

CLIENT: **MINISTRY OF COMMUNICATIONS & TRANSPORT**

PROJECT: **RESURFACE OF RUNWAYS & MARKINGS**

LOCATION: **TUVALU**

PROJECT NO.: **2621**

McConnell Dowell Corporation
MCD Management System

CONTRACTOR'S ENVIRONMENTAL MANAGEMENT PLAN (CEMP)

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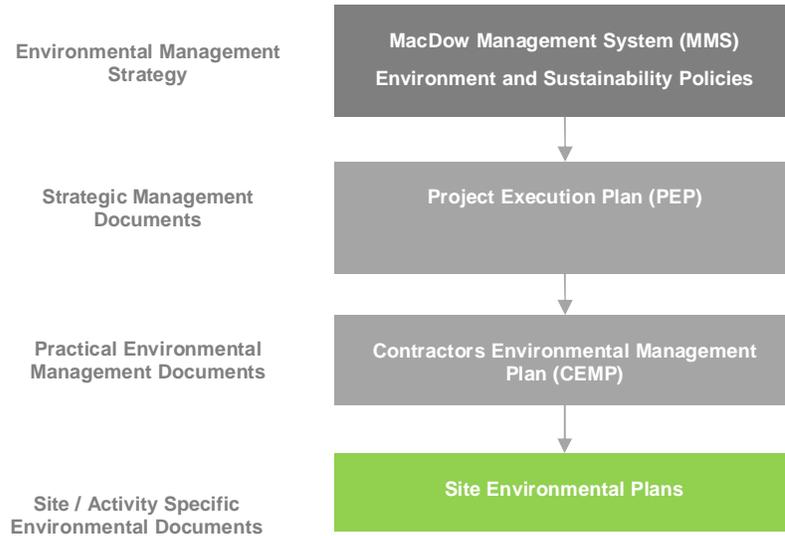
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1.0 INTRODUCTION

1.1 PLAN OBJECTIVES

This Contractor's Environmental Management Plan (CEMP) covers strategies, systems and procedures to ensure the Resurface of Runways and Markings, Tuvalu (hereafter known as the Project) meets the environmental obligations and targets for the construction of the Project. This CEMP forms an integral part of McConnell Dowell Management System (MMS) and applies to the activities that are anticipated to occur during the construction of the Project.

The purpose of this CEMP and incorporated documents is to:

- Achieve the Project's stated environmental objectives and targets;
- Ensure legal and contractual compliance;
- Ensure compliance with the PAIP Environmental Management Plan; and
- Outline procedures for the management of environmental protection issues during construction phase.

This CEMP is the primary document for managing potential environmental risks and opportunities during the Project. It provides the framework for identifying environmental aspects and impacts associated with the construction phase. In addition, it provides a framework for managing the environmental controls and processes implemented by McConnell Dowell, subcontractors and consultants in carrying out their respective responsibilities in relation to the Project.

1.2 STANDARD ABBREVIATIONS

CEMP	Contractor's Environmental Management Plan
CEP	Construction Execution Procedure
EMS	Environmental Management System
ERP	Emergency Response Plan
HSE	Health, Safety and Environment
JSEA	Job Safety and Environmental Analysis
PEP	Project Execution Plan
MMS	McConnell Dowell Management System
KPI	Key Performance Indicators

1.3 PROJECT PERSONNEL ABBREVIATIONS

DC	Document Controller
EMR	Environmental Management Representative
HRR	Human Resource Manager
PDM	Project Design Manager
PE	Project Engineer
PM	Project Manager (most senior responsible person)
QMR	Quality Management Representative
SA	Site Administrator

SUPT Superintendent
SUPV Supervisor

2.0 PROJECT OVERVIEW

2.1 CLIENT

The Project Client is the Ministry of Communication and Transport (MCT).

2.2 PROJECT DESCRIPTION

The project involves the upgrading of airside pavements at Funafuti Airport and maintenance resurfacing improvement works on Tuvalu Roads. This upgrading generally includes the resurfacing or rehabilitating and upgrading of the runway, taxiway and aprons and related infrastructure works.

The Employer is Ministry of Communications and Transport, Tuvalu and is financed by the World Bank.

2.3 SITE INFORMATION

The Site is located at Funafuti International Airport, on Funafuti Atoll. Funafuti is the capital of Tuvalu Islands. The Tuvalu Islands themselves are over 3,000km from Auckland and Brisbane. The Tuvalu islands are remote from major infrastructure development in the region.

The Ministry of Transport and Communication of Tuvalu Government is rehabilitating and upgrading the runway, taxiway and apron for a projected service life of 20 years. The runway upgrade will facilitate the operation of current and future turbo-prop DASH 8 – Q300/Q400, ATR 42/72, CA 580A, and HS 748. As an emergency response capability C130 Hercules (military) operations are also considered.

2.4 SCOPE OF WORKS

2.4.1 Funafuti Airport

The scope of work at the Funafuti Airport comprises of:

- Supply of aggregates and bituminous materials;
- Reconstruction works on the taxiway;
- Installation of electrical ducting;
- Grout injection;
- Application of Surface Enrichment Spray Treatment to an area of 45,500m²;
- Application of two coat chip seal to runway, apron and taxiway (45,500m²);
- Runway turning nodes and extension to the existing apron; and
- Provision of paint markings.

2.4.2 Funafuti Road

The scope of work for the Funafuti Road comprises of:

- Supply of aggregates and bituminous materials;
- Repairs to gravel surfaced areas;
- Repairs to distressed sections of the concrete pavement;
- Surface Enrichment Spray Treatment to an area of 36,600m²; and

- One coat chip sealing to an area of 45,000m²; and
- A second coat seal to selected junctions.

3.0 STATUTORY AND POLICY FRAMEWORK

3.1 ENVIRONMENTAL LEGISLATION

McConnell Dowell will ensure compliance with all relevant legislation and aim to employ best practice environmental management procedures for the construction of the Project. Key environmental legislation for the Project is outlined below:

3.1.1 Summary of Environmental Legislation

Legislation	Description
Environmental Protection Act 2008	The Environmental Protection Act (2008 edition) is the national legislation which provides for the protection and management of the environment in Tuvalu. Part 6 provides details of the responsibility of the Department of Environment in relation to pollution control and waste management in Tuvalu including the management of hazardous waste, control and management of discharges of pollutants and promoting composting, recycling and efficient use of wastes.
Marine Pollution Act 1991	The Marine Pollution Act (2008 Revised Edition) also requires the control and prevention of pollution, and dumping and incineration of wastes on the sea.
Quarantine Act 2008	The Quarantine Act (2008 Revision) allows for measures related to the inspection, exclusion, detention, observation, segregation, isolation, protection, treatment, sanitary regulation and disinfection of vessels, persons, goods and things and having as their object the prevention of the introduction or spread of diseases or pests affecting man.
Basel Convention	The Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal is an international treaty designed to reduce the movements of hazardous waste between nations, and specifically to prevent the transfer of hazardous waste from developed to less developed countries (LDCs). The Convention is intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.
Civil Aviation Act 2008	The Quarantine Act (2008 Revision) allows for measures related to the inspection, exclusion, detention, observation, segregation, isolation, protection, treatment, sanitary regulation and disinfection of vessels, persons, goods and things and having as their object the prevention of the introduction or spread of diseases or pests affecting man. The Quarantine (Marine and Aerial) Regulations (2008 Revision) provides the regulations for the arrival of passengers within Tuvalu either by air or sea and requirements regarding declaration of communicable

Legislation	Description
	diseases. The Civil Aviation Act (2008 Revision) allows for the administration and regulation of civil aviation including safety and economic requirements, establishment of aerodromes, and declaration of land subject to control for airport operational safety and security.
Waigani Convention	The Waigani Convention is a treaty that bans the exporting of hazardous or radioactive waste to Pacific Island Forum countries and prohibits Forum Island countries from importing such waste. The convention has been ratified by Fiji and New Zealand. It entered into force in 2001.
Regional Requirements	The Funafuti Kaupule (Town Council) are able to implement local regulations for management of the environment. On Fongafale the Funafuti Kaupule coordinate the town rubbish collection and assist SWAT in waste management and education programmes. The Environment Protection Act allows the Funafuti Kaupule to establish an Environmental Committee which may identify areas of environmental concern, participate in and propose activities to the Department of Environment work programme.

The **Compliance with Legal and Other Requirements** (MMS # 000-D004-000) procedure which is part of the Project Execution Plan (PEP) outlines how McConnell Dowell identifies, maintains and evaluates compliance with legal and other related requirements that are applicable to delivery of the Project. This legislation is identified and recorded in **PEP Att2-1B Review Record ENV Legal**.

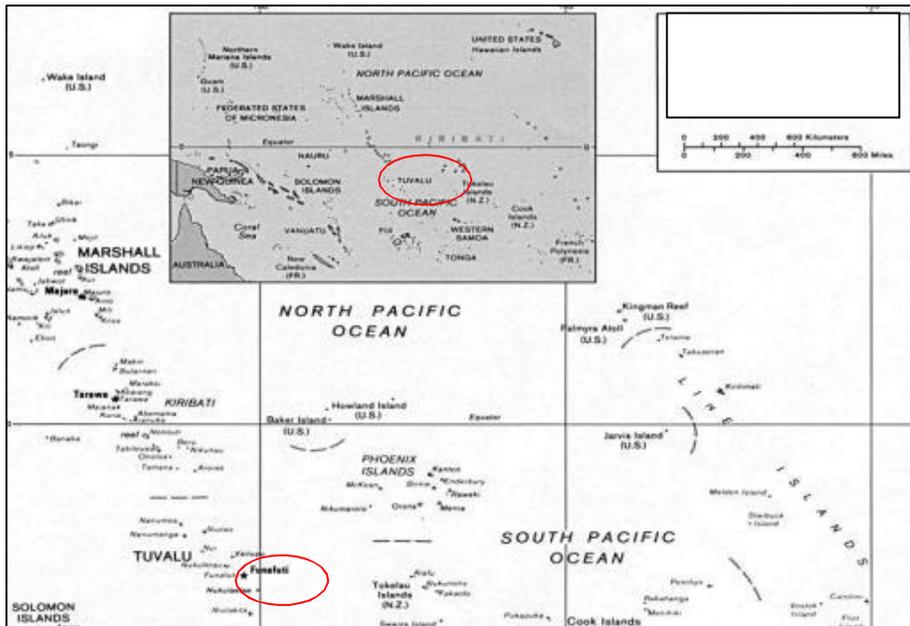
All relevant legislation requirements are identified and recorded at the commencement of the Project and included within the development of the PEP and specific management plans. Legislation and compliance are reviewed by management on at least an annual basis.

4.0 ENVIRONMENTAL & SOCIAL ENVIRONMENT

4.1 PHYSICAL ENVIRONMENT

4.1.1 Location and Geography

Tuvalu is a Polynesian island nation that lies in the Central South Pacific, west of the International Dateline and 1,000 km north of Fiji. The three islands and six atolls that make up Tuvalu stretch for just 579 km (360 miles) and measure approximately 25 km² in total land area. The capital of Tuvalu is the entire atoll of Funafuti, where the airport is located.



Funafuti measures between 20 and 400 metres wide, encircling a large lagoon. The land area of the 33 islets of Funafuti aggregates to 2.4 km². The airport is located on Fongafale islet in the village of Vaiaku on the eastern side of the atoll. The eastern side of the atoll is also where the majority of landmass is and population reside.

4.1.2 Land Use

Land availability in Funafuti is limited and infrastructure has encroached into the runway clearance zone (e.g. roads). The south eastern side of the runway is primarily Government owned land with the meteorological services, Public Works Department (PWD) compound, the prison, the sports field, the power station, demonstration gardens (funded by The Republic of China (Taiwan)), and private pig farms on leased land. The north and south western side of the runway is dominated by residential houses and a small number of commercial properties and is a mix of Government and privately owned land. The north eastern end of the runway is the ocean side of the atoll.

There is also a brackish pond adjacent to the north eastern tip of the runway (Tafua Pond) which was partially infilled when the runway was first constructed in 1942. There are no official conservation areas in the vicinity of the airport however the Tree Care Project has a demonstration plot north of the terminal between the Airport Road and Tuvalu Road, west of the Runway. The plot is a pulaka (swampy taro) pit rehabilitation site to reduce land degradation.

Adjacent to the current terminal building is the Falekaupule (34th Independence Anniversary), MP and Speaker of the House offices and the Women's Craft Centre. The land all these buildings are on is Government owned. It is proposed to remove selected buildings (namely the terminal and offices) to allow for the new airport terminal to be set back from the apron (out of the obstacle limitation surface) and increase in size. As there is pressure on land availability in Tuvalu the terminal design allows for some spaces to have multiple functions.

4.1.3 Climate

Funafuti has a tropical climate with temperatures directly related to the ocean temperature and do not vary greatly from an average high of 31 °C and an average low of 25 °C. The wettest months are usually between November and April with the annual rainfall on Funafuti reaching over 3,000

mm, averaging over 200 mm per month. Cyclones tend to be more frequent during El Nino. Wind direction is usually north easterly and average wind speeds are between 24 and 32 kph.

4.1.4 Soils and Geology

Funafuti is a coral atoll and as such the surface soils are derived from limestone which is the result of coral reef deposits. Soil quality and saltwater contamination of the underlying freshwater lens has meant that intensive horticulture is not possible. Produce tends to be grown in raised garden beds in topsoil. The increase in composting activities (from coordinated village compost schemes to the household composting toilets) has meant the use of soil improvers to supply necessary nutrients to the soil.

While generally limestone derived soils tend to be highly porous, in the more densely populated areas of Funafuti compaction of the soil, particularly on road verges and on the heavily trafficked side of the runway, causes localised flooding during heavy rainfall events.

Mangrove replanting programmes are also underway on Funafuti to help with sand retention and buffering the effects of erosion and storm surges. The construction of the runway in 1943 using aggregate dug up from within the Fongafale landmass has left large pits that fill with sea water during king tides (usually in February and March). These pits have become dumping areas for rubbish and other waste posing significant health risks.

4.1.5 Water Resources

The lagoon is the largest in Tuvalu measuring 24.5 km by 17.5 km, with an area of 275 km². Some atolls have freshwater lenses underlying the landmass that sit on top of underground salt water. Funafuti's freshwater lens is no longer a viable source of freshwater for the community due to pollution and salt water intrusion. The community rely on rainwater harvesting and three desalination plants. Therefore water efficiency measures and rainwater harvesting are to be incorporated into terminal and drainage designs.

During the construction phase, McConnell Dowell will secure a water supply which does not adversely affect the community's freshwater reserves.

4.2 BIOLOGICAL ENVIRONMENT

4.2.1 Marine Biodiversity

The marine environment provides the main local source of protein and the major natural resource base for economic exploitation, both for local use and through foreign licensing agreements with foreign fishing nations. Exploitation at the local level is mainly for subsistence use. A review of the conservation area in 2003 found an abundance of large sized fish of target food species indicating that either the biomass of the conservation area was spilling over to the rest of the lagoon or that the fishing pressures throughout the lagoon are relatively low.

