into the terrestrial and shallow water marine environment resulting in contamination of the environment and negative impacts on the resources.

> Pollution derived from visiting vessel discharging directly into the marine environment, whether purposely or accidentally entering the marine and coastal environment resulting in the contamination of the environment and negative impacting the resources.

Mitigation Measures

> Continue implementation of waste management plan.

> All facilities associated with the port (terrestrial and shallow water marine) inspected cleared and cleaned.

> All drainage system inspected, cleared of any debris and cleaned.

> Siltation, pollution and oil traps regularly inspected and cleaned, with all waste material removed, separated and deposited at a certified waste reception location.

> No waste should be dumped within the NPDP site nor close to the coastal line.

> All wastes to be stored and removed from the site periodically to designated waste reception areas.

> All maintenance material stored in a secured regulated area with covering to prevent sediment discharge during period of rainfall and dust during windy conditions.

> Ensure protocols are in place to address hazardous chemical spill (e.g. petrol spillage form refueling activities) and staff are suitable trained with correct equipment.

> All maintenance work conducted according to pre-announced time schedule in consultation with key stakeholders, preferable outside peak business hours to limit inconvenience to business and community.

5.6.4 Increased noise and dust emission pollution

Impact

> Dust resulting from vehicle movement within and adjacent to the Port and noise resulting from machinery operating within the port is expected to be increased due to the increased in port activities and operation of new equipment.

> All noise impacts restricted within port site whilst dust may impact areas directly adjacent to the port.

> Impacts to the communities and public very low.

Mitigation Measures

> Continue implementation of port operational management plan, including provision of (i) awareness to all staff on noise and dust management and prevention, (ii) PPE supplied to all staff, especially noise reducing equipment (iii) wetting of roads and port surfaces during period of high dust production to reduce suspension (iii) ensure maintenance programs for all vehicles and machinery are undertaken ensure noise reducing requirements are regular maintained.

Social – Economic

5.6.5 Community perception

Impacts

> Perceived negative impacts of the community relating to the (i) marine environment (inshore and offshore) and subsequent resource abundance and diversity and (ii) terrestrial environment as a result of the port project.

Mitigation Measures

> Provide continued awareness and information exchange with the public on all aspects of the port and ensure all management activities undertaken to preserve and enhance the marine and terrestrial environment and resources are fully disclosed and acknowledge by the community.

5.7 Cumulative impacts and mitigation measures

5.7.1 Environment

In summary, the IEE concludes that there are no identifiable significant environmental impacts nor is the project deemed environmentally sensitive. The NPDP scope of works has a low environmental footprint and is an extension of an existing port and harbor complex. When completed the project will result in an improved environment associated with the port and a marked improvement in the efficiencies and delivery of port services in Nauru port.

Although the NPDP area of coastal disturbance includes the removal of additional intertidal reef platform and the acquisition and extension of the reef flat for additional port activities, the overall foot print of the project in terms of loss of intertidal reef flat available for natural uses remains very small and as such these is no foreseeable irreversible or irretrievable cumulative environmental impacts due to the project. The implementation of the mitigation measures defined in the EMP will ensure all potential impacts are managed resulting in reduced impacts.

5.7.2 Social economic

Through the NPDP social safeguard screening assessment process it was found that there is no expected risk of landlessness, loss of home, and/or loss of major income source as a result of the project. In addition there are no expected negative impacts on social structures or communities nor will there be any adverse impacts on cultural identities or heritage issues for business and community individuals. The project will not require acquisition of private or customary owned land however leases will need to be drawn up with customary owners and as such these is no foreseeable irreversible or irretrievable cumulative social impacts due to the project.

However, it was identified that public awareness, understanding and information exchange associated with the project are required to ensure community support and compliance. The NPDP social safeguard assessments, including Indigenous People (IP) and Involuntary Resettlement (IR) issues have been documented in the NPDP Social and Poverty Assessment Report (February 2017). This report should be referred to for additional background information if required. The ADB IEE requirements of Indigenous People (IP) and Involuntary Resettlement (IR) issues associated with the project component are extremely low and require no additional investigation or reporting.

6 Environmental Management Plan

6.1 Introduction

An Environmental Management Plan (EMP) addresses the environmental impacts during the design, construction and operational phases of a project. It outlines the key environmental management and safeguards that will be initiated by the project proponent to manage the project's key environmental impacts. They provide tools for mitigating or offsetting the potential adverse environmental impacts resulting from various activities of the project and management measures that are to be applied during the project's implementation to avoid, reduce and mitigate adverse environmental impacts.

The general purpose of the EMP is to:

> encourage good management practices through planning and commitment to environmental safeguarding and management;

> provide rational and practical environmental and social guidelines that will assist in minimizing the potential environmental impact of activities;

> help in minimizing disturbance to the environment (physical, biological and ecological, socioeconomic, cultural, and archaeological);

> combat all forms of pollution through monitoring air, noise, land, water, waste and natural resources;

> prevent land degradation;

> comply and adhere to all applicable laws, regulations, standards and guidelines of GoN and the ADB safeguard policy for the protection of the environment;

> adopt best practicable waste management for all types of waste (liquid and solid), including asbestos during decommissioning of buildings, with the objective to prevention, minimization, recycling, treatment or disposal of wastes;

> describe all monitoring procedures required to identify impacts on the environment and social aspects;

> train and bring awareness to employees and contractors with regard to environmental obligations and compliance; and

> reduce environmental and social risk and provide better Health, Safety and Environment (HS&E).

The EMP for the NPDP includes impacts directly related to the (i) pre-construction (design), (ii) construction and (iii) operational phases of the project and has been presented in two cross referenced tables, defining impacts and mitigative measures needed to prevent or reduce effects (the Environmental Mitigation Table or EMiT – Section 6.2) and monitoring actions to track compliance and effectiveness of the mitigative measure (the Environmental Monitoring Table or EMoT – Section 6.3). The EMP also includes location, time and responsibility information, permitting follow up investigators to track all work undertaken.

The proposed EMP for the NPDP is based on documented and verbal information provided to the consultant. It has been developed to outline the measures that are to be implemented in order to minimize adverse environmental impacts and serves as a guide for the contractor and the workforce on their roles and responsibilities concerning environmental management on site and outlines the potential environmental impacts and their mitigation measures, roles and responsibilities and timescales.

It is fully acknowledged that as part of the PDA a pre-construction IEE was prepared to guide the environmental monitoring of a number of specific site assessments for the development of the Feasibility Study (FS). This included assessments for the presence of Unexploded Ordinances (UXO), Geotechnical, Topographical and Bathymetric information required to provide empirical evidence to assist with the design of the project. Each specific assessment has been completed before the drafting of this IEE and as such the outcome and findings have been included in the IEE where relevant.

Therefore, the only pre-construction requirements to be brought forward into this document relate to requirements on the IA/PMU and contractor in respect of EMP updating and incorporation into bid documents, obtaining government approvals and clearances, and preparation and review of the CEMP and induction to the site. Any background information required on the pre-construction phase should refer to the Pre-Construction IEE.

Similarly, the NPA, at the writing of this report has commissioned a contractor to prepare the Nauru Port site for the initiation of the NPDP. This includes infrastructure removal and a general project site physical clean. These activities will be finalized before the NPDP is commissioned and, as such all activities undertaken are not part of the NPDP scope of works and subsequently not included in the EMP. These activities include the removal of the ports asbestos roof sheeting and used petrochemical products.

The NPDP EMP is to be used throughout the project's life cycle–commissioning, mobilization, construction, operation and maintenance and is to be regularly updated and amended when required, to ensure alignment with progress.

Environmental protection and mitigation measures will i) mitigate environmental impacts, ii) achieve compliance with national environmental policies/guidelines and ADB safeguard standards, iii) provide compensation or offsets for lost environmental resources, and iv) when possible enhance environmental resources.

The EMP complies with the ADB's requirements as specified in SPS 2009. The EMP includes the following information:

> Implementation arrangements for the EMP including:
  - Institutional roles and responsibilities for EMP implementation throughout all stages of the project (pre-construction, construction and operation);
  - Capacity building requirements for executing agency to ensure Nauruan and ADB's environmental management requirements are properly understood and fully implemented; and

  - Grievance Redress Mechanism (GRM).

> Environmental mitigation and monitoring matrices including:

  - Potential environmental impacts that could occur during each stage of the project (principally construction and operation);
  - Proposed mitigation measures to address each impact identified;
  - Agency responsible for implementing each mitigation measure;
  - Monitoring tasks to ensure mitigation measures have been implemented effectively during each stage of the project; and
  - Schedule and responsibility for monitoring.

The PAD is the Executing Agency (EA) for the NPDP, and the project's Implementing Agency (IA) will be the Nauru Port Authority (NPA), which will report to a board and to the Ministry of Transport (MoT). The Division of the Environment (DCIE) under the Ministry of Commerce, Industry and Environment (MCIE) will be the lead agency for ensuring environmental compliance to the nation's legislation and issuance of development consent for project development. These agencies together will be responsible for ensuring the implementation of the day-to-day EMP. This includes ensuring that all GoN and ADB requirements and procedures relating to environmental safeguards are maintained.

A contractor/s will be engaged to undertake the proposed NPDP construction activities based on the project's detailed and approved plans. The projects contractor/s will be hired through a competitive tendering process that meets GoN requirements and procedures. The contractor will be responsible for ensuring that all design and construction environmental mitigation requirements specified are properly implemented during construction. The contractor will be required to describe the contractor's construction methodology, measures and plans for implementing the EMP and as such must prepare a CEMP for the NPDP construction site. The contractor will need to incorporate and adopt the following principles:

> compliance with the conditions of any approvals;

> compliance with environmental legislation;

> maintain a site diary and grievance registry;

> manage environmental risks associated with the project;

> maintain a healthy safe work practices for the workers, nearby commercial operators, residents and the general public;

> identify, control and where possible minimize the adverse environmental impacts arising from the works;

> prevent pollution, minimize waste and improve resource use efficiency; and

> communicate openly with the government and the stakeholders regarding the environmental performance.

The CEMP shall be reviewed by the PAD and recommended for approval by the NPA prior to the contractor's mobilization to the site. The contractor will be required to report on the implementation status of the EMP to PAD or its designator agency. The contractor's environmental requirements for the projects scope of works are detailed in the projects EMP with additional background information provided in the Risk Management Framework Table (Annex 5) and Sections 5.4 – 5.6 of this report. The information detailed in these section needs to be considered and incorporated into the CEMP.

The EMP prepared as part of this IEE includes nine preconstruction, 21 construction and six operational phase mitigative and monitoring actions respectively.

Reporting will be completed regularly during the different phases of the project and should include monthly reports from the contractor to the PAD and NPA, as detailed in the EMP.

The most important action required during the pre-construction phase will be the distribution of the environmental documentation, including the Environment and Mitigation Plans to all stakeholders including the successful contractor(s), acquisition of all permits and consent requirements, the completion of a pre-construction briefing/workshop for the relevant government agencies, the contractor and relevant key business and community stakeholders. During the construction period, environmentally responsible construction practises, management of all wastes and proper disposal will be required and will be enforced. Due diligence and consideration of neighboring business operators, their customers, residence and general community need to guide construction activities to reduce inconveniences as best as possible. The development and implementation of a long-term maintenance program (including the allocation of suitable funds) is required to ensure the port continues to successfully operate.

Consideration of capacity building and institutional strengthening of DCIE and it agencies staff in all aspects associated with environmental planning, management and monitoring should be considered under the NPDP project. Assistance in the form of professional advice on all aspects associated with environmental assessments and EMP development and implementation will assist the GoN to further delivery its supervisory, management and monitoring responsibilities. This assistance can be provided in the form of multiply short term in country professional services over the construction period of the project to be provided by a qualified environmental safeguard specialists (with tropical coral reef marine expertise) funded through the NPDP.

6.2 Grievance redress mechanism

A Grievance Redress Mechanism (GRM) is to be established to receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievances about the environmental and social performance of the Project. The GRM is based on accepted practises in Nauru including previous experience on ADB projects and provides an accessible, time-bound and transparent mechanism for the affected persons to voice and resolve social and environmental concerns linked to the Project.

The GRM has been developed as a step-by-step procedure to receive, register and track all grievances concerning the environment and includes the following principals to ensure the successful GRM implementation. These include:

> Mechanisms and procedures that provide for two-way communication.

> Culturally and gender appropriate communication and consultation mechanisms.

> Existing communication methods will be used where they meet the individual communication needs.

> The contracts for the construction activities will include Contractor obligations for communicating with project communities and stakeholders through a permanent CLO.

> Complaints handling procedures established to provide a process for dissatisfied complainants to take their complaints to a higher level.

> Communication and consultation will be treated as a routine procedure.

> Communication procedures will be refined as necessary throughout the life of the NPDP.

