

Pacific Aviation Investment Program (PAIP)

Environmental Management Plan - Funafuti International Airport
(FUN) and Road Interim Working Document



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Design & Supervision Services of the Pacific Aviation Investment Program (PAIP)
Pacific Aviation Investment Program (PAIP) – Environmental Management Plan -
Funafuti International Airport (FUN) and Road Interim Working Document
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Pacific Aviation Investment Program (PAIP)

Environmental Management Plan - Funafuti International Airport (FUN) and Road Interim Working Document

Client: Ministry of Communications and Transport (MCT)

Co No.: N/A

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°C	Degrees Celsius
ACM	Asbestos Containing Material
ADS-B	Auto Dependent Surveillance – Broadcast
AGL	Airfield Ground Lighting
ARFF	Airport Rescue and Fire Fighting
ATC (ATCT)	Air Traffic Control (Air Traffic Control Tower)
ATR	Twin-engine turboprop short-haul regional aircraft built by the French-Italian aircraft manufacturer ATR
AWS	Automatic Weather Station
CAD	Civil Aviation Directorate
Category B	World Bank categorised projects with potential limited adverse social or environmental impacts that are few in number, site-specific, largely reversible, and readily addressed through mitigation measures.
CLSM	Controlled Low Strength Material
DME	Distance Measuring Equipment
EA	Executing Agency (Ministry of Communications and Transport)
EHS	Environmental, Health and Safety
EMP	Environmental Management Plan
ESMF	Environmental and Social Management Framework
FUN	Funafuti International Airport
HIV/ AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
IA	Implementing Agency
IATA	International Air Transportation Association
ICAO	International Civil Aviation Organisation
IUCN	International Union for Conservation of Nature
Kaupule	Tuvalu local/ village Town Council
km	kilometre
LED	Light Emitting Diode
m/ m ² / m ³	Metre/ square metres (area)/ cubic metres (volume)
MOWP	Method of Works Plan
MCT	Ministry of Communications and Transport
NDB	Non-Directional (radio) Beacon
NGO	Non-Governmental Organisation
NZAid	New Zealand Government's Aid Programme
NZBC	New Zealand Building Code
NZCAA	New Zealand Civil Aviation Authority
OLS	Obstacle Limitation Surface

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PAIP	Pacific Aviation Investment Program
PAPI	Precision Approach Path Indicator
PCN	Pavement Classification Number
PIB	Project Information Bulletin
PMU	Project Management Unit
PV	Photovoltaic
PVC	Polyvinyl Chloride (type of plastic)
PWD	Public Works Department
SIT	Series Isolation Transformer
SPREP	South Pacific Regional Environmental Program
Stakeholder	Project stakeholders are all people directly or indirectly, negatively or positively impacted by the project; that are important to make the project successful, or that may oppose the project or that have a vested interest.
TANGO	Tuvalu Association of Non-Governmental Organisations
TFSU	Technical and Fiduciary Services Unit responsible for coordinating implementation across all activities for the PAIP. The TFSU is based at Tonga Airports Ltd and is comprised of fiduciary, procurement and technical staff. The TFSU leads the procurement activities on the PAIP, with inputs from the countries (Kiribati, Tonga and Tuvalu).
TMP	Traffic Management Plan
TOR	Terms of Reference
TvAIP	Tuvalu Aviation Investment Project
UHF/ VHF	Ultra-High Frequency/ Very High Frequency
WB	World Bank
WDI	Wind Direction Indicators

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Executive Summary

The Tuvalu Aviation Investment Project (TvAIP) was established to carry out the upgrade activities as identified in the Pacific Aviation Investment Program (PAIP) funding loan from the World Bank (WB). The TvAIP project objective is to enable air transport infrastructure and operations of Funafuti International Airport (FUN) to meet International Civil Aviation Organisation (ICAO) standards, and to improve sustainability of the airport and civil aviation of Tuvalu. This Environmental Management Plan (EMP) has been prepared for selected FUN TvAIP project components, namely the infrastructure works, which are listed below and to meet with funding and Tuvalu legislative requirements.

- Runway pavement rehabilitation
- Road surface rehabilitation
- Terminal upgrades
- Upgraded navigational aids

The 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).

This EMP looks to outline the potential environmental impacts and the measures needed to prevent, minimise, or mitigate adverse impacts and improve environmental performance for the TvAIP project components.

Overall the TvAIP is a Category B project under WB environmental and social screening guidelines and requires development of the project EMP. Category B projects have potentially limited adverse social or environmental impacts that are few in number, site specific, largely reversible, and readily addressed through mitigation measures. This EMP is a dynamic document to be updated if there are changes to the project scope, detailed designs, or if further information becomes available as a result of consultation with stakeholders and the community. The objective of the EMP is to provide a framework for managing the airport and road upgrade works in a manner that incorporates the principles of environment sustainability while minimising potential adverse effects on the local community and the environment.

This EMP includes information on mitigation, monitoring, capacity development and training, and implementation costs (in accordance with WB Operational Policy 4.01 Environmental Assessment). The majority of potential adverse impacts will occur during the construction phase of the TvAIP. However given that this primarily involves the rehabilitation of existing infrastructure, mitigation measures should be able to alleviate or lessen any potential negative impacts. The key potential impacts that are being 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 resources
- Wastewater discharges
- Construction camp establishment and dis-establishment

This EMP is designed to address these issues through:

- Implementation of this EMP through the Contractor's EMP.
- Regular supervision and monitoring of the implementation of the EMP (refer EMP monitoring plan).

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1.0 Introduction

1.1 Background

The Pacific Aviation Investment Program (PAIP) is funded by the World Bank (WB) and has the development objective to (i) improve the safety, security, efficiency, management and environmental sustainability of airports, and (ii) improve regional harmonization of aviation safety standards. Phase I of the Program, for which this Environmental Management Plan (EMP) is prepared, includes Kiribati, Tonga and Tuvalu. This site specific EMP has been developed for project work at Funafuti International Airport (FUN) and the road network on Fongafale islet.

Tuvalu is the fourth smallest country in the world with a land mass of only 26 km². The three reef islands and six atolls are only accessible by boat. FUN is the only airport within Tuvalu and is the primary access point for tourists and expatriate Tuvaluans. Tuvalu faces many challenges and constraints regarding economic development due to the remote location and limited capital resources. Transport connectivity with the Pacific region is an example of one such challenge Tuvalu faces. Improved accessibility to the country will benefit tourism related services, seasonal agriculture, seafarers labour markets and commercial businesses.

Recognising the key role of aviation transport in the country's socio-economic growth, in 2011, the Government of Tuvalu requested support from the WB and other regional donors (New Zealand Aid Program, AusAID and Asia Development Bank) to improve the FUN facilities and services. FUN is operated by the Civil Aviation Directorate (CAD) of the Ministry of Communications and Transport (MCT) The Tuvalu Aviation Investment Project (TvAIP) was established to carry out the upgrade activities as identified in the PAIP funding grant.

In November 2011 an overarching EMP (CAD/ MCT, 4 November 2011. Draft Environmental Management Plan for Tuvalu Aviation Infrastructure Investment Project) was published for all components of the TvAIP. However the road surface rehabilitation component was not included in the overarching EMP as it was not initially budgeted for in the TvAIP. The overarching EMP is in compliance with WB Policy OP/BP 4.01 Environmental Assessment and Tuvalu national legislation, and provides a framework for mitigation of the projects impacts and development of a specific EMP for the detailed design, construction and operational stages. Consultation and public disclosure was undertaken during the project preparation phase with details of stakeholders and outcomes included in the overarching EMP. This EMP builds on the overarching EMP and details environmental impacts and mitigation measures specifically for FUN and incorporates details of the detailed designs.

1.2 TvAIP Objective

The TvAIP project objective is to enable air transport infrastructure and operations of FUN to meet International Civil Aviation Organisation (ICAO) standards, and to improve sustainability of the airport and civil aviation of Tuvalu. In addition, the project aims to rehabilitate the road surface on Funafuti to improve road safety.

1.3 Environmental Management Plan Objectives and Scope

The TvAIP is a Category B project requiring development of a site specific EMP. The WB involuntary resettlement policy OP/BP4.12 is triggered by the components of the TvAIP particularly the road pavement rehabilitation component due to the potential temporary need for laydown areas (e.g. small stockpiles), removal of vegetation (potentially food trees) infringing on the line of sight for road users and moving of stalls or other non-permanent structures away from the road edge.

This EMP is a dynamic document to be updated if there are changes to the project scope, detailed designs, or if further information becomes available as a result of consultation with stakeholders and the general public. The objective of the EMP is to provide a framework for managing the airport upgrade works in a manner that incorporates the principles of environment sustainability while minimising potential adverse effects on the local community and the environment.

To achieve this objective the EMP outlines the mitigation measures required for avoiding or minimising the potential impacts of the works and provides a monitoring program to confirm effectiveness of the required mitigation measures. Roles and responsibilities are clearly defined for all stages of the project works and execution of project works. The EMP also provides the details of how the community and stakeholders are to be engaged and the mechanisms for ongoing consultation and communication.

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This EMP is limited to the scope of works as described in Section 2 of this document and addresses impacts and mitigation measures identified at each stage of the project's execution, namely detailed design, construction and operation. This EMP builds on the impacts and mitigation measures as identified in the overarching EMP which included outcomes of the consultation undertaken to date. This EMP will be included in the bidding documents for construction contractors and form the basis of the Contractor's EMP. The mitigation measures identified in this EMP form the minimum requirement for reducing impacts on the environment as a result of works associated with the project.

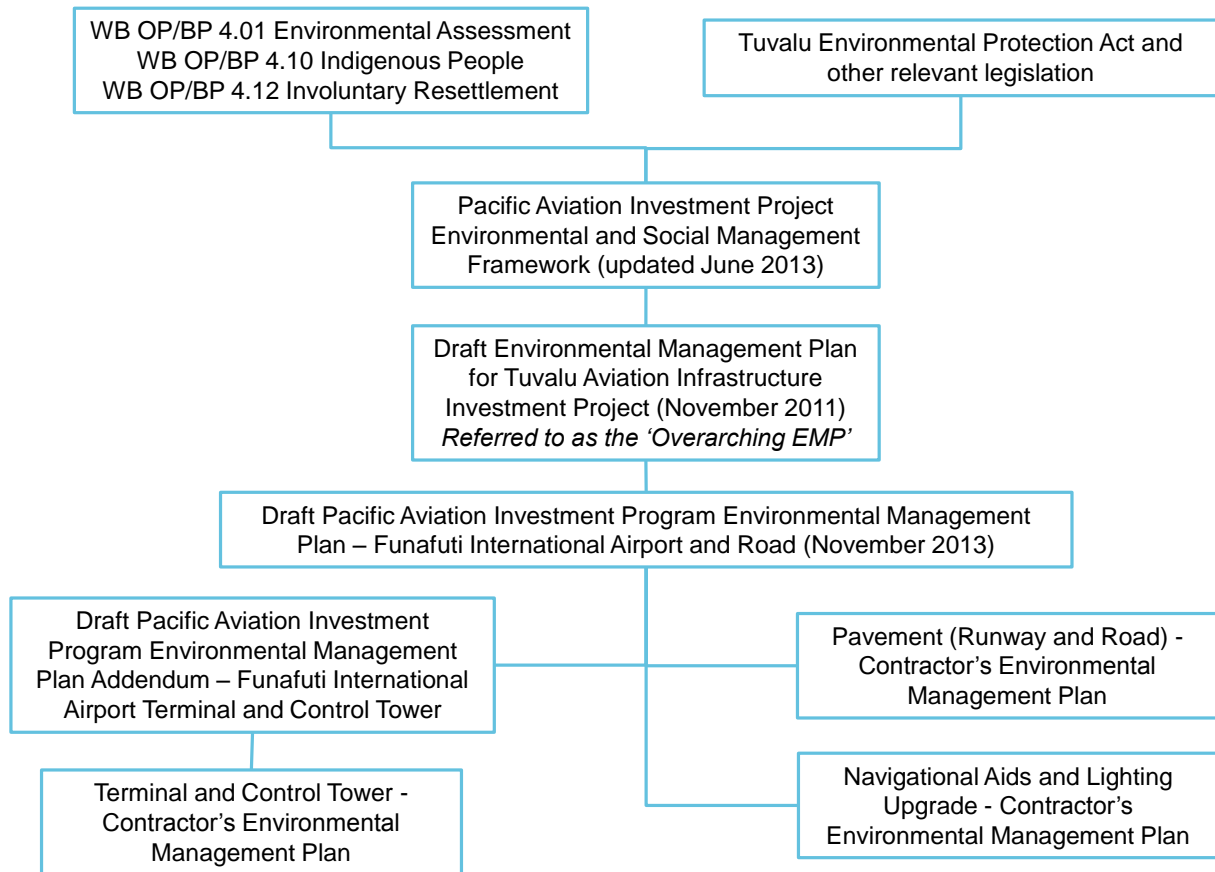
1.3.1 Environmental Safeguards Document Hierarchy and Development

The PAIP has an Environmental and Social Management Framework (ESMF) which outlines the key steps and procedures in screening and assessment of environmental and social issues related to the PAIP (generally). The ESMF sets out the principles, rules, guidelines and procedures to assess the environmental and social impacts. It contains measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project impacts. It defines roles and responsibilities, and provides guidance for the Implementing Agency (IA), Executing Agencies (EA) (respective country's ministries) and the respective countries Civil Aviation Authorities for developing the environmental and social safeguards documents in compliance with respective WB operational policies (namely OP/BP4.01, OP/BP4.12, OP/BP4.10) and respective country environmental requirements

The EMP is a dynamic document which is updated as and when project scope, detailed designs or further information becomes available, thus creating a hierarchy of documents as the project progresses. The diagram below shows the hierarchy and development of these documents culminating in the development of the contractor's EMP which specifically details how the contractor will implement requirements of the EMP. Issues, impacts and mitigation measures identified in superseded EMPs are incorporated into subsequent versions unless they have been addressed through design or other means, in which case this is identified in the EMP. Only those documents showing a date have been drafted, all others are either in progress or are yet to start. This EMP supersedes the overarching EMP and identifies the impacts and mitigation measures that must be implemented in order to manage the identified impacts. The contractors are required to comply with this EMP and use it to identify what mitigation measures need to be implemented. The contractors EMPs will document implementation and specific measures that will be used based on their construction methodology (if different from that identified in Section 2.0).

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Figure 1 Environmental safeguard document hierarchy



In order to finalise this EMP for inclusion with the pavement (runway and road), and navigational aids and lighting contractor procurement bid documents for the TvAIP, the information pertaining to the terminal and control tower has been left at the draft detailed design stage. An addendum to this EMP specifically addressing the final detailed design of the terminal and control tower (if agreed) will follow when the detailed design phase is finalised and confirmed by MCT.

1.3.2 Social Safeguards Document Development

In August 2013, a Resettlement Policy Framework (RPF) (MCT, 2013. *Resettlement Policy Framework, Funafuti Airport and Road, Tuvalu Aviation Investment and Tuvalu Electricity Sector Development Projects*) was developed for the TvAIP. The RPF documents the framework under which social impacts, particularly loss of land, trees, structures or access are to be managed. The RPF provides the criteria for defining displaced persons, organisational procedures, RPF implementation, grievance and redress mechanisms, funding for compensation claims, and on-going consultation. The RPF allows for the development of Resettlement Plans and or Abbreviated Resettlement Plans as required during project implementation.

1.4 EMP Methodology

The methodology used to develop this EMP is as follows:

- Review the ESMF and Overarching EMP including consultation outcomes to inform the Design and Supervision team of specific issues or items for detailed design.
- Prepare for field survey and organise site visits, include specific requirements as identified in the Overarching EMP and ESMF (e.g. awareness training for HIV/AIDs).
- Conduct field survey using the Overarching EMP, ESMF and an environmental screening checklist as a basis for assessment.
- Liaise with Design and Supervision team regarding any findings which may influence detailed design.

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- Draft the FUN EMP based on Overarching EMP framework and consultation outcomes and update with information obtained from the field survey and detailed designs.
- Submit to Technical and Fiduciary Services Unit (TFSU) and MCT/Department of Environment for review prior to consultation, update according to comments and feedback from TFSU and MCT/Department of Environment.
- Consultation at FUN with site specific EMP available in hard copy and online conducted by MCT. Incorporate outcomes as required from consultation into final FUN EMP to be included in bidding documents.
- Submit to TFSU and MCT/Department of Environment for final review.

A number of PAIP concept design, detailed design and supporting assessment reports have also been reviewed in compiling information regarding the scope of the project and identifying impacts and mitigation measures. Some of these reports are still in draft form and changes may impact on the type and scale of impacts and opportunities to avoid these impacts or potential mitigation measures that may need to be implemented. Any changes in these documents should prompt a review of this EMP and be updated accordingly. The documents are listed as follows at the stage of development at the time of writing this version of the EMP.

- Pacific Aviation Investment Program (PAIP) Road Condition Survey Report (D-V1-1), 13 November 2012
- Pacific Aviation Investment Program (PAIP) Airport PCN Study Report – Funafuti, Tuvalu, 26 February 2013
- Pacific Aviation Investment Program (PAIP) Airport Terminal Concept Design Report – Tuvalu (D2), 8 March 2013
- Pacific Aviation Investment Program (PAIP) Obstacle Limitation Surface (OLS) Survey and Operational Review Report, Funafuti International Airport (FUN) – Tuvalu (D-V2-1), 12 April 2013
- Pacific Aviation Investment Program (PAIP) Final Pavement Detailed Design Report – Tuvalu (D-10), 10 May 2013
- Pacific Aviation Investment Program (PAIP) Runway Lighting and Air Navigation Aids Final Detailed Design Report (D-12), Version B with Final Amendments, 5 August 2013
- Pacific Aviation Investment Program (PAIP) – Tuvalu Draft Final Design Report – Airport Terminal & Security (D-5), 8 August 2013
- Pacific Aviation Investment Program (PAIP) Tonga & Tuvalu Bid Documents for Airfield Pavements (D-15), 29 August 2013

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2.0 FUN Upgrade Description of Works

2.1 Overview of Works

The PAIP consists of four primary tasks:

- Airport runway pavement
- Road pavement
- Airport terminal and security
- Airport runway lighting and navigational aids

The TvAIP scope has been expanded to include rehabilitation of the road network surface.

2.1.1 Runway Pavement Design

The design scope for FUN is the resurfacing and upgrading of the runway, taxiway and apron for a projected life of 20 years, before any further resurfacing or major maintenance work is required with, where possible, a minimum Pavement Classification Number (PCN) of 18 to allow for emergency flights. Considering the commercial airline operators' trends towards larger aircraft variants, geometrical considerations for larger Code C turboprop variants (ATR 72) have been designed for.

The detailed pavement design for FUN includes the following aspects:

- Resurfacing of the main runway, taxiway and apron areas
- Treatments to address runway surface subsidence which are ponding water
- Installation of 750 m² runway end turning bays (to accommodate the ATR 72)
- Reconstruction of the taxiway formation to address low strength and flooding issues
- Extending the apron sealed area by 350 m²
- Installation of ducting crossing the runway and taxiway to facilitate onward connections to the new terminal building and new ATC and ARFF facilities, and new navigational aids installations
- Detailed design drawings, schedules of quantities
- Project specific Method of Works Plan (MOWP) for airside construction activity
- Technical specifications and related support documentation for procurement

The 20 year old runway surfacing is aged and is suffering from severe oxidation of the bitumen and ravelling of the surfacing aggregates. The bitumen binder is very hard and brittle in appearance and a change in surface texture is noted in areas of the runway where less bitumen content was observed and increased stone loss is occurring. In many areas, the chipseal surface has stripped right back to the basecourse and has pavement waterproofing related issues.

The surfacing treatments for each section of the runway are summarised below from top surface treatment to base material. Bold text indicates new and reconstructed treatments and un-bold text indicates existing treatment that is remaining.

Table 1 Runway surfacing treatments from top surface to base material, bold text indicates new and reconstructed treatments

New Runway Ends	Existing Runway Ends	Existing Runway	Reconstructed Taxiway	Existing Apron	New Apron
Sand seal locking coat	Sand seal locking coat	2 coat interlocking spray Seal	DG 20 structural mix	Jet Seal	Jet Seal
3 coat interlocking Spray Seal	2 coat interlocking Spray Seal	DG 7 infill localized runway dips	Prime coat	Sand seal locking coat	Sand seal locking coat

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New Runway Ends	Existing Runway Ends	Existing Runway	Reconstructed Taxiway	Existing Apron	New Apron
Bitumen prime coat	Bitumen rejuvenation treatment	Bitumen rejuvenation treatment	New Basecourse layer	2 coat interlocking Spray Seal	3 coat interlocking Spray Seal
New Basecourse	Existing seal coats	Existing seal coats	Basecourse layer (1995)	Bitumen rejuvenation treatment	Bitumen prime coat
Compacted runway strip fill	Basecourse layer (1995)	Basecourse layer (1995)		Existing seal coat	New Basecourse
				Basecourse layer (1995)	Compacted strip filling

The initial scope of the TvAIP included a review of the feasibility of capturing rainwater from the runway pavement. The Final Pavement Detailed Design Report Tuvalu (AECOM, 10 May 2013) identified a number of issues which concluded that the runway rainwater capture capital expenditure required is prohibitive. The review suggested that expenditure at a residential level on rainwater capture tanks from house roofs would appear to be a better economic return on investment, particularly considering the freshwater lens is no longer a viable supply of freshwater due to salt water intrusion and pollution.