About 75% of the fish landings in Tuvalu are ocean species, predominantly two species of tuna - skipjack and yellowfin. The remainder is made of reef and lagoon species, with smaller amounts of bottom fish from deep slope areas. From census data it has been determined that 74% of households in Tuvalu participate in reef fishing and 63% in ocean fishing (2002 census data).

The 2009 Tuvalu National Biodiversity Strategy and Action Plan identified the crown-of-thorns starfish (*Acanthaster planci*) as an emerging threat which was introduced into Tuvaluan waters through discharge of ballast water and other carrying water cargos. Coral bleaching is also on the rise which is caused by a rise in water temperature (can be less than 1 °C).

4.2.2 Terrestrial Biodiversity

Funafuti is a narrow, densely populated landmass which has undergone significant anthropogenic changes. Coconut, breadfruit and pandanus dominate the landscape as do pawpaw and other food species. The vegetation has been affected by the contamination of the freshwater lens with salt water and subsidence crops require careful cultivation and application of compost and nutrients to sustain the crops. In Tuvalu nearly 65% of the flora is not native. The swamp taro is the traditional source of carbohydrate in the Tuvalu diet. As swamp taro is grown in pits so it is particularly susceptible to the effects of salt water intrusion into the high water table.

4.2.3 Rare or Endangered Species

The 2008 International Union for Conservation of Nature (IUCN) Red List identified a total of 84 species in Tuvalu which are threatened. None of the species identified are endemic and no species have been identified as extinct. A total of 461 species were assessed and 1 bird, 2 mammals, 8 fish, 72 invertebrates and 1 reptile species were identified as being threatened. The IUCN regard the threatened status of animals and plants as one of the most useful signs for assessing the condition of an ecosystem and its biodiversity. The IUCN Red List of Threatened Species™ (IUCN Red List) is widely recognized as the most comprehensive, apolitical approach for assessing and monitoring the status of biodiversity. The green sea turtle, hawksbill turtle, bay shark, and the leatherback turtle are endangered.

The location of the airport is not near any conservation areas and is located within the most developed area of the country. However there is still potential for activities carried out in relation to this project to encounter a threatened species. Mitigation measures to deal with these encounters have been identified in Section 8 of this CEMP.

4.3 SOCIO ECONOMIC CONDITIONS

4.3.1 Population and Demographics

The Tuvalu census is carried out every 10 years with the most recent conducted in November 2012 however at the time of writing results from this census were not available. The Tuvalu Central Statistics Division estimated the 2011 national population at 11,206. The 2002 census reported the population of Funafuti as 4,492, comprising 2,281 males and 2,211 females. The population density of Funafuti was reported as 1,610 per km².

The average annual rate of growth on Funafuti (1991-2002) was 0.9%.

4.3.2 Education and Health

School attendance is compulsory from age 7 to 15. On Funafuti there is one government primary school (Nauti Primary School), one Seventh Day Adventist primary school, and one high school run by the Church of Tuvalu (Fetuvalu High School). Nauti Primary School is located approximately 390m northwest of the northern end of the airport runway on Fogaafale Road and in 2007 had an enrolment of 2,093 (Tuvalu Central Statistics Division) and Fetuvalu High School is located approximately 4.4 km north of the airport on Tuvalu Road (2.5 km north of the port) and in 2004 had an enrolment of 183 (Tuvalu Central Statistics Division).

Tuvalu has 18 pre-schools or early childhood learning centres. The Vaiaku Pre-school (early childhood learning centre) is located on Airport Road approximately 35 m from the edge of the runway pavement on the north western side.

Life expectancy at birth is 63.6 years. Funafuti boasts the only hospital in Tuvalu, the Princess Margaret Hospital on Fogaafale Road approximately 430 m north west of the northern tip of the airport runway. Tuberculosis appears to be on the rise (WHO Country Profile, 2011) however this could be due to the improved testing facilities and diagnostics. A filariasis (roundworm) mass drug administration and deworming programmes are in place. Diseases like dengue and typhoid fever occur from time to time. Education programmes are in place for food hygiene, water purification through boiling and nutrition.

4.3.3 Livelihoods and Economic Activities

Tuvalu's economy suffers from problems of geographic isolation, few resources, and a small population. The country has no known mineral resources and few exports. Subsistence farming and fishing are the primary economic activities. The islands are too small and too remote for development of a large-scale tourist industry. Income from fishing license fees, remittances, surpluses from the Tuvalu Trust Fund (an international sovereign wealth fund established in 1987 by the United Kingdom, Australia and New Zealand), and rent of its ".tv" internet domain are highly variable. There is a high reliance on imported goods, as there is very little manufacturing on the island due to the lack of resources and water. Some marine resources and coconut products are exported but most people derive income from Seamen and family members working overseas through remittances sent to their families. The 2010 Household Income and Expenditure Survey reported the average monthly household consumption expenditure as AU\$1,331 for inhabitants of Funafuti, compared to the average monthly household income of AU\$1,364 for Funafuti households. Approximately 90% of Funafuti households reported earning wage and salary income.

The IMF estimated the Gross Domestic Product (GDP) of Tuvalu for 2012 was US\$36 million, with a per capita GDP of US\$ 3,246. The GDP by sector is agriculture 16 %, industry 27.2%, and services 56.2%.

4.3.4 Land Tenure and Rights

The land tenure system is largely based on kaitasi (extended family ownership) making land availability for business development restrictive. On Fongafale, it is prohibited to build a house or extension to an existing building even on private land unless approved by the Funafuti Kaupule in cases of privately owned lands, and by the Lands Management Committee in cases of lands leased by Government. This helps to control vegetation clearance, beach mining (for construction material) and density.

5.0 ENVIRONMENTAL MANAGEMENT APPROACH

5.1 ENVIRONMENTAL POLICY

McConnell Dowell will lead by example in ensuring that statutory and contractual requirements are met and positive environmental performance is maximised. To achieve this, the McConnell Dowell Board have developed an Environmental Policy that directs the level of commitment to positive environmental performance for the Project (refer to appendix 16.1).

The Policy makes the following key commitments:

- Continuous Improvement;

- Prevention of Pollution;
- Compliance with Legal and Other Requirements;
- Sustainable Development.

5.2 ENVIRONMENTAL MANAGEMENT SYSTEM

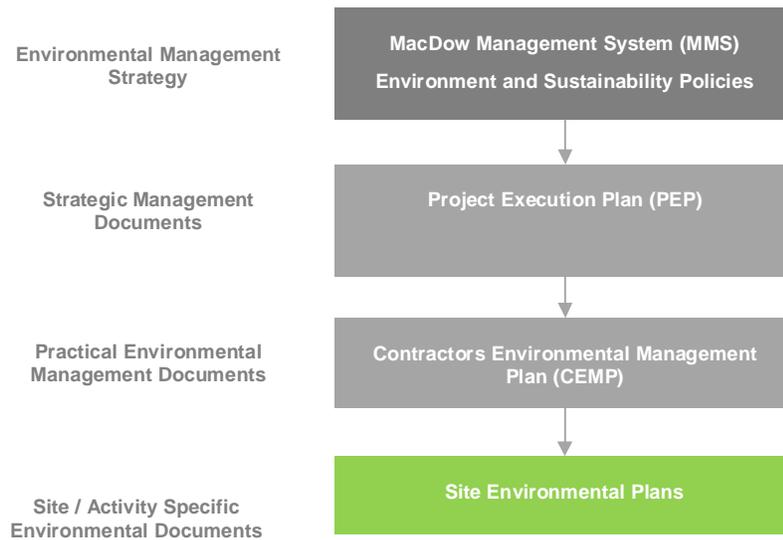
McConnell Dowell operates an ISO 14001 accredited Environmental Management System (EMS) that forms part of the integrated MacDow Management System (MMS). The MMS provides the framework for managers to implement specified corporate standards and practices in a consistent manner. It defines the application of work practices, processes, and systems for engineering / design, acquisition of materials, equipment and services, construction, and other services related to tendering and project execution.

5.3 ENVIRONMENTAL MANAGEMENT FRAMEWORK

This CEMP forms part of the overarching Project Execution Plan (PEP) for the delivery of the Project. The CEMP provides a system and set of procedures to ensure that McConnell Dowell establishes and maintains sound and effective controls to manage potential environmental impacts throughout the Project / ongoing Facility operations, and wherever practicable, realise opportunities for enhanced environmental outcomes.

Effective environmental management needs to be proactive rather than reactive. The CEMP is therefore based upon a risk management approach to identify and assess environmental risk associated with each element of the project and to implement appropriate mitigation strategies to minimise the subsequent risk. This CEMP provides a series of issue specific management procedures to address key environmental aspects for the construction of the Project.

The approach to environmental management activities developed for the Project is shown graphically below with each level of management control described in the following sections.



5.3.1 Site Environmental Plans

Site Environmental Plans (SEPs) are spatial representations, in the form of an aerial photograph of a segment of the construction alignment, illustrating the key site features relating to environmental management which are developed for the entire length of the Project. The SEPs will provide a picture of the existing environmental values, including cultural heritage sites and flora and fauna sites of significance within the Project alignment from which area / site specific controls will be implemented to protect the existing value.

In addition to the environmental values to be protected, SEPs will represent the location of the site environmental controls and other key environmentally relevant features of the Project, including access routes and haul roads, site office / compound areas, wash down areas, waste storage areas, chemical and fuel storage areas and sedimentation basin locations. The SEPs will be continually updated to reflect the dynamic nature of the Project as construction progresses.

The SEPs will be used as part of the CEP process to provide the Construction Team with as much information as possible to ensure that all key environmental sites and locations are identified as part of the CEP being produced.

5.3.2 Construction Execution Procedures

Construction Execution Procedures (CEP) are developed and implemented for each major part of the scope of work, defining the methodology, management strategies, responsibilities, resource requirements, testing and recording requirements, contractual and legal requirements and the identification of separate work packages or stages. Safety and environmental risks are also anticipated and associated controls are recommended. Documentation, such as Job Safety Environment Analysis's (JSEAs) are referenced where applicable.

CEPs are developed by the Project Team in advance of work commencing, providing a technical explanation of the requirements for each major work activity. The Plans are developed in consultation with the Environmental Management Representative to ensure that any required environmental or sustainability controls are embedded into the processes adopted. Personnel involved in the specific activity covered by the CEP are inducted into the requirements by the Site Supervisor to ensure they understand their responsibility to comply with its requirements and to

implement any required controls. All CEP require review and approval by the Environmental Management Representative prior to work commencing on the Project.

5.3.3 Job Safety and Environmental Analysis

The Job Safety and Environmental Analysis (JSEA) is a tool used to determine environmental risk associated with tasks prior to commencing a component of work. Each task is reduced to individual steps and the potential hazard associated with each step identified. Risk mitigation steps are attributed to each hazard, thus providing a detailed plan for installation of control measures.

The main strength of JSEAs prepared on the job is their ability to focus on unique risks at a particular point in time — for example, current conditions, resources, experience of workers and impact with other jobs or people. JSEAs prepared on the job are best carried out close in time and location to the execution of the associated works. It is acceptable to use a pre-existing generic JSEA as a basis to commence the process but it is essential that current circumstances such as site conditions, level of experience of the crew, prevailing weather conditions, etc. are incorporated into the job specific JSEA.

5.4 ENVIRONMENTAL RESPONSIBILITIES

5.4.1 Leadership

Sustainability and environmental protection are core values in the position descriptions of all staff. From the Project Manager down, all staff will lead by example, setting the highest standards for environmental management and performance. They are to act immediately to correct any non-conforming conditions or behaviours and promote environmental awareness, good environmental behaviours and continuous improvement at every opportunity. The Project Team will be assisted by the Environmental Management Representative throughout the duration of the works.

The following Project personnel have key accountabilities in the development, approval and execution of the works in accordance with this Plan:

- Construction Manager
- Project Manager
- Environmental Management Representative
- Project Engineer / Site Engineer
- Superintendent / Supervisors

Ultimate environmental responsibilities for each of the nominated Project Team representatives are outlined below.

5.4.2 Construction Manager

The Construction Manager has ultimate responsibility to:

- Promote at all times the company's policies, procedures and standards relating to health, safety and environmental management and ensure that they are complied with;
- Ensure sufficient resources are available to achieve the Project's policy, objectives and targets and that those resources have sufficient skills to conduct the roles competently;
- Report performance on a regular basis to internal and external stakeholders; and
- Report significant incidents internally and externally as required by law and the Project Conditions.

5.4.3 Project Manager

The Project Manager has responsibility to:

- Ensure the Project achieves legislative compliance;
- Provide leadership in the development and implementation of this CEMP;
- Ensure that engineers, supervisors, foreman, operators and construction workers are familiar with and implement all relevant environmental control measures;
- Periodically review all environmental control measures to assess their ongoing applicability and effectiveness;
- Encourage all employees to maintain acceptable standards of health, safety and environmental work practices and foster awareness of health, safety and environmental matters; and
- Encourage the reporting of incidents, events and other concerns and ensure appropriate feedback on proposed corrective actions.

5.4.4 Environmental Management Representative

The Environmental Management Representative (EMR) is the functional and technical leader for the Project's environmental obligations, and the principal contact for internal and external communication. They have the authority and responsibility for overseeing all environmental management aspects, including the following key responsibilities:

- Be the principal source of functional and technical expertise available to the entire Project team;
- Provide leadership sufficient to inspire and influence others to achieve the Project objectives and targets;
- Develop, review and ensure implementation of the CEMP and all issue specific Environmental Management Plans;
- Ensure that environmental plans, procedures and work instructions as applicable are prepared, reviewed and approved prior to commencement of work;
- Ensure all significant environmental issues are reflected in the significant environmental aspects identified for the Project;
- Report significant incidents internally and externally as required by law and the Project Conditions;
- Ensure that all key environmental aspects and associated impacts are incorporated into this CEMP, and that suitable control measures are proposed to minimise the Project's environmental impact;
- Ensure that all relevant environmental permits are obtained for the Project;
- Ensure all staff and contractors engaged to work on the Project are appropriately inducted and trained in environmental issues and controls relevant to the Project;
- Ensure monitoring programs, which assess the performance of this CEMP and specific Plans, are implemented;
- Report internally and externally in accordance with Project and other requirements;
- Conduct an employee and sub-contractor induction training session, prior to each individual beginning work on the Project;
- Provide ongoing support to Supervisors and site personnel in implementing the CEMP; and

- Investigate and report incidents and non-conformance and ensure corrective and preventive action is taken and is effective.

5.4.5 Project and Site Engineer

The Project and Site Engineers have the responsibility to:

- Ensure designs are undertaken in accordance with the requirements of the Project Scope, Technical Requirements, CEMP and relevant standards;
- Ensure design has minimal environmental impact; and
- Participate in incident and non-conformance report investigations and ensure that corrective and preventative action proposed is implemented effectively.

5.4.6 Superintendent and Supervisors

The Project Superintendent and Supervisors have the responsibility to:

- Ensure work undertaken on the Project is in accordance with the requirements of the Project Scope, technical requirements, CEMP and relevant standards;
- Ensure environmental impacts are minimised;
- Promote zero tolerance of harm to the environment; and
- Participate in incident and non-conformance report investigations and ensure that corrective and preventative action proposed is implemented effectively.

