AECOM

Design & Supervision Services of the
Pacific Aviation Investment Program (PAIP)

Ministry of Communications, Transport and
Tourism Development

16-Jan-2014

Doc No. D-8

Pacific Aviation Investment Program (PAIP)

Basic Environmental Impact Assessment - Bonriki International Airport (TRW) Final Draft

Pacific Aviation Investment Program (PAIP)

Basic Environmental Impact Assessment - Bonriki International Airport (TRW) Final Draft

Client: Ministry of Communications, Transport and Tourism Development

Co No.: N/A

Prepared by

AECOM New Zealand Limited
8 Mahuhu Crescent, Auckland 1010, PO Box 4241, Auckland 1140, New Zealand
T +64 9 967 9200 F +64 9 967 9201 www.aecom.com

16-Jan-2014

Job No.: 60277003

AECOM in Australia and New Zealand is certified to the latest version of ISO9001, ISO14001, AS/NZS4801 and OHSAS18001.

Quality Information

Document: Pacific Aviation Investment Program (PAIP)

60277003

Ref: k:_projects\atta paip airports (60277003 60277004 60277008)\4. tech work area\4.4 environment\4.4.3 kiribati\trw-verf-20140117-final ver2-wb late comments\paip-trw-emp_draft_v6_20140115.docx

Date: 16-Jan-2014

Prepared by: Kristina Healy

Reviewed by: Peter Hartley, Bill Andrew

Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	22-Mar-2013	For Comments	Craig Ridgley Aviation Director	
B	12-Apr-2013	For Comments	Craig Ridgley Aviation Director	
C	9-May-2013	For Comments	Craig Ridgley Aviation Director	
D	11-Oct-2013	Final Draft for Submission and Disclosure	Craig Ridgley Aviation Director	
E	13-Dec-2013	Final	Craig Ridgley Aviation Director	
F	16-Jan-2014	Final	Craig Ridgley Aviation Director	

Table of Contents

Glossary and Abbreviations

ºC	Degrees Celsius
ACM	Asbestos Containing Material
ADS-B	Auto Dependent Surveillance – Broadcast
ARFF	Airport Rescue and Fire Fighting
AST	Aboveground Storage Tank
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
BEIA	Basic Environmental Impact Assessment
BTC	Betio Town Council
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
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.
CGI	Combustible Gas Indicator
CLSM	Controlled Low Strength Material
CXI	Cassidy International Airport
DME	Distance Measuring Equipment
EA	Executing Agencies
ECD	Environment Conservation Division of the Ministry of Environment, Land and Agriculture Development
EHS	Environmental, Health and Safety
EMP	Environmental Management Plan
ESA	Environmentally Significant Activities
ESAT	Environmentally Safe Aggregates for Tarawa
ESD	Environmentally Sustainable Design
ESMF	Environmental and Social Management Framework
ETC	Eutan Tarawa Council
FTC	Kiribati Fisheries Training Centre
GoK	Government of Kiribati
GoT	Government of Taiwan
HAT	Highest Astronomical Tide
HCFC	Hydrochlorofluorocarbon
HIV/ AIDS	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
IA	Implementing Agency
IATA	International Air Transportation Association
ICAO	International Civil Aviation Organisation
IFC	International Finance Corporation
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JSS	Junior Secondary School
KAIP	Kiribati Aviation Investment Project

KANGO	Kiribati Association of Non-Governmental Organisations
KAP	Kiribati Adaptation Project
KIT	Kiribati Institute of Technology
km	kilometre
KPI	Kiribati Pastoral Institute
KPC	Kiribati Protestant Church
KTC	Kiribati Teachers' College
LED	Light Emitting Diode
LNAPL	Light, Non-aqueous Phase Liquid
m/ m^2/ m^3	Metre/ square metres (area)/ cubic metres (volume)
maneaba	A community's central meeting house where communal concerns are discussed, and decisions taken about matters that affect the whole community.
MCTTD	Ministry of Communication, Transport and Tourism Development
MELAD	Ministry of Environment, Land and Agriculture Development
MOWP	Method of Works Plan
MPWU	Ministry of Public Works and Utilities
MTC	Maritime Training Centre
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
PAH	Polycyclic Aromatic Hydrocarbon
PAIP	Pacific Aviation Investment Program
PAPI	Precision Approach Path Indicator
PCN	Pavement Classification Number
PAPI	Precision Approach Path Indicator
PCCSP	Pacific Climate Change Science Program
PEO	Principal Environment Officer
PIB	Project Information Bulletin
PID	Photoionization Detector
PMU	Project Management Unit
PPE	Personal Protection Equipment
PV	Photovoltaic
PVC	Polyvinyl Chloride (type of plastic)
RAP	Resettlement Action Plan
RESA	Runway End Safety Area
RPF	Resettlement Policy Framework
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.
TPH	Total Petroleum Hydrocarbon
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
TTC	Tangintebu Theological College
TOR	Terms of Reference
TRW	Bonriki International Airport
TUC	Teinainano Urban Council
UHF/ VHF	Ultra-High Frequency/ Very High Frequency
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
WB	World Bank
WHO	World Health Organization

Executive Summary

The Kiribati Aviation Investment Project (KAIP) 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 KAIP aims to improve Kiribati's airport infrastructure, meet International Civil Aviation Organisation (ICAO) standards (for international airports), and to ensure sustainable operation of the civil aviation sector in Kiribati. This Basic Environmental Impact Assessment (BEIA) and Environmental Management Plan (EMP) has been prepared for the Bonriki International Airport (TRW) KAIP project components which are listed below and to meet with funding and Kiribati legislative requirements.

- Runway pavement rehabilitation
- Perimeter security fence
- Upgraded terminal
- Upgraded navigational aids

The Ministry of Communication, Transport and Tourism Development (MCTTD) through the Civil Aviation Directorate (CAD) manage the airport operations and are responsible for compliance with national and international civil aviation requirements.

This BEIA and 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 KAIP project components.

Overall the KAIP 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. The 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 BEIA and 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.

This BEIA and 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 KAIP. 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 (potentially including asbestos and hydrocarbon contaminated soils)
- 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 Tarawa
- 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 BEIA and 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).

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 Basic Environmental Impact Assessment (BEIA) and Environmental Management Plan (EMP) is prepared, includes Kiribati, Tonga and Tuvalu. This site specific BEIA and EMP has been developed for project work at Bonriki International Airport (TRW) on Tarawa.

Air transport is the most efficient mode of transport in Kiribati due to the distance of its islands (stretches some 4,000 km). Kiribati operates two international airports with Bonriki International Airport (TRW) being the primary gateway to Kiribati. The Ministry of Communication, Transport and Tourism Development (MCTTD), through the Civil Aviation Directorate (CAD) is responsible for both the administration and regulation of the civil aviation sector along with operation of the airports.

The Kiribati Aviation Investment Project (KAIP) was established to implement the PAIP and manage works associated with the airport upgrades. The KAIP aims to improve Kiribati's airport infrastructure, meet International Civil Aviation Organisation (ICAO) standards (for international airports), and to ensure sustainable operation of the civil aviation sector in Kiribati.

In May 2011, an overarching EMP (AECOM, 2011. *Kiribati Aviation Infrastructure Investment Environmental Management Plan*) was published for all components of the KAIP. The overarching EMP is in compliance with WB Policy OP/BP 4.01 Environmental Assessment and national legislation, and provides a framework for mitigation of the projects' impacts and development of a site specific EMP incorporating 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 National Task Force report titled *Consultation Report Pacific Aviation Investment Program – Kiribati* dated 8 September 2011. This BEIA and EMP builds on the overarching EMP and details environmental impacts and mitigation measures specifically for TRW and incorporates details of the final detailed designs.

1.2 KAIP Objective

The KAIP aims to improve Kiribati's airport infrastructure, meet International Civil Aviation Organisation (ICAO) standards (for international airports), and to ensure sustainable operation of the civil aviation sector in Kiribati.

1.3 BEIA and EMP Objectives and Scope

The KAIP is a category B project under WB environmental and social screening guidelines and requires development of the project 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.

This BEIA and 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 BEIA and 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 BEIA and 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 their execution. The BEIA and EMP also provide the details of how the community and stakeholders are to be engaged and the mechanisms for ongoing consultation and communication.