The new turning bays at either end of the runway are required to accommodate the ATR 72 and will require approximately 150 m³ (area 750 m² to a depth of 0.2 m) of excavation at either end to construct the new turning bay pavement. The current apron formation will be expanded and require approximately 70 m³ (area 350m² to a depth of 0.2 m) of excavation to construct the new pavement and drainage.

Flooding of the taxiway area due to the under vertical curve of the runway strip and apron slopes are addressed by installing two soak away drainage sumps, one on either side of the raised and crowned reconstructed taxiway formation. Localised regrading of the runway strip grass area will be implemented to further improve the local drainage path to the sumps.

The runway pavement detailed design as described above has been finalised. A selection of the final design plans which best demonstrate the work described are included in Appendix A.

As all materials and equipment will need to be imported the following volumes of materials have been estimated (subject to change based on outcomes of procurement process).

Table 2 Estimated quantities of material required for the runway pavement component of the TvAIP (this list is not exhaustive and subject to change)

Material	Unit	Quantity
In-situ to Waste ¹	m ³	500
Aggregate (chip seal, sand and basecourse)	m ³	1,500
Bitumen	Litres	180,000
DG20 Cold Mix Asphalt	m ³	60
DG7 Cold Mix Asphalt	m ³	60
Kerosene	Litres	25,000
Grout Slurry	Litres	10,000
Jet Seal	Litres	3,300
Paint - White	Litres	2,000
Paint - Yellow	Litres	100
Paint - Glass Blend	Tonnes	2

¹ In-situ to waste refers to material (topsoil and vegetation) from excavations and clearance work

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2.1.2 Road Rehabilitation

The total surfaced length of the road network amounts to 15.5 km with an average width of 5 meters. The traffic loading is generally light and the total number of vehicles on the Island is approximately 1,200 units. The spectrum consists mainly of motor bikes (75%), motor vehicles (20%) and the remaining 5% light medium and heavy commercial vehicles.

The general pavement condition is in what can be described a “warning” condition with early signs of surface deterioration. The surface seal consists of a well-shaped single sized imported volcanic aggregate and was constructed in 2002. Edge breaking and the formation of small potholes is the predominant visible modes of failure on the road network. These modes of failure are generally related to aging of the bituminous binder, and seal chips removed from the road surface revealed an aged brittle binder. Edge breaking occurs mostly in areas where the shoulders have been eroded below the pavement level and the formation of large potholes is limited to the more heavily trafficked road sections. Forty one speed humps are on the Funafuti road network with 10 in need of repair.

In order to preserve the pavement structure and to prevent moisture from entering the pavement, it is proposed that the entire network be rejuvenated. The less trafficked northern and southern ends of the network will receive a Fog Spray (bitumen and cutter mix) and application of a 10mm chip seal on the more trafficked, urbanised areas of the road network. Removal of large portions of substandard concrete work is not feasible and it is proposed only to remove and replace failed concrete sections within the travelled lanes of the road.

To enhance road safety, sight distance improvements are proposed at a number of intersections. This will entail cutting of hedges and a limited number of trees as well as the shifting of a few electricity metering boxes. A need for sidewalks exists specially in the vicinity of the hospital, schools, government buildings and churches. From a pedestrian safety point of view, sidewalks should be constructed by providing non-mountable kerbs. The exact location of where sidewalks are to be constructed is to be decided on site by the contractor, MCT and PWD.

Some drainage improvements are proposed in terms of soakage drains and reshaping of shoulders. The exact location of these are to be decided on site by the contractor, MCT and PWD.

The section of road at the Port consists of a 17 meter wide by 180 meter long jointed concrete pavement with signs of severe distress in terms of cracking. This section of road acts as a container storage and handling facility. The concrete slabs do not show signs of differential settlement or faulting. Only a few corner breaks are evident. The pavement of the container handling facility adjacent to the docks consists of an uneven granular pavement with large undulations. In comparison to the road section, this paved area is probably a less safe container handling facility. Due to the costly nature of replacing the concrete pavement, it is proposed to only replace the most severely cracked sections of the pavement especially the section at the gate to the container camp. It is also proposed to provide good quality basecourse material to the container facility within the harbour area in order to provide a more durable unsurfaced pavement to this area.

Due to the scarcity of borrow pits all seal chip and construction aggregates will have to be imported. Therefore the following preferred option was selected which consists of applying the following rejuvenation: A Fog spray on the northern and southern extremities of the network and a Grade 3 (7mm) single coat on the remaining road network with second coat seal at selected intersections. The total area of each seal type is as follows:

- Fog Spray – 36,600 m²
- Grade 3 (7mm) – 45,000 m²
- Second Coat Seal at Selected Intersections – 6,500 m²

The Scope of Works include replacement of distressed and cracked sections of a 17 meter wide by 180 meter long jointed concrete pavement the Port. Typical design drawings (road cross section, concrete pavement details at Port, drainage details and edge restraints) are provided in Appendix A.

All materials and equipment will need to be imported. The following volumes of materials have been estimated (subject to change based on final designs and outcomes of procurement process).

DRAFT**Table 3** Estimated quantities of material required for the road pavement component of the TvAIP (this list is not exhaustive and subject to change)

Total	Unit	Quantity
15 Mpa Concrete	m ³	100
Cold Mix AC	m ³	20
Bitumen	Litres	100,000
Concrete to Waste	m ³	500
PCQ Concrete ¹	m ³	500
Paint - White	Litres	2,000
Portland Cement (Kerb)	m ³	90
Aggregate (chip seal, sand etc)	m ³	1,200

¹ PCQ Concrete refers to pavement quality concrete

2.1.3 Terminal***AN ADDENDUM TO THIS EMP WILL FOLLOW ADDRESSING SPECIFIC IMPACTS AND MITIGATION MEASURES ASSOCIATED WITH THE FINAL TERMINAL DETAILED DESIGN***

The existing Terminal building, completed in 1994, is undersized for the existing one way Peak Hour of 40 passengers (ATR 42-500). The terminal building is in poor condition and is at the end of its serviceable life. A detailed review of the existing Terminal passenger processing functions and the condition of the existing terminal is provided in the Inception Report.

The runway, taxiway and aprons are at a low elevation relative to sea level. The outer areas of the runway strip reportedly flood during the annual high-tide season from January to April. The terminal and apron are located adjacent to the main street in the centre of Vaiaku, directly opposite the Government building. The availability of airport land area for Terminal and Apron redevelopment is constrained. The existing Terminal building stands in the way of apron expansion required to cater for future planned ATR 72-500/600 operations.

An outcome of the site inspection findings, condition assessments of existing buildings, identification of breeches of ICAO SARPS and direct requests by the FUN Airport Client identified two additional buildings that require upgrading or relocation. At present these two additional buildings are not included in the scope of this EMP or this stage of the PAIP.

- A new relocated standalone Air Traffic Control Tower (ATCT).
- A new Airport Rescue and Fire Fighting (ARFF) building to incorporate the new relocated ATCT.

Budget constraints have meant that a staged process has been proposed in developing the Terminal and meeting all the design objectives. Through a series of design workshops and an iterative design process (as detailed in the Tuvalu Draft Final Design Report – Airport Terminal & Security (D-5), 8 August 2005) a number of options were developed with 'Option 6' being recommended as the final Stage 1 Terminal Design option. The Option 6 Final Stage 1 Terminal Design is based on the providing for the IATA LOS C space standards for a Peak Hour of forty (40) arriving and forty (40) departing passengers to cater for ATR 42-500 or similar fifty (50) seat aircraft at an average 80% Load Factor. The design also sets aside reserved Terminal expansion zones at both ends of the Terminal, providing the flexibility to extend the Terminal length to cater for ATR 72-500/600 or similar seventy (70) seat aircraft at an average 80% Load Factor. Manual bag search for the Hold Bag Screening (HBS) and Passenger and Bag Security Screening functions are provided and access to the Check-in Hall is limited to ticketed passengers in order to reduce the check-in hall area requirement and cater for HBS manual bag search.

The proposed site plan is shown below (refer Figure 1). The Terminal designs are at concept stage with the detailed designs currently being worked through with the CAD/MCT and TFSU. Therefore all information presented here is subject to change and will be updated on issue of the final detailed designs. Current plans are to remove the existing terminal along with the offices on the landside of the terminal. The Falekaupule will be retained.

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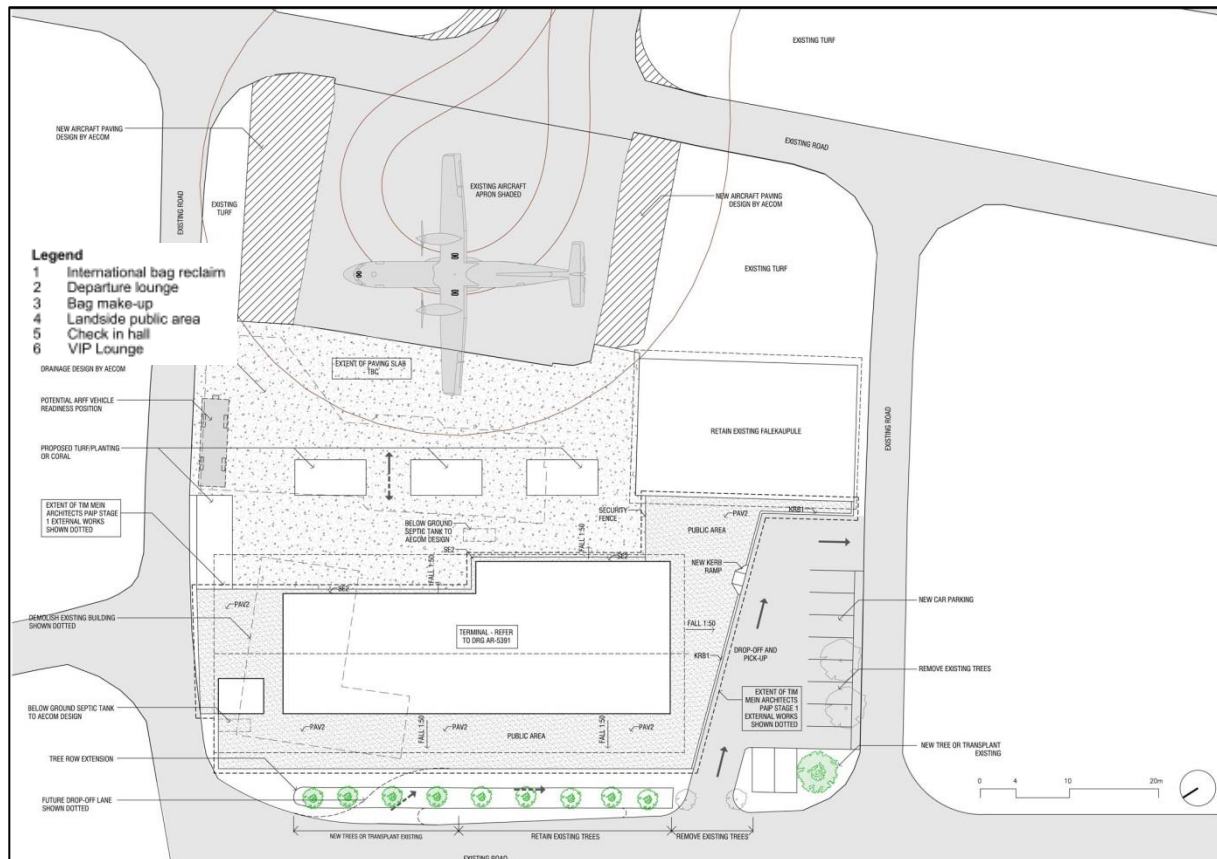


Figure 2 Option 6 (Recommended Final Stage 1) – Site Plan (subject to change through detailed design process)

The recommended Option 6 does incorporate environmentally sustainable design elements as outlined below which may be included in the Option 6 construction or later development:

Rainwater collection - collected from the roof catchment area and stored in a below ground water storage with an estimated total of 600,000 litres storage capacity has been included. The size of this cistern however will be adjusted to suit the funding available – MCT's decision on this is required.

Retain existing trees to provide shade – siting of the proposed Terminal has been done so that most existing trees on the airport site can be retained.

Solar power generation – the roof is an 'energy generator' with most of the roof area available for future photovoltaic (PV) solar panel installation. The roof angle is set at 23 degrees to enable retrofit of solar panel array framing system to be fixed at the same angle as the roof without the need for additional angle adjustment frames. On days when the Terminal is closed, or on days when there are few flights, the PV array will be used to supply electricity to the Funafuti Island grid or to nominated buildings such as the adjacent Government office building.

Passive solar design - the Terminal is designed as an open pavilion sheltered from the sun by a large overhanging roof. The roof overhangs provide shade and reduce radiation of heat into enclosed and covered spaces. The roof will be insulated to an R value that exceeds NZBC requirements to reduce solar heat gain.

Thermal mass, including the floor slab, the below ground water storage cistern beneath the Terminal building and internal shaded concrete block walls provide a temperature moderating effect.

Natural ventilation - designed to maximise natural ventilation by providing permeable external and internal walls including the use of operable glass louvers and perforated security screens; a long narrow Terminal plan, orientated to take advantage of the prevailing easterly winds; roof ventilation at the highest point of the roof to encourage the stack effect, where hot air rises and increases air movement within the building; and ceiling fans.

The proposed construction method, for the FUN Terminal project, is to prefabricate the buildings using a 'flat-pack' methodology. The prefabricated Terminal will be shipped by sea freight to site in 20 foot sea containers and assembled on site by the Contractor. As such, all elements of the building shall be sized to fit inside 20 foot containers.

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Site works and site preparation

Prior to delivery and construction of the prefabricated parts of the Terminal, site work will be undertaken including:

- Staged demolition of existing buildings.
- Foundations, waterproof tanking, water cistern, raft slab, retaining walls.
- Suspended floor slab.
- Shear walls.
- Block walls.
- Plumbing and drainage services.
- Electrical and communications services.

Selected plans and concept views are included in Appendix A for information. These are still works in progress and are subject to change.

2.1.4 Runway Lighting and Navigational Aids

New and replacement Air Navigation Aids include installations for:

- 1) New Automatic Weather Station (AWS)
- 2) ADS-B (Automatic dependent surveillance-broadcast) installation – *Currently on hold pending independent review by the funding provider*
- 3) New Air Traffic Control Equipment: UHF / VHF radio's and related equipment
- 4) Precision Approach Path Indicator (PAPI) installation – new installation to aid visual approach to the runway
- 5) Wind direction Indicators (WDI) – new installations to aid visual approach to the runway

A new ATC tower is needed however the exact location and timing for construction has not yet been determined. Therefore in the interim electronic equipment should be installed into an insulated air conditioned shipping container, much like that currently used for the NDB equipment. MCT will confirm with the contractor which site is to be used.

The physical works associated with the new air navigation aids (items 1 to 5 above under section 2.1.4) include concrete pads and trenching for power and communication cables (in PVC rigid conduits). Details of the physical works are presented in the table below with final detailed design plans provided in Appendix A, including the layout plans which are drawings 60277008-AV-5402 Rev3, 60277008-AV-5403 Rev3, and 60277008-AV-5404 Rev3.

Item	Works Description	Drawing Number Reference**	Dimensions
Pit and duct system (connecting NDB, AWS and PAPI)	1,710 m ducting trench	60277008-AV-5410 Rev 3	500 mm wide 1,000 mm or 1,200 mm deep (TBC – dependent on PVC cable duct placement)
	6 x Heavy Duty Pits (for cable direction change) Prefabricated steel frame pits with sub soil drainage	60277008-AV-5411 Rev 3	900 mm x 900 mm x 1,000 mm
	20 x Series Isolation Transformer (SIT) Pits Prefabricated concrete chamber with drainage hole at base (approximately 20 mm diameter)	60277008-AV-5412 Rev 3	500 mm wide Depth will range from 590 mm, 640 mm and 945 mm
AWS Installation	Approximately 9 m cable duct between visibility pad,	60277008-AV-5413 Rev 3	300 mm wide

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Item	Works Description	Drawing Number Reference**	Dimensions
	10 m tower pad, lighting sensor pad and ceilometer pad		
	600 mm ² visibility pad, lighting sensor pad, ceilometer pad foundations	60277008-AV-5413 Rev3	Each pad will require 600 mm ² concrete pad with foundations to 1,050 mm
	10 m tower foundation pad	60277008-AV-5413 Rev 3	1,600 mm ² by 1,100mm deep

** Drawings for the final detailed design are provided in Appendix A

The pit and duct system is to run along the southern edge of the runway at 30 m off the runway centreline (outer strip edge has extensive existing buried reticulation). This pit and duct system is to be used for AWS power and communications cables and PAPI power and control cables (and possible future use). A new pit and duct system will also be provided from the proposed ATC location (at the current NDB site) to the runway, along the eastern side of the runway to the RWY 21 PAPI location and across the end of the runway at the 03 threshold to the RWY 03 PAPI location. It will be run within the runway 90 m runway strip, approximately 30 m from the runway centreline and will be used for AWS power and communications cables, and AGL primary cable.

Change of direction pits (heavy duty pits) will be outside the runway grade strip and will be 0.9 m x 0.9 x m 1.0 m pits with Class D lids. The SIT pits will be used as intermediate cable draw pits. Draw pits will be provided at intervals of no more than 180 m along straight runs.

The ducts will require a minimum 500 mm cover of compacted controlled low strength material (CLSM) fill. The sand and hardfill required for the backfill of trenches will make use of material from the excavations associated with the trenches, pits and foundations for the AWS pads. Material from other sources (e.g. the beach) will not be used. Concrete mixing will be subject to the requirements of this EMP.

Old equipment and material associated with the airport navigation equipment which are obsolete and cannot be reused or recycled on island must be removed from island at completion of project works.

2.2 Alternatives

The airport and road are existing infrastructure which requires maintenance work to ensure continued operation. Alternatives regarding design approach and methodology were explored however budgets and constraints around land and natural resource availability limited the selection of design and construction methodology. The designs and proposed construction methodology have been selected based on the most effective use of natural resources, labour, ease of ongoing maintenance, effects on the local environment and community and in the case of the Terminal ability to build onto the design at a later date as and when funds are available.

2.3 Construction Methodology

The runway pavement and road rehabilitation will most likely be the first components of the TvAIP to be started followed by the navigational aids and lastly the construction of the terminal and control tower. The contracts for the physical works for each component have yet to be awarded so the precise construction methodology is unknown. However the conceptual and detailed designs provide an indication of the nature of the work. The Contractor's implementation EMP will address specific methodological measures or impacts.

2.3.1 MOWP

The Method of Works Plan (MOWP) is a required document for any major construction works within the boundaries of an airport. The MOWP sets out the operational requirements for maintaining a functioning airport throughout the construction process. It includes the concessions and alternative arrangements that may need to be made (e.g. alternative aircraft parking apron) and staging of the construction process while ensuring the safety and security of all personnel, the community and aircraft and continued operation of the airport throughout construction works.

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2.3.2 Materials and Equipment

All materials and equipment for each component of the TvAIP will need to be imported. All cargo whether air or ship will need to be processed in accordance with Tuvalu quarantine and customs laws which require fumigation (proof of) of materials and equipment and declarations by personnel (specifically regarding communicable diseases).

2.3.3 Aggregate Supply

Aggregate materials for the runway and road rehabilitation will need to be imported. Section 2.1.1 and section 2.1.2 identify the estimated volumes of the different types of aggregate and materials required for the pavement works. Additional material will also be needed for the building components of the TvAIP. These are estimates and are subject to change. The source of aggregate will most likely be from Fiji (dependent on testing).

Small amounts of material (sand and hard fill) will be required for the excavations associated with installation of the navigational aids as detailed in section 2.1.4. Material from the excavations themselves will be used in the first instance and supplemented as required by the imported material.

2.3.4 Construction Camp and Lay Down Areas

Land availability on Funafuti is scarce and so there are not many options for positioning of the construction camp (the contractors work site). The construction camp will be utilised by all project contractors (pavement works, building and navigational aids) at differing times so the scale of the camp will vary. The greatest land area required will be for the pavement works (runway and road) component of the TvAIP as the equipment and aggregate requirements are the greatest. It is estimated that 1 hectare of land will be required for the duration of the TvAIP construction works. It is envisaged that the Public Works Department (PWD) compound on the southern side of the runway (approximately east of the apron) will be used as much as possible without interfering with normal PWD operations. There is an area of land between the PWD compound and the sportsfield which currently has the NDB aerial and supporting equipment on it. This area measures approximately 0.64 hectares and will also be required to store aggregate and equipment (V.F. Isoefa, personal communication, 10 September 2013). The southern end of the sportsfield may be affected by vehicle movements and potentially equipment parking. An encroachment onto the sportsfield will have to be agreed with MCT and other stakeholders as identified.

The exact details of the size and site management (health and safety, solid waste management, water management and wastewater management) will need to be decided by the Contractors in consultation with MCT. Final approval of these details will be required by MCT before the construction camp can be set up and documented in the contractors' environmental implementation plan.