5.4.7 Sub-Contractor Management

In general, all subcontractors engaged on the Project are required to operate within the requirements of this CEMP. In some circumstances, based on the activities to be conducted by the subcontractor, the Project Manager may determine that the subcontractor be required to develop a Project specific Subcontractor Environmental Management Plan.

Where a Subcontractor Environmental Management Plan is required, this Plan will address the specific work packages awarded and will be submitted to the EMR for approval. Works will be unable to commence until approval from the EMR has been received. Such Plans must assess the level of environmental risk and implement appropriate management controls for the subcontractor's full scope of work to a standard that is consistent with this CEMP.

Regardless of the approach to managing a subcontractor's environmental impacts, all subcontractors will be subject to the following:

- Regular on-site auditing to assess their performance against the requirements of this CEMP;
- Completion of the appropriate training requirements as specified in the Training Matrix; and
- Implementation, protection and maintenance of environmental management controls as set out in the Project's environmental management documentation, including JSEAs and CEPs.

6.0 ENVIRONMENTAL ISSUES & REQUIREMENTS

6.1 HAZARD AND RISK IDENTIFICATION

During Project execution, the principal objectives of risk management are to develop and monitor the implementation and effectiveness of risk treatments and to identify and evaluate changes in the risk profile of the Project.

A HSE risk assessment will be undertaken for the Project in compliance with the requirements of **HSE Risk Assessment (MMS # 020-E008-100)**. A number of residual risks associated with the Project are likely as remaining moderate or high after the implementation of control measures. These risks may include:

- Damage to existing infrastructure during trench excavation;
- Chemical spill/ leak due to incorrect storage or handling;
- Removal or damage to marine plants without a permit;
- Increased traffic on local roads during the construction period;
- Noise and vibration impacts on sensitive local receptors; or
- Chemical spill/ leak during transportation on site due to accident or incorrect transportation.

A Project HSE risk register of all identified risks will be created and kept as a live document on the Project site (Ref. **Att13-1 Project HSE Risk Register**). This register will be updated where appropriate through the lifetime of the Project. This risk assessment process is based on the Standard **AS/NZS ISO 31000:2009 – Risk Management Principles and guidelines** and covers all aspects of the Project including normal and abnormal operations or activities and any potential emergency situations.

The risk register is a live document, continually revised during the Project duration as risks or further information comes to hand. A preliminary risk register for the Project has been developed from available tender and planning information. This document will form the basis for future revisions.

6.2 SENSITIVE RECEPTORS

Environmental issues generated by the construction of the Project may affect sensitive receptors surrounding the work site, haul roads and access roads.

Fongafale is densely populated with little available landmass for expansion and so homes, schools and the hospital are located very close to the roads and airport runway. Homes, schools (including pre-schools), and hospitals are categorised as sensitive receptors where people can be more susceptible to the adverse effects of exposure, like to traffic (safety), noise, dust and vibrations. Sensitive receptors do not usually include places of business or public open space.

Specific consultation shall be undertaken with the identified sensitive receptors before and during construction activities to ensure impacts are minimised and community safety is ensured. This is particularly important for the road rehabilitation component of the project and transport of materials and equipment from the port to the construction camp. Mitigation measures may include construction works or transport during specific hours which do not impact school hours or specific traffic (includes pedestrian) safety management like flag controls and route diversions.

6.2.1 Key Sensitive Receptors:

The Key sensitive receptors that have been identified are:

- Nauti Primary School on Fogaafale Road
- Fetuvalu High School on Tuvalu Road
- Seventh Day Adventist Primary School
- Vaiaku Pre-school on Airport Road
- Princess Margaret Hospital on Fogaafale Road
- Residential homes along the length of the road network and runway

Environmentally sensitive areas and the appropriate management techniques will be communicated to all staff during their initial site induction training and reinforced when the scope of works to be completed may have a degree of impact upon the identified sites.

6.3 EXISTING ENVIRONMENTAL CONDITIONS

The Key potential impacts to be mitigated are:

- Solid waste generation;
- Soil erosion through vegetation clearing and excavation;
- Hazardous materials handling and storage
- Noise and vibration disturbances from machinery and transportation of materials;
- Air pollution from dust and equipment;
- Traffic disruption during construction activities;
- Transport of equipment and materials from the port and around Fongafale;
- Disposal of waste materials;
- Safety hazards for workers and users of the facilities where upgrades are occurring;
- Water demand management for freshwater users;
- Wastewater discharges;
- Construction camp (site yard) establishment and dis-establishment

7.0 ENVIRONMENTAL & SOCIAL IMPACTS

7.1 OVERVIEW OF IMPACTS

The TvAIP scope is to rehabilitate the existing runway and road surfaces (including limited drainage improvements) and upgrade of the terminal, control tower and navigation aids. New land acquisition is not required and the project is unlikely to cause any major negative environmental or social impacts as the work is improving existing infrastructure. The social outcomes of the TvAIP are expected to be positive by improving safety, accessibility and mobility of island communities. No land acquisition is required thus no physical resettlement will be necessary. However an RPF has been developed to provide the framework for managing any temporary land requirements and for loss of food trees or structures that may have encroached into the road corridor.

Possible negative impacts related to the airport and road upgrade are expected to be confined to the construction phase. Public notices and consultation with affected people will continue throughout the project. Where appropriate, warning notices and project bulletins will be posted informing the community when particular stages are to be completed and opportunities for involvement, whether through employment, collection and reuse of demolition materials or if there are complaints. With timely and proper implementation of this CEMP and application of appropriate mitigation measures, most if not all the potential negative impacts can be prevented or minimized. These impacts are expected to be limited to the following impacts, however this CEMP is a dynamic document and any changes in design or construction methodology may result in a reduction of impacts or additional impacts that will require mitigation.

7.2 ENVIRONMENTAL IMPACTS

7.2.1 Solid Waste

Refer to Solid Waste Management Plan

7.2.2 Water Resources

Freshwater will be required for workers and some construction activities (e.g. dust suppression, and concrete and bitumen production). The impact on current water supply could be major if not properly mitigated through good resource planning. Water efficiency, conservation and reclamation practices will be adopted.

7.2.3 Biological Resources

The TvAIP will rehabilitate and upgrade the existing infrastructure. The airport is located within an area of Fongafale which is densely populated and developed. Anthropogenic changes have already occurred. It is not anticipated that there will be any further loss of habitat or disturbance that is not short term (e.g. related to the construction phase). There is the possibility that in the process of construction works fauna (e.g. nesting birds) could be impacted or the temporary removal of vegetation (e.g. for trenching) could impact on potential habitats. The habitats surrounding the runway are primarily open grass with foot traffic and pig farming in the area. Mitigation measures will include liaison with the Department of Environment should any fauna (reptile, avian, or mammal) be encountered that affect construction activities (e.g. nesting bird).

7.2.4 Hazardous Materials

Potential soil and water pollution from construction run-off with fuel and lubricants are expected to be temporary and minor. Work practices and mitigation measures for spills will be implemented, including a Spill Response Plan and bunded areas for storage during construction.

7.2.5 Noise and Vibration

Noise and vibration disturbances are particularly likely during construction related to the transportation of construction materials from the port and operation of equipment (e.g. milling of pavement surface). These impacts will be short-term and affect different people at different times.

Impacts include noise during pavement resurfacing and possible effect of vibration caused by operation of heavy machinery, increased traffic in some sections of roads, etc. Due to the land constraints on Funafuti, residential houses and businesses are located adjacent to the airport and directly adjacent to the road network. In some areas of the road network, there is little distance from the road edge and a house or building. Therefore noise and vibration is likely to be an ongoing issue throughout the construction stage. As the airport and road are existing infrastructure, any noise or vibration impacts are probably already being experienced by the local community. The improvements to the road surface should help reduce some of these existing operational impacts.

The increased shipping requirements for import of materials and equipment and the export of waste materials and equipment at the end of the Project will increase the noise and vibrations caused by cargo unloading and loading and movement of materials and equipment to storage areas.

7.2.6 Erosion and Sediment Control

Some soil erosion may occur as a result of the removal of shrubs and earth cover during resurfacing, and restoration of pavement areas and drainage. The impacts on vegetative cover will

be short-term and reversible through natural regeneration. There is only a thin topsoil layer in most parts and runoff is easily filtered into the underlying groundwater table. Where topsoil is required to be cleared this will be set aside for use in restoration of disturbed areas.

Sediment has the potential to be generated during any excavations, particularly for the apron extension (approximate area 777 m²) and addition of the turning bays at either end of the runway (approximately 1,117 m² each). The excavation of the turning bays will be to a depth of approximately 0.2 m and for the apron extension a depth of 0.5 m.

7.2.7 Air Emissions

Air pollution can arise due to improper maintenance of equipment, dust generation and the bitumen smoke / fumes arising from application of the new pavement seal and maintenance work. Impacts are expected to be localised and short term with only minor negative impacts on the ambient air quality in the vicinity of the construction areas. No ongoing impact to air quality is expected as this is rehabilitation of existing infrastructure. Fongafale is densely populated, while air quality impacts are likely to be short term they will affect more people, particularly when construction work is near sensitive receptors.

Air quality also has the potential to be impacted as a result of the increased shipping that will occur to import and export materials and equipment for the Project. Dust can be generated during the unloading of the aggregate to be used for the runway and road pavement and the ships exhaust can emit harmful and odorous gasses which can be both a nuisance and be detrimental to human health if prolonged and concentrated exposure is experienced.

7.2.8 Traffic and Airport Operations

Impacts will occur during the road resurfacing and maintenance works, and also in transporting equipment and materials from the port. These impacts will mostly be short-term and through good mitigation and traffic management, the impacts should be low. A Traffic Management Plan (TMP) will be designed and implemented for the Project. The TMP will consider pedestrian traffic as well as vehicle traffic management, and particular attention will be given to management near sensitive receptors (schools, residential dwellings, markets, churches etc). Generally traffic and road safety should be improved once the construction works are completed with improved drainage, road surface and safety measures.

The MOWP will specify safety measures required for the operation of the airport when construction work is underway. The MOWP includes instruction on airfield operational distances, FOD protection, airfield security, and responsibility hierarchy and communication methods.

7.2.9 Wastewater Discharges

Sanitary facilities for workers will be identified and made available to prevent lagoons or other areas being used.

Uncontrolled wastewater (e.g. sewage, grey water, wash water) discharges have the potential to contaminate soil, water and spread disease. Wash water from equipment can be contaminated with hydrocarbons (e.g. oil and fuel) which have a detrimental effect on aquatic life, water quality and soil quality. There are also human health impacts regarding hydrocarbon exposure which vary in severity depending on type and length of exposure. Wash water from concrete processing and cutting is highly alkaline and can burn vegetation, result in fish kills and also cause burns to the skin. Sediment loads in wash water if allowed to discharge to either marine or freshwater systems can also adversely impact aquatic life and water quality. While the potential impacts of uncontrolled

discharges of wastewater can adversely affect the receiving environment, they can be easily mitigated through planning and implementation of mitigation measures.

The increase in ships to the harbour could also cause an increase in marine water pollution as a result of discharges of bilge and ballast water, vessel sewage, and oily wastewater. These discharges can adversely affect benthic communities, fish, and general water quality. Ballast water also has the potential to introduce new potentially invasive species which can displace and compete with local marine species.

7.2.10 Biosecurity

All aggregate material and equipment will need to be imported as there are very limited natural resources available on Tuvalu. Imported aggregate and equipment can harbour plant and animal species which may pose a threat to Tuvalu's biodiversity and ecosystems. The aggregate can also be a source of contamination from pesticides and other harmful substances which can pose short and long term environmental and public health risks.

As stated in Section 7.2.9 ballast water also has the potential to introduce new potentially invasive species which can displace and compete with local marine species for food and habitat.

7.2.11 Secondary and Cumulative Impacts

Secondary and cumulative impacts tend to be triggered by impacts to environmental resources that function as integral parts of a larger system over time and space, and can initially be 'invisible' to the normal present time impact assessment. Secondary impacts can include land use changes due to improved accessibility which in turn can impact habitats and pressure on existing resources and utilities (e.g. water supply). Secondary and cumulative impacts also often cannot be managed solely by the project executors (MCT). Town planning (e.g. restricting development and clearing of land) and conservation are two examples of external influences which can assist in reducing secondary and cumulative impacts.

Secondary and cumulative impacts are not always negative, positive impacts include increased business and supply chain opportunities due to improved infrastructure and accessibility, improved access to health and education facilities and employment (beyond the scope of the project).

The airport and road are existing infrastructure which have existing impacts (e.g. noise and dust generation). In most cases the TvAIP will not be able to remedy these impacts however the designs can lessen and in some cases mitigate some of the impacts. For example the increase of impermeable surface (pavement and compaction of shoulders) has caused localised flooding which can be mitigated through the design of improved drainage (e.g. soak holes).

7.2.12 Coastal and Marine Environment

A number of activities have the potential to adversely affect the marine and coastal environment, including uncontrolled discharges (e.g. stormwater, wastewater and spills), use of heavy machinery adjacent to the coast, and increased shipping. Impacts range from destruction of habitat and natural protection (e.g. the boulder bank), to reduced or contaminated water quality and loss of aquatic life due to pollution.

7.3 SOCIAL IMPACTS

7.3.1 Health and Safety

During construction of the Project, health and safety will be managed through the Workplace Health and Safety Management Plan. The primary hazards identified are construction on a public road under normal traffic conditions, construction works involving hot bituminous products (up to 165 °C), and working in extreme ambient temperatures.

During consultation the community also raised concerns regarding the spread of sexually transmitted diseases (particularly HIV) with incoming contractors and workers related to the Project. A number of mitigation measures have been identified including awareness training (offered by the Ministry of Health and the Tuvalu Family Health Association) for foreign workers and employing local labourers (refer to Appendix 16.2).

The runway is not fenced. There appears to be good management of clearing the runway and alerting residents to incoming and outgoing aircraft, however during the construction phase of the project and particularly the resurfacing of the runway, access will need to be limited to ensure community safety. The MOWP will provide specific details on how this is to be managed as fences and other security/safety measures have potential to be an obstruction to airport operations. In the late afternoon and evenings, the runway is used for sports games and informal social gatherings. Unfortunately these activities may be restricted to smaller areas of the runway which are not under construction. This will be a temporary restriction of access.

8.0 MITIGATION MEASURES

Due to the nature of the rehabilitation activities proposed there are some mitigation measures which are applicable to all aspects of the project, while others that are specific to particular components e.g. road resurfacing. Sensitive receptors and environmental values have been identified along the route of the road and around the airport which will require specific mitigation measures for safety and environmental protection. The mitigation measures are outlined in Appendix 16.2. The mitigation tables detail the impact or issue, the mitigation required, where this is to occur, when this mitigation is to be applied, implementation responsibility and supervision responsibility.

This CEMP is a dynamic document which shall be updated to include any variation from the current scope or addition of newly identified impacts and mitigation measures that may arise through the construction process. The mitigation measures associated with the impacts identified above are detailed below.