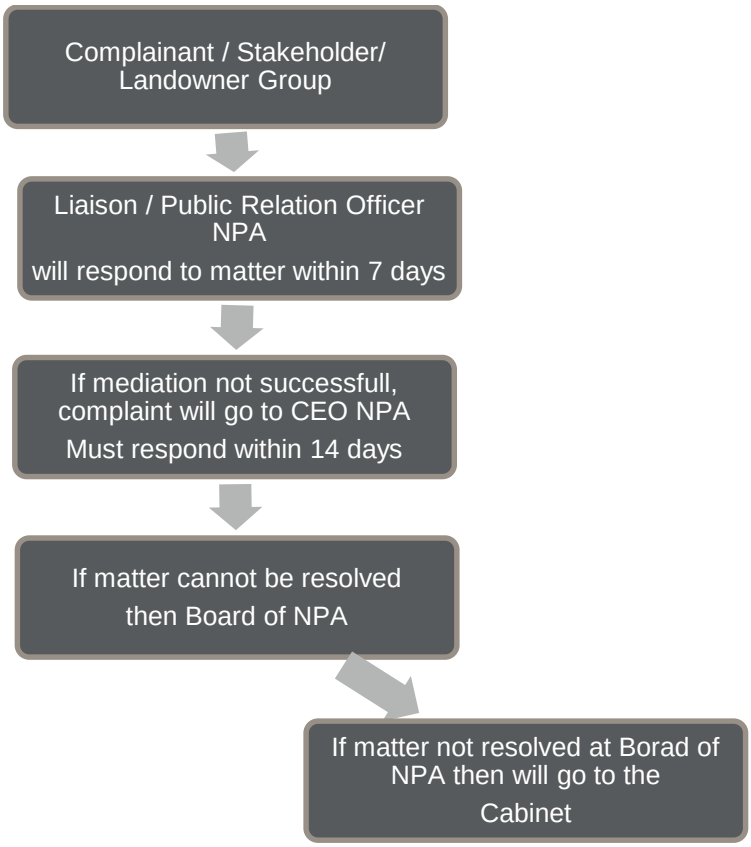
The NPDP GRM will be establish by the NPA to receive and address, in coordination with the government authorities, project related concerns and to resolve principally land and project related disputes that may arise during project implementation. The Executing Agency (EA) will inform Affected Persons (AP) about how they have access to the GRM. Other than disputes relating to land ownership rights, it is anticipated that all grievances related to benefits and other assistance will be resolved at the project level.

A Liaison/Public Relation Officer (PLO), who is tasked with the responsibly to address stakeholders' issues and complaints is required to be employed (PAD or NPA). If the CLO is unable to address the issue then the issues has to refer to the appropriate government to be solved.

It is recommended that APs to form a committee related to the implementation of the project. A complainant can lodge a project-related issue through the elected committee and executive members or directly to the Liaison Officer. The complaint will then be addressed by the NPA Public Liaison Officer, who then must respond to it by direct contact or in writing within 7 days. Depending on the nature of the complaint the officer will resolve it by consultation or pass it on to the NPA CEO's office. All related land issues or grievances are to be dealt through the CEO's office of NPA and/or through the government and other legal systems.

The NPA CEO has to respond to the complainant within 14 days, if the matter cannot be solved, then it will go up to the Board of Management, the last step then is the Cabinet (or Court). The GRM process is graphically depicted below.

Figure 40 Complaints mechanism



The NPDP site is located on leased public land and has been an industrial area under the management of the NPA for many year, as such, it is expected that there will be few if any grievance issues raised during the project's construction and/or operational phases.

Environmental reporting and monitoring requirements are specified in the EMP. The monitoring time frame will require either daily or weekly assessments during the construction phase especially during key activities associated with the intertidal reef excavation work and resulting construction of the breakwater, wharf and stabilization and backfilling of the coastal foreshore. Monitoring results will be used to evaluate the extent and severity of actual environmental impacts against the predicted impacts and the performance of the environmental protection measures or compliance with regulations.

Monitoring program. The Project monitoring program will focus on the environment within the NPDP area of influence. The program considers the scope of monitoring and frequency.

Monitoring parameters. The monitoring program will focus on parameters, which can be monitored visually by appropriate local specialists and equipment. Outside specialist inputs will be required to ensure environmental compliance to the EMP is attained.

Management. During construction, the PAD or if developed a Project Management Unit (PMU), will make appropriate arrangements for monitoring according to the progress of implementation. Monitoring reports will be made available to the PAD and/or PMU as required, on a monthly basis during construction. When complaints are received from the public (either directly or via the formal grievance redress mechanism), monitoring staff will conduct additional inspections immediately.

Monitoring costs. The costs involved in managing the environmental mitigation and monitoring of the projects scope of work during construction will be funded from the construction budget whilst ongoing monitoring costs will be covered by their operational budget. These costs will need to include an environmental safeguards specialist (specializing in marine tropical reef systems) to be engaged to oversee the monitoring and reporting duties. It is unlikely this individual will be available in country and as such will need to be recruited regionally and/or internationally. Estimated cost would be around US$150,000 for the duration of the construction phase of the project, which would include a part time salary, air fares and associated travel costs. This position would be responsible for the development of the projects reporting templates and monthly environmental reports. It would be expected that the position would need to be at the site for an extended period of time initially (3-4 weeks) at the start of construction and then at a minimum one week in every 4-5. The individual should work closely with staff of the DCIE and undertake a mentoring role.

Reporting. The construction contractor will prepare monthly reports that will include a description of CEMP implementation, any non-compliances or corrective actions required. The environmental monitoring reports are to be prepared jointly by staff at DCIE and by the independent environmental specialist and non-compliance issues need to be discussed with the contractor and PAD to seek amendments to gain compliance. These reports will be submitted to PAD and/or PMU. The PAD will prepare Quarterly Project Reports that will cover safeguards aspects, including summary of contractor's monthly reports and CEMP compliance monitoring undertaken by PAD.

6.3 Environmental management plan mitigation

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
Pre- Construction Phase					
1.1 Development Consent and Permit Acquisition	▪ Consult PAD and DCIE, submit IEE and make development consent application under statutory process. ▪ Ensure approved EMP and any conditions of development consent are included in contractor's contract documents including: – requirement for Contractor to seek approval and update EMP if significant changes are made to original design, – requirement for Contractor to prepare a CEMP (based on EMP) for approval before commencement of construction phase. The CEMP will demonstrate the manner (location, responsibilities, schedule/ timeframe, budget, etc.) in which the contractor will implement the mitigation measures specified in the EMP approved under GoN development consent. ▪ Disclose IEE project documents including Communication plan and established GRM.	NPA and DCIE Office	Once Contractor has been selected. Finalized before any work is commissioned	Contractor, NPA , DSCD & DCIE	PAD
1.2 Climate Change Adaptation Measures evaluated and incorporated into Port design.	▪ Design criteria in respect to extreme weather events (e.g. cyclones, tsunami) resulting in flooding, strong winds. ▪ Construction material used is salt water and tropical resistant, built to withstand high rainfall and practical for local conditions, including long term maintenance and cleaning.	NPA and DCIE office	Civil design specifications in tender document & awarded contract.	DSCD, DCIE	NPA, PAD & PMU
1.3 General ecological principles applied to design.	▪ Ensure design takes into account minimal disturbance of surround ecosystems and sound management of wastes associated with the NPDP.	NPA and DCIE	Incorporated into Engineer Design Documents	DSCD	PAD, NPA & DSCD Team
1.4 Environmentally responsible procurement.	▪ Specify in tender document qualified staffs are required to implement, manage, and monitor environmental and safety issues of the project. ▪ EMP included in bid documents to ensure that mitigation measures are budgeted and to prepare the contractor for environmental responsibilities. ▪ Contractor to submit site specific environmental management plan (CEMP) based on contractual EMP.	NPA, Contractor and DSCD.	Specifications in tender document & awarded contract.	DSCD, NPA, Contractor.	PAD, NPA & DSCD Team

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
1.5 Environmental capacity development	▪ PAD and/or NPA to commit sufficient resources for project duration to oversee EMP implementation. ▪ Allocation of funds for general training and awareness of safeguards requirements (e.g. workshops and on-the-job training). ▪ Conduct contractor / workers' orientation on EMP provisions.	PAD, DCIE and contractor.	Prior to start of site works and throughout construction phase.	NPA, DCIE, contractor & project safeguards consultant	PAD & DSCD Team.
1.6 Port Occupational Health and Safety (OH&S)	▪ Inclusion of OH&S requirements in Bid Documentation including: – Allocation of responsibility for safety inspections to a designated, qualified and experienced Health and Safety Officer (HSO) within the Contractor's staff; – Training of workers on safety precautions, for themselves and others and for implementing emergency procedures; – Provision of personnel protective clothing and equipment to workers as appropriate; – Ensuring that vehicle and equipment operators are properly licensed and trained; – Arranging for provision of first aid facilities; – Emergency evacuation procedures; – Provision for regular safety checks of vehicles and material; – Provision of hazard warning signs at the all construction sites; and – Requirement for the Contractor to maintain a register of accidents detailing date, circumstances, severity, action taken and outcomes.	NPDP work site and all associated work activities.	Prior to start of works program.	Project Contractor & DSCD	NPA
1.7 Potential risk of social disruption and interactions with community due to project of work.	▪ Site office and works yard established within the NPDP site, in consultation with relevant authorities and neighboring land owners/users. ▪ Municipal and community protocols discussed/ agreed and all workers informed and aware as part of induction process. ▪ Contractor responsible to ensure compliance of all workers to municipal and community rules and codes of conduct. ▪ Appropriate signage and security in implemented at project sites.	NPDP work site and all associated work activities.	Prior to start of works program.	Project Contractor & DSCD.	NPA
1.8 Failure to brief, understand and train NPA and Contractor(s) in EMP implementation.	▪ EMP provided to PAD and NPA within the NPDP IEE. ▪ EMP included in contractors tender bid documents. ▪ Workshop and information interactive exchange opportunity delivered Information exchange. ▪ Compliance managed by environmental safeguards specialist – review of CEMP	PAD and NPA offices	Prior to start of works program.	DSCD	NPA

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
1.9 Potential risks due to public not well informed on the Grievance Redress Mechanism (GRM) and how it is operated.	▪ A stakeholder participatory meeting is required prior to commencement of work, to ensure business and general public are aware of the GRM and how it is operated.	NPDP work site and all associated work activities.	Prior to start of works program	DSCD	NPA
2.0 Construction Phase					
Biological – Ecological					
2.1 Removal of intertidal reef substrate and associated sessile resources (flora and fauna).	▪ Care needs to be exercised during all intertidal reef construction activities to limit the physical removal (berth pocket) and subsequent material placement (breakwater, shoreline backfill and wharf piles) on the reef flat of the intertidal reef substrate to the designated scope of works. ▪ Access of all construction material entering the reef flat to be confined to specific areas to reduce impact on sessile flora and fauna. ▪ Deployment of silt traps and silt curtains around all excavation areas to reduce impact on neighboring flora and fauna and all material collected to be removed from reef flat and dispose in a designated land based receiving site. ▪ Consideration for the physical hand collection (removal) and relocation of the larger slow moving reef organisms, specifically the black sea cucumber (*H. atra*) from the project area of influence prior to start of work on the reef flat. Assistance from NPA staff, local community and government agencies greatly expedite this activity – (one low tide period would only be required) ▪ Due to the extremely low colony number of hard corals and marine life associated with projects area of influence on the reef flat there is no need for in situ management of flora or fauna. ▪ Due diligence is required from the contractor to ensure NO construction material and/or equipment is allowed to enter the sub tidal reef system. If complaint no impacts (short or long) expected to occur on flora and fauna.	NPDP work site and all associated work locations.	Before and During the Construction stage.	Contractor	NPA, DCIE, DSCD (including independent safeguard specialist)
2.2 Removal of vegetation (trees).	▪ Two trees are required to be removed during the physical clean-up of the NP land based facility. These are to be removed before NPDP is initiated. In the event these trees have not been removed and/or	NPDP work site and all associated work locations.	During the Construction stage.	Contractor	NPA, DCIE, DSCD (including independent

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	additional trees are required to be removed, discussions and approval is required from the DCIE before work can be undertaken. ▪ Due diligence needs to be exercised in situations where practical root systems are required to be removed for construction and long term management of the drainage/desalination systems. ▪ Care needs to be exercised during construction to avoid physical damage to existing trees adjacent to the project site, especially the large Skeoaks (*Casuarina equisetifolia*) to the north of the main port facility.				safeguard specialist)
Physical					
2.3 Accidental risks from mobilizing construction equipment (terrestrial and Intertidal marine).	▪ To the extent possible, avoid the mobilization of heavy equipment's at night and restrict movements during standard daily working hours. ▪ Over-width and over-length vehicles should display adequate warnings such as flashing lights, signs, and flags on extending parts of equipment. ▪ Designated routes for construction vehicles, stakeholders informed, local speed limits and road rules adhered to. ▪ Provision of signboards for the safe movement of the communities near the work site. ▪ Details of any necessary road or lane closure, diversion or deviations. ▪ Awareness in planning of road closures due to airport activities. ▪ Restricted access (entry and exit) point for all construction machinery required to work directly on the intertidal reef flat (the use of the small boat ramp just to the north of the NP should be considered).	NPDA work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, Traffic Unit of Nauru Police Force.
2.4 Accident risk from construction activity (terrestrial and intertidal marine).	▪ Safety awareness and education will be provided to all workers and will include; – Warning and/or Precaution Signs on safety throughout the NPDP Site. – PPE equipment required by all workers and entry onto the work site, including Safety Helmets. – Instruction on health and safety for the workforce engaged in the construction. – Establishment of all relevant safety measures required by GoN laws, donor agency and good engineering practices.	NPDA work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, Department of Health and Safety GoN.