Construction camp size should be kept to a minimum, be fenced and materials and equipment kept secure to prevent access and use by non-authorized personnel. Hiring of a local security firm to provide security for the area is recommended. There are no existing hard stand areas available for stock piling or banded areas (secondary containment) for hazardous substance storage. The secondary apron at the northern end of the runway will be required for aircraft parking during construction of the primary apron pavement. MCT has agreed that aircraft can also park on the runway provided there is no traffic. However this is not encouraged and should be the last resort when the secondary apron is not available. Vegetation clearance along with temporary hard stand and banded areas will need to be constructed. The banded area, also known as secondary containment, will require an impermeable base and water tight walls to contain the larger of 110 percent of the largest tank/container or 25 percent of the combined tank volumes in areas with a total storage volume equal or greater than 1,000 liters¹. The area identified as a potential construction camp is overgrown with grasses and scrub. There are no trees within this area that would require removal. Noise, dust, vibration and increased traffic are impacts that can negatively affect communities and sensitive receptors. The construction camp is located beside existing government departments and industrial activity sites. There are no residential sites directly adjacent to the area. The nearest residential properties are approximately 120 m across the runway. The use of the sportsfield could be temporarily affected depending on the size of the construction camp. The construction camp is not a residential camp. Foreign contractors will use local existing accommodation facilities.

Transport to and from the construction camp, particularly of materials and equipment, must occur on the existing road network and measures undertaken to prevent dust, noise and vibration nuisance (e.g. wheel wash, covering

¹ International Finance Corporation and World Bank Environmental, Health and Safety (EHS) Guidelines, Section 1.5 Hazardous Materials Management, Control Measures

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of loads, servicing of vehicles). If the transport of material or equipment is likely to impact on normal pedestrian and vehicle traffic or pose an increased safety hazard, consideration should be given to moving these items during off peak times. Hard stand areas must be available for storage of hazardous substances and other equipment that poses a potential risk to the environment (e.g. leaking lubricant from machinery). Runoff from hard stand areas used to store machinery will need to be collected and treated (e.g. oil water separator) to prevent contamination of soil or water bodies. Hazardous substances (e.g. fuel, lubricants or oil) must be stored in a bunded area. Solid waste and wastewater must be managed in such a way to prevent the spread of vector-borne diseases and contamination of soil and water bodies. There is one official landfill on Funafuti at the northern tip of the road which is managed by the Solid Waste Agency of Tuvalu (SWAT) and the Funafuti Kaupule. However there is pressure on the landfill and so all solid waste not able to be re-used either by the project or community must be removed from island at completion of the project works. There is no sewer network on the island. Therefore temporary toilets and disposal or treatment of wastewater will need to be in accordance with the PWD and SWAT's advice (for example construction and training in use of composting toilet facilities).

All occupational health and safety requirements must be in place and workers trained in necessary procedures (e.g. spill response plan). Personal protection equipment (PPE) needs to be available to workers as required (e.g. high visibility vest, safety boots) and processes in place for obtaining relevant PPE.

Temporary lay down areas for stockpile of material or equipment may be suitable to reduce the need to transport items on the road. All temporary stockpiles must be kept small (no higher than 2m) and bunded to prevent dust and sediment laden runoff being generated. If need be the stockpiles should be wetted or covered to prevent dust. Lay down areas should not be sited near sensitive receptors (refer Section 5.4). Any land required for a temporary lay down area will need to be negotiated with the landowner or lease holder.

2.3.5 Duration and Timing of Construction Activities

Three separate contracts will probably be awarded for the three types of work, namely pavement rehabilitation (runway and road), terminal and control tower construction, and installation of navigational aids. As the contractors have yet to be appointed the exact duration of each component is not yet known, however indicative time scales for the physical portion of the works are as follows in probable order of commencement.

Runway pavement – 16 weeks (to be confirmed)

Road pavement – 16 weeks (to be confirmed)

Navigational aids – 8 weeks (to be confirmed)

Terminal construction – To be confirmed

Control tower construction – To be confirmed

Normal working hours are Monday to Friday, 7am to 6pm. Works outside of these hours will require permission from MCT and notice to affected parties and the public at least 24 hours prior to work commencing. Working on a Sunday is not recommended and would likely only be approved if urgently required for safety purposes. It is likely the runway pavement works will need to work in addition to the normal working hours in order to work around flight schedules to ensure safe operations of the airstrip for incoming and outgoing aircraft. All flight and construction scheduling must be coordinated with air operators as documented in the MOWP.

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3.0 Policy, Legal and Administration Framework

3.1 National Requirements

The Environmental Protection Act (2008 edition) is the national legislation which provides for the protection and management of the environment in Tuvalu. To achieve this Part 5 of the Act allows the Department of Environment to request an environmental impact assessment for projects occurring within Tuvalu jurisdiction, whether land or sea. 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 Environment Protection Act (2008 edition) 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. Part 9 of the Act identifies the Department's role in protecting the biodiversity of Tuvalu including control of weed species.

The Marine Pollution Act (2008 Revised Edition) also requires the control and prevention of pollution, and dumping and incineration of wastes on the sea.

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 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. The following regulations are also in place:

- Aerodromes (Water Aerodromes) Regulations
- Aerodromes Regulations
- Air Navigation (General) Regulations
- Air Transport (Licensing of Air Services) Regulations
- Civil Aviation (Investigation of Accidents) Regulations
- Funafuti Airport (Departure Tax) Regulations
- Government Aerodromes (Landing and Take Off Fees) Regulations

3.2 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.

3.3 International Obligations

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. Applicable obligations include:

- Convention to Ban the Importation into Forum Island Countries of Hazardous and Radioactive Waste and to Control the Transboundary Movement and Management of Hazardous Waste within the South Pacific region. (Adopted at Waigani, PNG on 16 September 1995)

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- Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (Adopted at Noumea, New Caledonia on 24 November 1986) and the —
 - Protocol concerning Cooperation in Combating Pollution Emergencies in the South Pacific Region
 - Protocol for the Prevention of Pollution of the South Pacific Region by Dumping
- Agreement Establishing the South Pacific Regional Environment Program (SPREP Convention)
- Stockholm Convention on Persistent Organic Pollutants (Adopted at Stockholm on 23 May 2001)

There are also a number of international standards and operating procedures that the airport operations must comply with (e.g. ICAO and CAANZ).

Due to the problems regarding solid waste on Tuvalu and the need to export all non-recyclable or reusable waste from the project the Waigani Convention and Basel Convention are particularly relevant and will need to be adhered to in preparing hazardous substances (e.g. waste oil, lubricants, articles containing polychlorinated biphenyls) for shipping and final disposal at acceptable and licensed waste facilities. The conventions outline the necessary information required for documents (notification and movement) and agreements that need to be in place with the receiving territory.

3.4 World Bank Policy

The TvAIP is a category B project under WB environmental and social screening guidelines and requires development of the project specific EMP. Due to the nature of the project it is expected that environmental impacts will be site specific, few if any are irreversible, and mitigation measures can be readily designed and implemented. In accordance with the WB Operational Policy 4.01 Environmental Assessment this EMP includes information on mitigation, monitoring, capacity development and training, and implementation costs. The EMP outlines the potential environmental impacts and the measures needed to prevent, minimise, mitigate or compensate for adverse impacts and improve environmental performance of the project.

The EMP is a dynamic document which must be updated as consultation and detailed designs of the project components are finalised to ensure currently unanticipated impacts and revised mitigation measures are addressed. Effective implementation of the EMP is a requirement of the funding agencies and local legislation so monitoring is an integral component of implementation. A Monitoring Plan is included in Section 7 (and Appendix C) of this EMP. This EMP is to form part of the bidding documents for contract(s) awarded under the TvAIP and will form the basis of the contractor's EMP.

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4.0 Environmental and 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 (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.

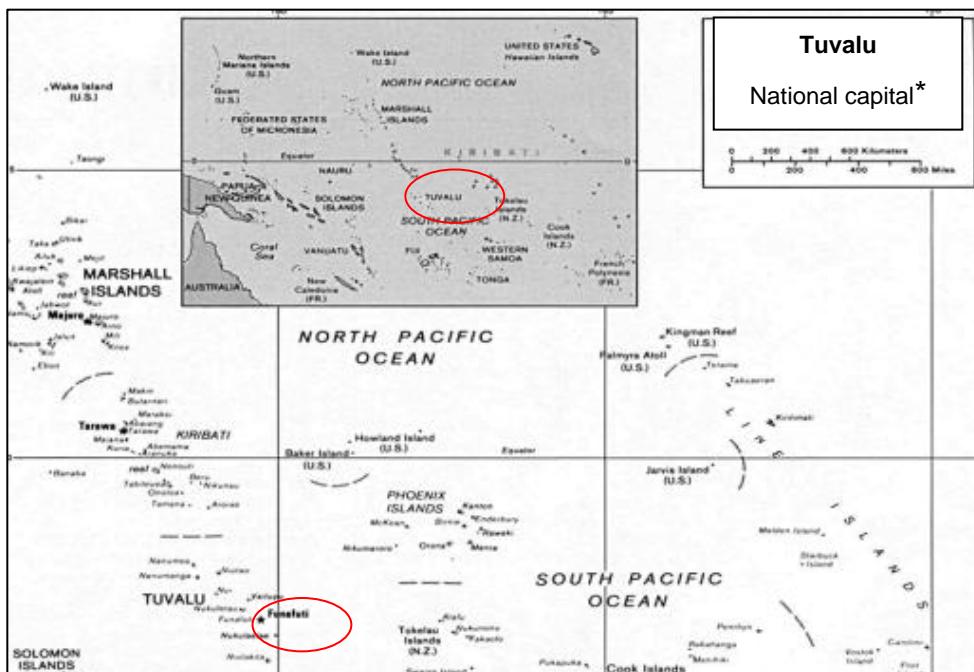


Figure 3 Location map of Tuvalu

The Tuvalu exclusive economic zone (EEZ) extends some 757,000 km², illustrated in Figure 4 as the dark blue shaded area.

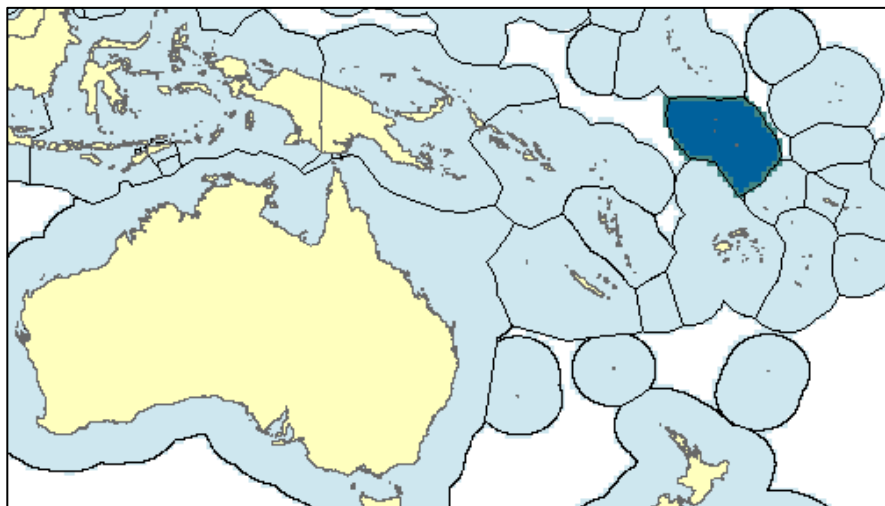


Figure 4 Tuvalu EEZ shown as the dark blue shaded area around the yellow shaded landmass (atolls).

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.

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On the western side of the atoll is the Kogatapu Funafuti Conservation Area, approximately 17 km west of Vaiaku across the lagoon (refer to Figure 5 for map of Funafuti and location of the conservation area). The conservation area was established in 1996, and covers 33 km² of reef, lagoon, channel, ocean and islands habitats. There are six uninhabited islets with native broadleaf forest (approximately 40% of the remaining broadleaf forest on Funafuti) and coral sand beaches within the protected area and are home to coconut crabs, nesting seabirds and turtles. A variety of colourful fish can easily be seen through the clear blue lagoon.

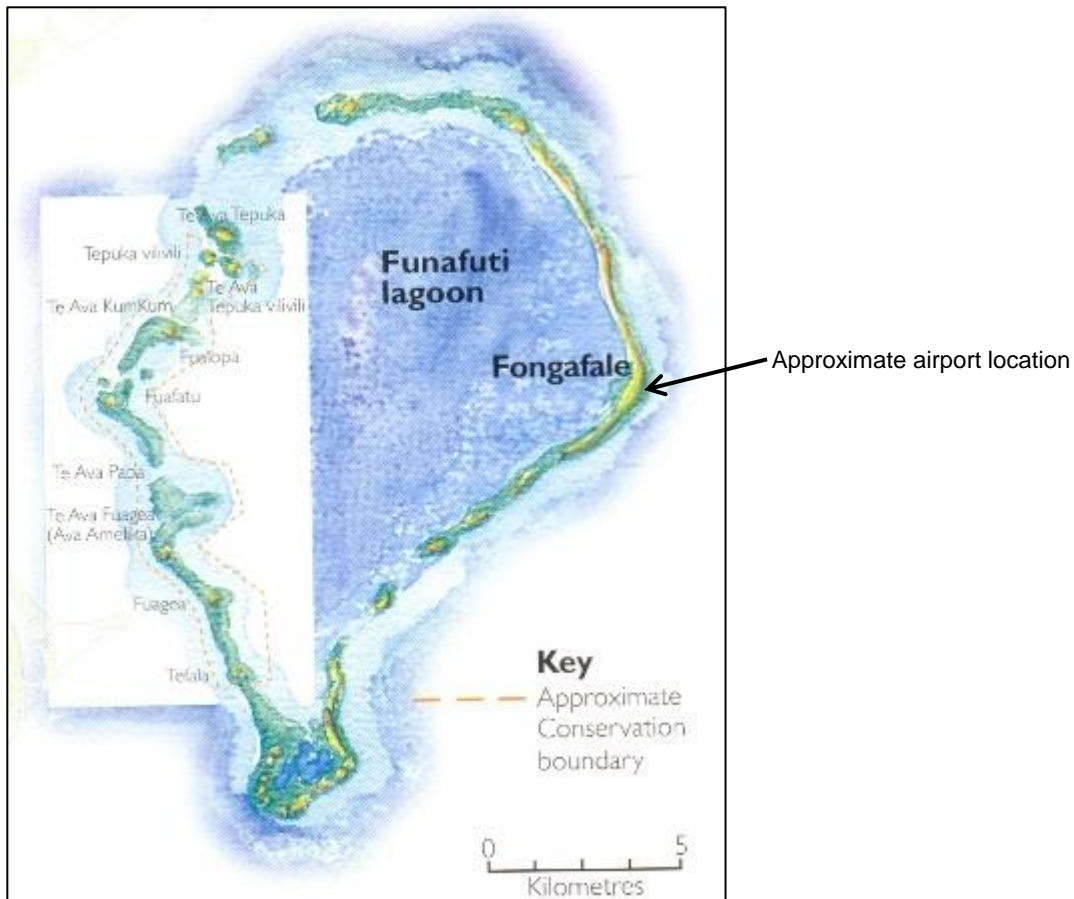


Figure 5 Map of Funafuti atoll showing the conservation area on the western side of the atoll and Fongafale on the eastern side (Source: Government of Tuvalu official tourism website - http://www.timelesstuvalu.com/tuvalu/export/sites/TTO/Attractions/funafuti_conservation_area.html)

4.1.1.1 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 sportsfield, 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 (refer to Figure 6).

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Figure 6 Photos of the Tree Care Project and Sustainable Land Management demonstration plot near the terminal (between Airport Road and Tuvalu Road).

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.

4.1.2 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 conditions and it is predicted that during 2013 there will be a return to the more neutral La Nina conditions. Wind direction is usually north easterly and average wind speeds are between 24 and 32 kph.

4.1.3 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.

4.1.4 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 the Contractor will be responsible for securing a water supply which does not adversely affect the community's freshwater reserves (e.g. their own mobile desalination plant and additional rainwater harvesting). There is no reticulated water supply to households.

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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.

As stated 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 7.0 of this EMP.

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).

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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 "dot.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.

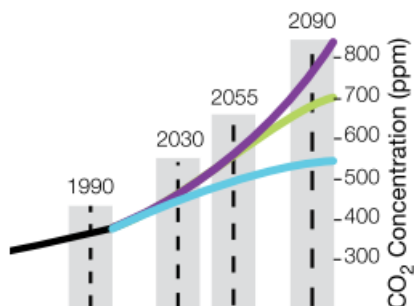
4.4 Projected Climate Changes and Impacts

The Pacific Climate Change Science Program (PCCSP) (part of the International Climate Change Adaptation Initiative) conducts critical climate research and capacity building in Pacific Island countries. Information regarding climate change projections was obtained from the BoM and CSIRO (2011) *Climate Change in the Pacific: Scientific Assessment and New Research (Vol. 2: Country Reports)* produced by the Pacific Climate Change Science Program.

Tuvalu, like many other Pacific atoll nations are already experiencing the effects of increased temperatures and rising sea level. Sea level (measured by satellite altimeters) has risen by 5 mm per year since 1993. Sea level does fluctuate throughout the year, peaking in February and March, particularly during La Nina years which tend to record warmer ocean temperatures. The annual mean air temperature (since 1950) has increased by approximately 0.24 °C per decade. Annual and seasonal rainfall trends have not shown any significant trends (1950 to 2009).

The projected design life is 20 years for the runway, and 50 years for the new terminal structure (or less for specific components such as cladding). Climate change projections for 2030, 2055 and 2090 (relative to 1990) were reviewed. The PCCSP report (as identified above) reviewed a number of climate projection models to determine the most plausible representations of future climate in the Pacific under the three emission scenarios developed by the Intergovernmental Panel on Climate Change (IPCC). The three emission scenarios are: low (B1), medium (A1B) and high (A2), for time periods around 2030, 2055 and 2090 (refer to Figure 7 for details of emission scenarios).

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Source: PCCSP, 2011. *Current and future climate of Tuvalu Brochure*. Tuvalu Meteorological Service, Australian Bureau of Meteorology and CSIRO.

Figure 7 Carbon dioxide (CO₂) concentrations (parts per million, ppm) associated with three IPCC emissions scenarios: low emissions (B1 – blue), medium emissions (A1B – green) and high emissions (A2 – purple). The PCCSP has analysed climate model results for periods centred on 1990, 2030, 2055 and 2090 (shaded).

Table 4 below shows the projected changes in annual average air temperature and sea level for Tuvalu for the three emission scenarios and the three time horizons. Sea level rise should be considered when establishing the design terminal floor levels, in conjunction with the intended design life and appropriate freeboard requirements.

Table 4 Air temperature and sea level rise projections for the three emission scenarios and three time periods

Annual Average Air Temperature Projection				Sea Level Rise Projection			
Values represent 90% of the range of the models and changes are relative to the average of the period 1980-1999.							
	2030 (°C)	2055 (°C)	2090 (°C)		2030 (cm)	2055 (cm)	2090 (cm)
Low emissions scenario	0.3–1.1	0.7–1.5	0.9–2.1	Low emissions scenario	4–14	9–25	16–45
Medium emissions scenario	0.4–1.2	1.0–2.0	1.5–3.1	Medium emissions scenario	5–14	10–29	19–56
High emissions scenario	0.4–1.0	1.0–1.8	2.1–3.3	High emissions scenario	4–14	9–28	19–58

Source: PCCSP, 2011. *Current and future climate of Tuvalu Brochure*. Tuvalu Meteorological Service, Australian Bureau of Meteorology and CSIRO.

In the short term (2030) the climate models prediction for rainfall do not increase (or decrease) significantly, however by 2090 it is expected that rainfall will increase. There is only moderate confidence in the models prediction. There is high confidence that the intensity and frequency of extreme rainfall days are projected to increase. As most runoff from rain events goes to natural soakage this does not impact on the detailed designs.

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5.0 Consultation and Stakeholder Engagement

5.1 Background and Approach

As required by WB Safeguards Policies consultation and disclosure of Category B projects must be undertaken with project affected groups (stakeholders) and non-government organisations (NGO). The potential environmental and social impacts of the project require the opportunity for discussion and review during the environmental assessment/ EMP process to inform detailed design and mitigation measures. This EMP will remain a draft until public disclosure and consultation has been completed. This will allow for the EMP to be updated with details of consultation and disclosure as and when this is completed. Disclosure and consultation will be the responsibility of MCT either directly or through their nominated Consultant.

5.2 Outcomes of Consultation to Date

The overarching TvAIP EMP was publicised and consultation held at the Telecom Conference Room at the airport on 29 and 30 September 2011. Forty participants were recorded as attending (as per Annex 1 of the overarching EMP, 4 November 2011). The overarching EMP was subsequently amended based on recommendations and suggestions provided by consultation participants. Outcomes and suggestions are well documented within the overarching EMP and have been transferred into this updated EMP.

The road rehabilitation component of the TvAIP was not included in the overarching EMP for the TvAIP and therefore has not yet gone out to public consultation or disclosure. On 22nd October 2012 the AECOM Senior Pavement Engineer met with Government stakeholders and made a presentation on the road rehabilitation component of the project and the link with the TvAIP. The meeting was organised by the Permanent Secretary for Communications and Transport and attended by the following Government officials:

- Lutelu Faavae – Permanent Secretary for Communications and Transport
- Collin Namoliki – Department of Lands and Survey
- Tekita Neemia – Department of Public Works
- Tuafafa Latasi – Project Support Team for TvAIP
- Olioliga Iosua – Permanent Secretary for Public Utilities

5.3 Disclosure

Disclosure does not equate to consultation (and vice versa) as disclosure is about transparency and accountability through release of information about the project. The draft overarching TvAIP EMP has been made available on the WB Infoshop website and in hard copy at government offices (most applicable and accessible) and local library. A draft of this updated TvAIP EMP should also be made available online (WB and government websites) and hard copies available at government offices and the local library on Fongagale. A follow up Project Information Bulletin (PIB), specifically for the road rehabilitation, will be produced by MCT and published in local media.