8.1 AGGREGATE, MATERIALS AND EQUIPMENT IMPORTATION

All materials and equipment must be fumigated and official certificates issued prior to arrival on Fongafale to ensure no plant or animal pests are accidentally introduced. The aggregate and any other fill type material will need to be completely inert and free of contaminants. Verification of source and or results from laboratory testing must be provided for importation. Importation permits and Quarantine certification shall be obtained from the Department of Public Works and Quarantine Department before applying for export permits from the source country of materials. Natural resources of important biodiversity value such as coral reefs shall not be used as construction materials (either locally or imported).

The increased shipping needs for the import of materials and equipment can have an adverse impact on the port facilities and local lagoon habitats. The scale of shipping needs shall be determined by the Project team and is dependent on the project schedule and construction methodology. Additional shipping schedules must to be coordinated with the Harbour Master and MCT.

8.2 HAZARDOUS SUBSTANCE USE, STORAGE AND DISPOSAL

Hazardous liquids (e.g. fuel and lubricants) must be managed within hardstand and bunded areas to prevent runoff to surrounding permeable ground. Bunded areas (secondary containment) must contain the larger of 110% of the largest tank or 25% of the combined volumes in areas with a total storage volume equal or greater than 1,000 litres. Bunded areas are to be impervious (water tight), constructed from chemically resistant material. A spill response plan must be in place and all workers trained in correct implementation of the spill response plan. Spill kits should be available in close proximity to where hazardous substances are used and stored e.g. on the work truck or beside the fuel store.

It is particularly important that care be taken when hazardous substances are used near identified sensitive receptors. Consultation should be undertaken with the schools to determine suitable times for work given pedestrian traffic at the start and end of the school day. This information should be included in the TMP.

Most hazardous substances will be stored in a Dangerous Goods Shed. This will be a 20 foot, if required, internally bunded shipping container with a false floor. The container is ventilated and will be locked out of hours.

Fuel will be stored in bunded storage containers.

8.3 SAFETY AND TRAFFIC MANAGEMENT

The road forms the backbone of the town and there are only a few unpaved links in the network. The traffic loading is generally light with only a limited number of heavy vehicles. Both pedestrians and vehicles use the road. Road safety both during resurfacing and transport of materials and equipment from the port will be managed through the preparation and implementation of a Traffic Management Plan, which must be approved by the MCT. The TMP shall include details of lay down areas (to be negotiated with individual land owners as required), site entry and exit layout, use of signage and flag operators (including night-time safety), and personnel protective equipment to be worn by workers (e.g. high visibility vests). The TMP will also detail specific safety and traffic management measures required around sensitive receptors.

These measures should be developed in consultation with MCT, PWD individual landowners and property managers (e.g. school principals, hospital management, and church leaders) as required. Mitigation measures may include restricted construction times (e.g. time of day and or scheduling for school holidays) outside schools or the hospital, reduced speeds and use of cones or barriers to guide traffic and pedestrians through the worksite. As there is only one road with few feeders and alternative routes, staging and methodology will need to consider access to property along the road. These details will be discussed in both the TMP and the OHSMP.

8.4 STORMWATER AND STORMWATER MANAGEMENT

Available land on Funafuti is limited with houses located close together and close to the road and runway edges. Localised flooding occurs on shoulders where compaction has occurred. The road

rehabilitation has been designed with a 3% fall from the centre line to allow water to drain freely from the road surface.

Water required for construction activities such as dust suppression and concrete production will need to be managed carefully as there is to be no impact on the island's freshwater supply as a result of the TvAIP construction or operational stages. Water for use during construction should be carefully planned for at the pre- construction mobilisation stage by the contractor. If required water should be purchased and stored.

Contractor has procured 5 No. 10,000 litre tanks and we have placed 4 of them at the batching Compound and one just outside our Office to collect rainwater.

Possible non-potable water sources (e.g. seawater) and uses should be identified (e.g. dust suppression, machinery washing), provided there will be no risk of contamination of groundwater. Water saving measures include sweeping of work areas and vehicles tires instead of washing to prevent dust.

Runoff from disturbed areas is not to be discharged directly to the marine or coastal environment. Sediment laden runoff will be treated by erosion and sediment controls, namely silt fences and/or decanting earth bunds, where it will then be discharged to land or reused.

8.5 BITUMEN, ASPHALT AND CONCRETE PLANT

Bitumen requires very high temperatures which pose a significant risk to workers and the general public. Therefore the bitumen should be located within a secure compound, either the construction camp or port, to ensure security and reduce risk of unauthorised access.

The project requires the installation of concrete edge restraints in selected areas of the road network. The concrete will be produced on island at the site concrete batching plant. All concrete slurry and runoff will be contained to ensure there is no discharge of high alkaline water to the natural receiving environment.

Concrete production will be restricted to the batching plant. Sand bags or diversion drains will be used to divert runoff from concrete cutting or setting areas. Wastewater from concrete cutting or production will be collected and treated (settling and neutralisation through pH adjustment). All equipment used in concrete production will be cleaned in designated wash down areas away from surface water.

8.6 CONSTRUCTION CAMP

The construction camp will be used to store equipment and materials for all components of the Project, and as such there are a number of potential hazards associated with the equipment and materials. The construction camp compound will be fenced and secured to prevent access by unauthorised personal. Security of the camp may be undertaken by a local security firm.

Areas within the compound will be clearly marked for solid waste collection, machinery maintenance, hazardous substance storage, plant operations (concrete, bitumen, asphalt) and toilet facilities for workers. Each of these areas will be constructed in such a way to prevent any potential adverse impacts on the surrounding environment. Including, protection from wind and rain, bunding (hazardous substances), clean water diversion drains, and collection and treatment of waste water from site operations (e.g. concrete production, machinery maintenance).

The construction camp will not be used as a residential camp. Project staff will utilise existing local accommodation. The ground of the construction camp will likely be compacted by the end of its use

and so restoration will require scarification of the soil, application of topsoil and revegetation unless the client requests that this area is left 'as is' for their future use.

8.7 EROSION AND SEDIMENT CONTROL

The land on Tuvalu is relatively flat and low lying with porous soils. Wet weather is usually experienced as short, heavy rainfall events, often in the morning or at night. Clean water diversion bunds (earth bund or sand bags) will be constructed around any excavation to prevent ingress of runoff from surrounding areas. Any ponding which may occur within an excavated area shall either be allowed to percolate into the subsoil or pumped out to a settling area or used for dust suppression at a later date. Excavations should be kept to a manageable size to reduce the time of exposure.

The largest stockpiles may be within the construction camp at the laydown area for the imported aggregate. These stockpiles will need to be on an impermeable geotextile and runoff directed to permeable land although the majority of aggregates will be containerised. The aggregate material will be inert larger size pieces. Stockpiles of any fine grain materials (e.g. sand and topsoil) will be covered or stored in containers to prevent dust and sediment laden runoff during rain events.

Runoff from stockpiles and excavations is prohibited from discharging directly to the marine or coastal environment.

8.8 WASTEWATER MANAGEMENT

There are some activities during construction and operation phases of the project which will generate wastewater. The contractor is responsible for ensuring the treatment and disposal of wastewater is in accordance with SWAT advice and approved by MCT and PWD.

All wash down areas and wastewater treatment areas, where practical should be located within the construction camp or PWD compound.

Water will be using primarily for Concrete production and to carry out the Grouting works to the runway. The only wastewater produced in this process will be for the washing out of the Concrete truck and the Grouting pump.

Occasionally water might be used for Dust suppression as required when the cleaning of the road is been undertaken just before the sealing process

Direct discharge to the marine or coastal environment is prohibited. Discharges of treated wash water are to occur to land only. Sufficient measures to avoid direct discharges are required when working adjacent to the marine and coastal environment, particularly for the road resurfacing component, which may include bunding (e.g. sand bags), demarcation of exclusion zones, and limited use of large machinery.

Wastewater from vessels at the port are to comply with the Harbours Act and Harbours Regulations which prohibit discharges of sewage and wastewaters (e.g. ballast, oil). The Harbour Master is responsible for policing this and issuing fines in accordance with the legislation.

8.9 SOLID WASTE MANAGEMENT PLAN

Refer to Solid Waste Management Plan.

8.10 MARINE AND COASTAL SPECIFIC MITIGATION MEASURES

The runway is located at the widest section of the island and at its closest point, is approximately 50m from the ocean (south eastern end of runway). All project work for the runway will be occurring

inland and there will be no direct or indirect discharges (stormwater or wastewater) to the marine environment. However the road is directly adjacent to the beach in some areas, particularly the northern and southern extents. Therefore work in these sections will need to manage runoff by directing it inland from the beach and marine environment. Heavy machinery operating adjacent to the beach should stay on the existing road or inland and not venture on the beach or rubble mound (also known as the boulder bank on the ocean side of the island). Temporary stockpiles and equipment parking is prohibited on the beach.

Surrounding the port are industrial and commercial properties, so while noise and vibration at the port is likely to increase during the project due to the increased shipping, it is unlikely to cause problems with adjoining properties. However loading and unloading activities and the transport of materials and equipment scheduled through the TMP in consultation with the schools and the hospital.

9.0 TRAINING AND COMPETENCY

9.1 OVERVIEW

The environmental competency and experience requirements for all staff positions are contained in the relevant Position Descriptions. Recruitment and procurement processes are conducted with the aim of engaging personnel with the required competency and experience.

All personnel will receive training of a type and level of detail that is appropriate for the environmental aspects of their routine and emergency work assignments. As a minimum, all personnel are required to satisfactorily complete the Project Induction Training. Other mechanisms of communicating environmental controls are through the JSEAs, Tool Box Talks and Pre-Start Meetings, all of which are described below.

Other training needs are assessed on a job-by-job, and position-by-position basis, as outlined in the Project Training Plan. For instance, supervisors, foremen and leading hands involved in earthworks are required to be competent in erosion and sediment control processes, and will therefore complete a training program specifically targeted on this area.

9.2 INDUCTION TRAINING

The Project Induction includes a presentation of the requirements of this CEMP including incident response, emergency procedures and spill management. The purpose of the induction is to ensure that, at a minimum, the employee or sub-contractor:

- Understands the importance of conforming with the environmental policy and procedures and to the requirements of this CEMP;
 - Is aware of the significant environmental values and issues within the vicinity of the Project alignment and the potential impact of the construction activities on these values;
 - Understands the sustainable activities and environmental control measures available to assist the Project to minimise its environmental impact;
 - Is aware of all conditions of environmental, permits and approvals;
 - Understands the potential consequences of a departure from the established procedures;
 - Is aware of the roles and responsibilities relating to environmental management for the Project;
- and

- Is aware of the emergency response and incident procedures.

Attendance records of all training and briefing sessions will be maintained in accordance with the Project Training Plan.

9.3 TOOL BOX TALKS

Tool Box Talks are conducted for site personnel to deliver specific training in an aspect of work or controls, such as spill kit training or correct erection of a silt fence, to provide site personnel with ongoing environmental training and information throughout the Project. Participants in Tool Box Talks shall sign the attendance sheet.

9.4 PRE-START MEETINGS

Pre-start meetings are used by the supervisors and foremen to explain the work to be done in the upcoming shift. All operational aspects of the task are discussed including safety and environmental issues and controls, particularly if there are new hazards or if there has been a recent incident.

An Environmental Management Representative will attend as applicable to explain new environmental controls or reiterate existing controls.

10.0 MONITORING, EVALUATION AND REPORTING

10.1 ENVIRONMENTAL MONITORING

Environmental monitoring is required during the construction of the Project to ensure that no adverse impact on the environment occurs. CEPs will detail any monitoring requirements, the frequency of the monitoring to be undertaken and the appropriate responsible person.

In general, monitoring is conducted on a routine basis; however, additional monitoring may be required in the event of a complaint or incident, or after a rain event in the case of water quality monitoring.

Generally the Environmental Management Representative is responsible for the implementation of on-site measurements of environmental aspects, including water quality. External specialists may be used, where required, to conduct specialist monitoring, including noise, vibration, air quality, soil, ecological and non in-situ water monitoring. The initiation of such monitoring is on an as-needs basis and may be in response to contract requirements, complaints or internal requirements.

10.2 ENVIRONMENTAL INSPECTIONS

Weekly Environmental Compliance Inspections are conducted by the Environmental Management Representative. The findings of the Inspection are recorded **Weekly Environmental Inspection**, in which required remedial actions are also recorded, including a responsibility and timeline for completion. These shall be monitored to ensure that they are closed out in the required time frame.

10.3 AUDITS

Environmental audits are to be carried out and reported in accordance with the requirements of **Audit Internal** (MMS # 010-D008-000) procedure.

10.3.1 Audit Frequency and Scope

The minimum requirements for the scope and frequency of project audits are as follows:

Scope	Documents	Frequency
HSEQ – including legal compliance	Project Execution Plan including procedure references and attachments. Sample Country or Regional Environmental Legislation.	Initial audit to be conducted at 25% project completion, or 3-4 months from mobilization (whichever comes first). Subsequent audits to be scheduled following review of initial audit performance, risks, and project duration. Period between audits must not exceed 12 months

Audits are scored on the number of findings of Internal Notification Reports (INRs) and minor Internal Notification Reports (mINRs). Subsequent audits are based on the previous audit score as follows:

Score	Score Parameters	Actions & Descriptor	Subsequent Audit Frequency
1	More than 10 INRs raised <i>and/or</i> More than 21 mINRs raised	Poor results. Significant improvement required.	3 months (or 40% project completion. Whichever comes first)
2	5 to 10 INRs raised <i>and/or</i> 11 to 21 mINRs raised	Average results. Improvement required.	6 Months (or 50 – 70 % project completion. Whichever comes first)
3	1 to 4 INRs raised <i>and/or</i> 1 to 10 mINRs raised	Positive results.	No longer than 12 months

In addition to these internal audits, McConnell Dowell will cooperate with any external environmental audits conducted by the Client or an authorised party in relation to compliance with contract or legislative requirements.

10.4 REPORTING REQUIREMENTS

Reporting requirements will evolve as the Project progresses. In the early phase, emphasis is on the establishment of systems, controls and competence of all personnel, while later the emphasis will shift to monitoring performance. When nearing completion (as applicable) the focus will be on final reports to address approval requirements.

The Environmental Management Representative is responsible for managing the Environmental Reporting Programme. The Project Manager is responsible for submitting the reports required externally.

Environmental reporting is undertaken on a monthly basis and is incorporated into the Project Monthly Report to be sent to Head Office and the Client.

11.0 INCIDENT REPORTING & INVESTIGATION

11.1 RECORDING OF INCIDENTS

Incidents shall be reported and recorded in accordance with the **Incident Reporting and Investigation** procedure (MMS # **020-E004-100**). The cause of all incidents will be subject to an investigation, convened by the Environmental Management Representative to determine the root causes of the incident and to ensure that remedial / corrective actions are able to be implemented to ensure a repeat of the incident is avoided.