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	– Provision and accessibility of first aid facilities at the construction sites.				
2.5 Accidental damage to property.	▪ Ensuring that all works operations take place in the presence of the Contractor's Supervisor, who is responsible for ensuring all reasonable precautions are undertaken to prevent damage to property. ▪ The contractor supervisor is fully aware of the NPDP GRM.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA. DSCD
2.6 Accidental damage to public utilities.	▪ Obtaining plans from the NPA and relevant government and public agencies showing the locations of desalination (intake and discharge) and underground water pipelines, septic storage facilities and seepage pits and overhead power cables prior to start of works program. ▪ Consultation with local communities and business on the location of utilities prior to commencing excavation operations.	NPDP work site and all associated work locations.	Continuous but prior to the start of excavation works and during the Construction stage.	Contractor	NPA, DSCD
2.7 Construction waste disposal from project site (terrestrial and intertidal marine).	▪ Preparation and implementation of waste management plan by contractor before start of work. ▪ No waste to be dumped for storage or long term activities within the NPDP sites (land, foreshore or intertidal marine), nor adjoin parcels of land; ▪ All construction waste derived from activities associated with the intertidal reef (e.g. berth pocket dredging, breakwater construction etc.) to be immediately (daily) removed from the intertidal reef site and disposed of at the projects dedicated and approved waste management site (topside). ▪ Land based project activity construction wastes to be removed from the project sites (weekly) and disposed of at the projects dedicated and approved waste management site (topside). ▪ Siltation traps, curtains, nets and covers (tarpaulins) to be used (mandatory) on all construction waste to prevent dispersion of waste before being removed from the site.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DCIE, DSCD
2.8 Construction wastewater disposal from project site (terrestrial and intertidal marine).	▪ Preparation and implementation of waste management plan by contractor before start of work. ▪ No wastewater to be dumped within the NPDP land, foreshore or intertidal marine sites; ▪ All wastewater and or water derived from rainfall events is to be preventing as best as possible from entering the adjacent terrestrial	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DCIE, DSCD

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	and coastal marine waters. ▪ Siltation traps, socks and nets (coastal) to be placed at the construction sites to regulate and manage wastewater sedimentation issues derived from construction activities, including specific sedimentation and pollution collection during all intertidal construction activities (e.g. water used for dredging and pile driving activities). ▪ Siltation traps, curtains, nets and covers (tarpaulins) to be used (mandatory) on all construction waste to prevent dispersion of waste due to rain events.				
2.9 Removal of intertidal reef substrate (Berthing Pocket) and utilization of material for breakwater construction/back fill.	▪ Care needs to be exercised during all intertidal reef construction activities to limit the physical removal (berth pocket) and subsequent material placement (breakwater, shoreline backfill and wharf piles) on the reef flat of the intertidal reef substrate to the designated scope of works. ▪ Access of all construction material entering the reef flat to be confined to specific areas to reduce impact on structural integrity of the reef and marine sessile flora and fauna. ▪ Mandatory installation and deployment of silt traps/nets and silt curtains around all excavation (e.g. berth pocket, steel piles driven into the reef) and land (e.g. breakwater) reclamation areas to reduce impact on neighboring ecology and all material collected to be removed from reef flat and dispose in a designated land based receiving site. ▪ Due diligence is required from the contractor to ensure NO construction material and/or equipment is allowed to enter the sub tidal reef system. If complaint no impacts (short or long) expected to occur on flora and fauna.	NPDP work site and all associated work locations.	During the Construction stage.	Contractor	NPA, DCIE, DSCD (including independent safeguard specialist)
2.10 Improper disposal of solid and liquid wastes within project site (terrestrial and marine intertidal).	▪ No disposal of solid or liquid waste to be undertaken within the project site. Due diligence needs to be ensured to prevent zero disposal of wastes associated with the foreshore and intertidal marine habitats associated with the projects site. ▪ Segregation of wastes shall be observed and provisions supplied (e.g. waste collection bins). ▪ Organic (bio-degradable) waste material shall be collected and disposed of off-site by composting (burning allowed in designated land fill site in accordance with local regulations).	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DCIE, DSCD

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	▪ All non-hazardous wastes to be disposed of at the projects dedicated and approved waste management site.				
2.11 Pollution due to use and storage of hazardous substances.	▪ Hydrocarbon and toxic materials to be stored in adequately protected site to prevent soil and water contamination, while vehicle maintenance and refueling will be confined to areas in construction sites designed to contain spilled lubricants and fuels. ▪ Fuel depot shall be provided with impervious flooring and bund/containment wall to keep spilled fuel/lubricant within the depot; ▪ Locate storage areas for petrochemical products including bitumen at least 100 meters from the coastline. ▪ Used oil and other toxic and hazardous materials shall be stored in safe containers (fuel drums) and disposed of in an authorized facility off-site. ▪ Spill waste will be disposed at disposal sites approved by local authorities. ▪ Employ safe practices in filling bitumen distributor tanks and in heating bitumen. Do not allow smoking or fire of any kind in the vicinity of bitumen and kerosene blending tanks. Provide a carbon dioxide fire extinguisher at the bitumen tank site for firefighting. ▪ Stop road asphalting and/or concreting activities during periods of heavy rainfall. ▪ Adequate precaution will be taken to prevent oil/lubricant/ hydrocarbon contamination onto the ground and port drainage systems. Spillage, if any, will be immediately cleared with utmost caution to leave no traces. ▪ Asbestos roof sheeting to be removed and stored on site (e.g. shipping containers) following government protocols and disposed of under guidance from DCIE (if still on site). All workers provided with suitable asbestos PPE. It is noted that the site should be clear of Asbestos before construction is initiated by a separate contract. ▪ All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying all the applicable statutory stipulations. ▪ The personnel in-charge of these sites will be properly trained and these areas will be access controlled and entry will be allowed only under authorization.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DCIE, DSCD

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	▪ Bitumen will not be allowed to enter drainage systems and nor will be disposed of in ditches or small waste disposal sites prepared by the contractor. ▪ Bitumen storage and mixing areas shall be protected against spills and all contaminated soil must be properly handled according to applicable national and local laws and regulation. As a minimum, these areas must be contained, such that any spills can be immediately contained and cleaned up. Any petroleum products used in the preparation of the bitumen mixture must also be carefully managed to avoid spills and contamination of the local water table and/or coastal foreshore and waters.				
2.12 Noise and Vibration.	▪ Provide information to nearby business/residents about the duration of noise generating operations, especially traffic moving through communities and significant construction activities. ▪ Planning of construction operations to minimize public nuisance. ▪ All construction vehicles and machinery to have working mufflers and they will be properly maintained and conform to GoN noise emission requirements. ▪ Activities that will generate high noise levels will be scheduled to coincide with period when people are least likely to be affected. ▪ All construction activities generating noise to be undertaken between the hours approved by NPA in consultation with the communities, noting low tidal requirements for the intertidal marine reef activities. ▪ Enforcement of regulations subsequent to public awareness.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DSCD
2.13 Dust and Air Pollution.	▪ Provide information to nearby community, residents, business about the duration of dust generating operations. ▪ Maintain all construction vehicles to minimize toxic vehicle emission. ▪ Sprinkle water on the road surface to prevent dust emissions, when required. ▪ Regular wetting or coverage of stockpiled material to ensure dust is not given off during windy conditions. ▪ Prompt removal of waste material to reduce potential dust. ▪ Concrete batching plant shall be located at least 500 m from settlements and market areas.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DSCD
2.14 Erosion and sediment control.	The management of Erosion includes: ▪ Storage and reuse of topsoil and stockpiles. ▪ Disposal of spoils off site.	NPDP work site and all associated work locations.	During the Construction stage.	Contractor	NPA, DCIE, DSCD

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	▪ Coverage of all spoils and stockpiles at all sites. ▪ Silt control, using sediment traps, socks, and/or nets to collect and prevent the distribution of materials during construction. ▪ Silt traps and nets mandatory used when construction activities undertaken on the coastal foreshore and intertidal reef flat areas to minimize sediment dispersion. Regular (daily) cleaning and correct disposal of sediment and rubble required. ▪ Vegetation disturbance/removal limited. ▪ Management of sediment laden water, when required (see section 2.8).				
2.15 Traffic disruption during construction.	▪ Provide information to nearby community residents, business about the duration of traffic disruptions and describe operations that will be undertaken. ▪ Consideration for the development and subsequent adherence to the NPDP Traffic Guidance Scheme (TGS), ▪ Employ 'flag men' to regulate the traffic flow around work site when required. ▪ Acquire relevant permits if NPDP scope of works requires activities to be undertaken outside of normal working hours – TGS will detail these activities.	NPDP work site and all associated work locations.	During the Construction stage.	Contractor	NPA, Traffic Unit of Nauru Police Force
2.16 UXO Detection, Management and Removal.	▪ UXO assessment to be undertaken at all sites (terrestrial and shallow water marine) when the construction activity requires the substrate to be dug. Due diligence needs to be exercised on the area to be assessed. ▪ The UXO assessment is to use mine/metal detectors and a deep magnetometer search. ▪ Strict adherence to Nauru Government UXO safety and management guidelines, including surveying the area and relocation of UXO to safety bunker until decommissioning can be undertaken, if UXO located. ▪ Confirmation from UXO expert that all NPDP sites are safe before constructions phase of NPDP can be undertaken. ▪ All measures to be carried out prior to construction. ▪ No construction to proceed without confirmation from UXO expert that sites are safe for construction activities.	NPDP work site and all associated work locations.	During the Construction stage.	Contractor through UXO expert.	NPA, DSCD, Police Force

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
Social – Economic					
2.17 Minimize social and community impacts.	▪ Methods of communication with key stakeholders, affected parties and the owners/occupiers of the neighboring properties regarding the: – Likely timing and duration of work. – Alternative routes. – Access to properties. ▪ Details of prior consultation and outline any measures developed with such group to manage or mitigate adverse effects.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DSCD
2.18 Public Health and Safety Risks.	▪ Community informed through public consultation, signage and awareness campaign. ▪ Barriers (e.g., temporary fence) shall be installed at all construction areas to deter access where required. ▪ The general public/local residents shall not be allowed into the NPDP site during construction, including access to the intertidal reef system. ▪ All high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation additional barriers to be erected.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DCIE, Heath department, DSCD
2.19 Coastal Resource User Access -Intertidal – marine systems (Fishers).	▪ Access to all terrestrial sites and projects area of influence to be restricted to only authorized personal (NPA staff, construction staff and associated project staff) for the duration of the project. ▪ Access to all marine sites, especially the intertidal reef flat and directly adjoining shallow water reef slope areas adjacent to the port and within the greater area of influence to be restricted to only authorized personal (NPA staff, construction staff and associated project staff) for the duration of the project. ▪ Exclusion areas need to be developed and fully understood by all local canoe fishers prohibiting access within the projects terrestrial and shallow water intertidal areas during construction period. Alternative canoe landing exit and entry points need to be arranged outside of the projects area of influence. ▪ Physical barriers, information signage and public awareness and information exchange required on all land boundaries of the project to inform public of restricted access areas. Exclusion areas for intertidal marine areas will require mobile signage and safety personal to ensure compliance to restricted areas.	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, NFMRA, DCIE, DSCD

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	▪ Intertidal reef gleaning and fishing (pole and line) from shore needs to be prohibited within the projects area of influence during the construction phase. ▪ Offshore reef fishing, specifically canoe bottom hand line fishing directly opposite the projects area of influence should be prohibited during construction. ▪ Water sports e.g. snorkeling and/or Scuba should be prohibited in all areas associated with the projects area of influence.				
2.20 Occupational Health and Safety (OH&S).	▪ Workers shall be provided with appropriate personal protective equipment (PPE) such as safety shoes, hard hats, safety glasses, earplugs, gloves, etc. ▪ The contractor shall brief and explain to workers health and safety issues related to their activities as well as on the proper use of PPE. ▪ Install channeling devices (e.g., traffic cones and barrels) or fence to delineate the work zone. ▪ Workers shall be provided with potable water supply. ▪ Provision of distinguishing clothing or reflective devices or otherwise conspicuously visible material when there is regular exposure of workers to danger from moving vehicles. ▪ Monitoring and control of the working environment and planning of safety and health precautions should be performed as prescribed by national laws and regulations. This includes; – Workers who have received appropriate training in accordance with national laws and regulations shall operate construction equipment. – The drivers and operators of vehicles and materials handling equipment shall be medically fit, trained and tested and of a prescribed minimum age as required by the government rules and regulation. – Safety provisions shall be brought to the notice of all concerned by displaying or notice board at a prominent place at the work locations. – The contractor shall be responsible for observance, by his sub-contractors, of all health and safety provisions. – The contractor should take adequate measures for the control of mosquito vector diseases (e.g. Dengue).	NPDP work site and all associated work locations.	Continuous during the Construction stage.	Contractor	NPA, DSCD

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	– All vehicles used in the construction yard should have reverse horns. – There should be proper demarcation of work areas with signage boards showing the work areas. The signboards should be in English, duplicated in Nauruan if required. – Suitable warning should be displayed at all places where contact with or proximity to electrical equipment can cause danger. – Persons having to operate electrical equipment should be fully instructed as to any possible danger of the equipment concerned. All the electrical equipment should be inspected before it is taken into use to ensure that it is suitable for its purpose. – Water transport tanks, storage tanks and dispensing container should be designed, used, cleaned and disinfected at suitable intervals in a manner approved by the competent authority. – Water that is unfit to drink should be conspicuously indicated by notices prohibiting workers from drinking it. – Secure storage areas should be provided for flammable liquids, solids and gases such as liquefied petroleum gas cylinder, paints and other such materials in order to deter trespassers. – Smoking should be strictly prohibited and no smoking notices be predominantly displayed in all places containing readily combustible or flammable materials – Only suitably protected electrical installations and equipment, including portable lamps, should be used. – Oil rags, waste and clothes or other substances liable to spontaneous ignition should be removed without delay to a safe place. – Fire-extinguishing equipment should be provided at construction camps, asphalt plants, storage areas for combustible materials and other areas where fire hazards are found. Such equipment shall be properly maintained and inspected at suitable intervals by a competent person.				
2.21 Failure to prepare and submit monitoring reports.	▪ The contractor(s) will be responsible for filing monthly monitoring checklist reports, defining the mitigative measures undertaken, issues arising and future activities-based on the EMP.	NA	Within 1 week of each month	Contractor	NPA, DCIE, PAD