This BEIA and 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 BEIA and EMP builds on the impacts and mitigation measures as identified in the overarching EMP and includes outcomes of the consultation undertaken to date. This BEIA and EMP will be included in the bidding documents for construction contractors and form the basis of the Contractors' EMP. The

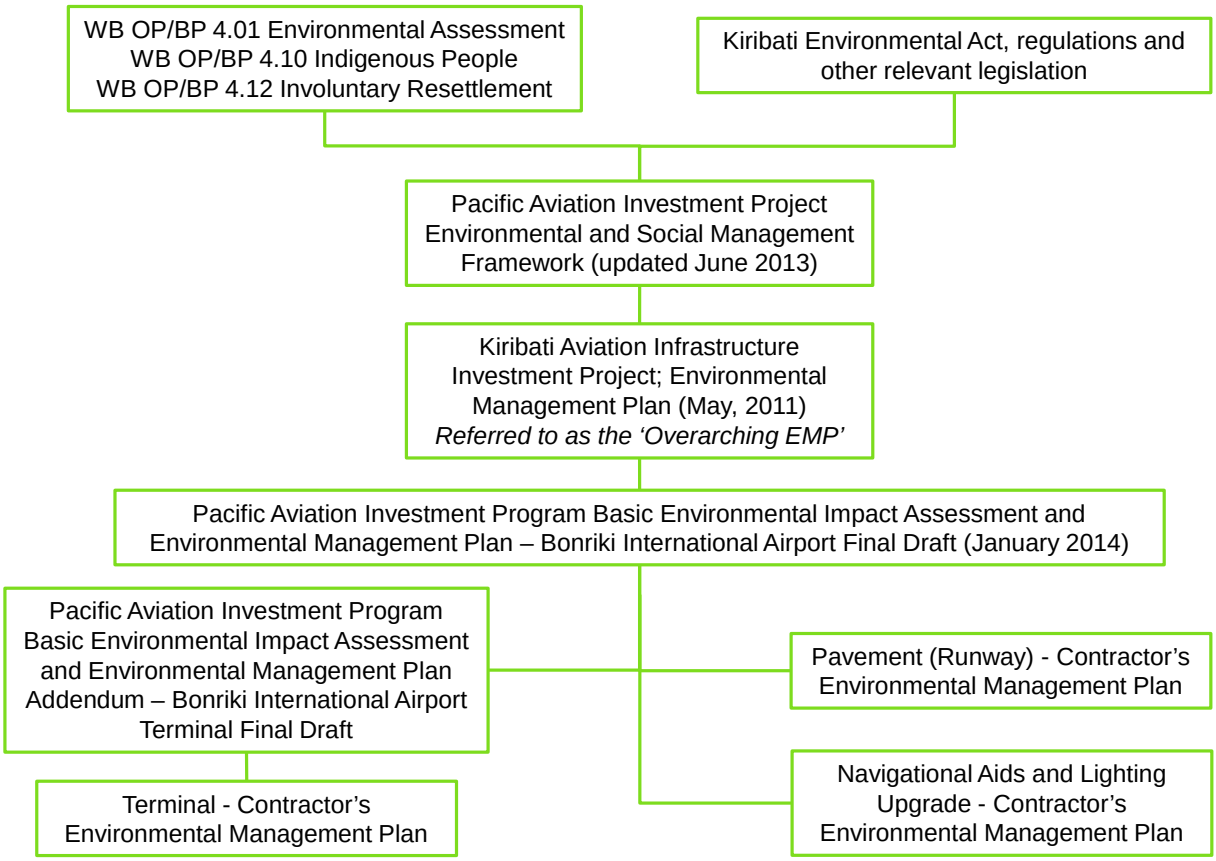
mitigation measures identified in this EMP form the minimum requirement for reducing impacts on the environment as a result of works associated with the project.

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 in the diagram below 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).

Figure 1 Environmental safeguard document hierarchy



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

1.3.2 Social Safeguards Document Development

In May 2011, a Resettlement Policy Framework (RPF) (AECOM, 2011. *London – Cassidy Airport Road Kiritimati, Bonriki Airport Tarawa Investment Sub-Projects; Resettlement Policy Framework*) was developed for the KAIP due to the initial trigger of the WB OP/BP 4.12 Involuntary Resettlement for outstanding land lease issues regarding the location of the Terminal and potential resettlement requirements as the result of the construction of a perimeter fence around TRW. The Social Safeguards Report (AECOM, December, 2013) was developed as the agreed perimeter fence location does not require any physical resettlement at this point, so a Resettlement Plan was not necessary. The Social Safeguards Report is set within the Resettlement Policy Framework.

1.4 BEIA and EMP Methodology

The methodology used to develop this BEIA and 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, inclusive of specific requirements as identified in the overarching EMP, Consultation Report and ESMF.
- Conduct field survey using the overarching EMP, ESMF and an environmental screening checklist as a basis for assessment.
- Liaise with the Design and Supervision teams regarding any findings which may influence detailed design.
- Draft the TRW BEIA and EMP based on overarching EMP framework and consultation outcomes and update with information obtained from the field survey and detailed designs.
- Submit to the Technical and Fiduciary Services Unit (TFSU) and MCTTD/Environment Conservation Division (ECD) for review prior to consultation. Update according to comments and feedback from TFSU and MCTTD/ECD.
- MCTTD to undertake consultation at TRW with this site specific BEIA and EMP available in hard copy and posted online. Incorporate outcomes as required from consultation into final TRW BEIA and EMP to be included in bidding documents.
- Submit to TFSU and MCTTD/ECD 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 potential effects and mitigation measures. Some of these reports are still in draft form and changes may impact on the type and scale of potential effects 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 BEIA and 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 BEIA and EMP.

- Pacific Aviation Investment Services (PAIP), Airport PCN Study Report – Tarawa, 1 March 2013
- Obstacle Limitation Surface (OLS) Survey and Operational Review Report, Bonriki International Airport (TRW) – Tarawa (D-V2-1), 12 April 2013
- Pacific Aviation Investment Program (PAIP) – Kiribati Runway Lighting & Air Navigation Aids Final Detailed Design Report – Kiribati (D-12) (Version B – with final amendments, 5 August 2013
- Pacific Aviation Investment Program (PAIP), Final 100% Design Report TRW Perimeter Fencing – Kiribati, 26 August 2013
- Pacific Aviation Investment Program (PAIP) Final Pavement Detailed Design Report – Kiribati (D-10) (Version B – with final amendments, 9 September 2013

- Pacific Aviation Investment Program (PAIP) – Kiribati, Draft Final Design Report – Airport Terminals & Security (D-5), 10 September 2013
- Social Safeguards Report Implementing the Resettlement Policy Framework, 5 December 2013

2.0 TRW Upgrade Description of Works

2.1 Overview of Works

The KAIP consists of four primary tasks:

- Airport pavements
- Airport security fencing
- Airport terminal and security
- Airport navigational aids

At the eastern end of the runway are seawalls protecting the coastline from erosion. The rehabilitation of selected seawalls has been identified as future works which is yet to be designed and assessed in regards to environmental and social impacts and mitigation measures. If the seawall and airport upgrade works (as described in the sections below) are to occur concurrently coordination of works and implementation of mitigation measures will need to occur including reference to design and safeguard documentation.

2.1.1 Runway Pavement Design

The 09-27 runway formation at Bonriki International Airport was reportedly constructed by the United States in 1943; following the battle of Tarawa, during WWII. Since then it has been developed into a civilian airport and is understood to have received a range of strengthening and surfacing works over the course of its life.

Currently the Bonriki runway surface is in poor condition. The main observable surfacing defect is the flexural cracking and breaking up of the top asphaltic layer at localised areas. This is considered to be due to a combination of environmental distress combined with water infiltration. The construction profile of the pavements results in a tendency to trap water between the old and new surfacing layers which compounds the problem.

Surfacing repairs and a structural overlay are urgently recommended to keep the runway and airport operational. The runway shoulders are aged with the asphaltic surfacing heavily oxidised. It is recommended that due to the low priority and rarity of aircraft loading, these shoulders receive a bitumen rejuvenation surface treatment to preserve them from continuing environmental effects.

The design scope for TRW is the resurfacing or rehabilitating and upgrading the runway, taxiway and apron for a projected life of 20 years before any further resurfacing or major maintenance work is required. It is proposed that the design aircraft for the TRW structural asphalt overlay is the current regular operation of B737 aircraft variants, operated by Air Pacific. The B737-8 is the most onerous in terms of wheel loading of the current Code C jet aircraft variants operated by commercial airlines in the Pacific region (similar sized alternatives include the A320 variants and the B737-700 which are all less onerous).

We note TRW also receives a range of infrequent C130 and P3 Orion operations which will also be included within the detailed pavement design.

The existing runway has an Aerodrome Reference Code of "**4C**" this is summarised as follows:

- The code number "**4"** referring to the runway length being greater than 1800m.
- Intended to service aircraft up to a Code "**C**" physical size (wingspan up to but not including 36m).

AECOM have completed the final detailed design for the agreed runway rehabilitation works scope.

The following volumes of materials have been estimated (subject to change based on final designs and outcomes of the procurement process).

Material	Unit	Quantity
Runway		
Aggregates	m^3	15,000
Bitumen	m^3	1,000
Cutter Oil	Litres	40,000
Tack Coat	Litres	60,000

Material	Unit	Quantity
White Paint	Litres	2,500
Yellow Paint	Litres	100
Glass Beads	Tonnes	2
Concrete (for foundation)	m^3	100
ACO Powerdrains	Linear m	105
Oil Separators (including connectors)	Item	2
Drainage soak-aways (including connectors)	Item	2
Stormwater Bypass (including connectors)	Item	2
Stormwater Manholes(including connectors)	Item	2
100mm diameter Pipes	Linear m	6
300mm diameter RCP Pipes	Linear m	75
To Waste		
Asphalt	m^3	1,500
Fuel Hydrants and Underground Tanks	Item	3
Insitu [1]	m^3	700
Existing redundant AGL fittings	Item	42

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

The taxiway and apron experience extensive flooding with standing water remaining for several days after heavy rainfall events. The apron area also has three pairs of abandoned fuel hydrant systems. These are in poor condition and are no longer in service. Currently commercial aircraft operating into TRW refuel using the local mobile fuel tankers. AECOM recommend that the hydrant heads and concrete surrounds are removed and the pipelines are slurry-filled and capped off.