5.4 Sensitive Receptors

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 should 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.

The key sensitive receptors that have been identified are:

- Nauti Primary School on Fogaafale Road

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- 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.



Figure 8 Fogaafale Road, primary school and market (linked by pedestrian crossing)



Figure 9 Tuvalu Road, Fetuvalu High School

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6.0 Environmental and Social Impacts

6.1 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 EMP 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 EMP 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.

6.2 Environmental Impacts

6.2.1 Solid Waste

Scarification, replacement of unsuitable pavement material, clearing of old terminal and control tower buildings and clearing of road shoulders of excess soil and vegetation would lead to the generation of excess soil and debris waste. Funafuti has recognised waste management as a significant problem which the community and Government are struggling to overcome. Implementing reuse and recycling opportunities are paramount as are the removal off island of any unusable waste (including hazardous waste) at the end of the project. The island cannot manage the potential level of waste generated from the demolition and construction activities.

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.

Material will also be generated from the excavations associated with navigational aids concrete pads, cable trenches, the apron extension, runway end turning bays and the removal of old concrete from the port and the removal of the old runway concrete edge markers. Most of the raw material 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 PWD and the community.

6.2.2 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, for example use of an osmosis plant for non-potable water purification or a mobile desalination plant.

The demands of the terminal on the islet's water supply has potential to have long term lasting impacts if not properly addressed during the design phase.

The roads on the island have no formed stormwater drainage systems. Together with the construction stormwater inlets, soakage drains will have to be provided in suitable positions. These soakage drains are usually designed on the infiltration capacity of the subgrade soils. It is anticipated that soakage rates will be sufficient to improve the existing drainage condition.

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6.2.3 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) are encountered that affect construction activities (e.g. nesting bird).

6.2.4 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 spill response plan and bunded areas for storage (during construction and operation phase).

There is also potential for hazardous materials to be in the building materials used in existing structures that are to be demolished (e.g. asbestos).

6.2.5 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 and to a lesser degree the operational phase (e.g. aircraft landing and take-off and vehicle traffic). 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.

At the operational phase of the project local residents have expressed concern regarding noise and fumes from aircraft, particularly if the frequency and number of flights were to increase. The scope of work for the TvAIP is general maintenance and improvement with a view to ensuring the continued operation of the airport and road, not increasing capacity and frequency of flights or vehicle traffic. So there will be no increase in noise or vibration levels during operation and only potentially small decreases due to improved pavement surfaces.

6.2.6 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. Excavation will also be required for the terminal and navigational aids (concrete pads and cable trenches) however details of these excavations have yet to be defined as these components are at the concept design stage.

6.2.7 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 impact on the ambient air quality in the vicinity of the

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construction areas. No ongoing impact to air quality is expected as this is rehabilitation of existing infrastructure. As stated in section 6.2.5 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.

6.2.8 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. The Contractor is responsible for developing and implementing a Traffic Management Plan (TMP). The TMP will need to consider pedestrian traffic as well as vehicle traffic management, and particular attention will need to 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 (e.g. street lighting, pedestrian crossings).

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.

6.2.9 Wastewater Discharges

Sanitary facilities for workers will be provided to prevent lagoons or other areas being used. The terminal will have new septic systems installed which will require the sludge to be cleaned out periodically (dependent on level of use). Specification of sanitary facilities will be at the advice of the SWAT.

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 effect the receiving environment, they can be easily mitigated through planning and implementation of mitigation measures (as outlined in Section 7.8).

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.

6.2.10 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 6.2.9 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.

6.2.11 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.

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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).

6.2.12 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, 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.

6.3 Social Impacts

6.3.1 Health and Safety

During construction and operation, health and safety is to be managed through a Site Specific Safety Management Plan (to be prepared by the contractors for the construction phase) and application of international environmental and health and safety (EHS) standards. 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 B).

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.

Sight distances seem to be one of the most prominent road safety problems on Fongafale. Sight distances will be improved by pruning vegetation and relocating a few electricity metering boxes. The Funafuti Kaupule are responsible for regulating the planting and control of vegetation along the road corridor. There are no sidewalks on the road network however a need for sidewalks exists especially in the vicinity of the hospital, schools, government buildings and churches. From a pedestrian safety point of view, sidewalks should be constructed by providing non-mountable kerbs. The exact location of where sidewalks are to be constructed is to be decided on site by the contractor, MCT and PWD.

Trenches for the navigational aids are not expected to exceed 1.2 m however batter slopes or shoring may be required to stabilise the sides of the trenches. Exposed trenches pose a risk to the community and airport operations therefore trenches will be progressively filled as the cable ducts are laid. At any one time the maximum length of exposed trench shall be 30 m. Exposed trenches shall be secured at night to prevent access by non-authorised personnel.

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7.0 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 or terminal. 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 B. The mitigation tables detail the impact or issue, the mitigation required, where this is to occur, when this mitigation is to be applied, estimated costs, implementation responsibility and supervision responsibility.

This EMP should be included in all bidding documents and form the basis of the Contractors EMP which will detail implementation of the mitigation measures identified in this EMP. The EMPs are dynamic documents which should be updated to include any variation from the current scope or addition of newly identified impacts and mitigation measures that may arise through the bidding and contracting process (if not addressed in the Contractor's EMP) or consultation. The mitigation measures associated with the impacts identified above are detailed below.

7.1 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 is to be determined by the contractor and is dependent on the project schedule and construction methodology. All shipping schedules are to be coordinated with the Harbour Master and MCT.

7.2 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 percent of the largest tank or 25 percent of the combined volumes in areas with a total storage volume equal or greater than 1,000 liters. Bunded areas are to be impervious (water tight), constructed from chemically resistant material, and be sheltered from the rain as rain water allowed to collect within the bund could be contaminated if there is any hazardous substance residue on storage containers or spilt product within the bund. 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 the identified sensitive receptors (refer Section 5.4). 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.

The bitumen and asphalt plant should be located at the construction camp to contain potential environmental impacts. The location of the construction camp should be such that residential settlements are not impacted by dust, noise or runoff.

Asbestos (hazardous substance) may be present in some building materials in old buildings to be demolished. Other areas, such as wrapped pipes, may also have asbestos containing material (ACM). The International Finance Corporation (IFC) Environmental, Health and Safety (EHS) Guidelines for Occupational Health and Safety (section 2.4 Chemical Hazards) should be followed for demolition, handling and transport of any ACM. An asbestos management plan which clearly identifies the locations where the ACM is present, its condition (e.g. whether it is in friable form with the potential to release fibres), procedures for monitoring its condition, procedures to access the locations where ACM is present to avoid damage, and training of staff who can potentially come into contact with the material to avoid damage and prevent exposure. The plan should be made available to all

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persons involved in operations and maintenance activities, including the Department of Environment and the Ministry of Health. Repair or removal and disposal of existing ACM in buildings should only be performed by specially trained personnel (equivalent to training standards required under applicable regulations in the United States and Europe) following Tuvalu national requirements, or in their absence, internationally recognised procedures.

The ACM will need to be removed from island so any international transport and disposal requirements will also need to be complied with (e.g. Waigani Convention and Basel Convention) and clearly documented in the asbestos management plan. Any personnel in contact with the ACM must be wearing suitable PPE, including respiratory protection, suitable for the removal of asbestos to be worn while handling and transporting the material. All workers should be provided with onsite washing facilities, and should wash hands, face, and boots/shoes before eating, drinking or smoking, and before returning home. Work clothing should be removed as soon as possible after arriving home and should be washed separately from other family laundry. It is advisable to have an officer from the Department of Environment and or Ministry of Health onsite during asbestos removal and packing to assist in monitoring and ensuring compliance with environmental, and health and safety requirements. The exact nature of required environmental, and health and safety requirements (also dependent on the type, scale, and deterioration of asbestos containing material identified) should be documented in the asbestos management plan. The plan should describe the work in detail and may include but not be limited to the following:

- Containment of interior areas where removal will occur in a negative pressure enclosure;
- Protection of walls, floors, and other surfaces with plastic sheeting;
- Construction of decontamination facilities for workers and equipment;
- Removing the ACM using wet methods, and promptly placing the material in impermeable containers;
- Final clean-up with special vacuums and dismantling of the enclosure and decontamination facilities;
- Inspection and air monitoring as the work progresses, as well as final air sampling for clearance, by an entity independent of the contractor removing the ACM.

7.3 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 to be written by the contractor and 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 need to be clearly detailed in the TMP.

The MOWP will detail the specific safety and security requirements for the airport operations, including safe operating distances and responsibility of key project roles.

7.4 Stormwater and Water 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. During resurfacing the road shoulders will be regraded where required and cleared of vegetation to allow water to infiltrate the porous soil.

The terminal has been designed with a below ground water storage cistern with an estimated total storage capacity of 600,000 litres (exact size to be confirmed as terminal designs are finalised).

DRAFT

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 rain water should be collected in advance and a project specific mobile desalination plant imported (or other mobile water treatment unit). 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 is to be treated (via settling pond or tank) and discharged to land or reused.

7.5 Bitumen, Asphalt and Concrete Plant

Bitumen and asphalt production requires very high temperatures which pose a significant risk to workers and the general public. Therefore the bitumen and asphalt plant should be located within a secure compound, either the construction camp or port, to ensure security and reduce risk of unauthorised access. The plant also requires use of hazardous materials which must be stored on hard stand areas or within bunded areas (both should be available at the construction camp).

The project requires the installation of concrete edge restraints in selected areas of the road network, concrete base pads for navigational aids and aspects of the Terminal. It is unknown whether the bulk of concrete will be prefabricated off island, at a concrete plant on the island or in-situ. If concrete is to be constructed on the island care needs to be taken with slurry and runoff from the concrete. Concrete production should only take place when there is no rain forecast and not within the coastal margin (e.g. restricted to the construction camp). Concrete slurry is highly alkali and cannot be diluted. Sand bags or diversion drains must be used to divert runoff from concrete cutting or setting areas. Any concrete debris must be collected and disposed of as a hazardous substance and removed from the island. Wastewater from concrete cutting or production must be collected and treated (settling and neutralisation through pH adjustment). All equipment used in concrete production must be cleaned in designated wash down areas away from surface water and permeable ground.

7.6 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 must be fenced and secured to prevent access by unauthorised personal. Security of the camp should be undertaken by a local security firm. Areas within the compound must 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 must be constructed in such a way to prevent any potential adverse impacts on the surrounding environment. Including hard stand areas, 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 is not a residential camp. Foreign contract and 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.

7.7 Erosion and Sediment Control

The land on Tuvalu is relatively flat, 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) should 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 will be within the construction camp for the imported aggregate. These stockpiles will need to be on an impermeable geotextile or hardstand and runoff directed to permeable land. The aggregate material will be inert larger size pieces (refer sections 2.1.1 and 2.1.2). Stockpiles of any fine grain materials (e.g. sand and topsoil) must be covered to prevent dust and sediment laden runoff during rain events.

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

7.8 Wastewater Management

There are a number of activities during construction and operation phases of the project which will generate wastewater. During construction wastewater will be generated by the sanitation facilities provided for workers and as there is no reticulated wastewater treatment system on the island, the contractor is responsible for treatment of the generated wastewater from sanitation facilities. There are a number of options regarding sewage treatment that the contractor can implement to mitigate the potential impacts on the land and or water (ocean or groundwater). These include mobile proprietary treatment systems (to be imported for the project) and composting systems. The contractor is responsible for ensuring the treatment and disposal of wastewater is in accordance with SWAT advice and approved by MCT and PWD.

Wastewater from wash down areas is to be collected either in a settlement pond or tank to allow sediment and particulate matter to drop out before the water can be reused as wash water, dust suppression or in other processes. A separate wash down area is required for machinery or material with oil or fuel residue as this wash water is required to be treated through a mobile oil water separator. Wash water from concrete production, cutting, washing of equipment used and areas where concrete is produced must be collected and treated to lower the pH (closer to neutral) and to allow settlement of suspended solids (see Section 7.5). All wash down areas and wastewater treatment areas, where practical should be located within the construction camp or PWD compound.

Treated wash water where possible should be reused for dust suppression or within other processes. 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. The vessels shall be equipped with spill response kits for onboard spills of potentially environmentally damaging substances (e.g. fuel, oil).

7.9 Solid Waste Management

Waste generated by the project that cannot be recycled or reused (to be determined in consultation with the PWD, SWAT and Funafuti Kaupule) is to be removed from Tuvalu at the completion of the contractors work. The contractor is responsible for ensuring the waste 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 facility (including transport documentation and agreements to receive the waste) must be provided to MCT to ensure the facility is licensed or permitted.

7.10 Marine and Coastal Specific Mitigation Measures

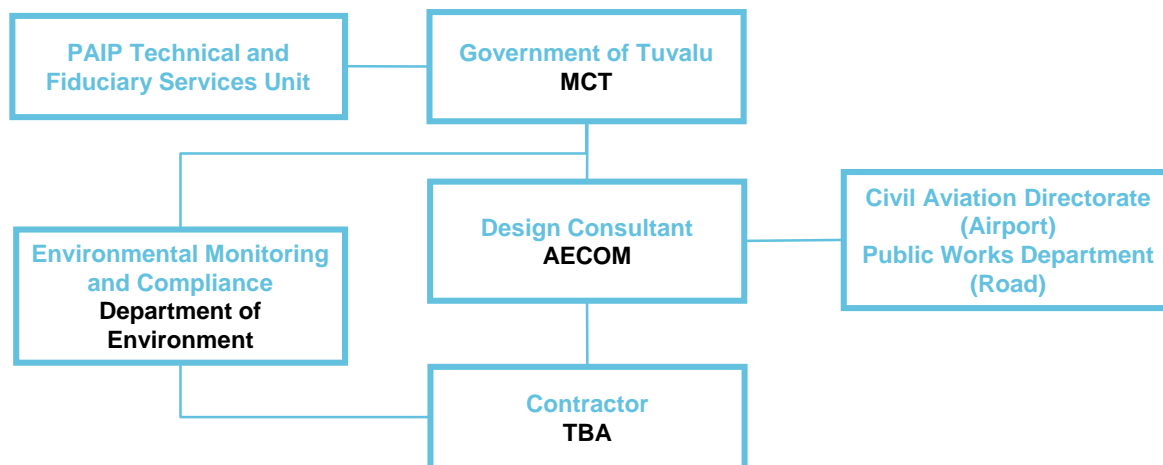
The runway is located at the widest section of the island and at its closest point is approximately 50m from the ocean (south eastern end of runway). All project work for the runway will be occurring inland and there will be no direct or indirect discharges (stormwater or wastewater) to the marine environment. 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 should be restricted to day time hours (7am to 6pm) and the transport of materials and equipment scheduled through the TMP in consultation with the schools and hospital.

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8.0 Roles and Responsibilities

The MCT is responsible for delivery of the TvAIP project (including all components), funding received and contracts awarded under the TvAIP. MCT is the Implementing Agency in regards to funding received from donors including the WB. A Project Management Unit (PMU) within MCT will be established to undertake the day to day management of the project. Aspects of the monitoring required by the EMP will be undertaken by CAD and MCT. The implementation of this EMP is the responsibility of the contractors awarded contracts under the TvAIP. The diagram below shows the reporting and responsibilities for this EMP. The Department of Environment has a statutory responsibility to respond to pollution complaints, and ensuring impacts are managed as per the EMP. There will also be ongoing airport operational monitoring requirements of the Department of Environment. The Department of Public Works will work alongside the Supervision Consultant in order to capacity build within the department and for ongoing maintenance of the road seal and runway repairs.



8.1 Institutional Capacity

MCT/ CAD will require environmental awareness training for monitoring the Contractors and Supervising Consultant's Environmental Representative.

Personnel from the PWD will work alongside the Contractor and Supervision Consultant to capacity build and gain a better understanding of the type of road and runway surface seal being used and ongoing maintenance requirements. A training budget must be put aside to enable this capacity building with the Government departments. There may also be an opportunity for an Officer from the Department of Environment to work with the Contractor and Supervision Consultant's environmental officer. X-ray equipment for security screening has been recommended however this may not be implemented as part of the TvAIP. Costs for ongoing monitoring of x-ray equipment have been included below but is indicative only, based on whether x-ray equipment is actually installed. It is understood that noise meters are already included and there is no need for additional meters. In case additional meters need to be purchased the cost is provided below.

An indicative training budget is as follows:

Training for Contractor's and CAD/ PWD personnel (onsite training in Tuvalu)	US\$ 15,000
Operational monitoring of x-ray equipment (annual cost)	US\$ 1,000
Procurement of one noise meter for monitoring (plus duty and delivery)	US\$ 500
Miscellaneous (e.g. Department of Environment participation)	US\$ 2,000
TOTAL Budget	US\$ 18,500

8.2 Complaints and Incident Reporting

All complaints and incidents should be referred to the Supervision Consultant's Officer (or designated staff) for undertaking complaint/incident investigation procedures. All complaints must be acknowledged with the complainant within 24hours. In general the following procedure should be followed:

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- Log complaint/incident, date of receipt and acknowledge complaint receipt
- Investigate the complaint/incident to determine its validity and to assess the source of the problem
- Identify and undertake any action required, communicate response action to complainant (if requested by complainant)
- Log the date of resolution
- Report the complaint in monthly monitoring report including actions, resolution status and any outstanding actions required.

Signage at site will be displayed by the contractor and outline the complaints procedure and contact details for making complaints. The RPF describes the grievance redress mechanism, particularly as it applies to value assessments and mediation for the project.

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9.0 Compliance and Monitoring Plan

9.1 Monitoring Plan

The Environmental Monitoring Plan identifies the environmental monitoring requirements to ensure that all the mitigation measures identified in this EMP are implemented effectively. Environmental monitoring methodology (refer Appendix C for details) for this project includes:

- Audit of detailed designs.
- Audit and approval of site environmental planning documents.
- Consultations with communities and other stakeholders as required.
- Routine site inspection of construction works to confirm or otherwise the implementation and effectiveness of required environmental mitigation measures.

Non-compliance to environmental mitigation measures identified in the EMP will be advised to the Contractor(s) in writing by MCT's nominated Environmental Officer as required. The non-compliance notification will identify the problem, including the actions the Contractor needs to take and a time frame for implementing the corrective action.

9.2 Monitoring Plan Reporting

Throughout the construction period, the Supervision Consultant will include results of the EMP monitoring in a monthly report for submission to the MCT who is responsible for submitting these monthly progress reports to the PAIP TFSU. The format of the monthly report shall be agreed with all agencies but is recommended to include the following aspects:

- Description and results of environmental monitoring activities undertaken during the month.
- Status of implementation of relevant environmental mitigation measures pertaining to the works.
- Key environmental problems encountered and actions taken to rectify problems.
- Summary of non-compliance notifications issued to the Contractor during the month.
- Summary of environmental complaints received and actions taken.
- Key environmental issues to be addressed in the coming month.

A day to day contract diary is to be maintained pertaining to administration of the contract, request forms and orders given to the Contractors, and any other information which may at a later date be of assistance in resolving queries which may arise concerning execution of works. This day to day contract diary is to include any environmental events that may arise in the course of the day, including incidents and response, complaints and inspections completed.

During airport operations the FUN Managers will include an environmental management section as part of their normal reporting the CAD. The environmental management section shall include an analysis of the operation monitoring programme, any environmental issues arising and recommendations (including cost estimates as required) for further action.

MCT is also responsible for quarterly progress reports to the WB. This quarterly progress report will include a section on environmental compliance and issues. This section will cover (as a minimum) the overall compliance with implementation of the EMP, any environmental issues arising as a result of project works and how these issues will be remedied or mitigated, and the schedule for completion of project works.

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10.0 Contingency Planning

It is recommended that the Contractors prepare a Contingency Plan encompassing tsunami, cyclone and storm events. The purpose of the Plan is to ensure all staff are fully aware of their responsibilities in respect to human safety and environmental risk reduction. Procedures should clearly delineate the roles and responsibilities of staff, define the functions to be performed by them, the process to be followed in the performance of these functions including tools and equipment to be kept in readiness, and an emergency medical plan. All of the Contractor's staff should undergo training/induction to the Plan.

The wet season in Tuvalu is usually November to April which coincides with the cyclone season. King tides tend to occur in February and March. Construction activities should be limited to the dry season (May to October) however storm and rain events can still occur during this period causing flooding and bringing high winds.

The Contractors are responsible for monitoring weather forecasts, inspecting all erosion and sediment control measures and undertaking any remedial works required prior to the forecast rain or storm event.

In general the Contractors will:

- Inspect daily weather patterns to anticipate periods of risk and be prepared to undertake remedial works on erosion and sediment control measures to suit the climatic conditions;
- Monitor the effectiveness of such measures after storms and incorporate improvements where possible in accordance with best management practice;
- Ensure appropriate resources are available to deal with the installation of additional controls as and when needed; and
- Inform MCT if there are any concerns associated with the measures in place.