In the event of an environmental emergency incident, McConnell Dowell will provide the Client or their representative with notification within 24 hours and will provide records of the incident, response and corrective actions as required within 7 days.

A summary and review of incidents for the duration of the Project and for the relevant month shall be included in the Project Monthly Report.

11.2 NOTIFICATION PROCEDURE

The Client shall be notified of incidents that trigger notification as defined in the Incident Reporting and Investigation procedure. These triggers include offsite discharges, unauthorised disturbance or destruction of fauna, flora or heritage sites and breaches and non-conformances of permits issued for the Project.

The Project Manager is responsible for notifying the Client of Reportable Incidents. The Environmental Management Representative is responsible for notifying relevant Regulators.

11.3 HAZARDOUS SUBSTANCE STORAGE

The **Hazardous Substance and Dangerous Goods Register** (MMS # **020-F028-100**) will include a list of hazardous substances including fuels and lubricants which will be kept on-site during the Project and where hazardous substances storage areas exist onsite. It also includes a detailed spill response procedure which communicates the responsibilities and management actions required in the event of a spill of a hazardous substance to the environment.

11.4 EMERGENCY RESPONSE

The Emergency Response Plan (ERP) to be produced for the Project will take into account the following factors:

- the parts of the site or adjoining properties likely to be affected;
- the degree of predictability of the emergency;
- the likely speed of onset;
- the likely effect of the emergency;
- The contents of the Emergency Response Plan are to include:
 - description of the potential emergency;
 - the person responsible for actioning the ERP;
 - the equipment required to deal with the emergency including rescue equipment;
 - emergency contact numbers;
 - direction to site workers and other affected persons on what they are required to do;

- the methods used to deal with the emergency (e.g. How to use specific equipment).

As necessary, emergency services such as Police, Fire Brigade, Ambulance, and Rail Interfaces are to be contacted and invited to visit the site in order to become aware of site access and other emergency considerations.

The ERP will incorporate the following components:

- Emergency contact list (for the above);
- Emergency Reporting Instructions;
- Emergency Muster Point Location;
- Emergency Response Co-ordinator Action Plan;
- Emergency Personnel and Equipment.

The emergency response plan will be displayed in prominent locations around the site and employees will be trained in its requirements. All relevant Project personnel, subcontractors and relevant emergency agencies will be instructed and rehearsed, as appropriate, in the requirements of this Plan.

11.5 ENVIRONMENTAL SPILLS

During the construction the Project Manager will be responsible for providing training and/or orientation to employees or subcontractors that addresses the proper action regarding spills.

The most effective spillage control system is prevention. To ensure that the adequate quantity and type of spill response materials / equipment are readily available to address potential spills when the petroleum products arrive onsite, the Project Team will evaluate the nature and frequency of various activities that pose the potential for spills / leaks. Based on these evaluations, the Team will obtain the adequate spill response material and equipment prior to work beginning on site.

As deemed necessary, utility vehicles, heavy equipment (e.g. dozers, excavators), pumps, and generators will have spill kits that, at a minimum, will contain sufficient oil absorbent material to contain (e.g. oil absorbent boom) and cleanup any drips, leaks, or spills (e.g. ruptured hydraulic line) and plastic bags to contain any contaminated absorbents, soils, or wastes. Bags containing used cleanup material will be transported to the designated hazardous material/waste storage area for proper drumming, labelling, and classification prior to off-site disposal. Spill kits for equipment maintenance, fuel storage areas, and fuel trucks will also contain sufficient absorbent material to contain the quantity of the material stored in the stationary containers (e.g. tanks, drums, cylinders) and equipment to cleanup (e.g. shovel, broom) and store used absorbent material (e.g. 200 litre drum with metal banded lid).

12.0 MANAGEMENT REVIEW

12.1 CEMP REVIEW

This CEMP has been developed using the best available methods, procedures, expertise and experience available to McConnell Dowell and as such it represents best practice environmental management standards. However, consistent with the philosophy of continuous improvement, there will be opportunities during the Project to implement new or improved procedures.

The root cause of many incidents leads to a need for action to prevent recurrence of that kind of incident. Where a repeat incident occurs or where there is a significant incident, an Environmental Alert may be issued. Environmental Alerts are used where incidents with broader implications and lessons that may be applicable to other Projects are summarised and distributed to disseminate findings more widely. Environmental Alerts from other Projects may also be relevant to this Project. Where applicable these lessons are communicated to the work force through Tool Box Talks and Pre-start Meetings.

Where any changes and improvement to working practices are identified through the investigation of environmental incidents, these will be assessed and incorporated into the CEMP as part of the Incident Reporting and Investigation process.

12.2 INTERFACE WITH OTHER PLANS

This plan should be read in conjunction with the following Project Management Plans:

- Project Execution Plan (PEP);
- Quality Management Plan; and
- Workplace Health and Safety Management Plan (WHSMP).

12.3 PLAN APPROVAL, DISTRIBUTION AND REVIEW

There is no restriction on the distribution of this Plan within McConnell Dowell Group entities. The controlled copy of the current version of this Plan will be maintained on the Project document control database.

A controlled copy of this Plan, as well as future updates, will be provided externally to the Client.

This Plan will be reviewed annually as a minimum and, if necessary, updated as required in an event if it:

- Does not adequately address the matters it is intended to address;
- Is causing non-conformity or is otherwise necessary to comply with the conditions of the contract;
- Has to be changed because of an Internal or External audit outcome;
- No longer represents current or appropriate practice;
- Is otherwise required by the Contract to be updated.

12.4 STAKEHOLDER AND COMMUNICATION MANAGEMENT

12.4.1 Internal Communication

Communication regarding environmental issues and controls is important to ensure that management techniques are being adhered to and that employees have the opportunity to address concerns. Environmental communication will primarily be through Pre-Start Meetings, weekly team meetings and Tool Box Talks; however it can also occur during site inspections or through members of the environmental or management teams.

Internal communication regarding the environmental means that employees will be involved in the communication and consultation of:

- Policies and management systems development;
- Hazards and risk control processes including identification, assessment and control;
- Changes to the workplace;
- Outcomes of incident reviews; and

- Other issues that may impact the environment.

12.4.2 External Communication

Communications and the management of complaints and enquiries are managed through the implementation of the Project Communications – Procedure – Internal and External (MMS # **300-E008-100**).

The Project Manager is responsible for the conduct and coordination of communications with all key external stakeholders. Subject to any specific Project Requirements, the Project Manager will be the key liaison officer in dealing for external communication.

12.4.3 Complaints Management

In the event that environmental related (including external / community) complaints are received, the Project Team will direct such complaints and enquiries to the Environmental Management Representative who will act on them.

Complaints will be recorded on **Environmental Incident / Event** (MMS # **020-F053-100**) form and entered into the Enquiry and Complaints Register. As a minimum, the following will be recorded:

- The date and time of enquiry / complaint;
- Personal details of the party lodging the enquiry / complaint (subject to privacy considerations);
- Nature of the enquiry or issue of concern;
- Outcome of complaint investigation and any remedial actions taken by the Project Team to cease the impact.

At the completion of the complaint / enquiry investigation, a summary of the findings and action taken will be provided to the party that lodged the complaint / enquiry.

13.0 DOCUMENT CONTROL

Document control will be undertaken in accordance with the requirements of the Project Execution Plan.

14.0 REFERENCES

All documents below will be made available upon request for viewing

HSE Inspections and Monitoring	020-E001-100
HSE Performance Reporting	020-E006-100
HSE Risk Management	020-E008-100
Identification and Control of Nonconformity	017-E002-100
Incident Reporting and Investigation	020-E004-100
Project Communications – Internal and External	300-E008-100
Subcontractor Safety and Environmental Controls	020-E007-100

15.0 RECORDS

All documents below are available for viewing on site

Environmental Incident-Event Report Form	025-F004-100
Internal Audits Database – MacDow Lotus Notes based system	
JSEA	020-F001-YYY
JSEA Register	020-F003-YYY
PEP Att2-1B Review Record ENV Legal	020-Ynnn-100
PEP Att13-1 HSE Risk Register	020-Ynnn-100
Site Inspection Environment Checklist – Weekly	025-F002-100
Visiting Managers Review Report	020-F004-100
Hazardous Substances & Dangerous Goods Register	020-F028-100

16.0 APPENDICIES

16.1 ENVIRONMENTAL POLICY

McConnell Dowell provides engineering, construction and maintenance services on civil, marine, tunneling, pipeline, rail, building, mechanical, electrical and instrumentation construction projects. We are totally committed to protection of the environment and to keeping environmental impacts as low as reasonably practicable.

Our goals include prevention of pollution and other adverse environmental impacts, efficient and sustainable use of resources, and recycling of materials where possible. McConnell Dowell undertakes to provide the necessary resources and management support to achieve these goals.

In particular, we have established and will maintain, review and continually improve our programme for management of environmental aspects that we can control or influence during provision of our activities. This programme includes:

- Visible, demonstrated leadership.
- Complying with applicable legal and other requirements including environmental legislation, regulations, industry codes of practice, and project specific requirements.
- Establishing measurable objectives and targets to quantify our environmental performance and demonstrate continual improvement.
- Consultation and communication with employees, contractors, clients, and key stakeholders on environmental issues.
- Clearly defining responsibilities and accountabilities for employees and contractors.
- Providing adequate information, training and supervision to employees.
- Identifying potential significant environmental impacts for each project and permanent facility.
- Developing and implementing methods to eliminate or minimise significant environmental impacts.
- Regular monitoring and auditing of our environmental performance and the identification of corrective actions to improve this performance.
- Building and encouraging a culture of environmental care amongst our people by providing training and support.



16.2 MITIGATION MEASURES

Potential Negative Impact	Environmental & Social Mitigation Measures	Implementing Location	Executing Agency	Supervising Agency
DETAILED DESIGN / PRE-CONSTRUCTION MOBILISATION PHASE				
Road Traffic Safety	Develop Traffic Management Plan (TMP) to include signage, flag operators, personnel protective equipment (e.g. high visibility vest etc), and specific actions to be implemented around sensitive receptors (e.g. residential dwellings, schools, hospital). TMP to include vehicle and pedestrian traffic.	Length of road rehabilitation	Design consultant & McConnell Dowell	MCT
	Include transport of materials and equipment to construction camp (located at the airport) in the TMP e.g. loads, maximum speed, designated travel times and notification of police and other required departments (e.g. hospital and schools).	From port to airport		
Aviation Traffic Safety	Refer to WHSMP for aviation traffic safety	Airport runway	McConnell Dowell	MCT
Soil Erosion	Minimize erosion and design erosion protection measures according to international good practice standards, including incorporation of effective drainage systems (soakage pits) and consideration of surface flow paths.	All locations	McConnell Dowell	MCT
Dust / Air Pollution	Identify and locate waste disposal sites, stockpile sites and equipment to minimize impacts on the environment and nearby population.	Construction Camp	Design consultant & McConnell Dowell	MCT
	Ensure all equipment is serviced and issued with a warrant of fitness (as required). Any machinery deemed to be polluting the air must be replaced (or fixed) on instruction by the Supervising Consultant and MCT kept informed.	Work sites		
Water & Soil Pollution	Minimise risk to groundwater and surrounding soil by developing a spill response plan and provide training to all contract workers on how to implement the spill response plan (refer to Spill Response Plan).	All components	McConnell Dowell	MCT
	Ensure bunded areas and hard stands are allocated at construction camp for the storage of fuel, lubricants and other potential substances required for the project.			

Potential Negative Impact	Environmental & Social Mitigation Measures	Implementing Location	Executing Agency	Supervising Agency
	Ensure wash down areas with respective collection and treatment systems are designated within the construction camp (e.g. settling pond or tank and concrete slurry treatment).			
Water Supply	Need to ensure adequate supply of water for construction and personnel which does not adversely affect the community's water supply	Construction Camp	McConnell Dowell	MCT
Importation of aggregate material	Obtain import permit and Quarantine certification prior to export from country of origin. Certificate of fumigation and verification of source (or proof that material is free of contamination) to be submitted to Department of Public Works and Quarantine Department.	All components	McConnell Dowell	MCT
Solid waste generation	Refer to Solid Waste Management Plan			
Hazardous Substances	Fuel will be mainly imported but may also be obtained from local commercially available sources. Prior arrangement regarding quantity and type will need to be organised. Hazardous substances to be stored in a Dangerous Goods Shed (20" ventilated, internally banded container). Hazardous wastes to be stored in banded containers, prior to removal off island.	All locations	McConnell Dowell	MCT
CONSTRUCTION PHASE				
Traffic (vehicle & pedestrian) & construction safety	Implement the traffic management plan to ensure smooth traffic flow and safety for workers, passing vehicles and pedestrian traffic. Where appropriate, employ flag operators on the road to prevent traffic accidents. The workers shall have relevant safety equipment. Special care must be taken when construction works reach the schools and hospital. Coordination with school and hospital representatives must occur for safe passage of students and parents, and hospital visitors/ patients through a construction area. May include restricted work hours, reduced speeds and detours.	Length of road rehabilitation	McConnell Dowell	MCT

Potential Negative Impact	Environmental & Social Mitigation Measures	Implementing Location	Executing Agency	Supervising Agency
	For further detail, refer to TMP and OHSMP			
Soil Erosion	<p>Minimise time and size of ground disturbing activities to workable size at any one time. Vegetation to be removed manually, strictly no use of herbicides/ pesticides.</p> <p>Keep construction vehicles on defined tracks and off the beach. Revegetate disturbed areas that are not being paved as soon as practicable (loosen ground; apply topsoil; seed or plant as necessary).</p> <p>Implement erosion and sediment controls as per site specific Erosion and Sediment Control Plans (to be drafted by HSE Representative once on site).</p>	All locations	McConnell Dowell	MCT
Waste Disposal	Refer to Solid Waste Management Plan			
Water & Soil Pollution	<p>Lubricants shall be collected and recycled if suitable. All waste lubricants shall be removed from island as hazardous waste.</p> <p>Train all workers in the Spill Response Plan, including how to use a spill kit. Zones for preliminary accumulation of wastes are designated in areas that will cause no damage to the vegetation cover or leach into groundwater or the marine environment (e.g. within construction camp on hard surface).</p> <p>Excavations are bunded to prevent ingress of water runoff. Sediment laden runoff from excavations or stockpiles must be directed to a settling area (not the sea or beach) or collected for dust suppression provided the runoff is not contaminated with any chemicals (e.g. fuel).</p> <p>Rehabilitation of the construction camp area shall include scarification to loosen compacted ground if required as a result of stockpiles and construction of hard stand areas (including bunded areas).</p>	All locations	McConnell Dowell	MCT
	Ships transporting materials and equipment are not permitted to discharge wastewater (bilge, ballast, sewage etc) while in harbour and will be subject to fines if this occurs (in accordance with the Harbours Act and Harbours Regulations).	Funafuti Port	Vessel Captain & McConnell Dowell	MCT & Harbour Master