In order to comply with NFPA 415 requirements, the apron should drain away from the terminal building for the first 15.2 m or greater. The existing apron cut off drain is currently positioned in a suitable location to achieve compliance with this standard. Unfortunately this has been concrete backfilled in the past and is in poor condition. A replacement slot drain will be implemented, this comprises:

a) A preformed 300mm wide grated rain unit, with aircraft rated gratings (which are bolted down rather than loose fit).

b) Fuel interceptor drainage pods which are reticulated to capture low volume flows, with high volume rain events bypassing the interceptor by way of an overflow weir in the main drain line interception sump.

Figure 2 Diagrams of typical preformed slot drain units & an example of the proposed oil separator pod

A perforated slot drain is recommended which is suitably rated for aircraft wheel loads. These have proven durability characteristics within the NZ airport market under regular Code C and Code D aircraft usage.

The fuel spill interceptor "pods" are fabricated from high density polypropylene. These are a relatively simple and low maintenance installation.

Additional fuel spill pod units are proposed for installation onto the existing main drainage line from the central apron area sumps and into a new sump proposed for the south east edge of the apron which drains the proposed second aircraft parking position. The overall apron drainage plan is shown in Appendix A.

2.1.1.1 Western Taxiway Area Flooding issue

Flooding of the western taxiway area due to the under vertical curve of the taxiway and apron slopes are addressed by:

a) Installing a soak away drainage sump to the east of the taxiway to replace the failed outlet drainage system.

b) Crowning of the taxiway to improve strength, which also breaks the flow path eastwards.

c) Installation of a slot drain between the taxiways to reduce the apron flow westwards to the taxiway sag area.

d) Sumps and gratings include aircraft load rated lids.

Selected final detailed designs are provided in Appendix A.

2.1.2 Perimeter Fence

The final agreed fence alignment, as approved by Cabinet (R.Timau, personal communication, 8 October 2013), is presented in drawings AV 1170 / 1171, copies attached in Appendix A. The minimum 150m runway strip extents and minimum runway end areas are also shown on these drawings for comparison.

Where possible, the runway fence has been moved to just clear of the minimum runway strip dimensions (150m wide runway strip), and a conventional 2.44m high ICAO type security fence is planned to be constructed. At the runway ends, the Government, in consultation with the main international Airline – Air Pacific, have instructed AECOM to leave the runway ends unfenced. The 2.44m high security fence terminates at the strip edge – runway end corner points. At the 27 runway end there is a significant seawall structure where the fence end terminates. At the 09 runway end, the existing access road is to be realigned (by others) to the practical extents of the runway end area around the end of the runway end safety area (RESA). The proposed road realignment is shown on drawing AV1170, highlighted in orange; refer drawing attached in Appendix A.

The instructed lower height (1.5m) uPVC fence extends from the aircraft maintenance hangar (adjacent to the main terminal complex) along the runway strip edge, around the runway 09 end area and connects to the existing public road at the 150m runway strip offset position. The Government advises that the 09 runway end road will be temporarily closed to vehicular traffic during operations by international aircraft. The low level fence is primarily a means of delineating and restricting public vehicles access to the operational runway area (which is currently extensively used as a means of public access from one end of the airport to the other).

A number of strategically placed pedestrian gates are planned to facilitate across runway strip pedestrian foot traffic during non-aircraft operational times. This lack of access to vegetable growing areas on the opposite side of the runway has been a major issue in the past (and the likely cause of public demolition of previous fences as a consequence).

Vehicle gates are positioned on the 27 end to allow public access across the runway end area, in a controlled fashion. A vehicle gate is also positioned at the 09 runway end to allow emergency vehicle access clear of the 09 runway perimeter if so required. Two controlled access gates are planned for at the Terminal building area as currently exists.

All cross runway accesses are to be operated under airport authority control. A typical pedestrian gate detail has been developed to allowed controlled access across the runway strip area, refer Figure 3.

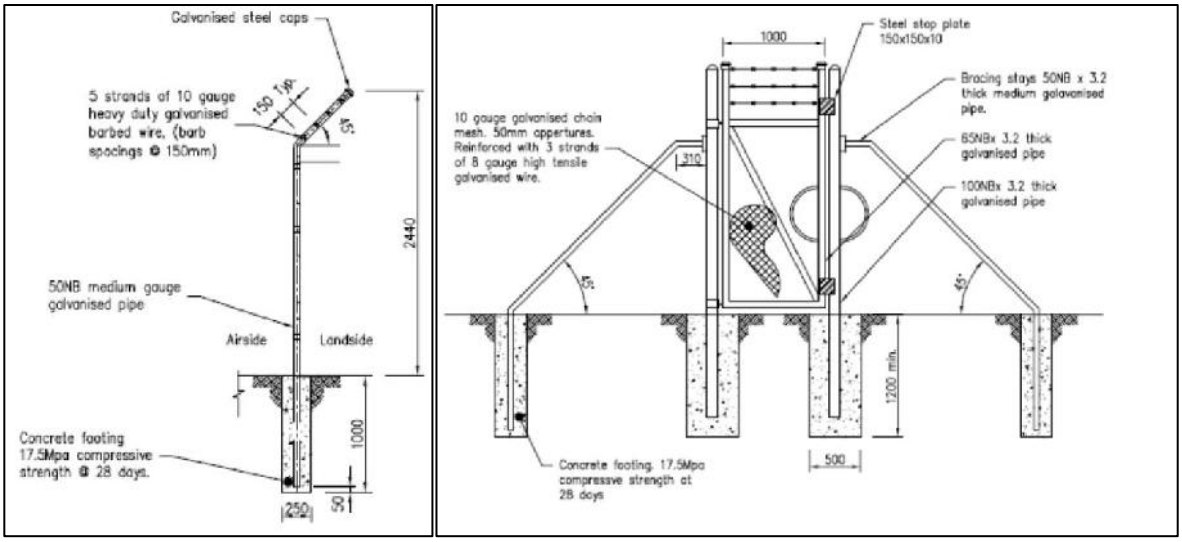


Figure 3 Typical Security Fence Detail and Typical Pedestrian Gate Detail

2.1.3 Terminal

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

The existing TRW Terminal, built in 1977, is in immediate need of interior and exterior maintenance work and is undersized for the existing Peak Hour of to 96 departures and 96 arrivals. The Terminal concepts are based on providing additions and upgrades to the existing Terminal.

Due to budgetary constraints, a staged process has been proposed in developing the Terminal and meeting all design objectives. Through a series of design workshops and iterative design process (as detailed in the Kiribati Draft Final Design Report – Airport Terminals & Security, 10 September 2013) a number of options were developed with Option 3 selected as the final stage 1 terminal design option. The Recommended Option 3 Final Stage 1 Terminal Design provides additional departures and arrivals passenger and bag processing capacity by:

- Re-planning and re-assigning existing internal Terminal areas.
- Expansion of the bag reclaim hall and provision of a new 17m presentation length bag reclaim conveyor.
- The addition of a new check-in hall that replaces the outdoor public space between the existing departures and arrivals wings.

Option 3 provides Terminal improvements throughout the Terminal, adopting a reduced area allowance compared to IATA LOS C space standards to meet PAIP Budgets. At peak times, temporary passenger congestion and processing delays can be expected. Nevertheless Option 3 will provide significant level of service improvements during Code C aircraft arrivals, albeit not to an IATA LOS C standard. It is also noted that while the 17m bag reclaim conveyor proposed is a significant improvement compared to the existing undersized timber reclaim bench, it does not meet the requirements for IATA LOS C for Code C operations (B738s or equivalent). A 35m bag reclaim conveyor would be required to provide IATA LOS C. Bag Reclaim Hall congestion and delays will be experienced for short periods during Code C jet international arrivals.

The primary constraints, in respect to the Stage 1 Terminal expansion, are:

- The aircraft parking apron which restricts expansion to the north-east.
- An existing aircraft hangar and other landside buildings restricting expansion at both ends of the Terminal.

The Terminal and Apron Precinct Constraints Plan (Figure 4) shows the main constraints (including buildings, below ground services and airside operational areas) to be considered in the design of the Stage 1 Terminal Expansion. The site for the proposed Stage 1 Expansion is constrained by an existing airport hangar and other landside buildings as indicated in Figure 4. Some existing car park land will need to be used to accommodate the expansion of the existing Terminal.

Figure 4 TRW Terminal and Apron Precinct Constraints Plan

The Recommended Option 3 incorporates Environmentally Sustainable Design (ESD) as outlined below:

- Water collection and re-use.
- Improved natural ventilation.
- New energy efficient lighting.
- New dual flush, water saving toilets.
- Materials and finishes with low embodied energy.
- Floor finishes, adhesives, paints and sealers with low or no off-gassing of Volatile Organic Compounds (VOC).

2.1.3.1 Terminal Water Supply

The Terminal is currently connected to bore supply; this water supply will be retained for emergency use.

The new water storage tanks are to be equipped with fire brigade connections to allow any water stored to be used for firefighting purposes.

Domestic water pumps duty/standby pumps will draw water from the storage tanks complete with a pressurisation tank, filters and controls as required to operate the system filling a header tank located at high level in the Terminal. Weather protection of the pump set will be required.