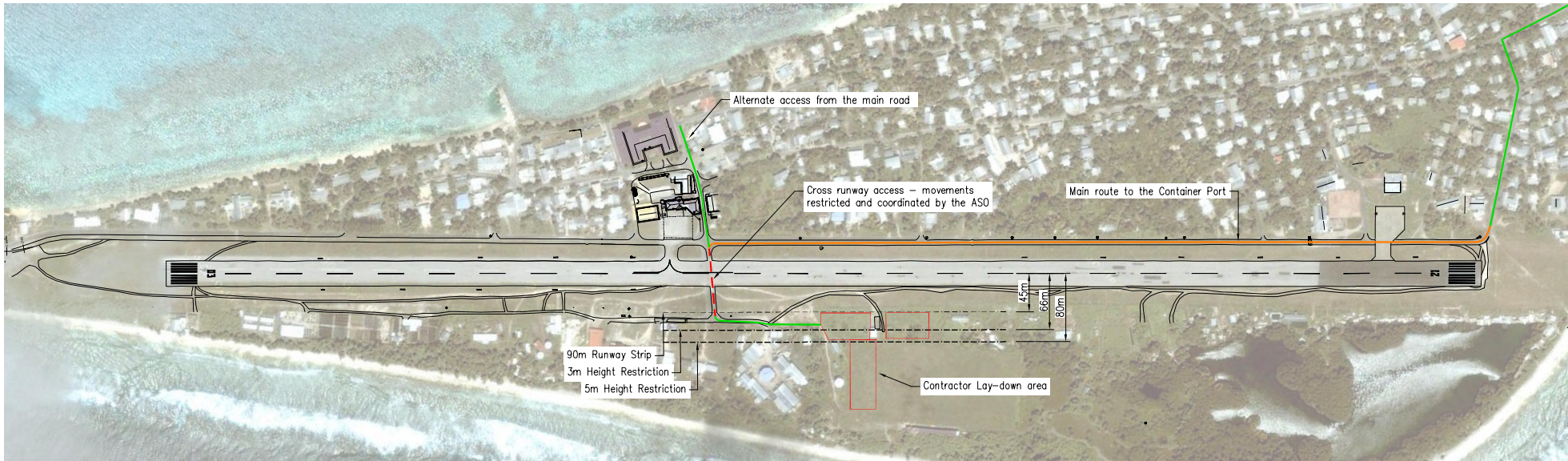
AECOM

Design & Supervision Services of the Pacific Aviation Investment Program (PAIP)
Pacific Aviation Investment Program (PAIP) – Environmental Management Plan -
Funafuti International Airport (FUN) and Road Interim Working Document
Commercial-in-Confidence

D R A F T

Appendix A

Plans and Design Details



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CLIENT:



NOT FOR CONSTRUCTION

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)
FUNAFUTI INTERNATIONAL AIRPORT (FUN)
SITE ACCESS AND CONTRACTOR LAYDOWN AREAS

REVISIONS				
No.	BY	DATE	DESCRIPTION	APPD
2	JCZ	24.05.13	FOR TENDER ISSUE	CR
1	JCZ	10.05.13	DETAILED DESIGN ISSUE	CR

DESIGNED	JC	CHECKED	CR
DRAWN	NW	CHECKED	CR
APPROVED	CR	DATE	Mar-13

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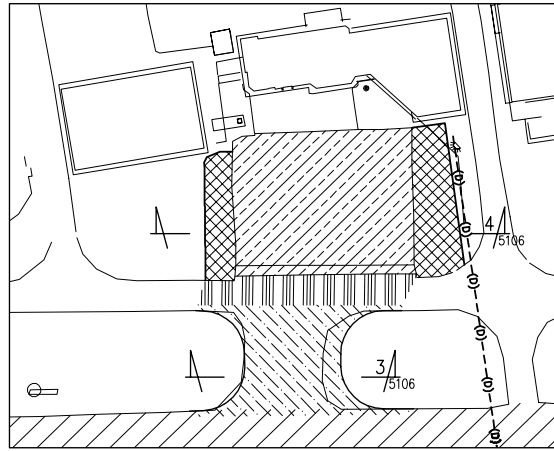
AECOM New Zealand Limited

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REV: 2



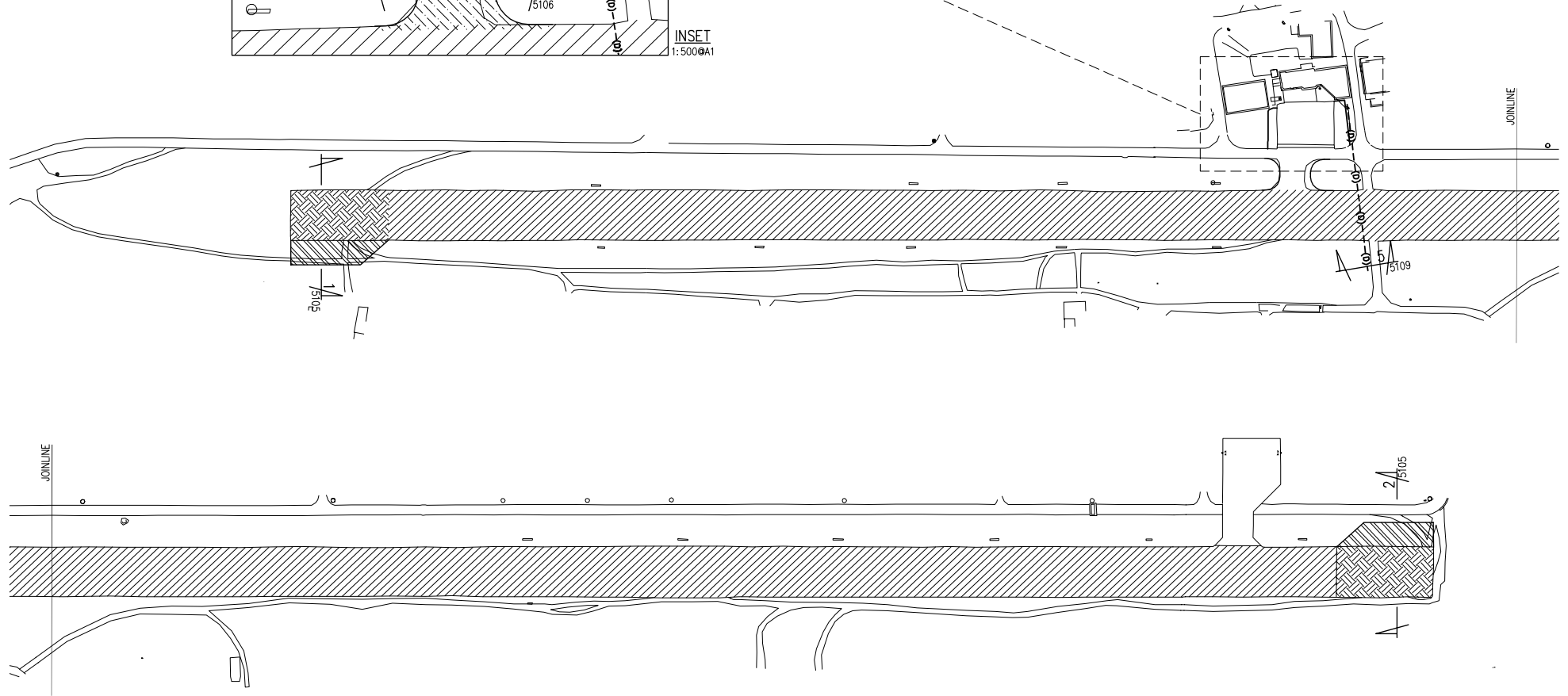
INSET
1:500@A1

NOTES:

1. All existing airside pavements to receive bituminous rejuvenation treatment.

LEGEND:

- Runway - 2 Coat Spray seal and localised levelling in-fill repairs
 - Runway End (existing) - 2 Coat Spray seal with Sandseal surface locking coat
 - Runway End - New 200mm basecourse construction, Prime coat, 3 Coat Spray seal with Sandseal surface locking coat
 - Taxiway - Widening to 18m, 200mm basecourse reconstruction, 100mm Cold mix Asphalt Overlay
 - Apron - 2 Coat Spray seal re-surfacing with Sandseal surface locking coat
 - Apron Widening - New 200mm basecourse construction, Prime coat, 3 Coat Spray seal with Sandseal surface locking coat
 - Road - Reshape, 2 Coat Spray seal with Sandseal surface locking coat
- (Ø)--- 2 No 100mm dia uPVC ducts to be installed across runway for AGL, refer drg 5109 for detail



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PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)

FUNAFUTI INTERNATIONAL AIRPORT (FUN)
RUNWAY OVERLAY PLAN - WORK EXTENTS

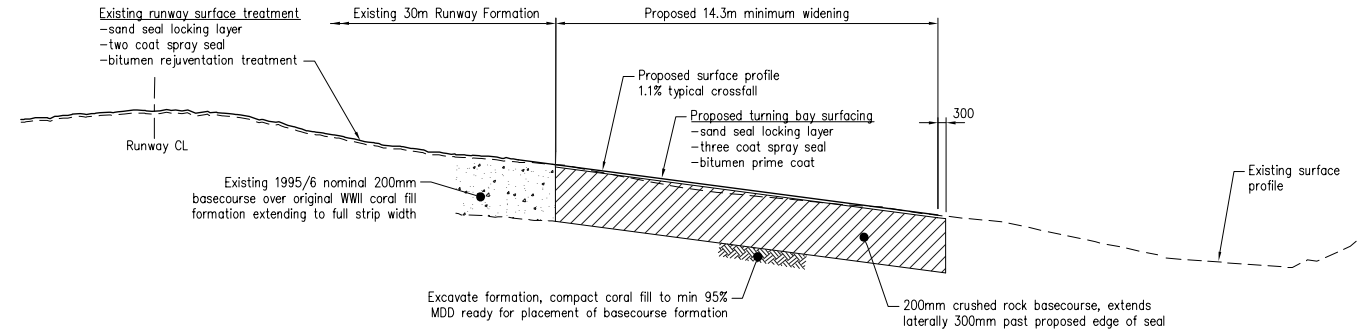
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3	JZ	10.05.13	DETAILED DESIGN ISSUE	CR
2	SAC	05.04.13	DRAFT ISSUE FOR CONSULTATION - DRAWING LAYOUT CHANGED	CR
1	NW	08.03.13	90% DRAFT ISSUE	CR

DESIGNED	JC	CHECKED	CR
DRAWN	NW	CHECKED	CR
APPROVED	CR	DATE	Mar-13

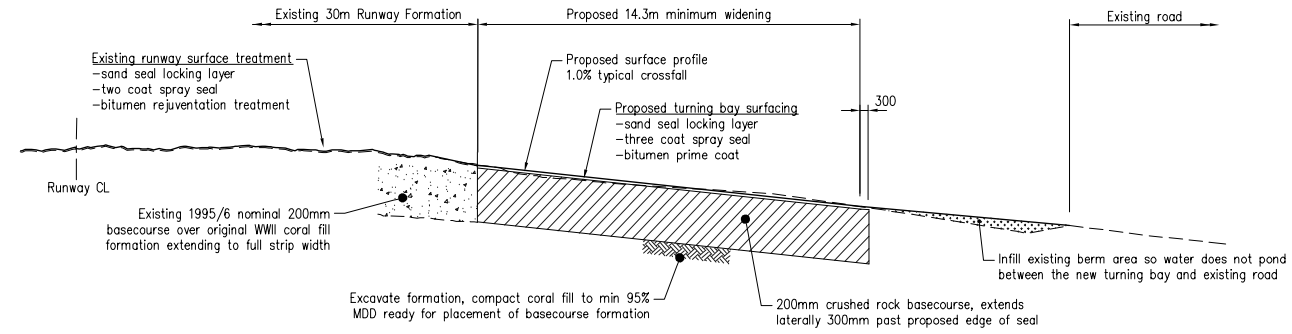
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NOTES:

1. At runway tie-ins, sawcut profile and mill edge to design depth.
2. Excavate existing formation to found new basecourse layer.
3. Proof roll and compact insitu coral formation and call for inspection before placement of pavement layers.



1 RUNWAY END 03 WIDENING TYPICAL CROSS SECTION
5104
NTS



2 RUNWAY END 21 WIDENING TYPICAL CROSS SECTION
5104
NTS

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3	JZ	10.05.13	DETAILED DESIGN ISSUE	CR
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APPROVED	CR	DATE	Mar-13

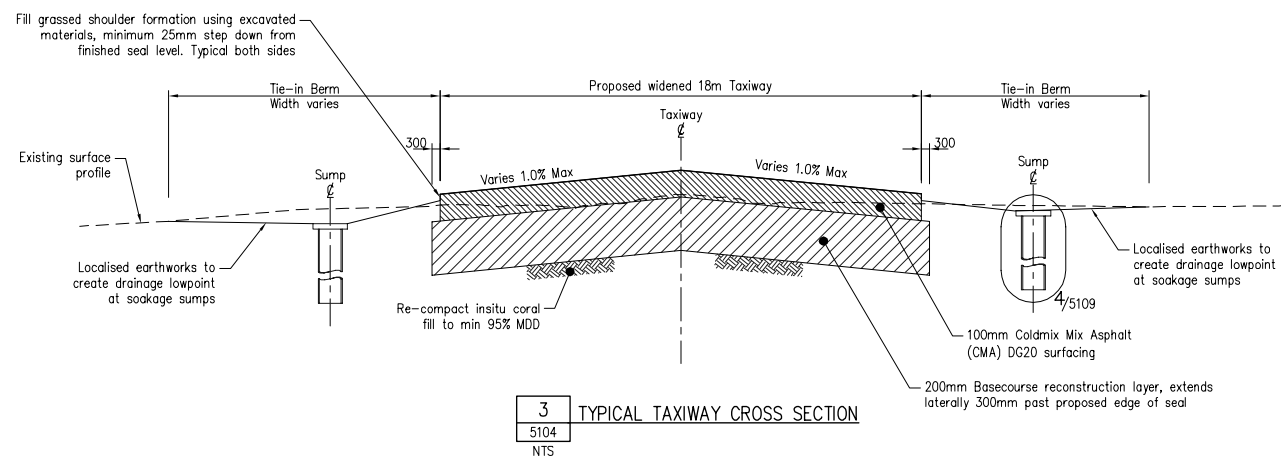
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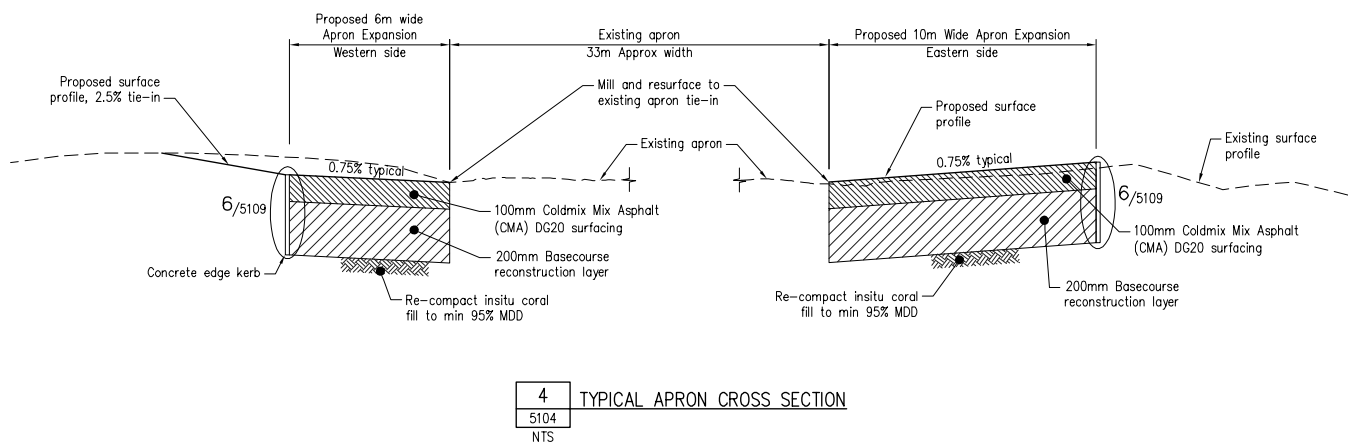
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FUNAFUTI INTERNATIONAL AIRPORT (FUA) RUNWAY END TYPICAL CROSS SECTIONS	
A1 STATUS: FOR TENDER	DRAWING NO: 60277008-AV-5105 REV: 4

NOTES:

1. At runway and apron tie-ins, sawcut profile and mill edge to design depth for Coldmix Asphalt concrete tie-in.
2. Excavate existing formation to found new basecourse layer.
3. Proof roll and compact insitu coral formation and call for inspection before placement of pavement layers.



3 TYPICAL TAXIWAY CROSS SECTION
5104
NTS



4 TYPICAL APRON CROSS SECTION
5104
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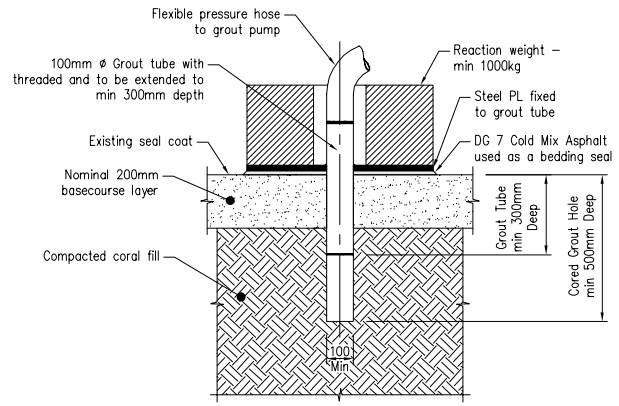
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APPROVED	CR	DATE	Mar-13	

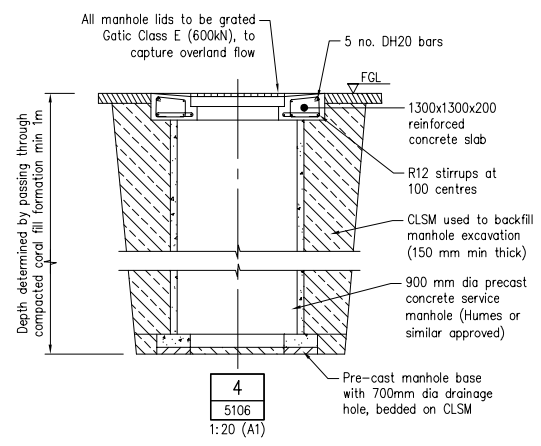
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PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)			
FUNAFUTI INTERNATIONAL AIRPORT (FUN) TAXIWAY & APRON RECONSTRUCTION TYPICAL CROSS SECTIONS			
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DRAWING NO:		60277008-AV-5106	



GROUT INSERTION TO SUBSURFACE RUNWAY VOIDS
TYPICAL DETAIL
 1:10 (A1)

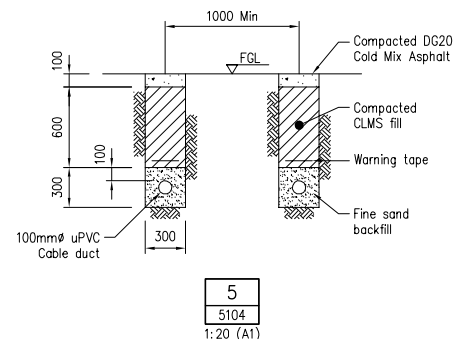


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5106
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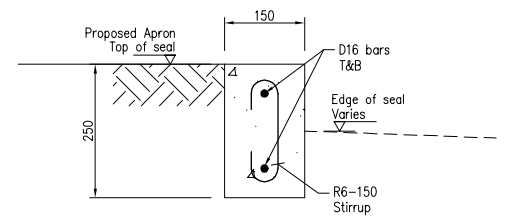
GROUT INJECTION TO SUBSURFACE RUNWAY VOIDS

WORK OPERATIONS

- (a) Core-drilling of injection holes to 500mm depth.
- (b) Sleeving of core holes as required.
- (c) Temporary blanking/sealing to facilitate trafficking by aircraft and pressurization (if required).
- (d) Checking of voiding continuity using compressed air.
- (e) Conplast 350 or equivalent shall be used as a suitable admixture to aid the pumping process and compensate for shrinkage. Mix proportions shall be in accordance with the technical specifications for this product, typically 1:20 (admixture/cement).
- (f) Insertion of gravity tube and reaction weight base plate. Reaction weights added and coupling of pressure delivery line to grout injection pump.
- (g) Placement of cementitious grout via pressurized injection, finished flush with surface level. Applied pressures may be up to 1000kPa where safe to do so and where ground heave is not evident.
- (h) Appropriate monitoring of ground swell/heave during injection.
- (i) Curing of cementitious materials.
- (j) Surface repair of core hole using DG7 Cold Mix Asphalt to 100mm depth.