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
3.0 Operational Phase					
Biological – Ecological					
3.1 Negative biological (flora and fauna) marine resource impacts associated with the port operations.	▪ Effective compliance to the EMP during the construction phase will provide the best possible scenario for the natural recruitment of flora and fauna within the area disturbed by the NPDP. Possible potential negative impacts on the shallow water resources resulting from long term operational activities of the port include; – increased density coverage of marine macroalgae due to disturbance of the reef system during construction and the potential continued release of land based nutrients, – increase presence of cyanobacteria associated with the sediments trapped within the port area producing anoxic environment (sulphur), – potential colonization of marine invasive species resulting from suitable habitats provided by the port developed (alien species derived from the vessel entering the port) and – habitat alteration that prevents natural resources recolonizing the affected area. ▪ Provision of suitable mooring systems, marine pilot guidance and information awareness to all vessel captains and crew entering the port berthing channel and guidelines and protocols in place to manage situations as they arise to prevent physical damage to the reef and resources due to vessel collision with the reef. ▪ Undertake periodic inspections of the port facilities for invasive species and instigate a proactive management and eradication program.	Nauru Port intertidal and sub tidal marine environment area of influence.	Continuous port operational activity and specific actions when required.	NPA	NPA, DCIE
3.2 Negative biological terrestrial resource impacts associated with the port operations.	▪ The restoration and replanting of native trees and other vegetation where appropriate to increase foreshore natural soil protection and the aesthetic of the port facility providing habitat shelter for terrestrial flora and fauna, specially nesting sites for sea and shore birds.	Nauru Port land environment area of influence.	Specific actions when required (i.e. tree planting)	NPA	NPA, DCIE
Physical					
3.3 Management of the port maintenance and cleaning.	▪ Continue implementation of waste management plan. ▪ All facilities associated with the port (terrestrial and shallow water marine) inspected cleared and cleaned including all road surface wet	NPDP work site and all associated work locations.	Specific actions undertaken when required. Integrated	NPA	NPA, DCIE

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
	during sweeping to reduce potential levels of airborne dust and contaminants. ▪ All drainage system inspected, cleared of any debris and cleaned. ▪ Siltation, pollution and oil traps regularly inspected and cleaned, with all waste material removed, separated and deposited at a certified waste reception location. ▪ No waste should be dumped within the NPDP site nor close to the coastal line. ▪ All wastes to be stored and removed from the site periodically to designated waste reception areas. ▪ All maintenance material stored in a secured regulated area with covering to prevent sediment discharge during period of rainfall and dust during windy conditions. ▪ Ensure protocols are in place to address hazardous chemical spill (e.g. petrol spillage form refueling activities) and staff are suitable trained with correct equipment. ▪ All maintenance work conducted according to pre-announced time schedule in consultation with key stakeholders, preferable outside peak business hours to limit inconvenience to business and community.		into a NP management system and regular maintenance program.		
3.4 Management of the ports operational dust and noise.	▪ Continue implementation of port operational management plan, including provision of – awareness to all staff on noise and dust management and prevention, – PPE supplied to all staff, especially noise reducing equipment, – wetting of roads and port surfaces during period of high dust production to reduce suspension, – ensure maintenance programs for all vehicles and machinery are undertaken ensure noise reducing requirements are regular maintained.	NPDP work site and all associated work locations.	Specific actions undertaken when required. Integrated into a NP management system and regular maintenance program.	NPA	NPA, DCIE
Social – Economic					
3.5 Community perception and awareness of ports activities.	▪ Provide continued awareness and information exchange with the public on all aspects of the port and ensure all management activities undertaken to preserve and enhance the marine and terrestrial environment and resources are fully disclosed and acknowledge by the community.	NPDP work site and all associated work locations.	When Required.	NPA	NPA, DCIE

Environmental Issue Project Activity	Mitigation Measures	Location	Time Frame	Responsibility	
				Implementation	Supervision
3.6 Health and safety risks associated with the maintenance of the port.	▪ Ensure correct OH&S procedures developed in the EMP are adopted and continued to be implemented during the operational phase, specifically including the maintenance and future repair activities of the ports equipment and infrastructures. ▪ Maintenance schedule is defined and costed to adequately cover the cost of maintenance is secured prior to the operation phase. Maintenance schedule should at least cover the operation life of the equipment.	NPDP work site and all associated work locations.	When Required.	NPA	NPA, DCIE

6.4 Environmental management plan monitoring

Environmental Issue	Monitoring Details	Timing	Executing Unit	Reporting Responsibility
1.0 Pre-Construction Phase				
1.1 Development Consent and Permit Acquisition	▪ Confirm with all stakeholders, permits and consent documentation has been acquired and received no later than 1 month before contractor mobilization.	After the contractor has been selected but before mobilization	NPA, DCIE	NPA
1.2 Climate Change Adaptation Measures evaluated and incorporated into design.	▪ Ensure that climate change adaptation measures are included in the NPDP design and reflected in the contractors tender bid documentation.	Prior to commencement of work	DSCD	NPA
1.3 General ecological principles applied to design.	▪ Ensure that efforts have been made to reduce environmental impacts measures are included in the NPDP design and reflected in the contractors tender bid documentation.	Prior to commencement of work	DSCD	NPA
1.4 Environmentally responsible procurement.	▪ Obtain written confirmation that environmentally responsible procurement measures are included in contract documentation and contractor has signed off.	Prior to commencement of work	DSCD	NPA
1.5 Environmental capacity development.	▪ File a written record of the training session provided by DSCD for inclusion in the semi-annual report to ADB.	Prior to commencement of work	DSCD	NPA
1.6 Occupational Health and Safety (OH&S) measures not specified in Bid Documentation	▪ Obtain written confirmation that OH&S measures are included in contract documentation and contractor has signed off.	Prior to commencement of work	DSCD	NPA

Environmental Issue	Monitoring Details	Timing	Executing Unit	Reporting Responsibility
1.7 Potential risk of social disruption of neighboring communities and business activities and interactions with community due to project of work.	▪ File meeting minutes of public consultation for submission to ADB in semi-annual monitoring report.	Prior to commencement of work	DSCD	NPA
1.8 Failure to brief, understand and train NPA and Contractor(s) in EMP implementation.	▪ File a written record of the training session provided by DSCD for inclusion in the semi-annual report to ADB.	Within 3 weeks of commencement of construction	DSCD	NPA
1.9 Potential risks due to public not well informed on the Grievance Redress Mechanism (GRM) and how it is operated.	▪ File meeting minutes of public consultation for submission to ADB in semi-annual monitoring report.	Prior to commencement of work	DSCD	NPA
2.0 Construction Phase				
Biological				
2.1 Removal of intertidal reef substrate and associated sessile resources (flora and fauna).	▪ Ensure physical collection and replacement of sea cucumbers outside of area of influence occurs before reef flat construction activities undertaken. ▪ Visual inspection and document individual construction activities associated with the berth pocket dredging activities, breakwater construction, wharf pile driving actions and foreshore back fill activities to ensure compliance with EMP activities. ▪ Ensure sedimentation traps, curtains and nets are compliant with usage and daily cleaning. ▪ Visual inspection of accidental damage or planned removal to reef outside of scope of works. ▪ Ensure conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily during construction period and as required based on construction plan.	Contractor	NPA, DSCD
2.2 Removal of vegetation (trees).	▪ Visual inspection and document removal of trees/vegetation. ▪ Visual inspection of accidental damage or planned removal of underground tree roots. ▪ Ensure conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Weekly and as required based on construction plan.	Contractor	NPA, DSCD

Environmental Issue	Monitoring Details	Timing	Executing Unit	Reporting Responsibility
Physical				
2.3 Accidental risks from mobilizing construction equipment (terrestrial and Intertidal marine).	▪ Visual inspection of project vehicles, access route, safety, hours of operation and conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.4 Accident risk from construction activity (terrestrial and intertidal marine).	▪ Visual inspection of project sites to ensure safety requirements (e.g. signage, safety gear, first aid), compliance to EMP and information exchanged, records of grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.5 Accidental damage to property.	▪ Visual inspection of project sites, and records of grievance made and actions taken.	Weekly and/or as required	Contractor	NPA, DSCD
2.6 Accidental damage to utilities	▪ Visual inspection of project sites, and records of grievance made and actions taken.	Daily however important to ensure location is known before construction initiated.	Contractor	NPA,DSCD
2.7 Construction waste disposal from project site (terrestrial and intertidal marine).	▪ Visual inspection of waste within construction locations to ensure; – Waste management plan is used. – Construction waste are collected, separated and transported to approved land fill locations offsite, – No storage of waste on site, – Sediment traps and tarpaulins are used to prevent discharge of sediment during rain fall events, ▪ Conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.8 Construction wastewater disposal from project site (terrestrial and intertidal marine).	▪ Visual inspection of waste within construction locations to ensure; – Waste management plan is used. – Sediment traps are in place managing wastewater, – Sedimentation traps (silt traps, nets and/or socks) used during construction activities both land and intertidal reef activities. ▪ Conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD

Environmental Issue	Monitoring Details	Timing	Executing Unit	Reporting Responsibility
2.9 Removal of intertidal reef substrate (berthing Pocket) and utilization of material for breakwater construction.	▪ Visual inspection and document individual construction activities associated with the berth pocket dredging activities, breakwater construction, wharf pile driving actions and foreshore back fill activities to ensure compliance with EMP activities. ▪ Ensure sedimentation traps, curtains and nets are compliant with usage and daily cleaning. ▪ Visual inspection of accidental damage or planned removal to reef outside of scope of works. ▪ Ensure conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.10 Improper disposal of solid and liquid wastes within project site (terrestrial and marine intertidal).	▪ Visual inspection of waste within construction locations to ensure; – Waste management plan is used. – Waste are collected, separated and transported to approved land fill locations offsite, – No storage of waste on site, – No spillage within site, ▪ Conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.11 Pollution due to use and storage of hazardous substances.	▪ Visual inspection of waste within construction locations to ensure; – Waste management plan is used. – Waste are collected, separated and transported to approved land fill locations offsite, – No storage of waste on site, – No spillage within site, – Ensure PPE for all workers especially asbestos removal activities. ▪ Conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.12 Noise and Vibration.	▪ Visual inspection of project sites, and records of grievance made and actions taken and conduct interviews with closest communities and/or business to establish impacts and actions taken by contractor.	Weekly, more if required.	Contractor	NPA, DSCD
2.13 Dust and Air Pollution.	▪ Visual inspection of project sites, and records of grievance made and actions taken.	Weekly, more if required.	Contractor	NPA, DSCD

Environmental Issue	Monitoring Details	Timing	Executing Unit	Reporting Responsibility
2.14 Erosion and sediment control.	▪ Visual inspection of site for erosion and sediment issues and monitor; – Sediment pollution traps (silt and socks) are in place managing wastewater and storm water discharge during initial cleaning and during construction. – Sediment collected are reused within the site or transported to approved landfill site. ▪ Conformity to EMP mitigation plan, records of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.15 Traffic disruption during construction.	Visual inspection of project sites and roads used for transportation to ensure traffic is not congested, record grievance and ensure actions are undertaken. Liaise with stakeholders and community to highlight concerns and action required by the contractor to undertake.	Monthly	Contractor	NPA, DSCD
2.16 UXO Detection, Management and Removal.	▪ Ensure UXO assessments are undertaken for all construction activities breaking the surface of the land and intertidal reef flat. ▪ Ensure adherence to Nauru Government UXO safety and management guidelines are followed. ▪ Confirmation from UXO expert that all NPDP sites are safe before constructions is undertaken.	When required based on construction plan.	Contractor	NPA, DSCD
Social – Economic				
2.17 Minimize social and community impacts.	Regular informal and formal discussions with key stakeholders identify issues and/or grievance and address through positive actions.	Weekly, more if required.	Contractor	NPA, DSCD
2.18 Public Health and Safety Risks.	▪ Visual inspection of project sites to ensure public access in the vicinity of the construction site is safe, requirements are clearly marked, accessible and readable. Record grievance and ensure actions are undertaken. Liaise with stakeholders and community to highlight concerns and action required by the contractor to undertake.	Weekly, more if required.	Contractor	NPA, DSCD
2.19 Coastal Resource User Access -Intertidal – marine systems (Fishers).	▪ Visual inspection of project sites to ensure public access to the intertidal and shallow water marine areas the vicinity of the construction site is safe, requirements are clearly marked, accessible and readable. Record grievance and ensure actions are undertaken. Liaise with stakeholders and community to highlight concerns and action required by the contractor to undertake.	Weekly, more if required.	Contractor	NPA, DSCD
2.20 Occupational Health and Safety (OH&S).	▪ Ensure OH&S EMP requirements have been fully implemented and ensure compliance for all activities and personnel are maintained. ▪ Ensure conformity to EMP mitigation plan, record issues of non-compliance or grievance made and actions taken.	Daily	Contractor	NPA, DSCD
2.21 Failure to prepare and submit monitoring reports.	▪ Have available full record of monthly monitoring checklist reports.	Monthly from contractor	Contractor	NPA, DSCD