Potential Negative Impact	Environmental & Social Mitigation Measures	Implementing Location	Executing Agency	Supervising Agency
Generation of Dust	<p>Cover stockpiles containing fine material (e.g. sand and topsoil) when not actively being used.</p> <p>Keep work areas clean with regular sweeping. Due to freshwater supply constraints large scale water sprinkling should be kept to a minimum and only used near sensitive receptors (e.g. hospitals or schools). If water sprinkling is required, collect runoff water, ensure it is free of hydrocarbon pollutants and use for water sprinkling.</p> <p>Only small areas should be cleared of vegetation at any one time and revegetation should occur as soon as practicable.</p> <p>Dust masks and personnel protective equipment must be available for workers during dust generating activities (e.g. pavement milling). In the vicinity of sensitive receptors particular care should be taken to ensure dust generating activities are kept to a minimum (may include different construction methodology or restricted operations).</p> <p>If barges are used to transport the aggregates to Tuvalu then when unloading cargo (particularly aggregate) ensure the material is wetted to prevent dust generation and do not unload in high winds. Ideally material should be loaded directly into the delivery trucks for transport to the construction camp and correct management of stockpiles. The wetting should be done so as not to generate sediment laden runoff which has the potential to enter the lagoon and cause water pollution.</p>	All locations	McConnell Dowell	MCT
Noise & Vibration	<p>Minimise nuisance from noise, especially closer to residential areas, through establishment and communication to affected parties. In consultation, adjust working hours nearby schools, hospitals and other similar institutions to avoid disturbing their routine operations where possible. (Work on Sunday is unlikely to be approved unless required due to safety reasons).</p> <p>Regularly check and maintain machinery, equipment and vehicle conditions to ensure appropriate use of mufflers, etc.</p> <p>Workers in the vicinity of sources of high noise shall wear necessary protection gear rated for the situation they are being used.</p> <p>Signage to outline complaints procedure and contact details of recipient of complaints</p>	All locations	McConnell Dowell	MCT

Potential Negative Impact	Environmental & Social Mitigation Measures	Implementing Location	Executing Agency	Supervising Agency
	(e.g. phone number, physical address and email).			
	Activity at the Port in relation to the unloading and loading of materials and equipment which has the potential to generate noise and vibrations should be restricted to standard working hours unless approval is provided by the Harbour Master, MCT and communicated to affected parties.	Funafuti Port	McConnell Dowell	Harbour Master & MCT
Accident risks / Impacts on traffic safety	Refer to WHSMP	All locations	McConnell Dowell	MCT
Loss of archaeological artefacts or sites	Work to stop in specific location of unearthed artefacts or site and MCT notified immediately for instructions on required mitigation measures prior to proceeding.	All locations	McConnell Dowell	MCT
Landscape degradation	Restoration of landscape after completion of rehabilitation works; restore the vegetation cover in accordance with the design and consistency with surrounding land condition (e.g. grass land or shrubs). Use plant species characteristic for the landscape in the course of restoration of the vegetation cover.	All locations	McConnell Dowell	MCT
Hazardous substances & safety and pollution	Store and handle hazardous substances in banded, hard stand or designated areas only. Banded areas should be constructed to drain to an oil water separator which will need to be constructed or a mobile proprietary unit imported specifically for use on the TvAIP. Provide hazard specific personnel protective equipment to workers directly involved in handling hazardous substances (e.g. chemical or heat resistant clothing, gloves). Complete list, including Safety Data Sheets (SDS) for each chemical stored or used shall be accessible at all times. Signage to be posted in storage areas identifying all chemicals present. Spill kits and training of use to be provided to all workers during toolbox meetings. Spill kits to contain PPE gear for the spill clean-up (e.g. gloves and overalls), material to contain the spill and absorbent pads, and a heavy duty rubbish bag to collect	All locations	McConnell Dowell	MCT

Potential Negative Impact	Environmental & Social Mitigation Measures	Implementing Location	Executing Agency	Supervising Agency
	<p>absorbent pads or material.</p> <p>Used oil to be collected and taken off island (for disposal or cleaning at approved facility) at completion of works.</p> <p>Refer to OHSMP for further health and safety requirements when managing hazardous substances.</p>			
Loss of biodiversity	If during course of construction work, particularly vegetation clearance and excavations any bird, reptile or mammal species is identified as being potentially impacted (e.g. nesting bird in area of proposed vegetation clearance) work is to stop in the specific location of the find and the Department of Environment and MCT notified immediately for instruction to proceed.	All locations	McConnell Dowell	MCT
Health and safety	Refer to OHSMP	All locations	McConnell Dowell	MCT
Damage to assets and infrastructure	As a result of the Project construction activities, any damage to assets or infrastructure must be reported to the MCT and rectified at McConnell Dowell's expense.	All locations	McConnell Dowell	MCT

16.3 MONITORING PLAN

Parameter to Monitor	Location	Monitoring	Frequency	Responsibility
DETAILED DESIGN / PRE-CONSTRUCTION MOBILISATION PHASE				
Traffic safety	Design documents	Ensure TMP is in place	Prior to sign off of final designs	Design Consultant
Aviation safety	Design documents	MOWP complete with details of flight schedules and emergency procedures.	Prior to sign off of final designs	Design Consultant
Soil erosion	Design documents	Construction scheduled for between. Designs include erosion protection measures.	Prior to sign off of final designs	Design Consultant
Water supply	Design documents	Water reclamation systems included in designs.	Prior to sign off of final designs	Design Consultant
Importation of materials and equipment	Importation permits	Ensure inclusion in design and material specifications that material and equipment to be fumigated and free of contamination. Approval to import material and equipment is given prior to material and equipment leaving country of origin.	McConnell Dowell to organize prior to export from country of origin.	McConnell Dowell
CONSTRUCTION				
Agreement for waste disposal	McConnell Dowell records	Permits and/or agreements with local waste disposal providers (e.g. Funafuti Kaupule and recycling contractor). Inspection of disposal sites. Permit and /or agreements with international waste facilities are in place (documented evidence) and correct transport containment methods are available. Note: green waste, food waste and aggregate allowed to be disposed of on island. Remaining	Documentation viewed prior to construction works starting Weekly as applicable to schedule of works.	MCT

Parameter to Monitor	Location	Monitoring	Frequency	Responsibility
		waste to be shipped off island to NZ / Fiji.		
Soil erosion	Areas of exposed soil and earth moving	Inspections at sites to ensure silt fences, diversion drains etc. are constructed as needed. Inspection to ensure replanting and restoration work completed.	Weekly inspection as applicable to schedule of works and after site restoration.	MCT
Waste disposal	At construction sites	Inspection to ensure waste is not accumulating and evidence waste has been stockpiled for removal from island. At the end of the project ensure there is no remaining non-recyclable or reusable material remaining.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	MCT
Water and soil pollution	At construction sites	Inspection of sites to ensure waste collection is in defined area; Spill Response Plan is in place and workers trained. Complete spill kits available where hazardous substances are sorted and handled.	Weekly inspection as applicable to schedule of works and on receipt of any complaints	MCT
Dust	At construction sites and adjacent sensitive areas.	Site inspections. Regular visual inspections to ensure stockpiles are covered when not in use.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	MCT
Noise	At work sites (including Port) and sensitive locations	Site inspections to ensure workers wearing protective equipment when required. Measurement of noise level with hand-held noise meter not to exceed 80dB. Public signage detailing complaints procedure and contact people/person on display.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	MCT
Storage of fuel, oil, bitumen,	At work sites and	Regular site inspections to ensure material is	Weekly as applicable to schedule of	MCT

Parameter to Monitor	Location	Monitoring	Frequency	Responsibility
etc.	construction camp. Contractors training log.	stored within bunded area and spill response training for workers completed. Visual inspection of spill kit for completeness and accessibility.	works and on receipt of any complaints.	
Vehicle and pedestrian safety	At and near work sites	Regular inspections to check that TMP is implemented correctly (e.g. flags and diversions in place) and workers wearing appropriate personnel protective gear.	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	MCT
Construction workers and staff safety (personal protective equipment)	At work sites	Inspections to ensure workers have access to and are wearing (when required) appropriate personnel protective equipment (e.g. for handling hazardous materials).	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	MCT
Community safety	At work sites	Inspections to ensure signs and fences restricting access are in place and pedestrian diversion routes clearly marked (whether for access to a building or home or particular route).	Weekly inspection as applicable to schedule of works and on receipt of any complaints.	MCT

16.4 WEEKLY ENVIRONMENTAL INSPECTION CHECKLIST

Project: Tuvalu Project No.: 2621

Inspection by: _____ Date of Inspection: _____

Area Identification/Zone/Chainage/
 Entire Site: _____

ITEM	COMPLIES (Y,N,N/A)	COMMENTS
VEHICLE MANAGEMENT		
Are all vehicles and construction equipment cleaned prior to arrival at the construction site?		
Are vehicles being kept clean of excess mud etc.?		
Is a Log book or Vehicle Wash down Register available for vehicle washes?		
Are all vehicles keeping to authorised access tracks?		
Are all vehicles clear of any vegetation build up?		
Are vehicles parked and/or being kept away from remnant vegetation?		
Is all construction equipment/vehicles well maintained so that there are no signs of leaks, excessive exhaust fumes or noise etc.?		
FLORA, FAUNA & WEED MANAGEMENT		
Have all environmentally significant areas been marked on site (e.g. flagging, bunting, fencing)?		
Are weed infested areas clearly labelled? Have weed management measures been put in place?		
Are Tree Protection Zones in place around all significant trees? Are any vehicles, plant, or materials within exclusion zones?		
Is effective fauna exclusion fencing in place, and well maintained?		
Is there sufficient fauna escape ramps provided in long term excavations?		
Are all construction personnel maintaining appropriate hygiene practices to minimise the transfer of weeds/diseases via clothing or equipment?		
EROSION AND SEDIMENT CONTROL		
Are all sediment controls adequately maintained? Do they need further maintenance?		
Are any sediment control structures filled to more than 70% of capacity?		
Is there sufficient silt fencing for the area of cleared land?		

Is there sediment or mud visible on any of the access or haul roads?		
LAND MANAGEMENT		
Is contaminated material (soil and water) being treated and stockpiled as per the requirements of the CEMP/ relevant management plan?		
Are vehicle wash facilities available to limit the movement of contaminated material?		
Has all earth moving equipment and all materials brought onto site been certified clean prior to entry?		
STOCKPILES		
Are stockpiles located in suitable locations away from waterways, drains and high velocity wind areas?		
Have stockpiles been profiled and covered to protect from wind impacts or stabilised?		
Are stockpiles free of weeds and other rubbish?		
WATERWAYS, DRAINS, GROUNDWATER MANAGEMENT AND WATER QUALITY		
Is the concrete washout basin being used correctly?		
Are there appropriate dewatering protection controls in place?		
Is water being discharged in a controlled manner?		
Are the banks of waterways adequately stabilised?		
Are drainage controls downstream of the work area working effectively?		
Is contaminated water adequately contained and treatment occurring?		
Are marine spill kits and floating booms available (where required)?		
Is non-potable water being used for construction activities?		
ATMOSPHERIC EMISSIONS		
Have work areas, access roads and stockpiles been sufficiently watered to prevent the generation of dust?		
Are trucks and plant using only designated haul and access roads? Are speed limits being adhered to?		
Is there visible exhaust gas continuous for more than 10 seconds emitted from any of the vehicles or plant?		
NOISE EMISSIONS AND VIBRATION		
If required, are vibration mitigation measures in place?		
Is there screening or enclosures around fixed plant with noise sensitive receptors nearby?		

Are generators and other fixed machines situated to minimise noise disturbance to local residents and the general public?		
CHEMICAL MANAGEMENT AND HAZARDOUS MATERIALS STORAGE		
Are spill kits readily accessible? Is there sufficient material to clean up a range of spill sizes?		
Do trucks or vehicles carrying hazardous substances have the appropriate licenses to transport those goods? Are they carrying the required shipping and emergency response documentation and have stocked spill kits?		
Are HAZCHEM signs displayed as necessary?		
Is the control, usage, transportation and storage of hazardous substances in accordance with manufacturer's instructions and license requirements? <ul style="list-style-type: none"> • Are hazardous substances stored neatly in a secure container? • Are chemicals stored away from watercourses and drains? • Are all containers carrying chemicals clearly and correctly labelled? • Are the storage areas for fuel and other hazardous substances bunded correctly? 		
Is mechanical plant free from oil leaks and in good mechanical condition?		
Are there temporary bunds placed around fixed plant? Are drip trays placed under fixed plant to prevent leakage?		
Are surplus oils, grease and other hazardous materials collected and stored separately in bunded areas prior to removal off site?		
Do any fuel tanks, caps, hoses etc. have signs of damage or visible leaks? Is there any evidence of physical damage or deterioration? (e.g. rust, cracks, dents)		
Is there sufficient access around fuel tanks? Is the fuel tank isolated from ignition sources (>15m)?		
Is bunding of hazardous goods (including fuels) of an adequate capacity, free of rubbish and properly maintained?		
Are toilets being emptied regularly enough? Are any overfull?		
VISUAL AMENITY & WASTE MANAGEMENT		
Are the construction camp and storage areas kept tidy?		
Are bin(s) of sufficient size? Are any overflowing?		
Are covered bins provided for the collection of domestic waste?		

Is there evidence of correct waste stream separation? (e.g. correct recycling)		
Where applicable, has all appropriate documentation been obtained for any waste identified for disposal?		
COMMUNITY MANAGEMENT		
Is access maintained to all properties and adequate traffic management implemented?		
Do community walkways adjacent/ through the site provide for controlled and safe travel?		
CULTURAL HERITAGE MANAGEMENT		
Are areas of cultural heritage importance clearly marked?		

ASPECT INSPECTION – CLOSE OUT

Have all aspects identified and documented on the inspection checklist No been rectified?

Yes No

If No give details:

.....

Name: Signed:

Reviewed by Project Manager -

Name: Signed:

Date:

PHOTO RECORD	
Date Description of Action To be completed by:	Affix Photograph here
Date Description of Action To be completed by:	Affix Photograph here

16.5 ATTACHMENTS – SUB PLANS

CLIENT: MINISTRY OF COMMUNICATION AND TRANSPORT

PROJECT: RESURFACE RUNWAYS AND ROADS

INCLUDING MARKINGS

LOCATION: TUVALU

PROJECT NO.: 2621

McConnell Dowell Corporation
MacDow Management System

SOLID WASTE MANAGEMENT PLAN (SWMP)

MMS # 025–Y003–2629

Revision History

Rev	Date	Details	By	Approved
A	Oct 2014	Draft Plan	JBarker	
B	April 2015	Draft Plan	M Towey	

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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The project involves the upgrading of airside pavements at Funafuti airport Funafuti, Tuvalu. This upgrading generally includes the resurfacing or rehabilitating and upgrading of the runway, taxiway and aprons and related infrastructure works. In addition the project involves the repair and resurfacing of Funafuti Airport Road and other associated Roads in Funafuti, Tuvalu.

The Employer is Ministry of Communications and Transport (MCT) through the Civil Aviation Directorate (CAD) manage the airport operations and are responsible for compliance with national and international civil aviation requirements. The public road network is managed by the Public Works Department (PWD).