5
5104
 1:20 (A1)



6
5106
TYPICAL EDGE KERB BLOCK DETAIL
 1:5 (A1)

SINGLE DUCT LINE - POWER IN RUNWAY/BERM:

- Communication duct - Minimum lateral spacing from power duct = 1m
- Duct ends blanked with a temporary slip fit cap and marked at ground level with timber stake
- Trench to be cut with rotary trench saw or similar
- Pavement surface to be sawcut prior to cutting trench
- In berm areas topsoil to be removed separately and used to re-instate trench surface on completion

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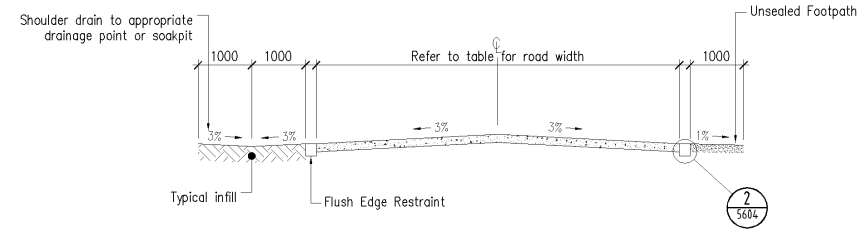
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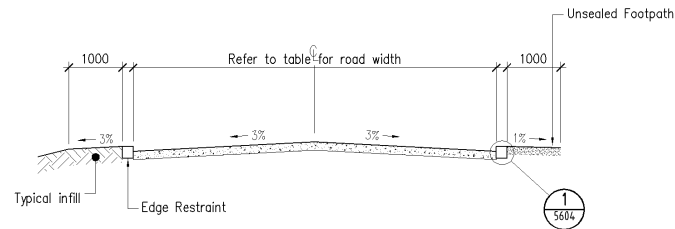
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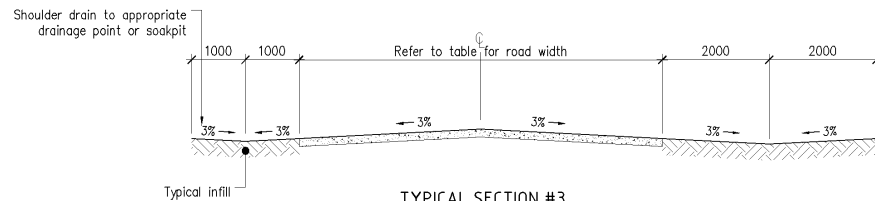
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FUNAFUTI INTERNATIONAL AIRPORT (FUN)		
CIVIL WORKS - CONSTRUCTION DETAILS		
A1	STATUS: FOR TENDER	REV: 4
	DRAWING NO: 60277008-AV-5109	



TYPICAL SECTION #1
1: 50 (A1)



TYPICAL SECTION #2
1: 50 (A1)



TYPICAL SECTION #3
1: 50 (A1)

NOTE: Shoulder drain dimensions to be adjusted on site to suit.

ROAD NETWORK INVENTORY

No.	Road name	From	To	Length (m)	Width
1	Airport Rd	Ulufono Rd	Alofa Rd	83	5.2
2	Airport Rd	Alofa Rd	Tokutu Rd	255	5.2
3	Airport Rd	Tokutu Rd	Vailiki Rd	393	5.2
4	Airport Rd	Vailiki Rd	Teutua Rd	260	5.2
5	Airport Rd	Ulufono Rd	Vaiaku Rd	338	5.2
6	Airport Rd	Vaiaku Rd	Southern End	1900	5.2
7	Tuvalu Rd	Alofa Rd	Tokutu Rd	260	5.2
8	Tuvalu Rd	Tokutu Rd	Vailiki Rd	358	5.2
9	Tuvalu Rd	Teutua Rd	Tepono Rd	113	5.2
10	Tuvalu Rd	Tepono Rd	Teuea Rd	285	5.2
11	Tuvalu Rd	Teuea Rd	Start	1215	5.2
12	Tuvalu Rd	Start concrete	End concrete	180	17.0
13	Tuvalu Rd	Causeway	Northern End	1985	4.8
14	Fogaafale	Te Pule Rd	Salamata Rd	345	5.2
15	Fogaafale	Salamata Rd	Te Pule Rd	377	5.2
16	Fogaafale	Alofa Rd	Salamata Rd	365	5.2
17	Ulufono Rd	Airport Rd	Namo Rd	156	4.8
18	Tokutu Rd	Airport Rd	Tuvalu Rd	120	4.8
19	Vailiki Rd	Airport Rd	Tuvalu Rd	175	4.8
20	Tepono Rd	Tuvalu Rd	Tuata Rd	58	4.8
21	Salamata Rd	Tuvalu Rd	Fogaafale	103	3.5
22	Te Pule Rd	Tuvalu Rd	Fogaafale	65	4.8
23	Faifou Rd	Tuvalu Rd	Fogaafale	69	4.8
24	Te Valovalu Rd	Tuvalu Rd	Fogaafale	93	4.8
25	Palagi Rd	Side Rd 6	Tuvalu Rd	240	4.8
26	Tuata Rd	Teutua Rd	Tepono Rd	118	5.2
27	Tuata Rd	Tepono Rd	Tuatapu Rd	125	5.2
28	Teuea Rd	Tuvalu Rd	End	61	4.8
29	Loop Rd	Teutua Rd	Tuatapu Rd	180	4.8
30	Tuatapu Rd	Palagi Rd	Tuvalu Rd	48	4.8
31	Side Rd 5	Tuvalu Rd	Fogaafale	78	5.2
32	Teutua Rd	Tuvalu Rd	Airport Rd	235	4.8
33	Tuvalu Rd	Vailiki Rd	Teutua Rd	325	5.2
34	Side Rd 3	Fogaafale	Tuvalu Rd	83	4.8
35	Side Rd 0	Fogaafale	Tuvalu Rd	65	3.5
36	Alofa Rd	Airport Rd	End	200	5.2
37	Namo Rd	Ulufono Rd	Vaiaku Rd	163	3.0
38	Namo Rd	Vaiaku Rd	Airport Rd	65	3.0
39	Vaiaku Rd	Alofa Rd	Namo Rd	210	5.2
40	Vaiaku Rd	Namo Rd	Airport Rd	258	5.2
41	Tuvalu Rd	Port	Causeway	3415	5.2
42	Causeway			19	5.8

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REVISIONS	No.	BY	DATE	DESCRIPTION	APPD
	1	JCZ	24.05.13	FOR TENDER ISSUE	CR

DESIGNED	RK	CHECKED	EF
DRAWN	VK	CHECKED	RK/EF
APPROVED	CR	DATE	May-13

SCALES:

1:50 @ A1



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CLIENT:

NOT FOR CONSTRUCTION

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)
FUNAFUTI INTERNATIONAL AIRPORT (FUNI)
FUNAFUTI ROADWORKS - TUVALU ROAD
ROAD NETWORK & SECTION DETAILS

A1	STATUS	FOR TENDER	DRAWING NO	60277008-AV-5602	REV	1
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Last saved Wed, 19 Jun 2013 05:11 pm

PAPI INSTALLATION NOTES:

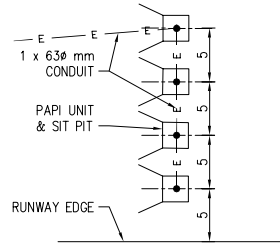
- DESIGN AIRCRAFT FOR THE PAPI'S WILL BE THE ATR 72-210A.
- DESIGN AIMING POINT WILL BE 227.69 METRES FROM THE RUNWAY THRESHOLD.
- THE CONTRACTOR IS RESPONSIBLE FOR PAPI LOCATION DESIGN
- ALL PAPI DIMENSIONS SUBJECT TO CONFIRMATION
- STANDARDS AND REGULATIONS THAT ARE CONSIDERED RELEVANT FOR THE PARTICULAR DESIGN ARE:
 - INTERNATIONAL CIVIL AVIATION ORGANISATION ANNEX 14, AERODROMES PART 1 (ICAO ANNEX 14)
 - CIVIL AVIATION AUTHORITY OF NEW ZEALAND, ADVISORY CIRCULAR AC139-6, AERODROME DESIGN REQUIREMENTS (CAA NZ AC139-6).
 - FAA AC 150/5345-28G, PRECISION APPROACH PATH INDICATOR (PAPI) SYSTEMS.
 - FAA AC 150/5340-30, INSTALLATION DETAILS FOR AIRPORT VISUAL AIDS.
 - AS/NZS 1170.2 STRUCTURAL DESIGN ACTIONS - WIND ACTIONS.
- PAPI EQUIPMENT SHALL BE:
 - L-880 - SYSTEM CONSISTING OF 4 LIGHT UNITS.
 - STYLE A - VOLTAGE POWERED SYSTEMS.
 - CLASS 1 - SYSTEMS THAT OPERATE FROM -35 DEGREES CENTIGRADE TO 55 DEGREES C.
 - WILL BE 3 LAMP UNITS PER PAPI BOX.
 - IN FULL COMPLIANCE WITH THE REQUIREMENTS OF FAA ADVISORY CIRCULAR AC FAA AC-150/5345-28G, PRECISION APPROACH PATH INDICATOR (PAPI) SYSTEMS.
- EACH PAPI FOUNDATION TO COMPRISE A 2 METRE SQUARE, 150 MM THICK, CONCRETE PROTECTION SLAB WITH CABLE CONDUIT CENTRED BENEATH THE LIGHT BOX AND EXTENDING 100 MM ABOVE SLAB LEVEL.

SET OUT INFORMATION:

RUNWAY 03 END PIN (TH03)
741293.419 mE, 9056527.264 mN, LEVEL 3.934 m

RUNWAY 21 END PIN (TH21)
742349.378 mE, 9057644.049 mN, LEVEL 3.654 m

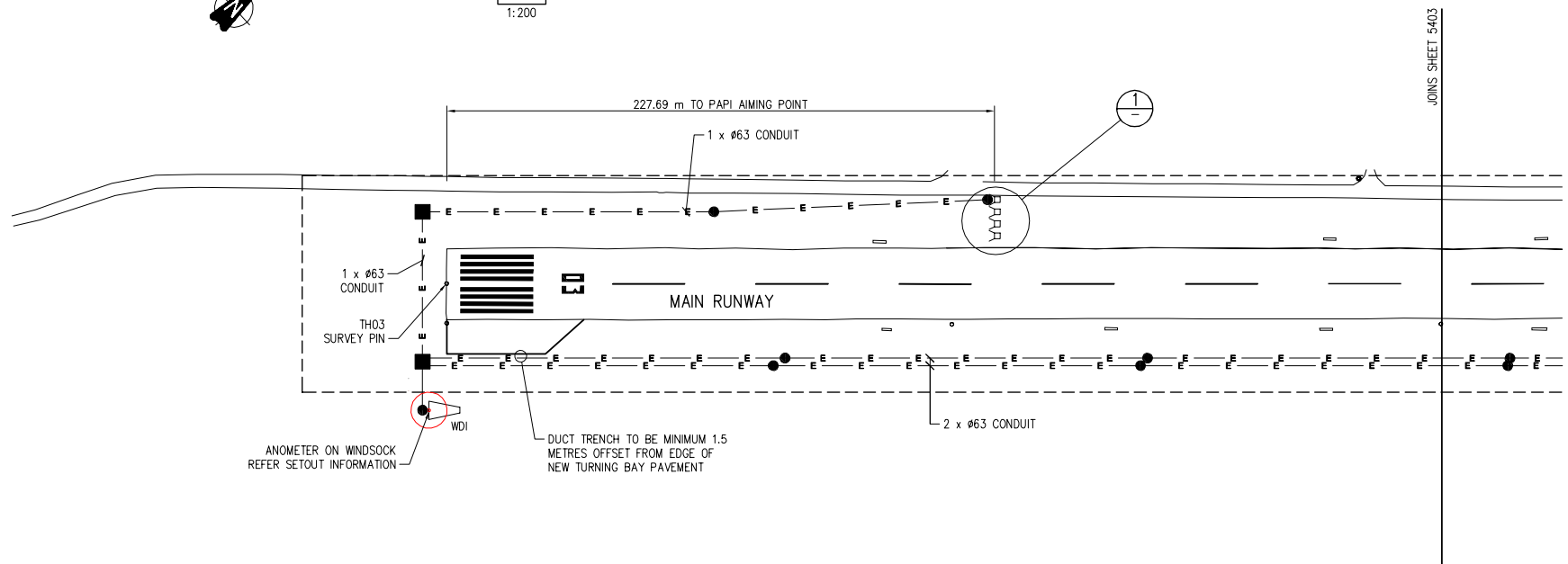
03 WDI (PROPOSED)
741319.710 mE, 9056482.82 mN



1 PAPI LAYOUT DETAIL
1:200

SYMBOL LEGEND:

- PRECISION APPROACH PATH INDICATOR (PAIP RED/WHITE)
- WIND DIRECTION INDICATOR 'WDI'
- SIT PIT
- HEAVY DUTY PIT TYPE 'D' - 900 x 900 x 900
- AUTOMATED WEATHER STATION (AWS)
- PROPOSED AIRFIELD ELECTRICAL EQUIPMENT ROOM, LOCATION (TBC)
- NEW PRIMARY DUCT AND CABLE
- NEW DUCT AND CABLE UNDER PAVEMENT
- SECONDARY CABLE DUCT
- APPROXIMATE RUNWAY STRIP (90m) EXTENTS



JOINS SHEET 5-403

CAD Ref: K:\PROJECTS\ATTA_PAP_Airports\40277008\AV-FUN\40277008-AV-5402.dwg

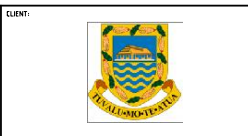
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REVISIONS				
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	JC	24.04.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2008			
DESIGNED	SH	CHECKED	CR
DRAWN	NW	CHECKED	CR
APPROVED	CR	DATE	Mar-13

SCALES:	
1:1000 (A1)	

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NOT FOR CONSTRUCTION			
PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)			
FUNAFUTI INTERNATIONAL AIRPORT (FUN)			
AIRCRAFT NAVIGATIONAL AIDS			
LAYOUT - SHEET 1			
A1	STATUS:	FOR TENDER	REV: 3
	DRAWING NO:	60277008-AV-5402	

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



AWS NOTES:

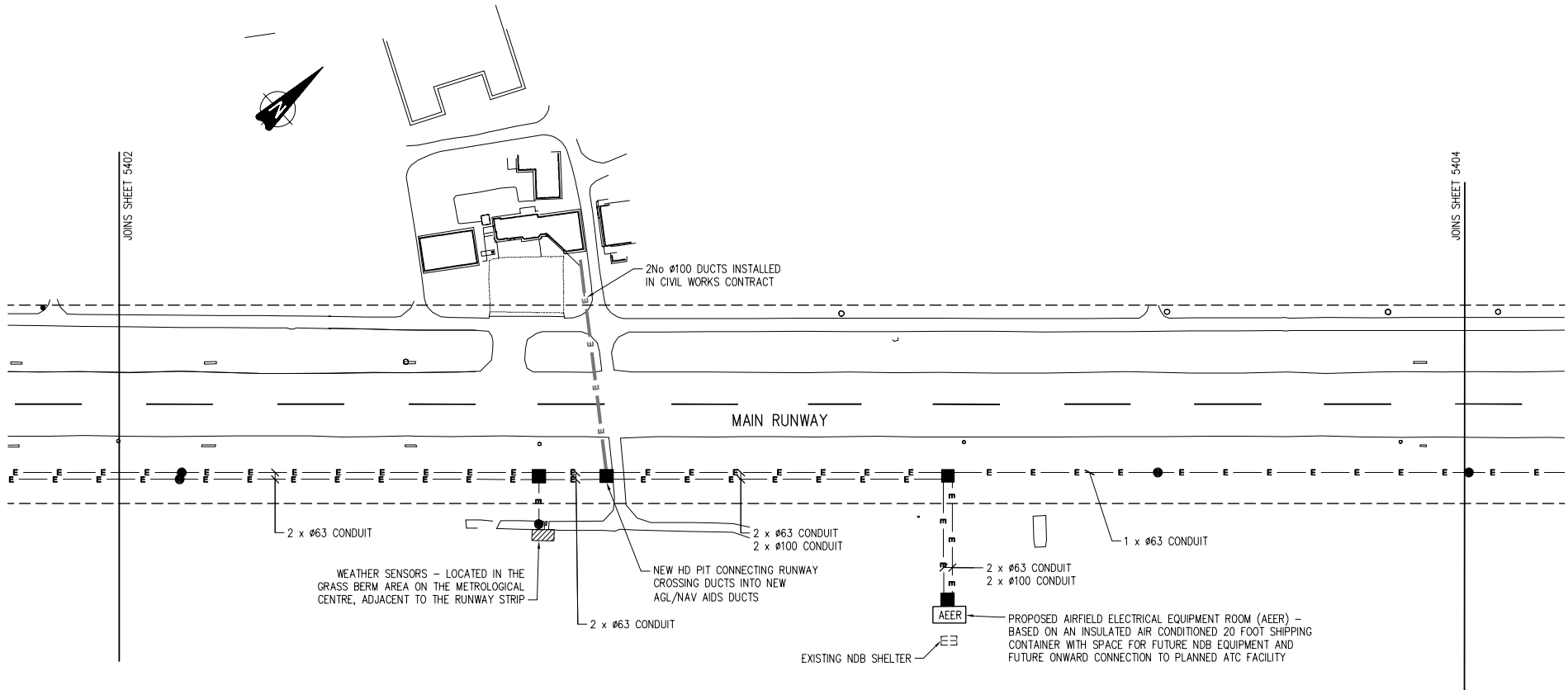
1. THE AWS WILL CONSIST OF AN ARRAY OF WEATHER SENSORS INSTALLED NEAR THE RUNWAY AND A CENTRAL PC WHICH WILL BE INSTALLED AT A SUITABLE LOCATION IN THE NEW AIRFIELD ELECTRICAL EQUIPMENT ROOM (AEER).
2. IT WILL HAVE A REMOTE WEATHER DISPLAY SCREEN MOUNTED IN THE AIRFIELD ELECTRICAL EQUIPMENT ROOM (AEER) AND WILL DISSEMINATE WEATHER DATA VERBALLY VIA VHF RADIO AND TELEPHONE CONNECTION, AND AS METAR DATA OVER APPROPRIATE COMMUNICATIONS LINKS.
3. REFER TO THE TECHNICAL SPECIFICATIONS FOR EQUIPMENT DETAILS.

ADS-B NOTES:

1. THE GROUND STATION IS TO BE OF THE 1090 MHZ EXTENDED SQUITTER TYPE AND CONFORM TO SPECIFICATIONS LAID DOWN IN ICAO ANNEX 10 VOL. 4 AND THE RECOMMENDATIONS OF ICAO IMPLEMENTATION AND OPERATIONS GUIDANCE DOCUMENT ISSUED BY THE ICAO PACIFIC OFFICE. THE EQUIPMENT IS TO BE LOCATED IN THE NEW AEER.
2. WHEN DECIDING ON AN EQUIPMENT CONFIGURATION, CONSIDERATION SHOULD BE GIVEN TO THE FACT THAT THE DISTANCE BETWEEN AN AVAILABLE ANTENNA SITE AND THE GROUND EQUIPMENT MAY BE UP TO 20M AND THE CABLE PATH MAY BE CONSTRICTED. THE AERIAL POSITION NEEDS TO CONSIDER NEARBY NDB MASTS.

SYMBOL LEGEND:

-  PRECISION APPROACH PATH INDICATOR (PAIP RED/WHITE)
-  WIND DIRECTION INDICATOR 'WD'
-  SIT PIT
-  HEAVY DUTY PIT TYPE 'D' - 900 x 900 x 900
-  AUTOMATED WEATHER STATION (AWS)
-  PROPOSED AIRFIELD ELECTRICAL EQUIPMENT ROOM, LOCATION (TBC)
-  NEW PRIMARY DUCT AND CABLE
-  NEW DUCT AND CABLE UNDER PAVEMENT
-  SECONDARY CABLE DUCT
-  APPROXIMATE RUNWAY STRIP (90m) EXTENTS



CAD Ref: K:\PROJECTS\ATTA PAIP Airports\40277008\05 FUNI\40277008-AV-5403.dwg

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This drawing is confidential and shall only be used for the purposes of this project.

REVISIONS	No.	BY	DATE	DESCRIPTION	APPD
	3	JC	19.06.13	FOR TENDER ISSUE	CR
	2	JC	24.04.13	DETAILED DESIGN ISSUE	CR
	1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2008

DESIGNED	SH	CHECKED	CR
DRAWN	NW	CHECKED	CR
APPROVED	CR	DATE	Mar-13

SCALES:

1:1000 (A1)



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NOT FOR CONSTRUCTION

PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)
FUNAFUTI INTERNATIONAL AIRPORT (FUNI)
AIRCRAFT NAVIGATIONAL AIDS
LAYOUT - SHEET 2

A1	STATUS:	FOR TENDER	DRAWING NO:	60277008-AV-5403	REV:	3
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PAPI INSTALLATION NOTES:

- DESIGN AIRCRAFT FOR THE PAPI'S WILL BE THE ATR 72-210A.
- DESIGN AIMING POINT WILL BE 227.69 METRES FROM THE RUNWAY THRESHOLD.
- THE CONTRACTOR IS RESPONSIBLE FOR PAPI LOCATION DESIGN
- ALL PAPI DIMENSIONS SUBJECT TO CONFIRMATION
- STANDARDS AND REGULATIONS THAT ARE CONSIDERED RELEVANT FOR THE PARTICULAR DESIGN ARE:
 - INTERNATIONAL CIVIL AVIATION ORGANISATION ANNEX 14, AERODROMES PART 1 (ICAO ANNEX 14)
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 - FAA AC 150/5345-28G, PRECISION APPROACH PATH INDICATOR (PAPI) SYSTEMS.
 - FAA AC 150/5340-30, INSTALLATION DETAILS FOR AIRPORT VISUAL AIDS.
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- PAPI EQUIPMENT SHALL BE:
 - L-880 - SYSTEM CONSISTING OF 4 LIGHT UNITS.
 - STYLE A - VOLTAGE POWERED SYSTEMS.
 - CLASS 1 - SYSTEMS THAT OPERATE FROM -35 DEGREES CENTIGRADE TO 55 DEGREES C.
 - WILL BE 3 LAMP UNITS PER PAPI BOX.
 - IN FULL COMPLIANCE WITH THE REQUIREMENTS OF FAA ADVISORY CIRCULAR AC FAA AC-150/5345-28G, PRECISION APPROACH PATH INDICATOR (PAPI) SYSTEMS.
- EACH PAPI FOUNDATION TO COMPRISE A 2 METRE SQUARE, 150 MM THICK, CONCRETE PROTECTION SLAB WITH CABLE CONDUIT CENTRED BENEATH THE LIGHT BOX AND EXTENDING 100 MM ABOVE SLAB LEVEL.