Environmental Issue	Monitoring Details	Timing	Executing Unit	Reporting Responsibility
3.0 Operational Phase				
Biological – Ecological				
3.1 Negative biological (flora and fauna) marine resource impacts associated with the port operations.	▪ Ensure appropriate resources are allocated to ensure suitable mooring systems, marine pilot guidance and information awareness to all vessel captains and crew entering the port berthing channel and guidelines, protocols and policies are in place to manage situations (e.g. vessel grounding) as they arise to prevent physical damage to the reef and resources. ▪ Undertake periodic inspections of the port facilities for invasive species and instigate a proactive management and eradication program.	As required once construction phase is complete. Inspection for invasive species to occur at least bi-annually.	NPA	NPA,
3.2 Negative biological terrestrial resource impacts associated with the port operations.	▪ Ensure appropriate resources (trees, water, nutrients) are allocated to plant native trees and other vegetation where appropriate within the NP site (along boundaries). ▪ Ensure NP staff and communities are aware of this initiative through information exchange and support the project.	As required once construction phase is complete.	NPA	NPA,
Physical				
3.3 Management of the Port maintenance and cleaning.	▪ Continue implementation of a NPDP waste management plan based on a regular and planned maintenance schedule including protocols for the collection and safe management of different wastes products and emergence capability for hazardous wastes. ▪ Ensure equipment is procured and maintained to ensure maintenance and cleaning operations can be undertaken. ▪ Ensure an internal NPA traceable reporting system to ensure compliance is attained.	Weekly	NPA	NPA
3.4 Management of the ports operational dust and noise.	▪ Continue implementation of port operational management plan, including awareness to all staff of noise and dust management, provision of equipment for wetting surfaces when required, provision of PPE to staff and ensure maintenance programs are undertaken to reduce noise from all NP machinery. ▪ Ensure an internal NPA traceable reporting system to ensure compliance is attained.	Daily operational process.	NPA	NPA
Social – Economic				
3.5 Community perception and awareness of ports activities.	▪ Provide continued awareness and information exchange with the public on all aspects of the port and ensure all management activities undertaken to preserve and enhance the marine and terrestrial environment and resources are fully disclosed and acknowledge by the community.	Initial project operational undertaking then quarterly or biannual activity.	NPA	NPA

Environmental Issue	Monitoring Details	Timing	Executing Unit	Reporting Responsibility
3.6 Health and safety risks associated with cleaning and removal of silt, oils and plastics from the Port.	▪ Ensure OH&S EMP requirements developed and implemented during the construction phase are adopted and continued to be used when maintenance work on the roads and drainage systems are undertaken. Full compliance should be maintained. ▪ Ensure OH&S equipment required is procured ad used during all work activities.	During maintenance activities.	NPA	NPA

7 Information Disclosure, Consultation and Participation

7.1 Consultation and public information

Field investigations were undertaken in November 2016 and involved a series of informal and formal discussions and information exchange with key project government, private sector and public stakeholders. The staff of the NPA, the PPTA consultant team and the Planning and Aid Division (PAD), Ministry of Finance, arranged stakeholder meetings. Key areas of discussion focused on assessments of the marine and terrestrial habitats associated with the NPDP.

The subtidal reef assessment was undertaken on Saturday 26 November with assistance from two staff members from the NFMRA (Mr. Jonas Star and Mr. Delvin Thoma) whilst the intertidal reef assessment transects were completed by the PPTA marine consultant on Sunday 27 November. Extensive discussions and literature exchange was undertaken with the NFMRA staff and utilized in this report. The list of people interviewed and discussed the project with the consultant are presented in Appendix 6.

7.2 Project disclosure

Information within this IEE will be included with the ADB PPTA study and disclosed on the ADB website in accordance with the ADB Public Communications Policy 2011 and will also be disclosed locally. The PAD in conjunction with the NPA will undertake further discussions to identify the arrangements to ensure information about the project will be available to the public and provide copies of the IEE available on request.

7.3 Project communication plan

The NPDP has developed a project based communication plan through stakeholder discussions. The projects communications plan has been developed based on the following key objectives;

> At the project level, internal and external stakeholders were engaged and informed routinely of the NPDP project outputs and outcomes to contribute, as necessary, for the effective delivery of the project components.

> For the civil works component, the objective is to ensure that the necessary communications are established to manage the contract in accordance with each party's contractual obligations. Further, to engage, involve and inform communities and other local stakeholders adjacent to the project site/s and to provide all parties with a process to deal effectively with complaints arising from the civil works activities.

8 Conclusions and Recommendations

8.1 Project benefits

The proposed design and development of the NPDP is environment-friendly and will result in the substantial increase in the efficiency and safety of the Nauru port operational functions. This will result in increased inbound and outbound movement of shipping containers and commodities resulting in an increased business opportunities and income generation for the nation and foreign trade.

8.2 Conclusions

The IEE concludes that there are no identifiable environmental significant impacts nor is the project deemed environmentally sensitive. Impacts arising from the construction and operational phases of

the project are minor, localized, and acceptable, providing that the set of mitigations measures set out in the EMP are incorporated in the design, implemented, and monitored properly. Key impacts include;

> The NPDP is located within the existing land parcel of the Port that has been highly modified (cleared, filled, built on) and does not support any terrestrial ecological or biological (flora or fauna), endemic, endangered or significant biodiversity.

> The Nauru Port land site does not have any freshwater (rivers, streams), forests or agriculture.

> The NPDP includes the coastal foreshore, intertidal reef flat and sub tidal reef slope. The coastal foreshore and intertidal reef flat areas have been highly modified (dredged, built on, rock walls) whilst the sub tidal shallow water reef areas have been impacted by port activities (e.g. mooring chains, existing harbor entrance) resulting in the degradation of benthic habitat and resources.

> The intertidal reef flat ecosystem associated with the NPDP does not support any marine shallow water ecological or biological (flora or fauna) endemic, endangered or significant biodiversity. Hard coral is all but absent in this area.

> The subtidal reef edge, and upper slope ecosystem associated with the NPDP does not support any marine shallow water ecological or biological (flora or fauna) endemic, endangered or significant biodiversity. Hard coral coverage in the region proposed for the NPDP has a very low level of coverage.

> Impacts on the terrestrial and shallow water marine ecosystems and their environments resulting from the projects construction activities are expected to be very minor.

> Impacts on the environment associated with the intertidal reef resulting from the physical dredging of the area and subsequent increased short lived sedimentation has a low impact on the marine fauna and flora due to the scarcity of resources located within and adjacent to the projects the area of influence.

> The NPDP site does not impact any terrestrial or marine conservation and/or protected area/s, sites of cultural, customary or heritage significance nor any national or international endangered or protected species.

> Due diligence and proactive management of all pre-construction, construction and operational activities will ensure limited disturbance to the daily business activities undertaken within the Port and surrounding business and community activities.

> Nauruan laws and regulations associated with labor, employment, OH&S need to be adopted by the pre-construction contractors monitored by the NPA.

> Climate change adaptation measures have been included in the pre-construction design and implemented activities.

The pre-construction, construction and operational EMP identifies potential environmental impacts arising from the project along with a corresponding schedule and monitoring of mitigation measures to ensure potential impacts are maintained at insignificant levels. It also includes the institutional arrangements for implementing the EMP to ensure its effectiveness.

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Annex 1: Relevant Nauru International Agreements

Convention / Agreement	Ratified
The International Plant Protection Convention (IPPC)	1951
Treaty on the Non-Proliferation of Nuclear Weapons	1970
Convention on the Prevention of Marine Pollution by dumping of Waste and other Matter.	1972
South Pacific Forum Fisheries Agency Convention	1979
Party to the Nauru Agreement	1982
Palau Arrangement	1992
United Nations Framework Convention on Climate Change (FCCC)	1992
United Nations Convention on Biological Diversity (CBD)	1993
FSM Arrangement	1994
Kyoto Protocol to the United Nations Framework Convention on Climate Change	2001
United Nations Convention to Combat Desertification (UNCCD)	1998
United Nations Convention on the Law of the Sea (UNCLOS)	1996
Agreement on Straddling Fish Stocks and Highly Migratory Species	1997
Convention of the Protection of Natural Resources and Environment of the South Pacific Region and related Protocols.	1995
Convention for the Prohibition of fishing with long driftnets in the South Pacific (Wellington Convention).	1992
Convention on Hazardous and Toxic Wastes (Waigani Convention)	Signed 1995, but not ratified
UNESCO member	1996
United Nations Charter	1999
Cartagena Protocol on Biosafety to the Convention on Biological Diversity	2001
Convention to Wetlands of International Importance especially as Waterfowl habitats (RAMSAR)	Not signed
Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	Not signed
Conservation on Migratory Species (CMS) of Wild Animals	Not signed
The Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their Disposal	2001 accession
Stockholm Convention for the Persistent Organic Pollutants (POPs)	2002
Vienna Convention for the protection of the Ozone Layer, Vienna, 22 March 1985	2001
Montreal Protocol on Substance that Deplete the Ozone Layer, Montreal, 16 September 1987.	2001
London Amendment to the Montreal Protocol, London, 29 June 1990.	2004
Copenhagen Amendment to the Montreal Protocol, Copenhagen, 25 November, 1992	2004
Beijing Amendment to The Montreal Protocol, Beijing 3 December 1999	2007

Annex 2: ADB Environmental Categorization From Completed

Environment Categorization

Date: December 2017

A. Instructions

(i) The project team completes and submits the form to the Environment and Safeguards Division (RSES) for endorsement by RSES Director, and for approval by the Chief Compliance Officer (CCO).

(ii) The classification of a project is a continuing process. If there is a change in the project components or/and site that may result in category change, the Sector Division submits a new form and requests for recategorization, and endorsement by RSES Director and by the CCO. The old form is attached for reference.

(iii) In addition, the project team may propose in the comments section that the project is highly complex and sensitive (HCS), for approval by the CCO. HCS projects are a subset of category A projects that ADB deems to be highly risky or contentious or involve serious and multidimensional and generally interrelated potential social and/or environmental impacts.

B. Project Data

Country/Project No./Project Title	:	Nauru: SC 106298 NAU: Preparing the Nauru Port Development Project
Department/ Division	:	PPTA
Processing Stage	:	PPTA
Modality	:	Project

[**X**] Project Loan [ ] Program Loan [] Financial Intermediary [ ] General Corporate Finance
[ ] Sector Loan [ ] MFF [ ] Emergency Assistance [ ] Grant
[ ] Other financing modalities:

C. Environment Category

[X] New [ ] Recategorization — Previous Category [ ]

☐ Category A	**X** Category B	☐ Category C	☐ Category FI

D. Basis for Categorization/ Recategorization (pls. attach documents):

[X] REA Checklist
[X] Project and/or Site Description
[ ] Other: _____

E. Comments

The proposed project scenario is located immediately north to a working boat harbor. This area is already somewhat environmentally degraded, compared to more natural coastal locations elsewhere in Nauru.	RSES Comments

F. Approval

Proposed by:	**Endorsed by**:	
Project Team Leader, {Department/Division} Date:	Director, RSES Date:	
Endorsed by:	**Approved by**:	☐ Highly Complex and Sensitive Project
Director, {Division} Date:	Chief Compliance Officer Date:	

SC 106298 NAU: Preparing the Nauru Port Development Project – Description

The objective of the project is expand the existing port which will include a new harbor trenched into the reef flat to the north of the existing harbor and a new break wall to the north constructed on the reef flat to provide protection from prevailing oceanic swells and waves. This proposed options does not provide any opportunity for replacing the existing phosphate loading arrangements, and hence the high maintenance costs for the mooring buoy system will continue, this solution provides the initial stage for a future enclosed harbor development. The REA for this project is Category B.

Rapid Environmental Assessment (REA) Checklist

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Office.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the 'without mitigation' case. The purpose is to identify potential impacts. Use the 'remarks' section to discuss any anticipated mitigation measures.

Country/Project Title: **NAU: Preparing the Nauru Port Development Project**

Sector Division: PPTA

NOTE: The information documented below has in part been taken from Nauru Port Pre-Feasibility Study – ADB. The author of this report concurs with the findings.