1.2 SITE INFORMATION

Tuvalu is a Polynesian island nation that lies in the Central South Pacific, west of the International Dateline and 1,000 km north of Fiji (refer to Figure 3 for location). The three islands and six atolls that make up Tuvalu stretch for just 579 km (360 miles) and measure approximately 25 km² in total land area. The capital of Tuvalu is the entire atoll of Funafuti, where the airport is located.

1.3 SCOPE OF WORK

The scope of work at this Airport comprises of:

- Construction of new turning bays at each runway end.
- Construction of new apron pavement either side of the existing apron.
- Reconstruction of the taxiway.
- Installation of electrical ducting.
- Application of Surface enrichment spray treatment all airside surfacing's.
- Grout injection to address runway depressions.
- Infill surfacing to address runway depressions.
- Resurfacing of the 03/21 runway, apron and taxiway.

The scope of work on the roadworks comprises of:

- Grade 3 (7mm) – 45,000 square meters
- Second Coat seal at selected intersections – 6,500 square meters
- Rejuvenation spray – 36,600 square meters
- Replacement of distressed and cracked sections of a 17 meter wide by 180 meter long jointed concrete pavement at the Port
- Repairs to the gravel surfaced sections between the container yard and the water side
- Drainage improvements in terms of soakage drains and reshaping of shoulders.
- Maintenance of public roads used by construction traffic during the bulk aggregate stockpiling phase of the Works and reinstatement of the unsealed access road between the stockpile location and the sea port on the completion of the Works

1.4 PURPOSE & SCOPE OF THIS SUB PLAN

McConnell Dowell recognizes that construction activities will result in the production of waste materials, which if not treated in an appropriate manner can have adverse environmental impacts. McConnell Dowell is committed to effectively managing the impacts of its construction works and aims to reduce negative impacts whenever possible.

This Solid Waste Management Plan (SWMP) has been written to ensure compliance with the contract requirements including the Client's Environmental Management Plans – Funafuti International Airport and applicable legislation. As such, this plan focuses on the mitigation measures to be put in place to manage the solid waste generated during the construction of the Project.

The sub-plan addresses the management and disposal of waste and issues relating to the management of waste as a result of construction. It will act as a guide for construction planning and works to minimise waste related construction impacts.

The Plan covers strategies, systems and procedures to ensure the Project meets the required environmental obligations and targets for construction including demobilization at the Project completion.

The SWMP addresses:

- Disposal and separation of waste associated with the construction works;
- Promotion of the waste hierarchy 'reduce, reuse and recycle';
- Minimise the generation of waste to be delivered to off Island landfills and maximize the recycling of waste materials both on and off site; and
- Requirements of the Client's EMP, contract conditions and applicable legislation.
- Removal and disposal of solid waste that has been identified under the contract.

1.5 INTERFACE WITH OTHER PLANS

This Solid Waste Management Plan (SWMP) has been developed in conjunction with the Project Execution Plan. It is a sub-plan to the Contractors Environmental Management Plan (CEMP).

1.6 PLAN AUTHORISATION AND APPROVAL

The Project Manager is responsible for ensuring this plan is fully implemented. This plan and any amendments are subject to the approval of the Construction Manager.

1.7 DEFINITIONS, INTERPRETATIONS & ACRONYMS

Any definitions, interpretations and acronyms specific to this plan are listed below:

CEMP	Construction Environmental Management Plan
CEP	Construction Execution Procedure
EMP	Environmental Management Plan (Client's document)
ERP	Emergency Response Plan
HSE	Health, Safety & Environmental

JSEA	Job Safety and Environmental Analysis
KPI	Key Performance Indicator
MacDow	McConnell Dowell Constructors Ltd
PEP	Project Execution Plan
TPRR	Tender Project Risk Register

1.8 ROLES & RESPONSIBILITIES

The roles and responsibilities are contained within the CEMP.

1.9 PLAN DISTRIBUTION & REVIEW

The Project Manager is responsible for the distribution of this Plan. The mitigation requirements of this Plan will be introduced to all Project staff and the workforce through site inductions, Toolbox Talks and Pre-Start Meetings.

A controlled copy of this plan will be maintained on the Project G: Drive. The plan may be updated and revised when necessary as a result of any change in equipment, systems or procedures in performing the works, or when directed by the Client.

Update and revision of this Plan may be required in the event that the Plan:

- Does not adequately address the matters it is intended to address;
- Causes non-conformity or does not comply with contract and EMP requirements;
- Has to be changed due to an audit finding;
- No longer represents current or best practice;
- Requires change due to feedback received through designated monitoring mechanisms;
- Following the release of relevant environmental alerts, bulletins or guidelines from regulatory authorities; and
- Is otherwise required to be updated by the Client.

1.10 CONTINUOUS IMPROVEMENT

During the term of the Project, relevant changes in technology and work methods will be examined for opportunities to improve processes and systems for the benefit of all Project stakeholders.

The Project Manager will be accountable for ensuring continuous improvement in all aspects of the construction of the Project, including ongoing development of all project management documentation such as the PEP.

2.0 OBJECTIVES & PERFORMANCE CRITERIA

Key Objectives and Targets for solid waste management for the construction phase of the Project are as follows:

Table 1: Summary of Waste Objectives and Targets

Environmental Objective	Target
Compliance with all relevant statutory approvals and requirements	Zero prosecutions or fine relating to waste management
Avoid wherever possible the generation of wastes	No degradation to the environment (relating to poor waste management as a result of the Project) Minimise demand for construction materials through minimisation of the number and volume of materials required, as well as acknowledgement of environmental concerns during the procurement stage in relation to the purchase and use of materials. Develop opportunities to reuse or recycle resources during construction.
Re-use or recycle construction waste to the greatest extent possible	Endeavour to recycle at least 50% of all construction and demolition materials
Maintain separation of recyclable and disposable waste streams	Recycle 100% of properly sourced, separated and uncontaminated <ul style="list-style-type: none"> • steel, • concrete, • timber, • oil, • cardboard packaging material
To achieve waste minimisation and reduction in accordance with the waste management system hierarchy	All project personnel educated on the importance of waste management practices and mitigation measures, through site induction and targeted toolbox talks

3.0 STATUTORY & OTHER REQUIREMENTS

McConnell Dowell will ensure compliance with all relevant legislation and aim to employ best practice environmental management procedures for the construction of the Project. Key environmental legislation, guidelines, standards and contract requirements for the management of solid waste on the Project are outlined below:

3.1.1 Summary of Environmental Legislation

Legislation	Description
The Environmental Protection Act (2008 edition)	The Act has been promulgated and the items in the Act regarding environmental assessment have already been implemented. The Department of Environment had reviewed the overarching TvAIP EMP (4 November 2011) and provided its approval on 4th November 2011, as documented in the overarching EMP.
The Marine Pollution Act (2008 Revised Edition)	This Act requires the control and prevention of pollution, and dumping and incineration of wastes on the sea.
The Quarantine Act (2008 Revision)	This Act allows for measures related to the inspection, exclusion, detention, observation, segregation, isolation, protection, treatment, sanitary regulation and disinfection of vessels, persons, goods and things and having as their object the prevention of the introduction or spread of diseases or pests affecting man.
	Schedule 1 of the Environmental Protection Act (2008 edition) provides a list of all applicable international conventions and treaties that Tuvalu has signed up to or endorsed. The Act enables the Government to enforce and carry out obligations associated with these international obligations.

3.1.2

Contract Requirements	Description
4.18 – Protection of the Environment	<p>The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from pollution, noise and other results of his operations.</p> <p>The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values stated in the Specification or prescribed by applicable Laws.</p>

Contract Requirements	Description
4.23 Contractor's Operations on Site	<p>The Contractor shall confine his operations to the Site, and to any additional areas which may be obtained by the Contractor and agreed by the Engineer as additional working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land.</p> <p>During the execution of the Works, the Contractor shall keep the Site free from all unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works which are no longer required.</p> <p>Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such Goods as are required for the Contractor to fulfil obligations under the Contract.</p> <p>The Contractor shall comply with all national, provincial and local environmental laws and regulations.</p> <p>The Contractor shall:</p> <ul style="list-style-type: none"> (a) Establish an operational system for managing environmental impacts: (b) Carry out all of the mitigation measures set forth in the Initial Environmental Impact Assessment and Environmental Management Plan: and (c) Allocate the budget required to ensure that such measures are carried out. The Contractor shall submit monthly reports on the carrying out of such measures to the engineer. <p>For EMP infringements the Contractor will be given a Notice by the Project Manager to initiate action to remedy the problem within 48 hours. If remediation and restoration has been satisfactorily initiated but could not be completed during this period, the Project Manager shall determine a reasonable extended period to complete the remediation in consultation with the contractor,</p> <p>If within the 48 hour period, in the judgment of the Project Manager, contractor has not initiated any action or the restoration is not being done properly or in a timely manner during the extended period, the Employer shall be entitled to employ and pay others to carry out the work. The Contractor shall pay to the Employer all costs reasonably incurred by the Employer in remedying the problem."</p>

Contract Requirements	Description
11.11 Clearance of Site	<p>Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish, Temporary Works from the Site.</p> <p>Unless a separate agreement is in place with the Employer, if all these items have not been removed within 60 days after receipt by the Contractor of the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items. The Employer shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.</p> <p>Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Employer's costs, the Contractor shall pay the outstanding balance to the Employer.</p>
Clearance of Site and Disposal of Solid Waste	<p>In pursuance of the provisions under the contract relating to solid waste disposal, the following further provisions shall apply: At all times, the Contractor is responsible for the safe and sound disposal of all solid waste generated by the Works;</p> <p>Solid waste includes;</p> <ul style="list-style-type: none"> • Inorganic non-recyclable waste = waste that cannot decompose / break down and which cannot be recycled • Hazardous waste: examples such as asbestos, waste oil etc. The export of such waste must be in compliance with the Waigani Convention and any relevant laws enacted by Tuvalu and the recipient country. • Recyclable waste: waste that can be recycled, i.e. plastics, metals, rubber etc. <p>All waste is to be disposed of in permitted or licensed facilities at all times. It is the Contractor's responsibility to ascertain permissions for receipt of waste from Tuvalu into another country OFFSHORE, preferably to New Zealand or Fiji. Evidence will need to be supplied to the employer or proper disposal of waste.</p> <p>The Contractor may dispose of aggregate in a designated location on island, agreed to by the Government.</p> <p>Biodegradable (organic) waste (i.e. waste that will decay / break down in a reasonable amount of time, such as green waste, food waste) maybe left on the island, (in designated dumping areas) in reasonable quantities.</p>

4.0 ASPECTS AND IMPACTS

The export of waste to another territory transfers the potential solid waste impacts (e.g. air, land and water pollution) therefore careful due diligence of the receiving waste facility is required to ensure the facility is a licensed operation (under the receiving country's legislation) and that it is managed according to best operational management practices. The trans-boundary movement of waste can also cause pollution at sea if the waste is not properly packaged and prepared for transport.

The potential environmental impacts that may occur as a result of construction may include:

- Depletion and unsustainable use or overuse of natural resources;

- Surface/ground water contamination;
- Soil contamination;
- Attraction of pests and vermin, or other undesirable flora and fauna;
- Odour and aesthetic issues; and
- Contamination of surface and marine waters.

Scarification, replacement of unsuitable pavement material, demolition within the terminal, replacement of lighting and navigation aids will lead to the generation of excess soil and demolition waste.

Material will also be generated from the excavations associated with the runway turning bays and cable trenches. Most of the raw material from excavations can either be used to backfill areas where old equipment or infrastructure has been removed or as a resource (e.g. crushed concrete) for general use by the Airport and the community.

The major waste generation aspects or activities to be undertaken which have the potential to cause waste management issues include:

- Excess rubble generated from the runway repairs and excavations;
- Green waste from clearing the area for the construction area;
- Packaging materials from imported supplies;
- Waste oil, lubricants etc.; and
- Wastewater from sanitary facilities (dependent on system used).

Tuvalu has a landfill program, however all solid waste that cannot be accepted by this facility, bar aggregate will be transported off islands to either NZ or Fiji in compliance with international waste conventions (e.g. Waigani, Basel and Stockholm).

Throughout the Project, a register of anticipated environmental risks will be located in the PEP Attachment 13-1 Project HSE Risk Register, as well as processes for identification of further risk through CEP risk assessments.

The following table below outlines the waste streams which will be created as a result of construction activities. It includes management opportunities for recycling and reuse in order to achieve the best waste management results.

4.1.1 Waste Stream Separation, Storage and Disposal Methods

Waste Source/Stream	Waste Type	Management Opportunity/ Intended Fate
Excavated materials	Clean excavated materials	<ul style="list-style-type: none"> • Reuse of materials on construction site. For example, reuse as fill. • Where reuse not possible on site, seek opportunities for reuse off-site.
	Green waste	<ul style="list-style-type: none"> • Mulched and/or composted and used on site, where possible. • Where reuse onsite not possible, disposal or reuse off-site or to designated locations or facilities.

Waste Source/Stream	Waste Type	Management Opportunity/ Intended Fate
Earthworks (other than excavation)	Timber	<ul style="list-style-type: none"> Reuse on site where possible. If unable to reuse, store for transportation off island to NZ.
Excess or used construction materials (e.g. packaging, formwork and pallets etc.)	Plastic (including conduit and pipes)	<ul style="list-style-type: none"> Store in suitable containers for recycling. Store prior to transportation off island to recyclers in NZ.
	Metal, scrap steel and formwork	<ul style="list-style-type: none"> Store in suitable containers for recycling. Store prior to transportation off island to recyclers in NZ.
	Clean soil (from landscaping)	<ul style="list-style-type: none"> Stockpiled for reuse by the Client.
	Bitumen and gravel	<ul style="list-style-type: none"> Bitumen purchased and imported in half high containers (Isotainers) with holding capacity of 15,000L Excess / waste bitumen transported off island in Isotainers, minimising problems when supplied in smaller drums. Returned to the supplier where possible or reused on construction site Where reuse not possible, store on site, prior to transportation off island to NZ.
	Concrete	<ul style="list-style-type: none"> Reuse on site,
	Bitumen impregnated paper	<ul style="list-style-type: none"> Store prior to transportation off island to recyclers in NZ.
	Lubricants (oils and greases), oil water and receptacles	<ul style="list-style-type: none"> Collection in sealed, banded containers, prior to ship to Fiji/NZ for recycling.
Workshop by-products and waste	Tyres	<ul style="list-style-type: none"> Store on site, prior to transportation off island to NZ
	Cardboard and paper	<ul style="list-style-type: none"> Shred and combine into compost. Where reuse not possible, store on site, prior to transportation off island to NZ, to a recycling facility.
General Waste– Applicable only to goods and materials imported by the contractor	Putrescible waste (i.e. kitchen scraps)	<ul style="list-style-type: none"> Disposed at approved land fill sites.
	Mixed recycled (aluminium, glass, plastic)	<ul style="list-style-type: none"> Where reuse not possible, store on site, prior to transportation off island to NZ, to a recycling facility.
	Toner cartridges	<ul style="list-style-type: none"> Collect and store on site, prior to transportation off island to NZ for either recycling or disposal at licenced landfill facility.
	Cans and bottles	<ul style="list-style-type: none"> Store in suitable containers for recycling.