SET OUT INFORMATION:

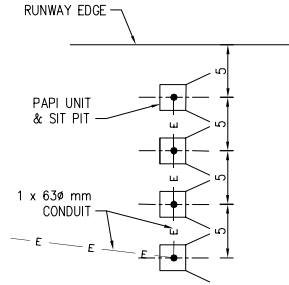
RUNWAY 03 END PIN (TH03)
741293.419 mE, 9056527.264 mN, LEVEL 3.934 m

RUNWAY 21 END PIN (TH21)
742349.378 mE, 9057644.049 mN, LEVEL 3.654 m

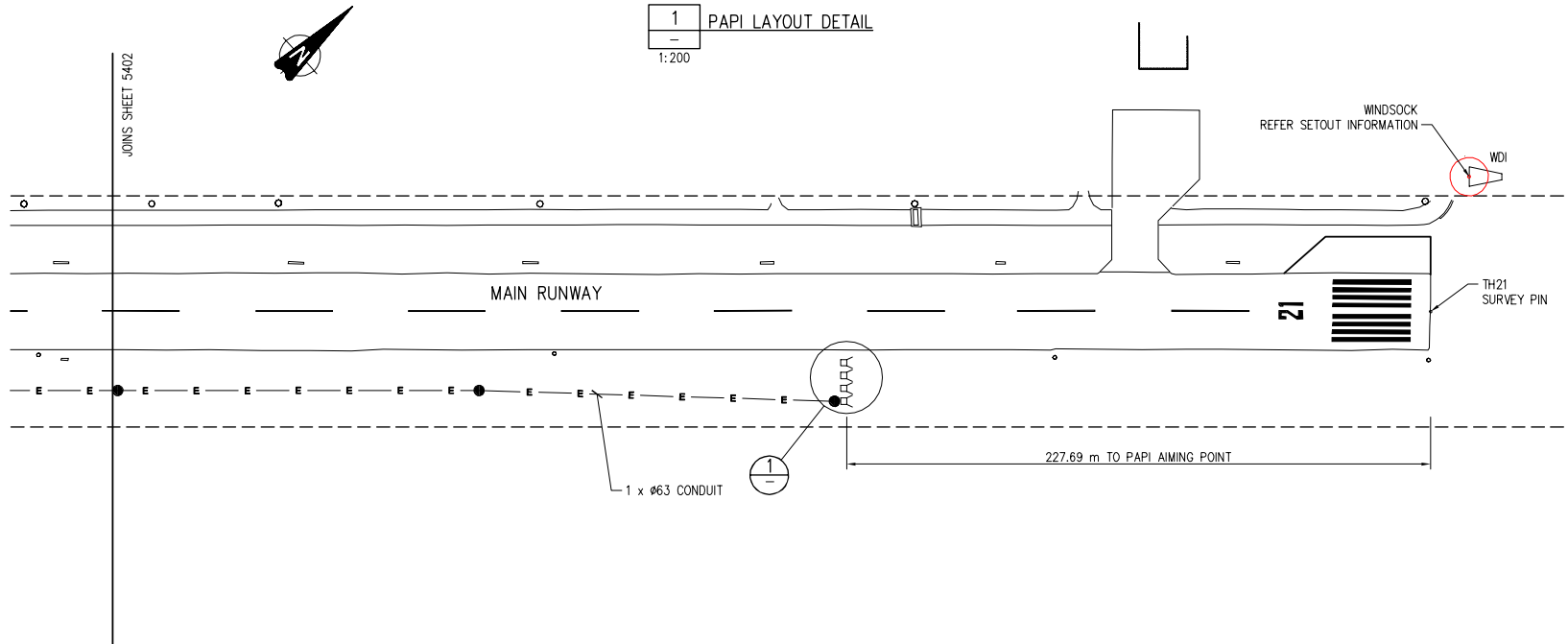
21 WDI (PROPOSED)
742321.53 mE, 9057691.02 mN

SYMBOL LEGEND:

- PRECISION APPROACH PATH INDICATOR (PAIP RED/WHITE)
- WIND DIRECTION INDICATOR 'WDI'
- SIT PIT
- HEAVY DUTY PIT TYPE 'D' - 900 x 900 x 900
- AUTOMATED WEATHER STATION (AWS)
- PROPOSED AIRFIELD ELECTRICAL EQUIPMENT ROOM, LOCATION (TBC)
- NEW PRIMARY DUCT AND CABLE
- NEW DUCT AND CABLE UNDER PAVEMENT
- SECONDARY CABLE DUCT
- APPROXIMATE RUNWAY STRIP (90m) EXTENTS



1 PAPI LAYOUT DETAIL
1:200



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No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	JC	24.04.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

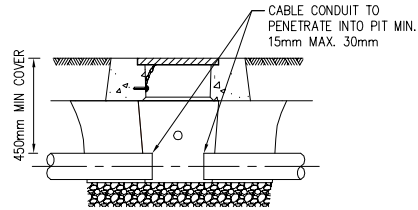
THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2008			
DESIGNED	SH	CHECKED	CR
DRAWN	NW	CHECKED	CR
APPROVED	CR	DATE	Mar-13

SCALES:
1:1000 (A1)

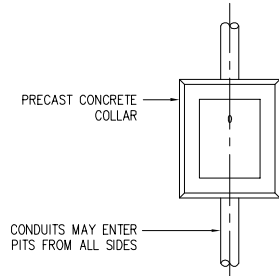


NOT FOR CONSTRUCTION		PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)	
		FUNAFUTI INTERNATIONAL AIRPORT (FUN) AIRCRAFT NAVIGATIONAL AIDS LAYOUT - SHEET 3	
A1	STATUS: FOR TENDER	DRAWING NO: 60277008-AV-5404	REV: 3

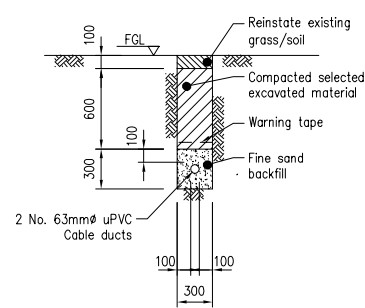
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SIT PIT DUCT PENETRATION
NTS

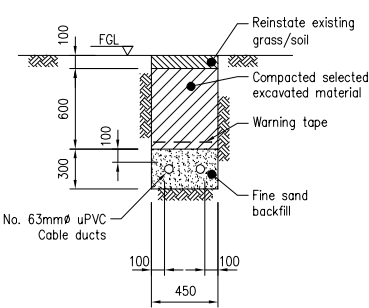


SIT PIT DETAIL
NTS



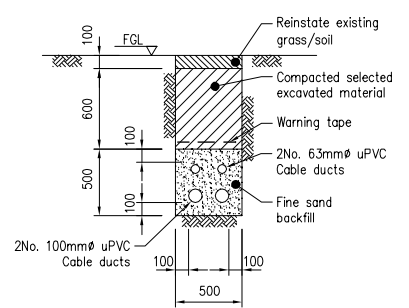
1x DUCT BANK - TYPICAL DETAIL

1
-
1:20



2x DUCT BANK - TYPICAL DETAIL

2
-
1:20



4x DUCT BANK - TYPICAL DETAIL

3
-
1:20

DUCT LINE - POWER IN RUNWAY/BERM:

- Trench to be cut with rotary trench saw or similar.
- In berm areas topsoil to be removed separately and used to re-instate trench surface on completion.

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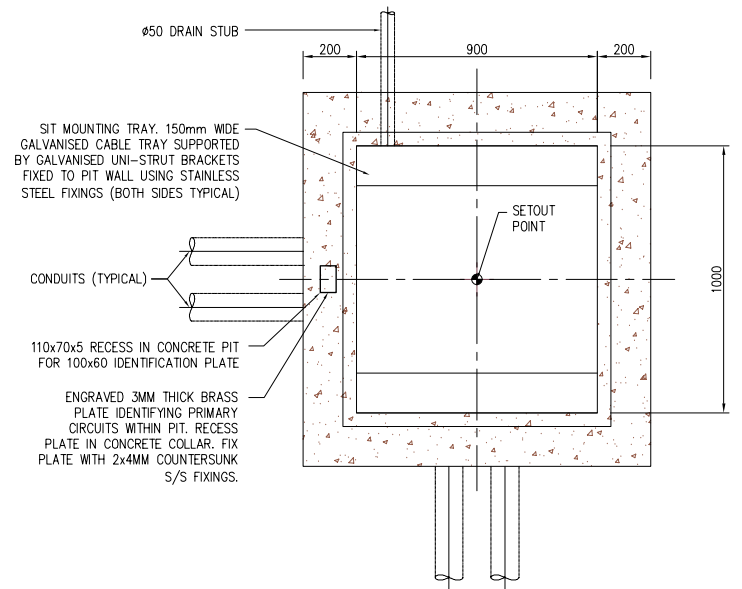
REVISIONS				
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	JC	24.04.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2008				
DESIGNED	SH	CHECKED	CR	
DRAWN	AK	CHECKED	CR	
APPROVED	CR	DATE	Mar-13	

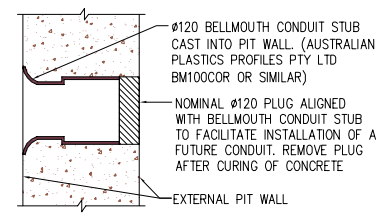
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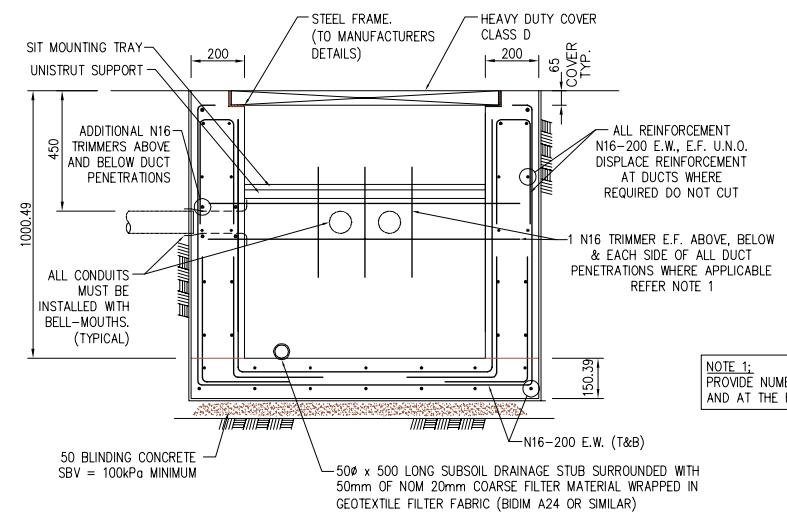
NOT FOR CONSTRUCTION			
PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)			
FUNAFUTI INTERNATIONAL AIRPORT (FUIA)			
AIRCRAFT NAVIGATIONAL AIDS			
LIGHT FIXTURE AND PIT INSTALLATION DETAILS			
A1	STATUS:	FOR TENDER	REV: 3
	DRAWING NO:	60277008-AV-54-10	



**CLASS D ELECTRICAL PIT
GENERAL ARRANGEMENT**
SCALE 1:10



1
-
NTS



NOTE 1:
PROVIDE NUMBER OF PENETRATIONS OF THE REQUIRED SIZE AND AT THE REQUIRED DEPTH TO SUIT EACH LOCATION

TYPICAL SECTION OF CLASS D PIT

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No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	JC	24.04.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2008			
DESIGNED	SH	CHECKED	CR
DRAWN	AK	CHECKED	CR
APPROVED	CR	DATE	Mar-13

NTS

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NOT FOR CONSTRUCTION	
PACIFIC AVIATION INVESTMENT PROGRAM (PAIP) FUNAFUTI INTERNATIONAL AIRPORT (FUN) AIRCRAFT NAVIGATIONAL AIDS CLASS 'D' HEAVY DUTY PIT DETAILS	
A1 STATUS: FOR TENDER	CLIENT: REV: 3
DRAWING NO: 60277008-AV-54-11	

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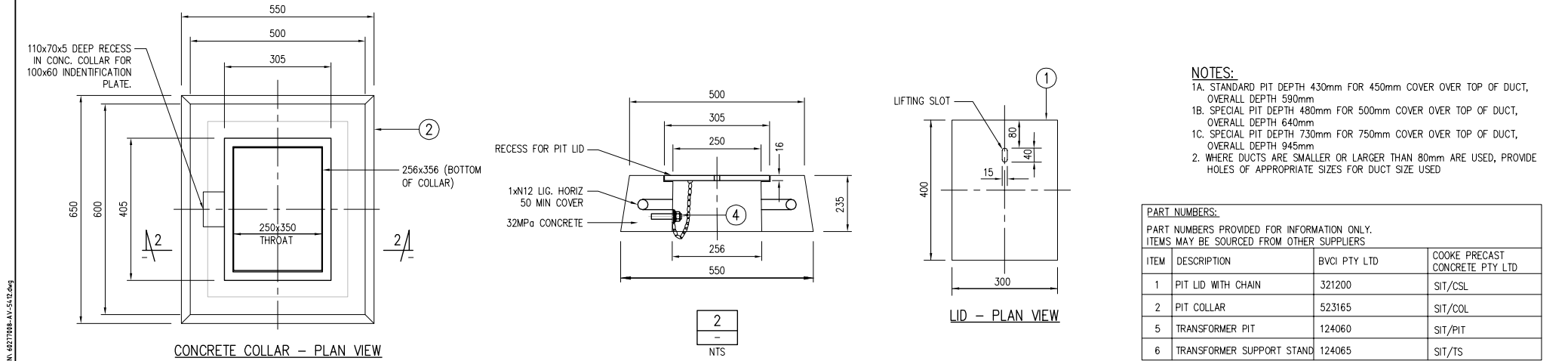
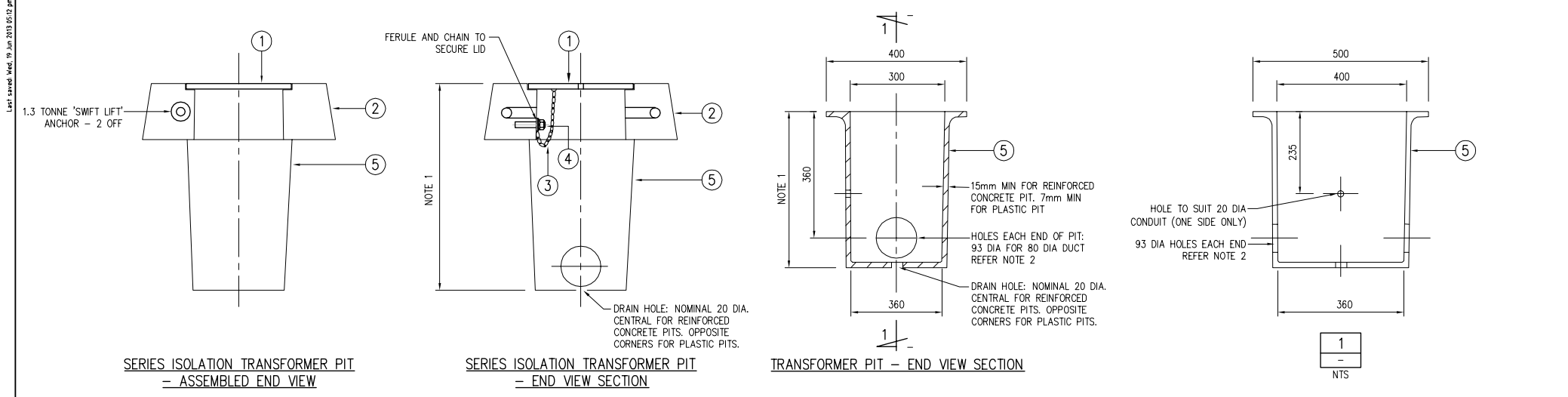
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
2	JC	24.04.13	DETAILED DESIGN ISSUE	CR
1	NW	22.03.13	90% DRAFT ISSUE	CR

THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM TO ISO 9001:2008			
DESIGNED	SH	CHECKED	CR
DRAWN	AK	CHECKED	CR
APPROVED	CR	DATE	Mar-13

SCALES:
NTS



PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)	
FUNAFUTI INTERNATIONAL AIRPORT (FUN) AIRCRAFT NAVIGATIONAL AIDS SIT PIT DETAILS	
A1	STATUS: FOR TENDER
DRAWING NO: 60277008-AV-54-12	
REV: 3	



- NOTES:**
- STANDARD PIT DEPTH 430mm FOR 450mm COVER OVER TOP OF DUCT, OVERALL DEPTH 590mm
 - SPECIAL PIT DEPTH 480mm FOR 500mm COVER OVER TOP OF DUCT, OVERALL DEPTH 640mm
 - SPECIAL PIT DEPTH 730mm FOR 750mm COVER OVER TOP OF DUCT, OVERALL DEPTH 945mm
 - WHERE DUCTS ARE SMALLER OR LARGER THAN 80mm ARE USED, PROVIDE HOLES OF APPROPRIATE SIZES FOR DUCT SIZE USED

PART NUMBERS:

PART NUMBERS PROVIDED FOR INFORMATION ONLY. ITEMS MAY BE SOURCED FROM OTHER SUPPLIERS

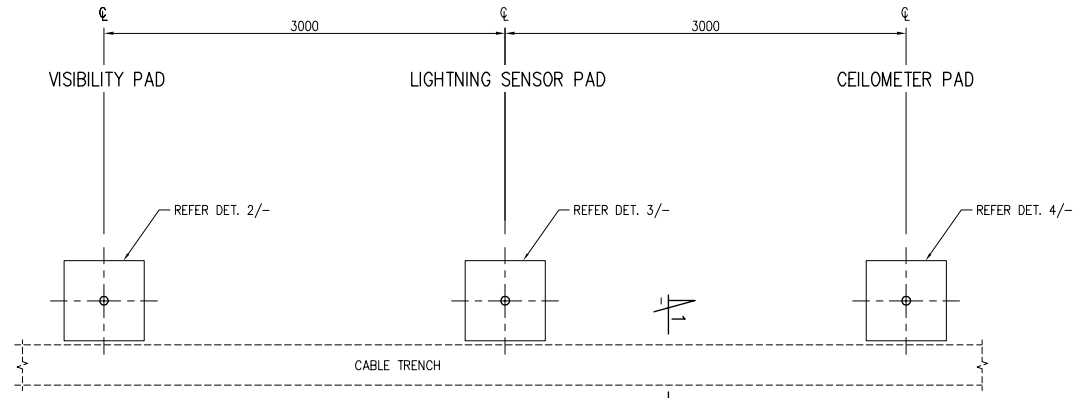
ITEM	DESCRIPTION	BVCI PTY LTD	COOKE PRECAST CONCRETE PTY LTD
1	PIT LID WITH CHAIN	321200	SIT/CSL
2	PIT COLLAR	523165	SIT/COL
5	TRANSFORMER PIT	124060	SIT/PIT
6	TRANSFORMER SUPPORT STAND	124065	SIT/TS

PARTS LIST:

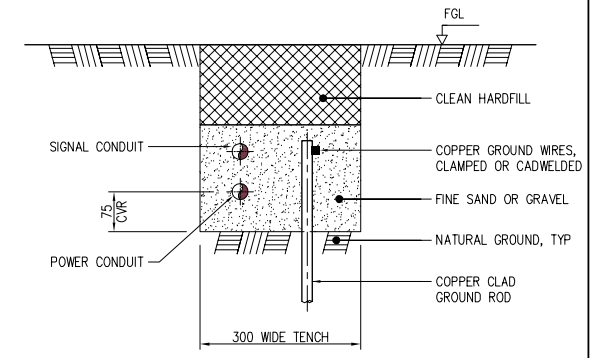
ITEM	DESCRIPTION	MATERIAL	NOTE
1	PIT LID	16mm THICK HOT DIP GALVANISED STEEL GRADE 250	
2	PIT COLLAR	32 MPa PRECAST CONCRETE COLLAR WITH 1xN12 LIG. 80+/- SLUMP. 14-20mm AGGREGATE	50 MIN COVER TO LIG. 1.3 TONNE SWIFT LIFT ANCHOR - 2 OFF
3	LID CHAIN	GENERAL PURPOSE HOT DIP GALVANISED 5mm CHAIN (188.7m/100kg) 500mm LENGTH	WELD TO UNDERSIDE OF STEEL LID AND BOLT TO ITEM 4
4	CHAIN FIXING	STUD/WASHER/NUT/FERRULE	CAST OR CHEMICALLY ANCHORED STAINLESS STEEL STUD IN COLLAR
5	TRANSFORMER PIT	U.V STABILISED POLYETHYLENE OR FIBERGLASS REINFORCED CONCRETE (RECTANGULAR)	REFER NOTES 1A, 1B AND 1C FOR PIT REQUIRED DEPTHS