Screening Question	Y/N	Remarks
A. Project Siting		
Is the Project area adjacent to or within any of the following environmentally sensitive areas?		
• Cultural heritage site	N	There are none associated with the project.
• Protected Area	N	There are no marine or terrestrial protected or managed areas associated directly with or in close proximity to the Port.
• Wetland	N	There are no wetlands associated directly with or in close proximity to the Port. There are no coastal wet lands in Nauru.
• Mangrove	N	There are no mangroves associated directly with or in close proximity to the Port.
• Estuarine	N	There are no streams/river or estuaries associated directly with or in close proximity to the Port. There are no estuarine systems in Nauru.
• Buffer zone of protected area	N	No protected areas, or potential protected areas, associated directly with or in close proximity to the Port.
• Special area for protecting biodiversity	N	There are no significant biodiversity attributes (terrestrial or marine) in the project area.
• Bay	N	There are no bays on this coastline.
B. Potential Environmental Impacts		
Will the Project cause…		
• Encroachment on precious ecology resulting in loss or damage to fisheries and fragile coastal habitats such as coral reefs, mangroves, and seagrass beds?	N	The Nauru Port has been a fully operational port for at least the last 40 years; as such, the coastal/marine habitats in the immediate vicinity have been somewhat compromised by equipment damage (especially on the reef flat, and chain scraping over the reef slope near the phosphate cantilevers), hydrocarbon runoff from the port area, septic tank seepage, and at times sewage and waste oil discharged through the large reef flat sewage outfalls, as well as phosphate dust in this particular area. The immediate project area (north of the existing harbor) comprises of a horizontal flat intertidal reef flat almost devoid of hard coral and other benthic organisms and dominated by several species of marco algae. The subtidal reef system is dominated by oceanic swells and

Screening Question	Y/N	Remarks
		waves with hard coraline algae dominating the surf zone of the reef crest and edge with increasing hard coral colonies within the upper and lower reef slopes. The sud tidal reef system is small and drops vertically into the abyss close to shore. Hard coral diversity and percentage coverage highest to the south and north of the existing harbor and planned project area. There are no mangroves or seagrass beds. Very high volumes of water exchange (tides and frequent swells) along the reef slope would support relatively healthy coral, even with the occasional berthing of ships and phosphate dust (which disperses in air, and then is further dispersed in water exchange at the reef edge). There are no fisheries in the project area, except some recreational fishing from the tip of the current south-side quay. These local recreational fisheries will be disturbed temporarily during construction, and increased security at the new port may preclude access to the quays for fishing in the future. In any case, most recreational and artisanal fishing in Nauru is undertaken at the reef edge at low tide, in other areas.
• Short-term increase in turbidity and reduced sunlight penetration as well as changes in sediment pattern and flows at dredging site?	Y Minor	The development of the new ship harbor and retaining protection wall will require reef dredging and possibly expansive rock fracturing to provide the depth of water for the vessels to dock. The depth of the blasting will be approximately 10 m from the existing height of the reef flat and as such will result in increased temporary turbidity plumes, as well as some shock waves associated with blasting. These activities will be undertaken almost exclusively on the reef flat (minor excavation work will occur at the new port entrance in the upper reef slope and reef edge) which is wave washed, which will result in suspended sediments washing off reef (this is a natural tidal process occurs daily, There are no environmental attributes of concern on the reef flat in this area (which has been impacted by anthropogenic activities since the original port was commissioned). All sediments and smaller coral fragments will be suspended due to the daily wave and tidal movements and as such moved offshore. There is limited potential of damage to existing benthic hard coral colonies within the upper and lower reef slopes when the sediments are transported however this will be short lived due to the existing wave conditions and will quickly disperse in very large volumes of water.
• Removal and disturbance of aquatic flora and fauna at dredging site?	Y minor	Existing macro algae associated with the intertidal reef flat will be removed during the excavation of the new port harbor and smothered in the areas the rock protection wall will be constructed. The macro algae in these specific areas are identical to algal assemblages north and south of the port site. Very low numbers of attached and sessile invertebrates will be affected during the construction phase. All moving resources would be expected to avoid impacts as they can move away from the site. The expansive shattering impacts may affect marine resources due to the compression waves however blasting is limited and if restricted to low water periods will have minimal impacts.
• Deterioration of water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	N	This is not expected to be an issue, as sanitary facilities will have to be provided for the construction workers on the backshore (terrestrial) area, and there are very few sediments on the foreshore, which is mostly a coral stone and rubble protective slope, littered with garbage and scrap metal. High water exchange on the reef flat, due to tides and frequent swells will rapidly disperse and dilute any contaminants that may enter at the work site. Work sites on the backshore will need to be bermed to prevent drainage to the foreshore and reef flat.

Screening Question	Y/N	Remarks
• Alteration of bottom surface and modifications to bathymetry, causing changes in tidal bore, river circulation, species diversity, and salinity?	Y	The proposed infrastructure (dredged harbor and breakwater) will be trenched into the reef flat and positioned on the reef flat. As such there will be modifications to the intertidal reef flat and water circulation patterns due to the permanent break wall. There will be no changes to the bathymetry on the seaward side of the reef flat nor is there any changes expected to tidal bore, river circulation, or salinity in this area.
• Changes in sediment pattern and littoral drift that may cause beach erosion of neighboring areas?	N	Currently, the boat harbor and the original waste water steel pipes to the north and south of the project of the project area obstructs north-south littoral drift that is likely occurring to the north of the boat harbor (where there is good beach development). There is no beach development in the project area (it is only evident about 300 m further south, where the cantilevers cross the shore). The new structures will not likely affect littoral drift of sediments in this area, given the current lack of sediment supply.
• Modification of terrestrial habitat by upland disposal of dredged material or covering of potential archaeological sites with dredge spoil?	N	Dredged material will be used as fill and be incorporated into the projects breakwater. There will be no disposal of spoil on the backshore associated with the port area. Excess spoil (rocks) to be used as landfill at designed rehabilitation mining sites.
• Short-term air quality degradation due to dredging-related operations?	N	Dredging and excavating will be utilized for the project and as such short term degradation in air quality is expected due to the use of excavation machinery and blasting operations. There is no concern for equipment emissions or dust, as shore breezes generally disperse airborne materials in the project area.
• Noise and vibration due to blasting and other civil works?	Y minor	Dredging and excavating will be utilized for the project and as such short term increased noise and vibration is expected due to the use of excavation machinery and blasting operations. There is no concern for equipment noise or vibration outside the port area and as such no impact on neighboring residents.
• Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?	N	The site is quite exposed (especially during the period November-March), so use of equipment on the water during periods of high water has risks involved. For the most part, construction workers will only be exposed to fuel, as no specific chemicals are required for the project. Port operational risks are expected to diminish with operation of the proposed project (use of PPEs, safety protocols, secure areas for hazardous materials, signage, etc.). Demolition of near-derelict port buildings will result in breaking and accumulation of asbestos roofing tiles and other ACMs; these will need to be handled by workers with breathing protective gear and all such materials isolated for proper disposal (a workable option is disposal in deep water, since wet asbestos is considered to be environmentally inert). Construction of the project will require careful integration with ongoing phosphate loading activities (which is a serious issue), and there are anchor lines for the mooring system that cross south of the proposed location of the projects activities.
• Dislocation or involuntary resettlement of people?	N	None; all activities will be within the current port footprint, and mostly associated with the intertidal reef flat (water-side).
• Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?	N	None expected from either project construction or operation.
• Other social concerns relating to inconveniences in living conditions in the project areas?	N	None expected, as there will be only transient noise, which will only be heard in the port work areas.

Screening Question	Y/N	Remarks
• Social conflicts if construction depletes local fishery resources on which communities depend for subsistence?	N	Not an issue; no fish habitat will be affected, and there is no artisanal or commercial fishing on the reef flat or reef edge in this area (this area was previously subjected to sewage outfall discharges, now stopped, for the most part, and the reef flat and edge in this area supports the phosphate loading operation).
• Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations (such as STI's and HIV/AIDS)?	N	The work staging area is expected to be on the edge of the current port lands (after containers are removed). There is already very poor sanitation and solid waste disposal throughout the port area, which can start to be improved with the construction of this project, and its operation. Worker-local population concern for STI's and HIV/AIDS) is not an issue, as most workers will likely come from the local population, which is fully mobile and integrated throughout the island.
• Social concerns relating to local inconveniences associated with port operation (e.g. increased volume of port traffic, greater risk of accidents, communicable disease transmission)?	N	While shipping volumes will probably increase over time, the improved port operations, clearing out the empty containers, disposing of all the solid waste and scrap, and repairing the roads adjacent to the port will probably eliminate most current issues. However, a more secure port (fenced) may be seen as an inconvenience for locals who presently come and go with no controls, Access to the ocean through the existing port for local fishers needs to be managed – excluded during ship unloading and loading operations.
• Deterioration of water quality due to ship (e.g. ballast water, oil waste, lubricant and fuel spills, sewage) and waterfront industry discharges?	N	Incoming empty vessels currently discharge ballast water offshore (as required by regulations) and come in light. Other MARPOL conventions apply (regarding sewage and oily waste). Significant water exchange occurs all along the reef front in this area, and water quality is very good, despite land-based drainage from the port, communities to the north, phosphate dust, and current vessel operations. There are no new waterfront industries expected (just ongoing phosphate loading and fuel transfers). While the phosphate operations will not be affected by the project, fuel transfer and handling should be significantly improved with the proposed project.
• Increased noise and air pollution resulting from airborne emissions (e.g. gas, smoke, fumes) from maneuvering and berthing ships and the waterfront industry?	N	Vessel movements will occur closer to shore (compared to current use of the mooring system by all vessels, which happens slightly offshore). However, there is generally good air movement (shore breezes) in this area, which will disperse any airborne emissions (including the ongoing production of phosphate dust). Noise levels (due to vessel movements) may be increase slightly with the project, but will probably still be less than the current noise produced by container handling. These risks are confined to port workers.
• Large population increase during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	N	Workers will come from the local community and outside of the nation for specialist roles and as such will require housing for the off island workers. Suitable workers camps are in existence on the island with adequate social and infrastructure services.
• Social conflicts especially when workers from other areas are hired?	N	Not expected to be an issue.
• Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	N	These will be confined to the port and stay within the port footprint.
• Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	N	The work sites will be secured, and the overall port security will be much improved, with operation of the project. The local public will be less exposed to health and safety risks compared to the ports situation now.

Climate Change and Disaster Risk Questions The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.	**Yes**	**No**	**Remarks**
▪ Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes (see Appendix I)?	**X**		The environmental assessment and design will take account of climate change impacts and include suitable resilience measures.
▪ Could changes in precipitation, temperature, salinity, or extreme events over the Project lifespan affect its sustainability or cost?		**X**	
▪ Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		**X**	
▪ Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., increasing traffic or housing in areas that will be more prone to flooding, by encouraging settlement in earthquake zones)?		**X**	

Annex 2a: Checklist for Preliminary Climate Risk Screening

Country/Project Title: Nauru Port:

Sector:

Subsector:

Division/Department: PPTA

NOTE: Developed by the authors ADB 2015 Nauru Port Prefeasibility Study

Screening Questions		Score	Remarks
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	2	Exposed to high waves with a relatively short period (very long fetch) during low pressure systems offshore. Engineering design (materials and loadings) to accommodate this risk, which may increase over time.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	2	Sea level is expected to rise, and all structures will therefore accommodate this, over a 50-year projection.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	Not significantly different from now, as high air temperatures and high humidity will continue to prevail.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	2	The integrity of hard infrastructure and lines, cables, boats, etc. is constrained by sea conditions (banging up against structures, materials lost off-deck, etc.). Port design, and operational guidelines, can help reduce the risk.
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	1	As now, the operability of the port (number of working days for all types of ships) will be constrained by very extreme events, but a more functional port should be able to increase the number of working days in slightly worse conditions, compared to now.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): High (7)

Other Comments: Climate resilience will be built into the port design (for climate projections for the next 50 years) and port operational guidelines will be very clear on the working limits for the port as they relate to wind speeds, and wave direction and height.

Annex 3: Terms of Reference of the International Environmental Specialist

Environment Specialist (international, 2 person-months). The consultant will;

a. undertake public consultation in coordination with the social/poverty, gender and resettlement specialist;

b. undertake visual/photographic transects of the reef as required;

c. undertake detailed survey of water quality, contaminant input sources to the marine environment and active coastal erosion sites in the port area, undertake an audit of existing port facilities and operations and identify corrective actions as required as per para. 12 Appendix 4 of ADB Safeguard Policy Statement 2009 (SPS);

d. undertake marine ecological surveys in the near-shore, inter-tidal and reef areas to detail the baseline characteristics of the physical and biological environment in addition to the inspections undertaken for the pre-feasibility study work and the pre-construction environmental assessment;

e. in coordination with the social/poverty, gender and resettlement specialist provide the baseline characteristics of the socio-economic environment;

f. based on the baseline conditions, identify and assess the impacts of pre-construction , construction and operation activities and identify mitigations to avoid and/or reduce/manage the impacts;

g. identify capacity building requirements in NPA (and other relevant government agencies) for implementation of environmental management, health and safety, and monitoring requirements during construction and operation of the port;

h. work with the social/poverty, gender and resettlement specialist to prepare a grievance redress mechanism for the project;

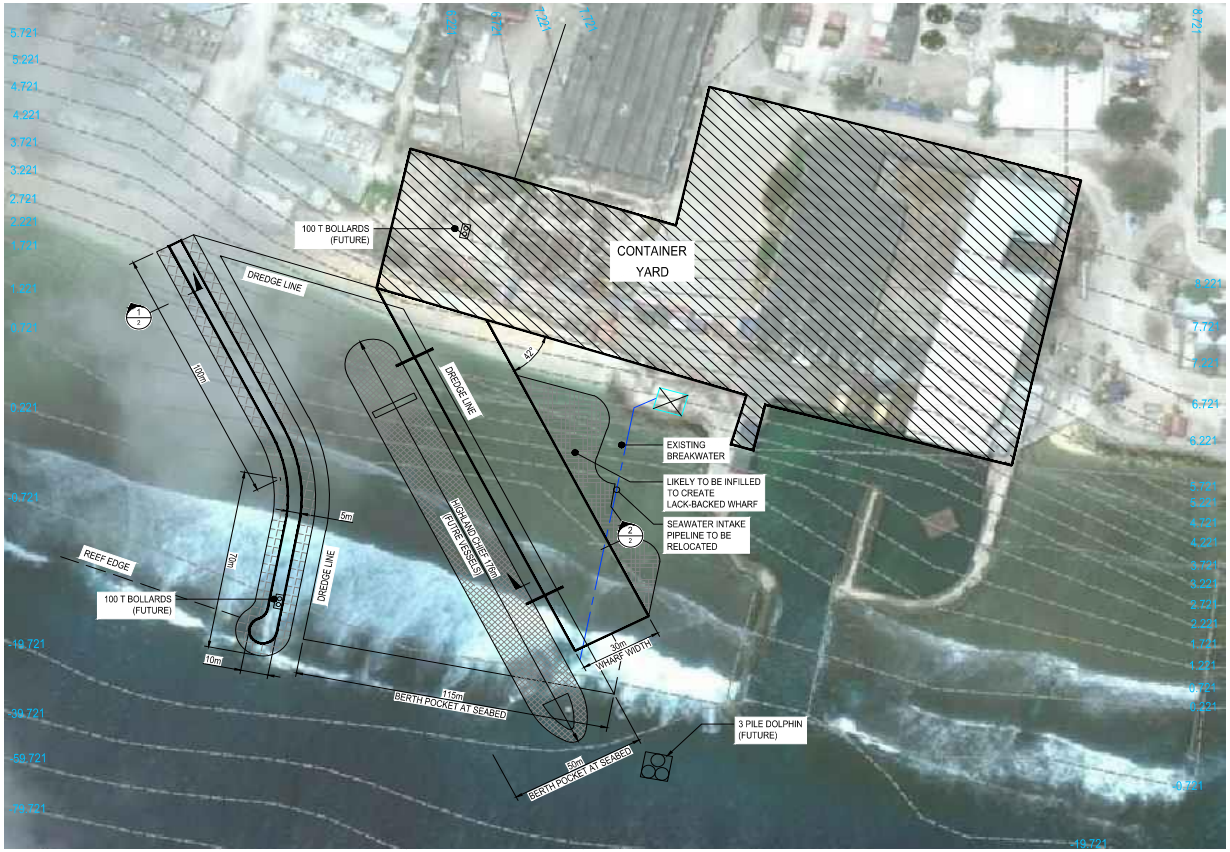
i. compile the foregoing into an environmental assessment (initial environmental examination) following the requirements of the SPS;

j. and provide advice and support to the consulting firm recruited to undertake the project design advance (PDA) in relation to integration of the environmental management plan and provisions from the environmental assessment being integrated into the construction bid documents.