A carbon filter will be fitted to the bore water supply to remove hydrogen sulphide odour.

2.1.3.2 Terminal Waste Water

Two new sanitary storage tanks will be provided. The tanks will be required to be periodically pumped out by a collection service.

Selected concept design plans are provided in Appendix A.

2.1.4 Navigational Aids

New installations have been approved for the following Air Navigation Aids:

- Automatic Weather Station (AWS).
- Automatic Dependent Surveillance-Broadcast (ADS-B) - Currently on hold pending independent review by the funding provider.
- New Air Traffic Control (ATC) radio installations.
- Replacement Precision Approach Path Indicator (PAPI) installation for approach runway 09.
- New PAPI installation for approach Runway 27.
- New Non-Directional (radio) Beacon (NDB)/Distance Measuring Equipment (DME) installation.
- Diesel generation unit

AWS installations are usually located adjacent to the primary runway touch down zone however this is not possible at TRW due to the site constraints on the primary approach (09 runway). Bonriki village is located on the southern side of the runway with ponds on the northern side of the runway. Therefore the preferred arrangements for TRW are:

1) Wind sensor (anemometer) location: On top of the windsock at the 09 end of the runway.
2) Wind sensor data connection: Fibre optic cable in new ducts to other sensors location.
3) Wind sensor power connection: Hard wired in new ducts.
4) Other weather sensors location: ATC compound.
5) Sensor power supply: From the ATCT supply.
6) Central PC location: Spare office space on the second floor of the ATCT facility.
7) PC power supply: From the ATCT facility supply.
8) Sensor to PC communications: Multi-core copper cable.
9) Remote display: ATCT cab.

The new ADS-B system should be installed in the ATCT facility compound, with the preferred arrangements as follows:

1) The new ADS-B antenna should possibly be installed close to and north east of the ATC tower, clear of the primary sight lines. Interference checks will need to be done with the other transmitting systems.
2) Equipment includes antenna, equipment shelter, ducted power supply and ducted communications cables.
3) Location for the equipment rack could be in the spare second floor office. The area shall be air conditioned using non- hydrochlorofluorocarbon (HCFC) gases in the unit(s).
4) The controller display system to be installed in the tower cab.
5) The design team will check the selection of equipment with Airways International for compatibilities with the regional network.

The existing approach runway 09 PAPI is in sound working condition, though spare parts are difficult to obtain. New PAPI boxes are to be retrofitted to the existing installation. New control and power cabling is to be provided and reticulated via a duct and pit reticulation system back to the ATCT facility. A new approach runway 27 PAPI is recommended which will include a new four box PAPI installation. New control and power cabling is to be provided and reticulated via a duct and pit reticulation system back to the ATCT facility.

A single PAPI light unit contains three 6.6 A, 200 W lamps, three reflectors and red filters, six lenses, a lens shield, a printed circuit board, and a tilt switch assembly. PAPI lights are only activated when an aircraft is approaching for landing. As TRW does is not able to receive night flights the only time the PAPI will be used at night time is if there is an emergency landing. There should be no effects of light pollution as a result of the PAPI light units.

A new NDB unit (including aerial mast) adjacent to the ATCT compound has been recommended so the unit can be removed from the public car park area. The new aerial mast is to be located behind the ATCT facility clear of sight lines.

The primary power supply to the ATCT facility is from the Government power supply utility. The transformer is located at the 09 runway end. A new diesel generator will be installed as the secondary airport supply and essential power supply for the navigational aids, PAPI, ATC facility and critical elements of the terminal building. This unit should be located in the ATCT compound.

A new pit and duct system connecting the proposed new windsock and existing PAPI along the northern side of the runway to the proposed AWS installation (in the ATCT compound) and reticulated into the ATCT facility is required. The second duct line will run south around the 27 runway end and up to the new 27 PAPI location. The pit and duct system will run within the runway 150 m runway strip. Details of the pit and duct system are as follows:

- 4,515 m of ducts will be provided with minimum 750 mm cover.
- Separate draw-in pits and change of direction pits will be provided for each 63 mm diameter duct to provide segregation between the PAPI primary cables and the AWS anemometer cables (reticulated to the 08 WDI).
- SIT pits will be provided at each PAPI box.
- Change of direction 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.
- 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.

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.

Selected detailed design drawings and plans which best show the physical works are provided in Appendix A.

2.2 Alternatives

The airport is an 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.

The option to not do any rehabilitation work associated with the KAIP would be detrimental to the community and safety of flight passengers and airport staff as the airport would be forced to close. Currently the Bonriki runway surface is in poor condition. The main observable surfacing defect is the flexural cracking and breaking up of the top asphaltic layer at localised areas. This is considered to be due to a combination of environmental distress combined with water infiltration.

Emergency repairs were implemented in early 2012 to address localised areas of badly deteriorated surfacing. AECOM's recent inspection has confirmed that there are several additional areas, though relatively small, that the surfacing is badly fatigued and on the verge of breaking up. Surfacing repairs and a structural overlay are urgently recommended to keep the runway and airport operational. The TRW runway is considered to have the highest priority for rehabilitation works overall under the PAIP programme. Although patching of the surface has proven to

be a reliable interim solution, it is only a short term holding repair to allow time for the planning and efficient implementation of a full resurfacing program.

The existing TRW Terminal, built in 1977, is in immediate need of external maintenance work and is undersized for the existing Peak Hour, thus creating an undesirable experience for passengers and staff working at the airport. Currently the Chatterbox Café (located in Bikenibeu) provides additional check-in facilities including issuing of boarding passes and weighing luggage. The café is attached to Tobaroi Travel who have been authorised to provide this service. Luggage is still required to go through security screening at the airport.

2.3 Construction Methodology

The perimeter fence followed by the runway pavement will most likely be the first components of the KAIP to be started followed by the navigational aids and lastly the construction of the terminal.. 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.

2.3.2 Materials and Equipment

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

All equipment and materials (unless used up) brought into Kiribati for the project must be removed from Kiribati at completion of the project. Old equipment no longer serviceable or waste material onsite (TRW) must also be removed from Kiribati. The exact types of equipment will be decided by the contractor(s) but may include machinery used in construction activities (e.g. dozers, asphalt pavers, trucks and excavators) or machinery to support construction processes (e.g. proprietary wastewater treatment unit, water purification unit, asphalt plant). Excess materials not used (and unable to be re-used or recycled on island) may include excess bitumen, used drums (for fuel, oil or lubricants), packaging from materials and equipment (particularly plastics), contaminated or hazardous material (e.g. soil, used spill kit material, building material from demolition). Re-use or recycling of excess material and waste within Kiribati is only permitted with prior arrangement and approval by MCTTD. Further information regarding solid waste impacts and management are provided in Sections 6.3.1 and 7.9.

2.3.3 Aggregate Supply

Aggregate sources on Tarawa are very limited. The Environmentally Safe Aggregates for Tarawa (ESAT) European Union funded dredging operation implemented by the Secretariat of the Pacific Community's SOPAC Division is a potential source of aggregate. However, timing availability, quantity and quality of the material is still to be determined. Until further detail can be ascertained on the suitability of the aggregate from the ESAT dredging operation the detailed design has been completed on the assumption all aggregates for the overlay should be imported from an off shore supply source. The most likely suitable offshore source is the Standard Concrete Company from Fiji. Contractors will be given the option of sourcing materials from alternative locations. There will be strictly enforced material inspections and testing program from the Contractors selected quarry source at an initial acceptance stage and retesting again prior to loading for shipment to site. Import requirements will also be enforced. Due to the uncertainty regarding the ESAT aggregate this BEIA and EMP assumes all aggregate material will be imported. If the ESAT project is confirmed as being able to supply some or all aggregate materials this BEIA and EMP or the Contractor's EMP will be updated to reflect this.

2.3.4 Construction Camp and Lay Down Areas

Land availability on Tarawa is scarce and so there are not many options for positioning of the construction camp. The construction camp will be utilised by all project Contractors (pavement works, fencing, 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) component of the KAIP 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 KAIP construction works. The proposed location for a construction camp has yet to be determined. This will be worked out through the detailed design and procurement phase. The construction camp is not a residential camp, existing local accommodation will be used.

The exact details of the location, 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 MCTTD. Final approval of these details will be required by MCTTD before the construction camp can be set up and documented in the contractors' EMP.

The construction camp size should be kept to a minimum, be fenced and materials and equipment kept secure to prevent access and use by non-authorised personnel. There are no existing hard stand areas available for stock piling or bunded areas (secondary containment) for hazardous substance storage. Vegetation clearance along with temporary hard stand and bunded areas will need to be constructed. Noise, dust, vibration and increased traffic are impacts that can negatively affect communities and sensitive receptors.