Waste Source/Stream	Waste Type	Management Opportunity/ Intended Fate
	wash-down water	<ul style="list-style-type: none"> • Reuse if suitable and free from visible oils and grease • Evaporation
Spill Response		<ul style="list-style-type: none"> • Suitable spill response kits to be in place during the construction of the works.

5.0 MITIGATION MEASURES

McConnell Dowell will implement three main measures in order to appropriately manage and minimise waste production and disposal during the Project works. These measures are:

1. Educating employees regarding their responsibility towards waste minimization and management and the importance of their compliance and cooperation;
2. Recycling and diverting surplus materials from landfills wherever practical; and
3. Where practicable, collecting and separating waste material into appropriate waste streams (food waste, green waste, concrete, aggregate, timber, metals, paper and packaging, glass and plastics etc.) and providing opportunities for recycling wherever possible.

McConnell Dowell will ensure that no waste from the site is transported to or deposited in any place that cannot be lawfully used as a recycling or waste facility for that classification of waste.

5.1 WASTE HIERARCHY

A waste management hierarchy has been adopted as a way of planning waste management for the Project. This style of management will allow waste to be dealt with in the most appropriate and sustainable manner by extracting maximum practical benefits from products and generating the minimum amount of overall waste (refer to Figure 1: Waste Management Hierarchy).

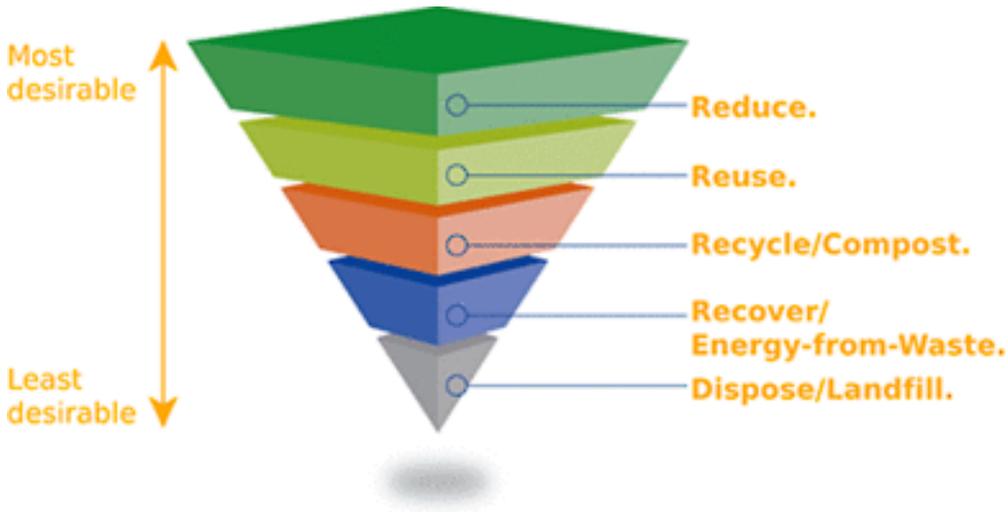


Figure 1: Waste Management Hierarchy

Waste streams will be reviewed in terms of suitability for reduction, reuse and recycling, with consideration to reducing impact through sustainable development (refer to Waste Hierarchy & Relevant Project Actions).

5.1.1 Waste Hierarchy & Relevant Project Actions

Hierarchy Level	Actions
Reducing waste generation	<p>Prior planning and accurate estimation of quantities of products required pre-mobilisation, combined with efficient and considered use of materials during construction will achieve avoidance of excess resource consumption and a reduction in waste generation. This may include:</p> <ul style="list-style-type: none"> • Arrangements being made with local suppliers to return any unused construction materials or use on another site • Specify packaging minimization in contracts with suppliers • Use of recycled materials for construction • Use of low toxicity equivalents to all products, i.e. solvents, paints and sealers • Use of local manufacturers and suppliers near site where practicable, to reduce packaging, storage and transport requirements • Consider use of materials and products that have a recycled content wherever cost and performance is competitive and where environmentally preferable to non-recycled alternatives • Sourcing of products in bulk to minimise packaging wastes • Returning packaging materials to suppliers wherever practicable • Promote awareness of on-site recycling and proper waste disposal practices to employees, including placement of instructional signage around work sites and camp

Hierarchy Level	Actions
Re-using waste	<p>The following measure on the re-use of materials may be adopted where appropriate:</p> <ul style="list-style-type: none"> • Waste concrete reused during road/runway construction (sub-base layer) or as hard stand areas in the construction compounds • Locate an area for storage of materials to be re-used later in the Project • Reuse clean spoil within the Project wherever practicable
Recycling waste	<p>The following recycling measures may be adopted by the Project:</p> <ul style="list-style-type: none"> • Work with licensed waste contractor to maximize the recycling of reusable construction waste • Provide training to site personnel and sub-contractors on segregation of waste, to facilitate recycling efforts • All recycling and waste bins to be monitored regularly and emptied on a regular basis • Where feasible, bins on site to have lids to ensure the minimization of windblown litter and rodent issues • Return packaging material (e.g. pallets) to the supplier wherever practicable, otherwise seek other opportunities for reuse and recycling • Used oils generated during construction will be collected in bunded containers and recycled and exported to a licensed recycling contractor in NZ or Fiji.
Disposing of waste	<p>The following disposal measures may be adopted for the Project:</p> <ul style="list-style-type: none"> • Clean uncontaminated materials unable to be recycled on island, but able to be recycled offshore, will be packaged up and transported to either NZ or Fiji for recycling in a certified recycling facility • Waste unable to be re-used or disposed of in the local landfill facilities will be stored on site and exported to NZ for disposal in a certified landfill • The materials and waste to be transported off island, will be transported in accordance with legislative requirements, both in Tuvalu and the destination country.

5.2 SOLID WASTE MITIGATION MEASURES

Due to the nature of the rehabilitation activities proposed, there are some mitigation measures which are applicable to all aspects of the project, while others that are specific to particular components e.g. road resurfacing. Sensitive receptors and environmental values have been identified along the route of the road and around the airport which will require specific mitigation measures for safety and environmental protection. The specific solid waste mitigation measures are outlined below.

5.2.1 Construction Camp / Laydown Area

The construction camp / laydown area will be used to store equipment and materials for all components of the Project, and as such there are a number of potential hazards associated with the equipment and materials. If required the construction camp compound will be fenced and secured to prevent access by unauthorised personal.

An area within the compound will be clearly marked for solid waste collection and will be set up so that waste is protected from the rain and wind. Hazardous substances and waste will be contained in bunded impermeable containers.

5.2.2 Solid Waste Management

Waste generated by the Project that cannot be recycled or reused or disposed of (to be determined with the consultation of the MCT, CAD and PWD), will be removed from Tuvalu at the completion of the Project.

McConnell Dowell will ensure all waste whether it is to be recycled or disposed of in NZ, is packed in shipping containers or other suitable impermeable containment to ensure waste (solid and liquid) is not inadvertently discharged at sea. Details of the receiving waste facilities (including transport documentation and agreements to receive the waste), will be organized prior to and during the construction period. This information will be provided to MCT to ensure that all applicable waste to be removed off the island will be going to a correct permitted facility and that all import regulations in NZ and Fiji will be complied with. Waste will be managed in compliance with international waste conventions (e.g. Waigani, Basel and Stockholm conventions).

The type of waste expected to be generated are:

- Packaging materials from imported supplies;
- Waste oil and lubricants;

5.2.3 Solid Waste Generation

During the pre-construction mobilisation stage, the Project team will liaise with Ministry of Communications and Transport (MCT), the Civil Aviation Directorate (CAD) and the Public Works Department (PWD) and any island recycling Council operations or businesses to determine where food and green waste and aggregate / general waste can be recycled or disposed of in the community. The Project team will allow for maximum reuse and recycling of construction materials prior to project completion. The remainder of recycled materials and solid waste will be segregated and stored in the laydown area, prior to packaging and transporting from Tuvalu.

5.2.4 Waste Storage on Project

During the Project, all imported construction waste material that cannot be disposed of in designated facilities and areas will be segregated for either recycling or disposal off island. Food and green waste and excess aggregate will be kept aside for recycling and disposal on island. All other waste, where possible, will be segregated, to minimise cross contamination and to ensure maximum recycling potential off island.

The waste storage area will be clearly marked and sign posted. A hazardous materials waste storage area will be kept aside from general waste in a secure area. There will be no unauthorised dumping of rubbish on the Project site or surrounding environment. The waste storage area will be clearly marked on the site plan.

Awareness training will form part of the site induction and other site meetings.

5.2.5 Hazardous Waste Storage

Hazardous waste will be stored in a bunded container or hard stand area only. The hard stand areas will be covered to stop rain water entering. Bunding will be of a size to contain 110% of the

largest container/tank or 25% of the total volume if the total volume is greater than 1,000L for liquid hazardous waste and used oil.

5.3 TRANSPORTING WASTE

For importation of all used construction equipment, waste and hazardous materials into New Zealand, McConnell Dowell uses the services of the customs broker, North Harbour Customs Agents Ltd (NHCA), Auckland, NZ. In consultation with NHCA, goods and waste is imported back into NZ in compliance with applicable legislation.

Prior to exporting from Tuvalu, McConnell Dowell will contact Tuvalu Customs to ensure the site packages and exports waste in compliance with Tuvalu and international legislation.

6.0 INSPECTION, MONITORING & REPORTING

All areas of the Project site and camp will be inspected to ensure compliance with waste management requirements as part of the environmental inspection. This will include:

- Inspection of construction work areas for litter, improper disposal of waste and inadequate separation of waste streams;
- Inspection of recycling and waste containers to ensure correct use and regular waste collection; and
- Inspection of construction areas to confirm proper storage and bunding of hazardous materials including waste.

Records of inspection will be kept on site and any non-conformances will be reported to MCT as part of the monthly reporting requirements. Significant non-conformances will be reported immediately.

7.0 TRAINING & RESOURCES

As part of the induction process training will be given to all Project personnel, including sub-contractor staff (if any), regarding the management and disposal of waste during the life of the project, as well as the responsibilities associated with waste management. Personnel will be made aware of the location of areas of interest in relation to the disposal of waste.

In addition to induction training, methods of delivery include the following:

- JSEA training
- Tool box talks
- Pre-start meetings
- Other focused environmental training sessions.

Further detail on Project training structures and the methods of delivery are outlined below:

Inductions:

The general project induction will include a component on waste management to ensure that the personnel on site understand the potential impacts that poor waste management can have, as well as the mitigation measures that will be adopted on site.

Toolbox Talks:

Toolbox talks will be provided on an ongoing basis as well as when specifically required highlighting any specific issues that arise on site. They will endeavour to cover environmental issues including the waste management mitigation measures contained within this plan. Examples of potential topics include:

- Dewatering and water re-use and disposal;
- Waste management and minimization;
- Waste mitigation measures and control; and
- Waste monitoring.

Pre-Start Meetings:

Pre-start meetings are used by the supervisors and foremen to explain the work to be done in the upcoming shift. All operational aspects of the task are discussed including environmental issues and controls, particularly if there are new hazards or if there has been a recent incident.

Records of all training will be filed in accordance with the designated Project Filing System.

8.0 INCIDENT PLANNING & RESPONSE

For all information relating to environmental incident response and management refer to the project Emergency Response Plan (ERP) and CEMP. Potential waste incidents which could arise during the Project include the following:

- **Generation of Hazardous Waste:**
Hazardous waste not being stored in correct area, causing contamination.
- **Community Complaints:**
Litter or waste complaints received from the community will be recorded, immediately investigated and closed out including any actions to be taken.
- **Waste Dumped at Wrong Location:**
Recover waste and transport to correct location for appropriate disposal.

9.0 RECORDS

Outputs that occur as a result of inspection and monitoring processors are required to be kept and documented as follow:

- Environmental Inspection (mitigation measures, stockpile stability, transportation)

- Offshore Waste Disposal Tracking Sheet
- Monthly report
- Inclusion of quantities/stats/figures into the Monthly Report
- Records of any training will be filed in accordance with the project filing system

In the event that a complaint is received, the following information will be recorded and reported:

- The date, time, source and reason for the complaint
- Details of waste observed and other relevant site conditions
- The date and time of any corrective action and the type of corrective action that was taken

Specific details regarding complaint management is included within the CEMP.

Site Environmental Plans- Tuvalu



We have 2 No. Compounds on site and the Locations are as follows:

- 1. Sealing Compound is located on the Eastern side of the Runway Beside the PWD Yard. This is where we will be undertaking all the Presealing works as in Precoating of Aggregate, storage of Bitumen and aggregate, blending of Kerosene and Bitumen during the sealing works.**
- 2. Batching Compound is located on Tuvalu Road and is approx 1.3 Km's from the Tuvalu Bank it is located on the left hand side of the Road as you head towards the Port. This is where we have our Batching Plant set up for the Concrete works,also at this location we also have our wash out bay set up in the corner of the compound.**

Each Compound will have a Spill Kit and a First Aid Kit as a Minimum.

Please refer to Maps below showing Location and Layout

Site Environmental Plans- Tuvalu





Site Environmental Plans- Tuvalu



Spill Response Plan- Tuvalu

2 No 120 Litre Spill Kits On site (Maps showing locations below)

- 1 Located at the Batching Compound
- 1 Located at the Sealing Compound

Small Spills

All plant and Vehicle carry absorbent pads to mop up any potential small spill on site.

If soil has been contaminated this is to be dug to a depth to be determined on site where no visible contaminants are left on site shall be bagged and removed to a Contaminated Material Bund within the Sealing Compound

All Spills are to be reported and contaminated materials brought to and disposed of at the Contaminated Material Bund ONLY.

Large Spills

If there is a significant spill the following Procedure will be implemented:

1. 2 No. 120 Litre spill kits are located in the sealing and Batching Compounds as per sketches above.
2. Once a spill has been detected the first thing to happen is for the Plant operator to turn off the engine and take out whatever absorbent pads are within that item of plant to help control the spread of the fluid.
3. Supervisor/Site Office is to be contacted on UHF CH16 and Spill Kit is to be requested to be transported to the location of the spill, Operator needs to give a clear description of Location.
4. Spill socks to be distributed around the perimeter to contain the leak.
5. If safe to do so the Leak is to be stopped and or plugged temporarily.
6. Once the leak has been contained and stopped, mopping up of the contaminant can commence with the Absorbent pads
7. All contaminated material including the soil to a depth to be determined on site where no visible contaminants are left on site shall be bagged and removed to a Contaminated Material Bund within the Sealing Compound.
8. Environmental Incident Report (MMS# 025-F004-100) to be filled out as soon as possible along with Witness reports and photographs taken, this is to include but not limited to what substance was spilled, quantity, location etc.
9. Report to be submitted to head Office and Client made aware of Incident.
10. Inventory on Spill kit to be carried out and additional equipment/materials ordered to replenish Spill Kit.

Spill Response Plan- Tuvalu



Spill Response Plan- Tuvalu