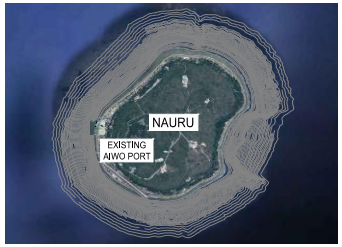
The consultant will be a postgraduate with a degree in environmental science, planning, or policy and possess substantial and recent experience in environmental impact assessment, environmental management planning and implementation, international experience working in environmental assessment/management in port and/or harbor development in several developing countries, and experience in Pacific countries.

Annex 4: Illustration of the Proposed Port Development Project


NORTH
LEGEND:
CONTAINER TYPE
TYS
FULL CONTAINERS
141
REEFERS
15
EMPTY CONTAINERS
145
X-RAY PROBE FUTURE PROVISION
WEIGH BRIDGE FUTURE PROVISION
PROPOSED INSPECTION BAY
LIGHT VEHICLES INTERNAL ACCESS ROAD
PEDESTRIAN FOOTPATH
5.0 R.L.
7.5 R.L.
BREAKWATER
BERTH CANAL
WHARF
PROPOSED CRASH BARRIERS
PROPOSED NEW MOORING PILES
FINAL POSITION OF PILES TO BE AGREED ON SITE
VESSEL HATCH COVER LAY-DOWN AREA
GENERAL SITE LAYOUT PLAN
SCALE 1:1000



PLAN VIEW



SITE LOCATION PLAN
NTS

LOCALITY PLAN
SCALE 1:10000

LEGEND:
- PROPOSED STRUCTURE
- EXISTING CONTOURS

CONSTRUCTION SEQUENCE

1. DREDGE/EXCAVATE BERTH POCKET USING LAND BASED EXCAVATOR AND DRILL AND BLAST WHERE REQUIRED, CUT SEAWARD ROCK LAST TO MAXIMISE OPPORTUNITY TO WORK 'IN THE DRY'
2. CONSTRUCT BREAKWATER
3. RELOCATE SEAWATER INTAKE PIPELINE AND CONSIDER INFILL (HATCHED AREA)
4. CONSTRUCT WHARF 'LEAP FROG' FROM LAND
5. INSTALL FENDERS, BOLLARDS, CP AND ALL FURNITURE

GENERAL NOTES

ALL LEVELS ARE TO LAT WHICH IS 0.279m ABOVE NAURU CHART DATUM

Rev	Date	Description	Des.	Verif.	Appd.
1	18.10.2016	ISSUED FOR REVIEW			

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		Date
Drawn	KP	
Checked		
Designed		
Verified		
Approved		

Client: NAURU
Project: NAURU PORT DEVELOPMENT PROJECT
Title: OPTION 2
DREDGED BERTH POCKET - SHEET A

Status: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION PURPOSES
Datum | Scale: AS SHOWN | Size: A3
Drawing Number: AC86200-020
Revision: 1

Annex 5: Threat Criteria, Consequence Scales and Risk Management

Identification of risk

The risks identified for the pre-construction (design) phase have been identified through the REA. Identified risks detailed in the REA and key environmental impact that related to site construction and operation are the only risks are evaluated for this project. Other potential risks that were deemed not relevant to the pre-construction phase of the project and score zero environmental impact risk rating have not been included.

Risk analysis

An important feature is the recognition of the fact that an event's consequence extends beyond the environment. This methodology ensures that the full consequences of events are visible to risk owners and managers, and that community effects are considered, understood and treated. Each class of consequence is rated a score of 0-5.

An analysis of each risk is undertaken to determine an environmental event's likelihood of occurrence and its consequences. A five-level qualitative description of the likelihood and consequences for each risk enables a semi-quantitative method to be used to calculate a 'score' for each risk.

Consequence of likelihood

Definitions for Consequences and Likelihood are shown in the tables below.

Calculation of risk level

Two levels of risk are used: The Primary Risk Level (PRL) is a conservative measure of risk, based on the most severe consequences across all the relevant criteria. PRL is calculated according to the equation: Primary Risk Level (PRL) = Likelihood Rating X Maximum Consequence Rating. The Secondary Risk Level (SRL) is a less conservative measure of risk, which incorporates all relevant criteria, not just the most severe ones. SRL is calculated according to the equation: Secondary Risk Level (SRL) = Likelihood Rating X Average

Consequence rating

In most circumstances PRL should be the preferred measure, as it is more conservative. Risk scores are banded into risk levels which provide a 'plain English' view of the risk. Scores will always be visible to enable prioritization within bands. The bands, their threshold values and indicative management action are documented in the tables below.

Selection and application of controls

Two levels of controls can be applied: Standard Controls are the inherent set of controls set out initially in the IEE, The Additional Controls are applied in case where the Expected Residual Risk is above a set limit.

Determination of mitigation measures

Following the analysis of a risk it is necessary to investigate the options available for risk treatment and then determine the option/s that provides the greatest cost benefit. Risks may be treated in one or a combination of ways: a) Avoiding a risk by preventing the activity that leads to the risk eventuating; b) Reducing the likelihood of the risk eventuating; c) Reducing the consequences if the risk does eventuate; d) Transfer the risk; e) Retaining the risk.

Risk Management Framework

Risk Level 1 (very low) to 10 (very high)

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
Environmental Impacts Associated with the Pre-Construction (design) phase of the NPDP site.										
Site close to or adjacent to any environmentally sensitive areas.	▪ No terrestrial nor marine sensitive areas or protected areas within project site nor adjacent area of influence; ▪ Project Site does include coastal foreshore, and marine intertidal (reef flat and reef crest) and subtidal (reef edge and upper and lower slope) areas. Intertidal areas highly modified by existing port infrastructure and operations; ▪ Care needs to be exercised during project development to reduce impacts (physical and contaminants) entering the coastal zone; ▪ No Risk associated with the environmental sensitive areas; ▪ Potential minor risk associated with existing marine environment therefore, minor environmental impacts.	2	1	2	4 Medium Risk	2 Low Risk	NFMRA	5.3.7	Low Risk	Minor impact expected on the marine and foreshore environment as environment already highly modified.
Site close to Cultural & Historical Areas/sites.	▪ No cultural or historical areas or sites within project site nor adjacent area of influence;	1	1	1	1 Vert Low Risk	1 Very Low Risk	Survey Data	5.3.7	Very Low Risk	Very minor risk during consultation phase protocols to be developed to ensure correct

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	▪ Potential for unearthing WWII memorabilia during construction; ▪ Due diligence therefore required in planning to ensure management or artifacts if located.									management if located.
Climate Change Adaptation.	▪ Climate change impacts required to be included in all design and scope of works for the NPDP.	2	2	2	4 Medium Risk	4 Medium Risk	Survey Data	5.3.2 5.3.3 5.3.4 5.3.5 5.3.6 5.3.7 5.3.8 5.3.9 5.3.10	Low Risk	Risk very low if international climate change construction techniques are incorporated into the projects design and implemented.
Environmental Impacts Associated with the Construction Phase of the NPDP site.										
Site contamination – land based hazardous materials used on site.	▪ Hazardous (toxic) substances used during existing Port decommissioning and up grading and replacement of buildings – including petrochemicals (fuels, oils) cement and possibly bitumen (rood resurfacing). ▪ Hazardous substances (petrochemicals) sequestered in substrate (rock and/or soil) possible but likely. ▪ Minor contamination found in isolated areas during assessment, resulting from legacy issues. Contamination	2	1	5	10 High Risk	5 Medium Risk	EMP	5.3.2 5.3.3	Low Risk	Additional control provided by DCIE and/or project by auditing the project site on at least a monthly basis. Expect a residual low risk level.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	of petrochemical (oil) from past port activities and poor waste oil management practises, sewage (septic – leach field) and household business grey water discharge in soil; ▪ NPA initiated clean-up of areas during project design phase. Therefore, potential risk very minor if managed correctly.									
Site contamination – land based hazardous material off site	▪ Hazardous substances transported to site from landfill material (rock, soil), very limited and unlikely; ▪ Majority of material extracted within the site (reef intertidal) and used within the site; ▪ Additional landfill if required transported to site from regulated/ permitted quarry site (topside); ▪ Potential risk unlikely, very minor if any environmental impact.	1	1	1	1 Very Low Risk	1 Very Low Risk	EMP	5.3.2 5.3.3 5.3.7	Very Low Risk	No Change.
Site contamination – Intertidal reef based hazardous materials used on site.	▪ Hazardous (toxic) substances not located within intertidal nor subtidal marine assessment; ▪ Hazardous substances (petrochemicals) sequestered in substrate (rock and/or soil) very	1	1	1	1 Very Low Risk	1 Very Low Risk	EMP	5.3.2 5.3.3 5.3.7	Very Low Risk	No Change.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	unlikely, however possible surface contamination from activities within the port – legacy issue – not located during assessment; ▪ Old steel structures dumped within sub tidal reef system – no contamination apparent apart from original physical damage.									
Site Contamination – construction material.	▪ Construction material used during port and harbor up grading and replacement – including limestone aggregates, blue metal, sand, cement and steel; ▪ Construction material acquired from onsite excavations (berth pocket) and/or existing permitted sources (topside); ▪ Reuse & recycle construction material to reduce wastage and improve sustainability; ▪ Potential risk very minor if managed correctly.	2	1	3	6 Medium Risk	3 Low Risk	EMP	5.3.2 5.3.3 5.3.6	Low Risk	Low Risk level expected with Standard Controls.
Site Contamination – Spoil and waste Disposal	▪ Construction material used during port and harbor up grading and replacement – including limestone aggregates, blue metal, sand, cement and steel; ▪ Construction material acquired from onsite	2	1	3	6 Medium Risk	3 Low Risk	EMP	5.3.2 5.3.3	Low Risk	Low Risk level expected with Standard Controls.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	excavations (berth pocket) and/or existing permitted sources (topside); ▪ Reuse & recycle construction material to reduce wastage and improve sustainability; ▪ Potential risk very minor if managed correctly.									
Site Contamination – Marine environment-quality, turbidity & pollution.	▪ Possible increased surface water runoff on land site and adjacent areas during construction; ▪ Storm water volume and sediment load potential to increase during construction phase; ▪ Runoff expected to remain on site, water expected to pool (intensive rainfall), percolate through site ground; ▪ Use of sediment traps will mitigate; ▪ Pollutants entering freshwater lens possible, especially high rain fall events; ▪ Increased sediment load (calcium carbonate) during all activities on the reef flat. Trenching on the reef flat, edge and upper slope, backfilling the foreshore and developing the breakwater;	2	1	5	10 High Risk	5 Medium Risk	EMP	5.3.2 5.3.3 5.3.6 5.3.7	Low Risk	Additional control provided by DCIE and/or project by auditing the project site on at least a monthly basis. Expect a residual low risk level.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	▪ Activities undertaken during low water and include sediment traps will mitigate sediment load; ▪ Potential risk minor if managed correct and anticipated dilution and disbursement of sediments on the reef during periods of high water.									
Site Contamination – Land Based – Sewage – septic.	▪ Toxic release of sewage due to damage to septic within port site possible but highly unlikely; ▪ Septic system on site and leach field; ▪ Possible legacy issue within site but small potential issue; ▪ Potential risk unlikely, very minor if any environmental impact.	1	1	1	1 Very Low	1 Very Low	EMP	5.3.3 5.3.6 5.3.7	Very Low Risk	Potential low risk provided standard controls applied. Management of construction workers required.
Site Contamination – Land Based Asbestos roofing.	▪ Presence of asbestos roof sheeting throughout the port terrestrial site; ▪ Total removal of all roofing and safe storage in containers till disposal; ▪ Removal and storage of asbestos is to be undertaken by a separate contract not ADB – however precautionary approach is required to ensure due	2	1	5	10 High Risk	5 Medium Risk	EMP	5.3.2	Low Risk	Additional control provided by DCIE and/or project by auditing the project site on at least a monthly basis. Expect a residual low risk level.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	process is undertaken within the NPDP. ▪ Possible asbestos poisoning during removal. International OH &S standards to be applied and compliance to Nauru protocols; ▪ Potential risk minor if correct management protocols implemented.									
Flora – Fauna terrestrial vegetation removal.	▪ Site vegetation almost non-existent, 2 trees to be removed and very minor grass removal within the port; ▪ No fauna expected to be impacted; ▪ Cleared land to receive land fill/aggregate or cement; ▪ Potential risk very low, very site specific and very minor if any environmental impact.	1	1	1	1 Very Low risk	1 Very Low Risk	EMP	5.3.3	Very Low Risk	Potential very low or no risk provided standard controls applied.
Flora – Fauna marine removal.	▪ High impact on sessile benthic organisms associated with the trenched reef flat areas (intertidal) for the berth pocket, breakwater, wharf and backfill areas; ▪ Minor impacts expected on marine benthic resources in the area of influence of sediment derived from the construction activities – albeit short lived;	2	1	5	10 High Risk	5 Medium Risk	EMP	5.3.3 5.3.6 5.3.7	Low Risk	Additional control provided by DCIE and/or project by auditing the project site on at least a monthly basis. Expect a residual low risk level.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	▪ Impacted zone very low hard coral presence, reef biodiversity and resource economic importance. Reef dominated by algae; ▪ Potential risk is high and imminent, however biological impact low.									
Noise and Vibration _ Construction period.	▪ Increase ambient noise level and ground vibration will occur during all construction including rebuilding infrastructure, trenching and port development due to the use of machinery and transportation; ▪ Restricted to approved hours, noting scope and condition and due diligence relating to noise suppression through maintenance of vehicles and machinery; ▪ Intertidal reef construction works restricted to periods of low water, possible night time activities may be required; ▪ Scope of works not in close proximity to houses and business resulting in minor community interruptions; ▪ The site is a commercial port and as such noise and	1	1	5	5 Medium Risk	5 Medium Risk	EMP	5.3.4 5.3.9 5.3.10	Low Risk	Risk can be reduced to low, is standard controls are used.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	vibration are a result of daily operational activities; ▪ Potential risk low and minor if any environmental impact.									
Air Pollution – Construction period.	▪ Increase ambient dust level and pollution will occur during construction due to use of construction machinery and transportation of materials (to and within site); ▪ Restricted to approved working hours, noting scope and conditions and due diligence using water suppression and covering of construction material during period of hot, dry and windy conditions; ▪ The site is located on the coastal foreshore and as such normal wind conditions will transport dust and pollution in an offshore direction; ▪ Potential risk low, very minor if any environmental impact.	1	1	5	5 Medium Risk	5 Medium Risk	EMP	5.3.4 5.3.9 5.3.10	Low Risk	Risk can be reduced to low, is standard controls are used.
Site Contamination – Acid Sulfate soils	▪ Soils containing iron sulphides are not reported from the existing port site and are not expected to be located during construction;	1	1	1	1 Very Low Risk	1 Very Low Risk	EMP	5.3.2 5.3.3	Very Low Risk	Very minor risk during construction activities.