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 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 (surface and underground). Hazardous substances (e.g. fuel, lubricants or oil) must be stored in a bunded area which is constructed with 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 litres[1]. 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 are a number of small landfills in South Tarawa which are managed by the town councils and MELAD. However there is pressure on the landfills 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 a limited saltwater flushed sewage system on the island that services Betio, Bairiki and Bikenibeu, it does not extend to Bonriki and the airport site. Therefore temporary toilets and disposal or treatment of wastewater will need to be in accordance with the MPWU and ECD's advice (for example construction and training in use of compositing 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 equipment parking and small scale material storage (lay down area) may be required to reduce the need to move equipment and supplies from the construction camp throughout the day and thus potentially impact road users and residents (e.g. dust, noise, road safety). 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) nor the coast. Any land required for a temporary lay down area will need to be negotiated with the landowner or lease holder. Temporary equipment storage areas within the air traffic control tower compound and at the eastern end of the runway have been proposed (refer to Appendix A for plan showing proposed locations). These temporary parking and lay down areas will be managed in accordance with this EMP and the main construction camp.

2.3.4.1 Construction Camp Location

As previously stated the location of the construction camp has yet to be confirmed and details of the location, size and site management (namely health and safety, solid waste management, water management and wastewater management) will need to be decided by the Contractors in consultation with MCTTD. Final approval of these details will be required by MCTTD and submitted to ECD before the construction camp can be set up. The

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

construction camp or lay down areas are not to be located within the water reserve catchment area (north of the runway).

The contractor's EMP will need to document the site specific management and include a site layout plan, identifying work areas (e.g. equipment parking, workshops, stockpiles, waste collection, wastewater treatment, offices including sanitary facilities for workers, hazardous substances and material stores, and freshwater supply). The mitigation measures identified in this EMP will need to be implemented on the construction camp as well as work sites at the airport.

2.3.5 Duration and Timing of Construction Activities

Four separate contracts will probably be awarded for the four types of work, namely pavement rehabilitation (runway), terminal construction, perimeter fence installation 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 are as follows in probable order of commencement.

Perimeter fence – 26 weeks (to be confirmed)

Runway pavement – 26 weeks (to be confirmed)

Navigational aids – 17 weeks (to be confirmed)

Terminal construction – to be confirmed

Normal working hours are Monday to Friday, 8am to 6pm. Works outside of these hours will require permission from MCTTD and ECD. Notice to affected parties and the public is also required for work outside normal work hours at least 24 hours prior to work commencing. It is likely that the runway pavement works will need to work in addition to the normal working hours during night time (6pm – 6am) in order to work around flight schedules to ensure safe operations of the airstrip for incoming and outgoing aircraft.

3.0 Policy, Legal and Administration Framework

3.1 National Requirements

Kiribati is a republic with a constitution that was promulgated on 12 July 1979. There are a number of legislative acts and regulations which pertain to the upgrade works at the airport. The more relevant pieces of legislation are described below, this list is not exhaustive.

The Environment Act 1999 (2007 Amendments) is the primary environmental legislation of Kiribati which provides for the protection, restoration and enhancement of Kiribati's natural, social and cultural environment. The Act also gives power to the ECD (a division of the MELAD) for the administration of the environment including providing for sustainable development and implementing the Environment Regulations (2009). The Act outlines requirements for impact assessment and statements relating to development. Applications are to be made to the Principal Environment Officer (PEO) for development approvals. This BEIA and EMP address requirements of a Basic Environmental Impact Assessment (BEIA) required under the Environment Act 1999 (as amended in 2007), Part IV, Section 33(1). The completed Environment License application is included in Appendix G. At this stage the contractors for the different components of work have yet to be appointed. The detailed designs for the runway pavement, perimeter fence and navigational aids are complete and are described in Section 2.0.

Section 49 of the Environment Act 1999 (2007 amendments) empowers environment officers as Environment Inspectors to implement and enforce the Environment Act in Kiribati especially on South Tarawa. The Environment Inspectors carry out patrols on illegal activities such as sand and gravel mining and dumping of waste. They are also responsible for review and inspection of proposed and ongoing development projects, including the airport upgrades.

The MELAD are also responsible for administering the Biosecurity Act 2011 which controls the movement of plants and animals and their products in order to prevent the establishment and spread of animal and plant pests and diseases that can harm human health and the agricultural economy of a country. The Biosecurity Act 2011 establishes a regime to control the import and export of regulated pests and diseases (Parts 2, 3, 4 and 5). The biosecurity functions of the Government are set out in section 6. The key administrative feature is the provision in Part 10 for the designation of a Director of Biosecurity and biosecurity officers for Kiribati.

The Aerodromes and Air Navigation Aids Ordinance (1977) applies to: (a) all aerodromes (areas of land or water for the landing and taking off of aircraft) licensed under the Air Navigation (Overseas Territories) Order 1977, and all Government aerodromes; (b) all air navigation aids established under section 4, and the sites upon which such aids are situated; and (c) all aerodromes, air navigation aids and the sites thereof to which the Minister may by notice apply the provisions of this Ordinance. It allows for the Government to declare controlled areas for security and safety around aerodromes and navigational aids and conduct maintenance as and when required. The Civil Aviation Act 2004 (based on New Zealand legislation) provides for the administration and management of the civil aviation sector in Kiribati including delegations of authority, functions, rules, licensing and security.

The Mineral Development Licensing Ordinance 1977 makes provision for the licensing and development of activities relating to the utilisation of Kiribati's mineral resources. Developments requiring minerals (the runway pavement rehabilitation requires aggregate) to be sourced within Kiribati must apply for a Mining License and will need a Quarry Management Plan in support of the Mining License application. Aggregate for this project will most likely be sourced offshore (e.g. Fiji) from a licensed supplier and thus be subject to quarantine and import regulations.

The Wildlife Conservation Ordinance (1977) allows the Minister to declare areas as wildlife sanctuaries and protection of specific animal and bird species. Within a wildlife sanctuary no person shall hunt, kill or capture any bird or other animal (other than a fish) or search for, take or wilfully destroy, break or damage the eggs or nest of any bird or other animal. "Closed areas" are wildlife sanctuary areas which are only accessible by license holders, wildlife wardens and public officers. There are no wildlife sanctuaries or closed areas on South Tarawa and none specifically near the airport.

Land put aside for reserves has three main pieces of legislation. The Recreational Reserves Act 1996 allows for land owned or leased by the Government to be reserved for recreational purposes for the use and enjoyment of the people of Kiribati. The Prohibited Areas Ordinance 1957 provides for certain islands and their territorial waters to be prohibited areas, set aside for conservation purposes. The Closed Districts Act 1990 allows for parts of islands to be declared for conservation purposes.

The Land Planning Ordinance (Cap.48, 1977) is the legal instrument that allows for the designations of land for specific purposes (e.g. water reserve protection) and defines a general land use plan as “indicating the use or class of use to which every part of the land depicted thereon maybe permitted to be put on for development or redevelopment”.

3.1.1 Environment License

The airport developments, and any construction work designed to enable the airport developments, are environmentally significant activities (ESA) as defined in the Schedule of Environmentally Significant Activities (Section 14.0) of the Environment Act 1999. Therefore an environment license is required in order to carry out the developments as described in Section 2.0 of this TRW BEIA and EMP. The ECD (responsible for administering the environment license application process) upon review of the environment license application and a draft version of this BEIA and EMP has stated that a Basic Environmental Impact Assessment is required for the KAIP. Upon receipt of the final BEIA and EMP the document will be publicly displayed and public comment invited. The required contents of a basic EIA have been provided and are presented in Appendix E. The table in Appendix E also provides references and comments as to where information requested in a basic EIA has been addressed in this TRW BEIA and EMP.

The steps and likely timeframes for environment license applications which require a basic EIA are identified below.

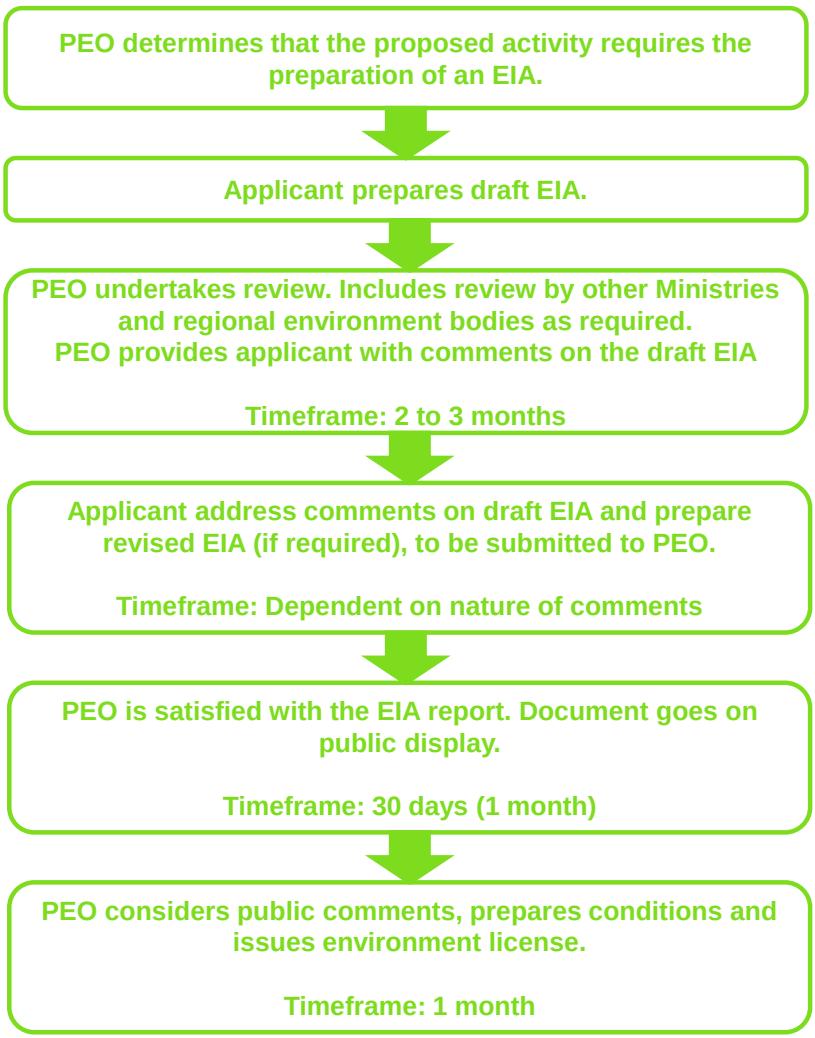


Figure 5 Steps and likely timeframes of the environment license application process for ESAs (Source: Environment License Application Guideline, Version 2 issued 2 September 2011)

As stated in section 3.1 the completed Environment License application is included in Appendix G. At this stage the contractors for the different components of work have yet to be appointed. The detailed designs for the runway pavement, perimeter fence and navigational aids are complete and are described in Section 2.0.