SERIES ISOLATING TRANSFORMER PIT / CONSTRUCTION DETAILS

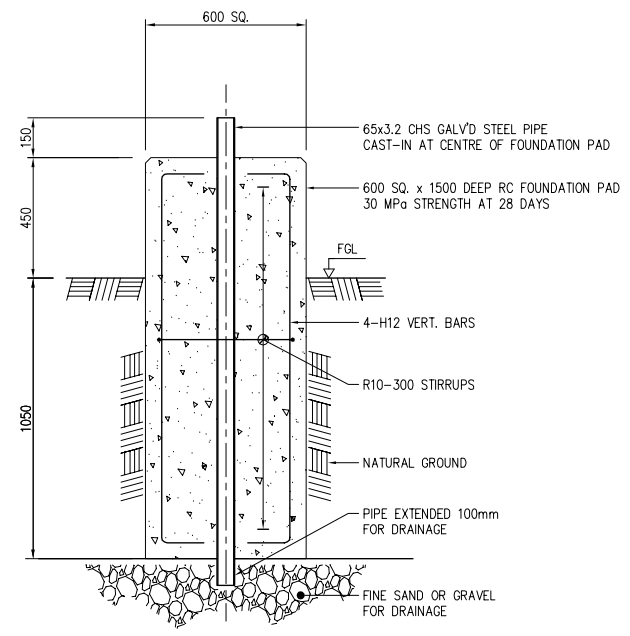
NOT FOR CONSTRUCTION



AWS SENSORS FOUNDATION PAD - TYPICAL LAYOUT
1:20mm

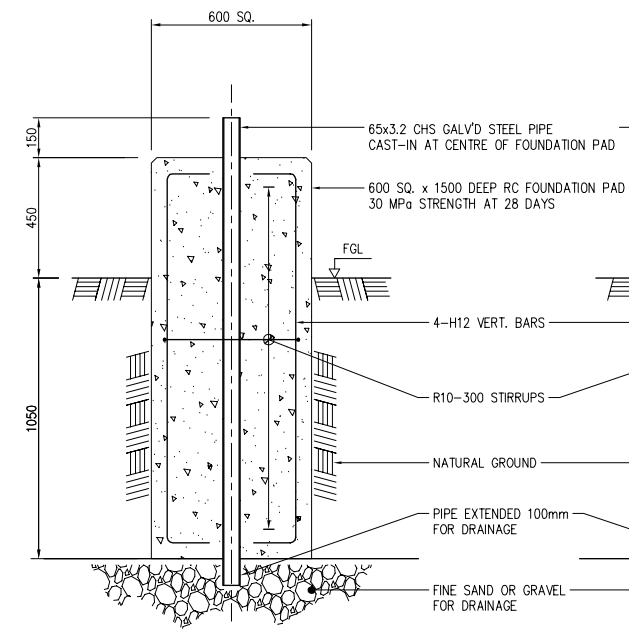


TYPICAL TRENCH DETAIL
1
1:5mm



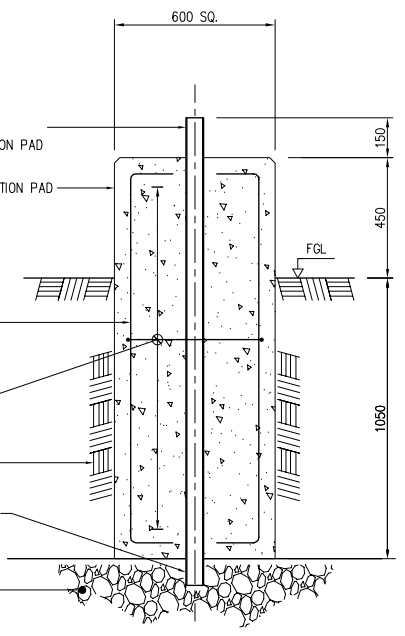
VISIBILITY SENSOR FOUNDATION PAD DETAIL

2
1:10mm



LIGHTNING SENSOR FOUNDATION PAD DETAIL

3
1:10mm



CEILOMETER FOUNDATION PAD DETAIL

4
1:10mm

NOT FOR CONSTRUCTION

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REVISIONS				
No.	BY	DATE	DESCRIPTION	APPD
3	JC	19.06.13	FOR TENDER ISSUE	CR
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THE SIGNING OF THIS TITLE BLOCK CONFIRMS THE DESIGN AND DRAFTING OF THIS PROJECT HAVE BEEN PREPARED AND CHECKED IN ACCORDANCE WITH THE AECOM QUALITY ASSURANCE SYSTEM (ISO 9001:2008)			
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APPROVED	CR	DATE	Mar-13

AS SHOWN



PACIFIC AVIATION INVESTMENT PROGRAM (PAIP)			
FUNAFUTI INTERNATIONAL AIRPORT (FUN) AIRCRAFT NAVIGATIONAL AIDS AUTOMATIC WEATHER STATION SENSOR INSTALLATION			
A1	STATUS	FOR TENDER	REV 3
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Design & Supervision Services of the Pacific Aviation Investment Program (PAIP)
Pacific Aviation Investment Program (PAIP) – Environmental Management Plan -
Funafuti International Airport (FUN) and Road Interim Working Document
Commercial-in-Confidence

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Appendix B

Mitigation Measures

DRAFT**Appendix B Mitigation Measures****Environmental & Social Mitigation Plan – For All TvAIP Components**

POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
DETAILED DESIGN/ PRE-CONSTRUCTION MOBILISATION STAGE					
Road traffic safety	<p>Provide for Traffic Management Plan (TMP) to be developed by Contractor, to include signage, flag operators, personnel protective equipment (e.g. high visibility vest), and specific actions to be implemented around sensitive receptors (e.g. residential dwellings, schools, hospital). TMP to include vehicle and pedestrian traffic.</p> <p>Include renewal of any signage (e.g. speed limits) or other traffic calming measures (e.g. speed bumps) and sidewalks in design for ongoing safety of road users.</p> <p>Include transport of materials and equipment to construction camp (located at the airport) in the TMP e.g. covering of loads, maximum speed, designated travel times and notification of police and other required departments (e.g. hospital and schools).</p>	<p>Length of Road Rehabilitation</p> <p>To be decided on site</p> <p>From port to airport</p>	Minimal (requirement of bidding documents)	Design Consultant and Contractor	MCT
Aviation traffic safety	Each investment within an operational airport is to have a Methods of Works Plan (MOWP) which is to be included in all bid and contract documents. The Contractor is to develop a Safety Management Plan as an addendum to the MOWP. The MOWP will include details of site works scheduling around known flight timetables and procedures for emergency response for all workers.	Operational airports	Minimal (requirement of bidding documents and standard construction practices)	Design Consultant	MCT

² Costs are estimates only and will be calculated during the detailed engineering design.

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
Soil erosion	<p>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.</p> <p>Schedule earthworks and construction activities outside of wet season, which is usually between November to April.</p>	All locations	Minimal (part of standard design practices).	Design Consultant	MCT
Dust/Air Pollution	<p>Identify and locate waste disposal sites, stockpile sites and equipment (e.g. bitumen plant) to minimize impacts on the environment and nearby population.</p> <p>Ensure all equipment serviced and issued with warrant of fitness (as required). Equipment over five years old shall only be used with written approval by the Supervising Consultant. Any machinery deemed to be polluting the air must be replaced (or fixed) on instruction by the Supervising Consultant and MCT kept informed.</p>	<p>Construction camp</p> <p>Work sites</p>	Minimal (part of standard design practices).	Design Consultant	MCT
Water and soil pollution	<p>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.</p> <p>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. Water tight and sheltered bunds to be able to contain 110% of volumes being stored or 25% if total volume greater than 1,000L.</p> <p>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).</p> <p>Sanitation treatment system (e.g. compost or proprietary treatment system) is approved by the SWAT and MCT prior to implementation.</p>	All components	Minimal (part of standard design and construction practices).	Design Consultant	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
Water supply	<p>Include maximum rainwater reclamation and water conservation/ efficiency in design of terminal.</p> <p>The Contractors will also need to ensure adequate supply of water for construction and personnel which does not adversely affect the community's water supply (e.g. mobile desalination plant or organising a reservoir supply specifically for construction).</p>	Airport terminals	Minimal (part of standard design practices).	Design Consultant and Contractors	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	Minimal (part of standard design and construction practices).	Design Consultant	MCT
Solid waste generation	<p>Allow for re-use of as much material as possible either within the TvAIP, other projects, or for community use. Funafuti Kaupule and the island recycling business should be consulted to determine if materials or waste can be recycled within the community. The recycling of construction materials will be at the discretion of the PWD.</p> <p>When planning the construction Camp ensure temporary waste dump areas are allowed for and approved waste disposal sites / methodologies identified for removal of all solid waste.</p> <p>As early as possible in the pre-construction preparation phase suitable receiving waste facility(ies) should be identified and agreements put in place to transport (trans-boundary) remaining project waste from Tuvalu.</p>	All locations	Minimal (part of standard design and construction practices).	Design Consultant and Contractor	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS ²	EXECUTING AGENCY	SUPERVISING AGENCY
Hazardous substances	<p>Fuel shall be obtained from local commercially available sources. Prior arrangement regarding quantity and type will need to be organised (MCT to provide details of providers).</p> <p>Fuel shall not be stored in the construction camp unless permission given by MCT and the Department of Energy.</p> <p>Confirm the presence of asbestos containing material on any buildings to be demolished and make the necessary EHS and customs arrangements to deal with demolition and transport.</p> <p>Ensure containment facilities are set up for the transport of hazardous waste substances that are to be disposed of at licensed waste facility (trans-boundary).</p>	All locations	Minimal (part of mobilisation and construction planning).	Contractor	MCT
CONSTRUCTION STAGE					
Traffic (vehicle and pedestrian) and construction safety	<p>Implement the traffic management plan to ensure smooth traffic flow and safety for workers, passing vehicles and pedestrian traffic.</p> <p>Where appropriate, employ flag operators on the road to prevent traffic accidents. The workers shall have relevant safety equipment.</p> <p>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.</p>	Length of road rehabilitation	Safety equipment included in construction cost.	Construction Contractor	MCT
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.</p> <p>Revegetate disturbed areas that are not being paved as soon as practicable (loosen ground; apply topsoil; seed or plant as necessary).</p>	All locations	Minimal (part of standard construction practice).	Construction Contractor	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
Waste disposal	<p>Ensure all construction waste material is recycled or packed up for transport off island. The municipal landfill on Funafuti is not suitable for disposal of construction waste generated from the TvAIP.</p> <p>Ensure areas for waste collection, recycling and off-side disposal are clearly marked/sign posted. Segregate waste to avoid cross contamination, such as with contaminated material (hazardous substance).</p> <p>Install waste collection facilities at construction camp to allow for collection and packing of waste. Strictly no dumping of rubbish. Include awareness training in general environmental training.</p> <p>Workers must be provided with a sanitary system to prevent fouling of lagoon or surrounding soils.</p>	All locations	Minimal (part of standard construction practice).	Construction Contractor	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
Generation of dust	<p>Use closed/covered trucks for transportation of construction materials. Any vehicle which is overloaded (exceed designed load limit) or is not covered properly shall be refused entry to the construction camp or material shall be refused delivery (if not to the construction camp).</p> <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).</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>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	Minimal (part of standard construction practice).	Construction Contractor	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
Accident risks/Impacts on traffic safety	<p>Arrange necessary measures for pedestrian and passer-by safety and all means of transportation safety (e.g., establish protection zones, by-pass these areas during transportation of materials, etc.)</p> <p>Relevant safety elements such as guardrails, road signs and delineators, pavement markings, barricades and beams, warning lights shall be installed. In some cases a flag operator or traffic control supervisor could be engaged around the specific work site.</p>	All locations	<p>Safety equipment included in construction cost.</p> <p>Minimal (part of standard construction practice).</p>	Construction Contractor	MCT
Loss of archaeological artefacts or sites	Work to stop in specific location of unearthed artefacts or site and MCT notified immediately for instruction to proceed.	All locations	No marginal cost	Construction Contractor	MCT
Landscape degradation	<p>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).</p> <p>Use plant species characteristic for the landscape in the course of restoration of the vegetation cover.</p>	All locations	Minimal (part of standard construction practice).	Construction Contractor	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
Hazardous substances and safety and pollution	<p>Store and handle hazardous substances in bunded, hard stand or designated areas only. Bunded areas should be covered to stop rain water entering or 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. Bunds (secondary containment) to contain 110% of the largest container/tank required to be stored or 25% of total volume if total volume is over 1,000L.</p> <p>Provide hazard specific personnel protective equipment to workers directly involved in handling hazardous substances (e.g. chemical or heat resistant clothing, gloves).</p> <p>Complete list, including MSDS for each chemical stored or used shall be accessible at all times. Signage to be posted in storage areas identifying all chemicals present.</p> <p>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 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 if no on island disposal or recycling facility available.</p>	All locations	<p>Safety equipment included in construction cost.</p> <p>Minimal (part of standard construction practice).</p>	Construction Contractor	MCT
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	No marginal cost	Contractor	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS²	EXECUTING AGENCY	SUPERVISING AGENCY
Health and safety	<p>Construction camp to be fenced to prevent access by unauthorised personnel.</p> <p>First aid training to be provided as required to site workers with basic first aid services to be provided by Contractor e.g. stretcher, vehicle transport to hospital.</p> <p>All contractors and workers to be given awareness training regarding prevention of communicable and sexually transmitted diseases (particularly HIV/AIDS). Contractor to coordinate with Ministry of Healthy regarding training.</p> <p>Only personnel trained in asbestos handling may be involved in any demolition works involving ACM. Full PPE to be used when handling the material ready for transport.</p>	All locations	<p>Security included in construction cost.</p> <p>Ministry of Health (US\$)</p> <p>Ministry of Health (US\$)</p> <p>Included in construction costs</p>	Contractor	MCT
Damage to assets and infrastructure	As a result of TvAIP construction activities any damage to assets or infrastructure must be reported to the MCT and rectified at the expense of the Contractors.	All locations	Dependent on asset/ infrastructure and level of damage	Contractor	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS ²	EXECUTING AGENCY	SUPERVISING AGENCY
OPERATION STAGE					
Hazardous substance management	<p>Strictly apply and enforce manufacturer's recommendations for handling and storage. These measures include sealing of drums, and avoiding extreme heat.</p> <p>Compliance with international good practice.</p> <p>Security of storage areas to facilitate transport, handling and placement to be maintained (e.g. fences and locks fixed immediately if broken or vandalised).</p> <p>Complete list, including MSDS for each chemical stored or used shall be accessible at all times. Signage to be posted in storage areas identifying all chemicals present.</p> <p>Staff to wear manufacturers recommended personnel protective equipment (e.g. gloves and overalls) when handling or mixing hazardous substances.</p> <p>Emergency vehicles are to be serviced and maintained at existing workshop areas.</p>	All airport compounds	No marginal cost (standard operating procedure).	PWD (roading investment) CAD (airports)	MCT
Water or soil pollution	<p>Workshops or maintenance areas to be fitted with bunded areas for storage of oil and fuel drums (and any other hazardous substances).</p> <p>Used oil drums should be returned to the suppliers or, after being cleaned, sold in secondary local market if there is demand for this.</p> <p>Used oils may be used for emergency drills/preparedness exercises as appropriate by ARFF.</p>	All locations	No marginal cost (standard operating procedure).	PWD (roading investment) CAD (airports)	MCT

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POTENTIAL NEGATIVE IMPACT	ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES	IMPLEMENTING LOCATION	ESTIMATED MITIGATION COSTS ²	EXECUTING AGENCY	SUPERVISING AGENCY
Maintenance of drainage and soakage systems	<p>Drainage systems shall be periodically cleared of sediment and organic matter build up to ensure appropriate flows and soakage. Material to be disposed at approved site (e.g. landfill or used as cleanfill) or composted if organic.</p> <p>Vegetation to be cleared from drainage channels and soakage pits and composted through Transfer Station.</p>	All locations	No marginal cost (standard operating procedure).	<p>PWD (roading investment)</p> <p>CAD (airports)</p>	MCT
Wastewater management	Septic systems of the terminal and tower to be cleaned regularly and sludge disposed or treated in accordance with requirements of PWD, Department of Environment and Solid Waste Agency of Tuvalu.	Terminal and Tower	No marginal cost for current practice of disposal.	<p>PWD (roading investment)</p> <p>CAD (airports)</p>	MCT

Note: "All locations" refers to all areas in Tuvalu which will be impacted by TvAIP activities, namely the airport (runway, terminal, control tower), the road corridor (approximately 15.5km and including the port), the port (for delivery of equipment and material), and the construction camp.

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Appendix C

Monitoring Plan

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Appendix C Monitoring Plan

PARAMETER TO MONITOR	LOCATION	MONITORING	FREQUENCY	RESPONSIBILITY
DETAILED DESIGN/ PRE-CONSTRUCTION PHASE				
Traffic safety	Design documents	Ensure TMP	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 May and December. Designs include erosion protection measures.	Prior to sign off of final designs	Design Consultant
Water supply	Design documents	Water reclamation systems included in designs (particularly terminal design).	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.	Contractor to organize prior to export from country of origin.	Contractors
CONSTRUCTION				
Agreement for waste disposal	Construction Contractor's 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.	Documentation viewed prior to construction works starting Weekly as applicable to schedule of works.	MCT
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

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PARAMETER TO MONITOR	LOCATION	MONITORING	FREQUENCY	RESPONSIBILITY
Water and soil pollution	At construction sites Port	Inspection of sites to ensure waste collection in defined area; spill response plan in place and workers trained. Complete spill kits available where hazardous substances sorted and handled. Inspect and check with Harbour Master to determine if any ships in port have unlawfully discharged wastewater (e.g. bilge, ballast, sewage).	Weekly inspection as applicable to schedule of works and on receipt of any complaints	MCT
Dust	At construction sites and adjacent sensitive areas. Port	Site inspections. Regular visual inspections to ensure stockpiles are covered when not in use and trucks transporting material are covered. Inspect and check with Harbour Master to ensure ship cargo unloading does not occur in high winds and loose material is wetted to prevent dust when being unloaded.	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, etc.	At work sites and construction camp. Contractors training log.	Regular site inspections to ensure material is stored within bunded area and spill response training for workers completed. Visual inspection of spill kit for completeness and accessibility.	Weekly as applicable to schedule of works and on receipt of any complaints.	MCT
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

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PARAMETER TO MONITOR	LOCATION	MONITORING	FREQUENCY	RESPONSIBILITY
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
OPERATION				
Accidents with hazardous materials or wastes	Airport sites	Accident report	Immediately after accident	Department of Environment
Traffic safety	On the road during operation	Observation of obedience of speed and other traffic regulations	Randomly by decision of the Traffic Police	PWD
Maintenance of drainage system	On site	Inspection	When needed, particularly after storm events and during rainy season	PWD
Wastewater management	Terminal and control tower	Proper maintenance of septic system	Quarterly inspection (observation) at connection to septic system.	CAD and PWD
Solid waste collection and disposal (non-hazardous)	Terminal and control tower	Solid waste being collected and taken to approved disposal site (e.g. landfill)	To be arranged with Funafuti Kaupule and Solid Waste Agency of Tuvalu as required	CAD

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Appendix D

Inspection Checklist

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Location:	
Auditor:	
Audit Date/Time (Start):	
Audit Date/Time (Finish):	

Environmental Issue:	Inspection areas:	Requirements met?
1.0 Construction Phase		
1.1 Soil Erosion	<ul style="list-style-type: none"> - Silt fences and diversion drains in place - Replanting and restoration work completed 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
1.2 Waste accumulation and Disposal Agreements	<ul style="list-style-type: none"> - Good housekeeping around the work sites - Waste stockpiled in defined areas with signage ready for removal - Waste/recycling permits/agreements in place 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
1.3 Soil and Water Pollution	<ul style="list-style-type: none"> - Waste collected in defined area on impermeable ground - Appropriate spill response plan/kit in place for waste area - Freshwater lens water quality results sighted - Harbour Master monitoring ship movement and wastewater discharges 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
1.4 Dust	<ul style="list-style-type: none"> - Stockpiles covered or kept wet when not in use - Visual inspection of ambient dust conditions - Truck transports are covered - Port ship cargo unloaded material is wetted 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
1.5 Noise	<ul style="list-style-type: none"> - Workers wearing ear protection as required - Noise level maximum of 70dB 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:

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Environmental Issue:	Inspection areas:	Requirements met?
1.0 Construction Phase		
1.6 Hazardous Substance Storage (fuel/oil/bitumen)	<ul style="list-style-type: none"> - Hazardous substances within bund on impermeable surface - Spill kit complete and accessible - Spill training completed 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
1.7 Traffic Management Plan Implementation	<ul style="list-style-type: none"> - Traffic Management Plan (TMP) implemented - PPE is being worn by workers 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
1.8 Personal Protective Equipment Use	<ul style="list-style-type: none"> - Workers have access to, and using appropriate, PPE for the task. 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
1.9 Community Safety	<ul style="list-style-type: none"> - Public signage of complaints procedure - Signs and fences restrict or direct pedestrians and public where appropriate 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
2.0 Operational Phase		
2.1 Drainage Maintenance	<ul style="list-style-type: none"> - Inspect to check for blockages and debris, particularly after storm events 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
2.2 Septic System Maintenance and Upkeep at Terminal/ Control tower	<ul style="list-style-type: none"> - <i>Quarterly inspection</i> of connections to system, for leaks 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:
2.3 Solid Waste Collection/ Disposal from Terminal/ Control Tower	<ul style="list-style-type: none"> - Solid non-hazardous waste being removed to council approved disposal site 	Yes <input type="checkbox"/> No <input type="checkbox"/> If No, details:

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Actions Required:

Issue No.	Action Required? By Whom?	Date Action Required?

Signoff

Signature:

Date:

.....

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