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
	▪ Potential risk very unlikely, very minor and site specific if present.									
Ordnance (UXO) Survey Assessment.	▪ All construction drilling activities to be assessed (includes terrestrial and shallow water marine environments) before excavation activities allowed to commence; ▪ Potential (minor) physical disturbance to environment during assessment survey; ▪ Potential human safety issue if UXO located; ▪ Potential environmental physical damage if UXO located, removed and/or explodes; ▪ Potential noise and/or air pollution from equipment used very minor; ▪ Potential OH&S risk to all NPA staff, survey team and general public if UXO is located; ▪ Due diligence required to locate and remove ordnance.	1	1	1	1 Very Low Risk	1 Very Low Risk	EMP	5.3.2 5.3.4 5.3.5 5.3.8 5.3.9 5.3.10	Very Low Risk	Very minor risk. If UXO located possible damage if not handled correctly (very low risk)
Environmental Impacts Associated with the Operation Phase of the NPDP site.										
Operational and maintenance activities of the Nauru Port –	▪ All work undertaken on site – no impact on the surrounding communities;	1	1	2	2 Low Risk	2 Low Risk	EMP	5.3.2 5.3.4 5.3.5 5.3.6 5.3.7	Low Risk	No change

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
Increase dust and noise pollution.	▪ Potential increase in ambient dust (air pollution) and noise levels occurring during daily operational activities within the port, especially when vessels are docked and unload/loading activities undertaken; ▪ Potential low risk, very minor if any environmental impact outside of the port boundaries.							5.3.9 5.3.10		
Operational and maintenance activities of the Nauru Port – Increase marine pollution and sedimentation.	▪ All work undertaken on site – no impact on the surrounding communities; ▪ Potential increase in marine pollution resulting from ships and port poor waste management including household/ship basic rubbish, wastewater (e.g. grey water, sewage) and petrochemicals; ▪ Potential increase in sediments derived from vessel activities within the port; ▪ Potential low risk, very minor with all environmental impacts within the port boundaries.	1	1	2	2 Low Risk	2 Low Risk	EMP	5.3.2 5.3.4 5.3.5 5.3.6 5.3.7 5.3.9 5.3.10	Low Risk	No change
Operational and maintenance activities of the	▪ All work undertaken on site – no impact on the surrounding communities;	1	1	2	2 Low Risk	2 Low Risk	EMP	5.3.2 5.3.4 5.3.5	Low Risk	No change

Environmental Aspect	Description of Risk	Consequence Rating		Likelihood	Risk Level		Controls	Mitigation Measures	Expected Residual Risk	Comments
		Maximum	Average		High (PRL)	Average (SRL)	Standard/ Additional	Refer to Section 5	Based on successful control	
Nauru Port – Increase terrestrial pollution.	▪ Potential increase in land based pollution (e.g. petrochemicals,) due to poorly maintained equipment, lack of skilled staff and lack of compliance; ▪ Potential low risk, very minor with all environmental impacts within the port boundaries.							5.3.6 5.3.7 5.3.9 5.3.10		
Operational and maintenance activities of the Nauru Port – Physical damage to the port from berthage.	▪ All work undertaken on site – no impact on the surrounding communities; ▪ Potential increase in vessel collision associated with the berthing location, increased during period of inclement weather; ▪ Potential low risk, very minor with all environmental impacts within the port boundaries.	1	1	2	2 Low Risk	2 Low Risk	EMP	5.3.2 5.3.4 5.3.5 5.3.6 5.3.7 5.3.9 5.3.10	Low Risk	No change

Table 1 – Threat Criteria and Consequence Scales

Rating	Capability & Mission	Environment	Community & Sustainability	Safety (Staff & Public)	Compliance & Reputation	Financial
5 Catastrophic	All activities cease. No resumption for at least 12 months. Major unacceptable delays in delivery of capability occurring at critical times. Unable to conduct missions. Failure to achieve critical performance goals.	A long term environmental harm. Permanent irreparable damage is caused to the environment.	Significant, extensive, detrimental long-term impacts on the community or public health. Irreparable damage to highly valued structures or locations of cultural significance or sacred value. Permanent and significant loss of scarce environmental resources.	Multiple fatalities, large number of major injuries or occupational illness (acute or chronic). Public exposed to a severe, adverse long-term health impact or life-threatening hazard.	Sustained detrimental national or state media reports. Subject of parliamentary committee hearing. Sustained community outrage. Potential large-scale class action or prosecution with significant fine or imprisonment.	Extreme financial loss (>$10m) to remedy.
4 Major	All normal activities curtailed. No resumption of normal activities for between 6 – 12 months. Major delays of capability delivery but at non-critical times. Unable to conduct missions. Failure to achieve some performance targets.	Significant environmental damage with widespread impacts. Damage may be permanent.	Significant detrimental impacts on the community or public health. Major damage to highly valued structures or locations of cultural significance or sacred value. Significant loss of scarce environmental resources.	Single fatality or serious non-recoverable injury, several major injuries. Permanent disablement. Public exposed to a hazard that could cause injuries or moderate adverse health effects.	Numerous detrimental national or state media reports. Subject of a number of parliamentary questions or ministerials. Organized community concern. High profile legal challenge or prosecution with heavy fine.	Major financial loss ($0.5-10m) to remedy.
3 Moderate	Most activities affected. No resumption of normal activities for up to 6 months. Significant delays resulting in some reduction in performance.	Moderate violation of regulation or guideline with moderate damage to the environment and significant clean-up cost.	Detrimental impacts on the community or public health. Damage to valued structures or locations of cultural significance or sacred value. Loss of scarce environmental resources.	A number of safety incidents requiring treatment by a physician. Exposure of public to a hazard that could cause minor injuries or minor adverse health effects. Illness requiring treatment.	Detrimental national or state media reports. Subject of parliamentary questions or ministerials. Community concerns and complaints. Some legal constraints imposed minimal fine.	Moderate financial loss ($0.05-0.5m) to remedy.
2 Minor	Modification to planned activities can be expected. Minor delays. Minor performance degradation.	Minor violation of regulation or guideline with minimal damage to the environment and small clean up. Immediately contained on-site.	Minor impact on the community or public health. Minor damage to valued structures or locations of cultural significance or sacred value. Minor loss of environmental resources.	A number of safety incidents requiring treatment by a qualified first aid person. Exposure of public to a hazard that does not cause injury or affect health adversely.	Detrimental local media reports. Subject of local government action. Random substantiated complaints from the community. Minor technical legal challenge or breach.	Minor financial loss ($0.005-0.05m) to remedy.

Rating	Capability & Mission	Environment	Community & Sustainability	Safety (Staff & Public)	Compliance & Reputation	Financial
1 Insignificant	Some minor modification to planned activities may be necessary. Insignificant delays. Negligible performance impact.	Negligible release or damage that is contained on-site and is non-reportable. The damage is fully recoverable with no permanent impact on the environment.	Negligible social impact. Negligible damage to valued structures or locations of cultural significance or sacred value. Negligible loss of environmental resources.	Minor of safety incidents only. Negligible impact on staff or the public. No lost work time.	Possibility of detrimental local media reports. Trivial substantiated complaints from the community. Negligible legal impact or breach.	Insignificant financial loss (<$0.005m) to remedy.
0 Nil	No impact on schedules.	No environmental impact.	No social impact, damage to valued structures or locations of cultural significance or sacred value or loss of environmental resources.	No incidents.	No impact.	No cost impact.

Table 2: Likelihood Table

Rating	LIKELIHOOD **The potential for risks to occur and lead to the assessed consequences**			
5	Almost certain	Very high, may occur at least several times per year	Probability over 0.8	A similar outcome has arisen several times per year in the same location, operation or activity
4	Likely	High, may arise about once per year	Probability 0.5 – 0.8	A similar outcome has arisen several times per year in Defense
3	Possible	Possible, may arise about once in a one to ten year period	Probability 0.1 – 0.5	A similar outcome has arisen at some time previously in Defense
2	Unlikely	Not impossible, likely to occur during the next ten to twenty-five years	Probability 0.04 – 0.1	A similar outcome has arisen at some time previously in Defense, but action has been taken to reduce the chance of recurrence
1	Rare	Very low, very unlikely during the next twenty-five years	Probability less than 0.04	A similar outcome has arisen world-wide

Table 3: Risk levels and Management Action (example)

Risk Level (PRL or SRL)	Descriptor	Indicative Management Action
16-25	Extreme	Immediate action required, senior management will be involved
9-15.9	High	Senior management attention needed and management responsibilities specified for further action
4-8.9	Medium	Manage by specific monitoring or response procedures, develop more detailed actions as resources allow
1-3.9	Low	Manage by routine procedures, unlikely to need specific application of resources

Annex 6: List of Government and Public Consultations Associated with the Project

Stakeholder	Position	Contact
Friday 25 November 2015		
Mr. Ted Mcfadyen	Team Leader – PPTA Cardno	Tedmcf48@hotmail.com
Ms. Cladia Strier	Social Safeguards- PPTA Cardno	cstrier@windowslive.com
Mr Anton Jimwereiy	CEO Nauru Ports Authority	antonjimwereiy@gmail.com
Mr. Henry Cocker	Deputy Secretary Planning & Aid Division, Ministry of Finance.	henry.cocker@naurugov.nr
Mr Beeing Yeeting	Fisheries Specialist Nauru Fisheries and Marine Resource Authority (NFMRA).	byeeting@gmail.com
Saturday 26 November		
Mr. Jonas Star	Fisheries Extension Officer – Coastal NFMRA	Not supplied.
Mr. Delvin Thoma	Acting Senior Coastal Fisheries Officer NFMRA	Delvin.oneal@gmail.com
Mr Anton Jimwereiy	CEO Nauru Ports Authority	antonjimwereiy@gmail.com
Sunday 27 November		
Mr Anton Jimwereiy	CEO Nauru Ports Authority	antonjimwereiy@gmail.com
Monday 28 November		
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Mr. Jonas Star	Fisheries Extension Officer – Coastal NFMRA	Not supplied
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Mr. Blake Thackrah	Plumbing Coordinator – Canstruct company	PH: 5570097
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Tuesday 29 November		
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Mr Anton Jimwereiy	CEO Nauru Ports Authority	antonjimwereiy@gmail.com
Wednesday 30 November		
Project Team		