3.2 Regional Requirements

The Local Government Act 1984 establishes local councils (also named island, town and urban councils) that have powers to regulate and administer a number of functions around utilities, agriculture, buildings and town planning among other things. In accordance with this legislation Tarawa has three administrative councils:

- Betio Town Council (or BTC), on Betio Islet;
- Teinainano Urban Council (or TUC), from Bairiki to Bonriki (this is the council applicable to the project area)
- Eutan Tarawa Council (or ETC), for North Tarawa or Tarawa Ieta (all the islets on the east side north of Bonriki, including Buota which is linked by road to South Tarawa).

TRW is within the Teinainano Urban Council's jurisdiction and so any solid waste management issues will need to be addressed with this Council.

3.3 International Obligations

Kiribati is also a signatory to a number of international agreements. Listed below are some of the more applicable agreements to the type of activities of the KAIP. This list is not exhaustive.

- 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)
- 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 Kiribati and the need to export all waste, generated by the project, not able to be reused locally 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 or asbestos) 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 KAIP 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 BEIA and EMP includes information on mitigation, monitoring, capacity development and training, and implementation costs. The BEIA and 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.

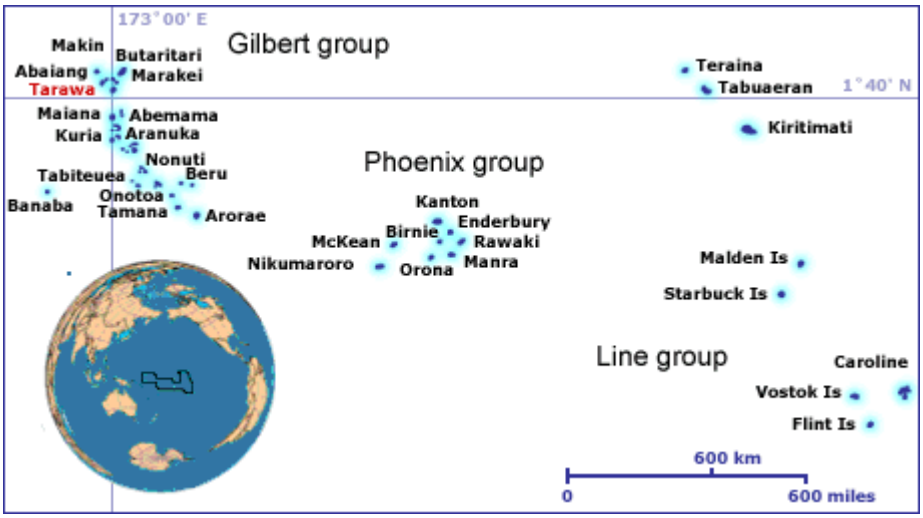
The EMP is a dynamic document which must be updated as consultation and detailed designs of the project components are finalised to ensure currently unanticipated impacts and revised mitigation measures are addressed. Effective implementation of the EMP is a requirement of the funding agencies and local legislation so monitoring is an integral component of implementation. A Monitoring Plan is included in Section 9 (and Appendix C) of this BEIA and EMP. This BEIA and EMP is to form part of the bidding documents for contract(s) awarded under the KAIP and will form the basis of the contractor's EMP.

4.0 Environmental and Social Environment

4.1 Physical Environment

4.1.1 Location and Geography

Kiribati is scattered over three island groups, the Gilbert Group, the Phoenix Group, and the Line Group and stretches some 4,000km located between Longitude 170 degrees East and 150 degrees West in the Central Pacific Ocean, on either side of the equator. See Figure 6 for the general location of Kiribati and a map of the islands. The three groups of islands are coral atolls with the exception of Banaba which is a raised limestone island. Of the 33 islands comprising Kiribati only 21 are inhabited. The country has two international airports, operating from Tarawa Island (Bonriki International Airport) and Kiritimati Island (Cassidy International Airport).



Source: Kiribati Tourism (http://www.kiribatitourism.gov.ki/index.php/aboutkiribati/maps)
Figure 6 Kiribati location map and Islands

Kiribati's exclusive economic zone (area of the ocean in which it controls fishing and other rights) covers more than 3 million km^2.

The Gilbert Group which is comprised of 17 islands has a total land area of 286 km^2. Tarawa, an atoll in this group, is home of the Kiribati government, the main port of entry, the main international airport, and is Kiribati's capital (shown in Figure 7).

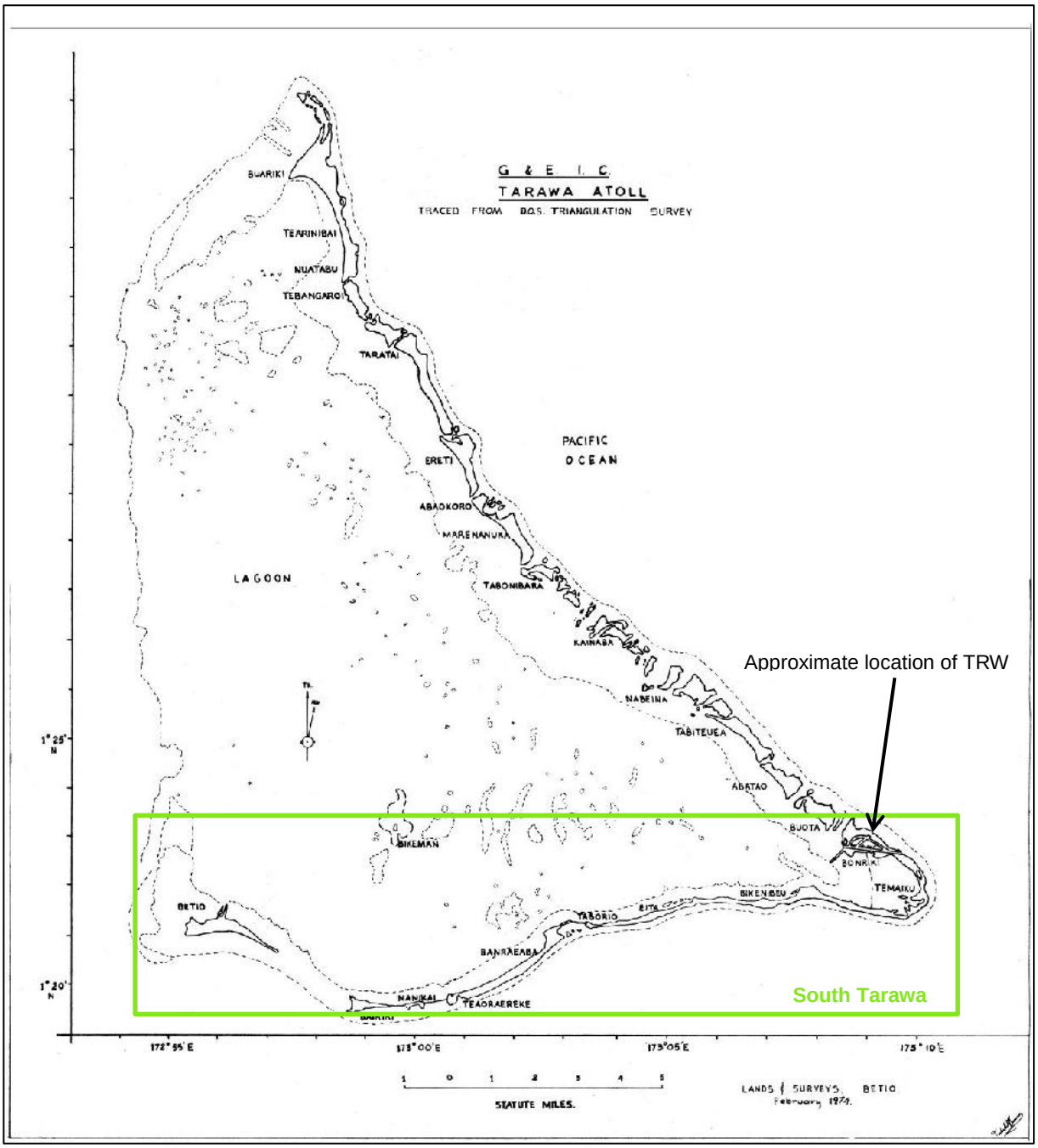


Figure 7 Map of Tarawa showing the villages; South Tarawa from Betio to Buota and North Tarawa from Buota to Buariki

On South Tarawa, the construction of causeways has created a single strip of land from Betio in the west to Buota in the northeast. Tarawa has a large lagoon, of over 500 km^2, and a wide reef. TRW is located by the village of Bonriki on the south eastern side of the atoll. Most of South Tarawa is less than 3 meters above sea level with an average width of only 450 meters.

4.1.1.1 Land Use

Land at TRW is primarily leased from some 300 plus individual landowners (personal communication with Tebutonga Ereata Director of Lands, 15 October 2012). Lease agreements are for a period of 99 years, with approximately 40 years remaining on existing leases. The land where the terminal and car park are located has been under dispute in recent years with a resolution reached in 2013. The Government will be paying the lease including arrears for the terminal and car park land. Local landowners claimed the terminal and car park are not

included in current lease agreements and the Government claimed that the land was naturally reclaimed as a result of the Bonriki causeway constructed in the 1970's..

The northern side of the runway is designated water reserve protection area. Gardens and rudimentary shelters directly adjacent to the airport leased area were observed as were more substantial homes and development at the north eastern end of the runway (part of Te Kawai ae Boou, a division of Bonriki village). On the north western side of the runway are saltwater/brackish water ponds. The south eastern and western side of the runway is Bonriki village with the apron, terminal and car park extending between the eastern and western side of the village. Beyond the village and terminal are fish farm aquaculture ponds (milk fish).

At the western end of the runway is the lagoon (approximately 90m from edge of runway) and the ocean at the eastern end of the runway (approximately 18 m from the closest edge of the runway). Seawalls have been constructed in two areas at the eastern end. The first is on the northern side of the runway, and the second is at the end of the runway (eastern end). The seawall on the northern side is a concrete sandbag construction. Erosion is occurring at the northern end of this seawall (refer to Figure 8). The road that goes around the eastern end of the runway is adjacent to this eroded area and the runway pavement is approximately 40 m south.

Figure 8 Seawall at north eastern end of runway showing erosion and bags of collected sand

The seawall at the eastern end of the runway is more substantial and was constructed as part of the Kiribati Adaptation Program (refer Figure 9) However during high tide waves were observed overtopping this seawall. It is understood that seawall rehabilitation is planned in future works however the environmental impact assessment and design of the seawall rehabilitation is yet to be completed. If works on the seawall occur at the same time as the airport construction works, activities and mitigation measures will need to be coordinated between the two construction components (seawall and airport construction works).

Figure 9 Seawall at eastern end of runway (low tide) looking north (runway to the left)

4.1.2 Climate

Tarawa has a tropical climate which is hot and humid and moderated by trade winds, most common are the north easterlies and easterlies. The average high temperature is 31 ºC and the average minimum temperature is 25 ºC. Average rainfall in central Tarawa is over 2,000 mm (White, 2011). Drought conditions are usually associated with La Nina conditions and the current prediction is for neutral ENSO (La Nina/ El Nino) conditions to continue through 2013. Rainfall is usually higher from December through to April, with September and October being the driest months. Tarawa is not often hit by cyclones however storm surges are experienced frequently often causing extensive flooding and strong winds.

4.1.3 Soils and Geology

Like other coral atolls and islands, the nature of the soil is derived from limestone which has been formed as a result of coral formation over thousands of years. The poor and infertile nature of the soil is due to its alkalinity, porosity and lack of essential elements which limits its ability to support plant life. Consequently, it is incapable of supporting intensive agricultural activities.

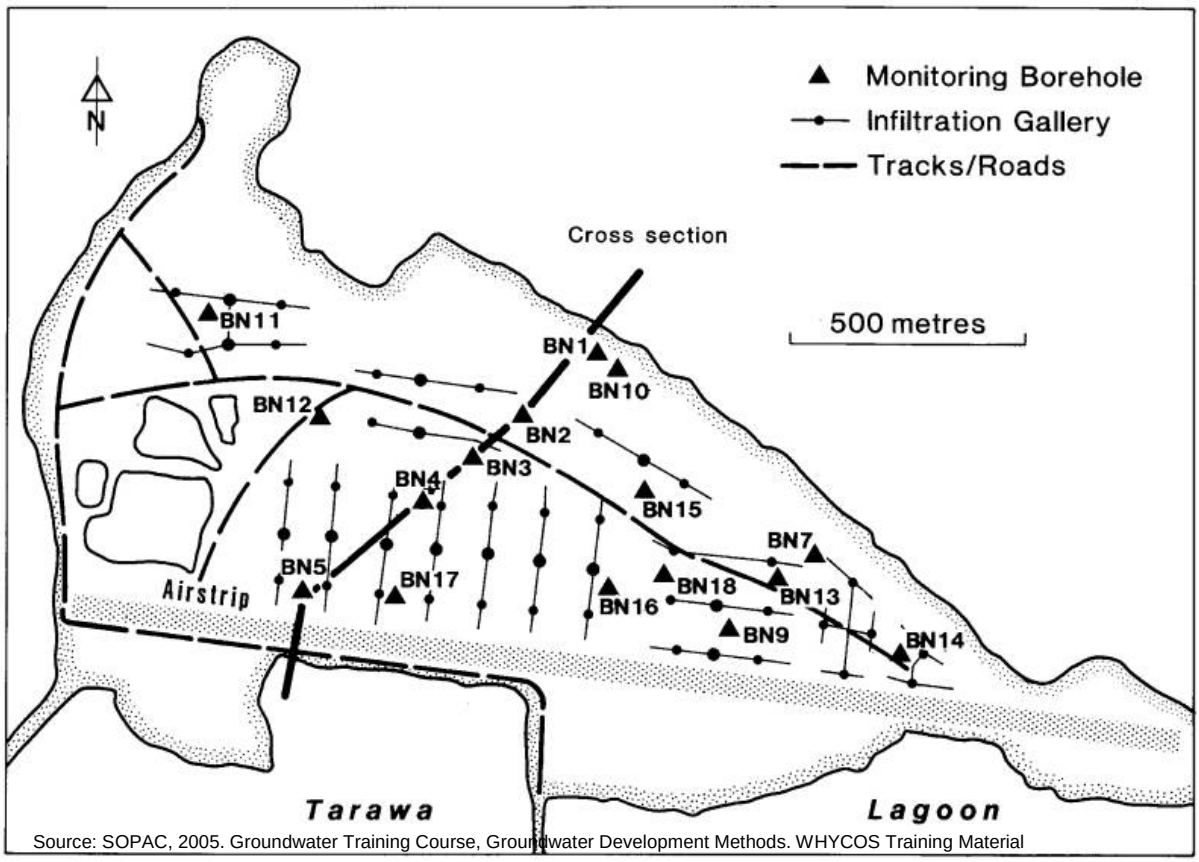
The topsoil is thinly spread over most of the area with plant cover and other areas covered with wild bushes. Due to their ability to withstand the harsh atoll conditions the predominant plants species that survive are coconuts (*Cocos nucifera*), pandanus or screw pine (*Pandanus tectorius*), salt bush (*Scaevola sericea*), and other tolerant indigenous plants and trees.

4.1.4 Water Resources

Freshwater resources on Tarawa come from two main freshwater lenses that supply water to most households. The two lenses come from Buota and Bonriki. Freshwater lenses overlay the underground denser saltwater. Freshwater lenses are usually shallow convex shaped water deposits which are readily influenced by rainfall and the tides. Atoll freshwater lenses are particularly vulnerable to saltwater intrusion and anthropogenic pollution (e.g. sewage) and the Tarawa freshwater lenses are no exception. The Bonriki freshwater lens is generally between 1 to 2 m below ground level and can be up to 30m deep.

The highly porous nature of the soils in Tarawa allows for recharge of the freshwater lens however compaction and increased areas of impermeable surfaces (e.g. roads or buildings) can greatly affect the recharge capability of the catchment. The Government of Kiribati have declared water reserve protection areas over the Bonriki and Buota freshwater lens in order to better manage the catchment areas. TRW is located within the Bonriki freshwater lens catchment.

The water reserve catchment areas have infiltration galleries throughout the catchment to promote recharge of the freshwater lens and also allow for extraction by skimming freshwater from the surface of the freshwater lens[2]. These galleries will have a pump station for extraction and or a monitoring bore for collecting water quality samples (refer Figure 10).



Source: SOPAC, 2005. Groundwater Training Course, Groundwater Development Methods. WHYCOS Training Material

Figure 10 Bonriki water reserve catchment infiltration galleries and monitoring bore locations

Due to supply and water quality pressures on Tarawa's freshwater resources water efficiency measures and rainwater harvesting are to be incorporated into the terminal design. 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 a limited reticulated water supply to households.

4.2 Biological Environment

4.2.1 Marine Biodiversity

The coastal areas of Kiribati are characterized by white sandy beaches, reef flats, reef patches, lagoons, mangrove forests, extensive reef mud flats and sea grass beds. These areas contain a variety of habitats, numerous ecosystems and marine organisms. The coastal areas support fishing, recreation, trade and communication. The marine environment is a critical and strategic resource for Kiribati as it provides the mainstay for subsistence.

Mangrove forests do exist on the lagoon foreshore. Replanting efforts are also underway to re-establish mangroves along the airport causeway road. Mangrove rehabilitation is undertaken by the Government (MELAD and Ministry of Education, Youth and Sports) with assistance from the International Society for Mangrove Ecosystems (headquarters in Japan) and the World Bank funded project, Kiribati Adaptation Project (KAP). It includes planting of mangrove in selected areas prone to coastal erosion and in areas to protect causeways. Several types of mangroves are found in Kiribati namely the white mangroves (*Sonneratio alba*), the tongo

[2] Sustainable Integrated Water Resources and Wastewater Management in Pacific Island Countries, 2007. National Integrated Water Resource Management Diagnostic Report Kiribati. Draft SOPAC Miscellaneous Report 638.

buangui (*Bruguiera gymnorhiza*), te aitoa (*Lumnitzera littores*), and the red mangrove (*Rhizophora stylosa*). While the airport site is located close to the lagoon in some places (less than 50 m) there should be no impact on the lagoon mangrove forests or replanting. Wastewater from site activities will be captured for discharge to land (or treatment) and will not be allowed to flow directly into the lagoon or ocean.

Ministry of Fisheries and Marine Resources is responsible for the management of marine resources including production of aggregates and sand from the coastal areas. Preventing the destruction of marine resources including coral reefs is necessary. Therefore, all material to be used for the KAIP shall be sourced from approved overseas quarries or borrow pits. Material for the runway will be imported as required (e.g. from Nauru, Fiji or elsewhere). The project will also take necessary precautions and measures to ensure that the construction activities will not pollute the lagoon environment.

4.2.2 Terrestrial Biodiversity

South Tarawa is a densely populated landmass which has undergone significant anthropogenic changes. There are no natural forests of major significance in terms of size, age and biological diversity near the airport on South Tarawa. Food crop trees of coconut (*Cocos nucifera*), breadfruit (*Artocarpus sp*), and pandanus (*Pandanus tectorius*) dominate the landscape as do papaya (*Carica papaya*) and other fruit trees. Decorative species which also feature prominently are casuarinas (*Casuarina equisetifolia*), hibiscus (*Hibiscus sp*), flame tree (*Delonix regia*) salt bush (*Scaevola sericea*) and terminalia (*Terminalia sp*).

The vegetation cover of South Tarawa has little biodiversity conservation significance and has been affected by the contamination of the freshwater lenses with salt water and subsidence crops require careful cultivation and application of compost and nutrients to sustain the crops. While the vegetation cover has little biodiversity conservation significance the vegetation that does exist needs to be preserved as food sources and providing shade.

4.2.3 Rare or Endangered Species

The 2008 International Union for Conservation of Nature (IUCN) Red List identified a total of 88 species in Kiribati which are threatened. None of the species identified as threatened are endemic and no species have been identified as extinct. A total of 488 species were assessed and 6 bird, 1 mammal, 7 fish, 73 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 biological 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 of this BEIA and EMP.

4.3 Socio-economic Conditions

4.3.1 Population and Demographics

The total population of Kiribati is 103,058 people (2010 Census). South Tarawa has an official land area of 15.76 km^2 and a population of 50,182 (52% female), giving a population density of 3,184 people per km^2 however density is expected to be higher than this due to not all the ‘official land area’ being available for residential development (e.g. roads, conservation, the airport). South Tarawa experienced 4.4% growth between the 2005 and 2010 census. This growth is a mix of immigration from outlying islands and births (2.26% contribution to annual population growth).

Table 1 South Tarawa village population (2010 Census)

Village	Population (2010)
Tanaea	279
Bonriki **	2,355
Temwaiku	3,135
Causeway (Nawerewere)	2,054
Bikenibeu	6,568
Abarao	1,665
Eita	3,061
Tangintebu	89
Taborio	1,282
Ambo	2,200
Banraeaba	1,969
Antebuka	1,087
Teaoraereke	4,171
Nanikai	988
Bairiki	3,524
Betio	15,755

** This village is adjacent to the airport

4.3.2 Education and Health

As the capital, Tarawa has education facilities catering for all levels of education, namely tertiary, secondary, junior secondary (JSS), primary and pre-schools. A total of 12,195 children were enrolled in the primary, JSS and secondary schools in South Tarawa in 2011, distributed as follows:

- Primary school enrolments were 6,442
- Junior secondary school enrolments 3,143
- Senior secondary school enrolments 2,610

School enrolments have not been increasing with the South Tarawa population increase.

At secondary level many students travel from their home island to attend school in South Tarawa, usually staying with relatives. Secondary schooling is not compulsory in Kiribati and school fees are hard to afford for many families.

At the tertiary level, the University of the South Pacific has a campus at Teaoraereke. There are also several vocational schools including an institute of technology (KIT), maritime training centre (MTC), a Fisheries Training Centre (FTC), a Police Academy, a nursing school, a Kiribati Teachers' College (KTC), a Tangintebu Theological College (TTC) for Ministerial Formation in the Churches at Tangintebu, and a pastoral institute (KPI) at Teaoraereke.

The main hospital is at Nawerewere in Bikenibeu area. Betio has its own hospital while the populated villages have their own clinics. From Buota to Bairiki, there are 13 clinics, and Betio alone has 7. Some of these clinics are special clinics for certain ailments or for counselling.

Kiribati has an extremely high incidence of water-borne diseases with an infant mortality rate amongst the highest in the Pacific at 46 per 1,000 live births, which is attributed to infantile diarrhoea. The World Health Organization (WHO) and health officials report an average of three outbreaks of diarrhoea annually directly linked to poor water supplies, inadequate sanitation, unsafe practices and poor public hygiene.

4.3.3 Livelihoods and Economic Activities

The primary source of income in South Tarawa is from formal work (wage earners) but unemployment and under-employment is high. In 2010 only 34% of urban people over 15 years of age (the labour force) were engaged in cash work. Of the remainder, 21% were unemployed, 5% were engaged in voluntary or subsistence work, and 41% were not in the labour force (that is they were studying, retired, raising children or otherwise not available for work). In total, two thirds (66%) of adults (over 15) in Tarawa are either out of the labour force, unemployed or engaged in subsistence activities.

The Household Expenditure and Income survey showed that the average household on South Tarawa earns $11,464 per year (including almost $4,000 “cash equivalent” for subsistence activities and imputed rent) but spent $13,149 each year with half of this spending being on food.

4.3.4 Land Tenure and Rights

The land tenure system in Kiribati is complex and in areas like South Tarawa conflict regarding resources and “the public good” abound. The airport land has not been immune to these conflicts. A Social Safeguards Report has been prepared for the KAIP to address access issues that may arise due to the perimeter security fence and the land lease dispute regarding the terminal land (now resolved).

There is a number of legislation that seemingly over-lap regarding land tenure, property rights and land use planning within Kiribati. Land is owned by families with all members of the family having equal rights to build or collect food from. The 2010 census showed that only 50% of South Tarawa inhabitants own the land they occupy, 29% is Government leased (which include Government buildings, sportsfields, small industry, port, airport, and public housing).

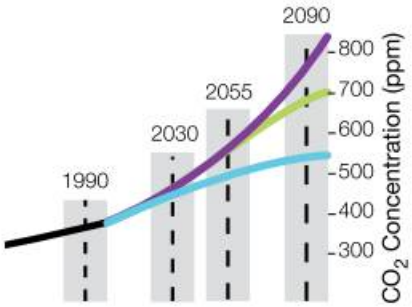
The Land Planning Ordinance 1972, revised 1977, establishes the right of Government to set aside designated areas, as was done with effect from October 1979 for the whole of Kiritimati Island (Subsidiary Legislation to Section III). The Native Lands Ordinance 1956, revised 1977 establishes the principle of indefeasibility of native title to land (S.4), though land may be alienated by the Crown (S.5(2)). The law recognises the concept of lease of native land, as is the case with Bonriki Airport land. Lease may normally only be by native to native, or to the State, and may not exceed a term of 99 years. Before registering a lease, the Court must be satisfied that the terms are fair to both parties, and that the lessor has sufficient land left to support the family (S.11(2)). Payment of land rent is prescribed (S.15), and payment of compensation is envisaged for damage by the lessee, or for unlawful occupation (Ss.24 and 35). The Ordinance allows for improvements on leased land with the permission of the owners, though does not address the issue of ownership of these assets or improvements on termination of the lease and reversion of occupancy to the title holder or another lessee.

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.

Kiribati, like many other pacific atoll nations are already experiencing the effects of increased temperatures and rising sea level. Sea level (satellite data) has risen by 1 to 4 mm per year since 1993. Sea level does fluctuate throughout the year particularly during La Nina years which tend to record warmer ocean temperatures. The annual mean air temperature (since 1950) has increased by approximately 0.184 ºC per decade on Tarawa. Annual and seasonal rainfall data for Tarawa has not shown any significant trends (1950 to 2009).

The projected design life is 20 years for the runway, and 50 years for the upgraded 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 11 for details of emission scenarios).



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

Figure 11 Carbon dioxide (CO_2) 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 2 below shows the projected changes in annual average air temperature and sea level for the Gilbert Islands (location of Tarawa island) 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 2 Air temperature and sea level rise projections for the three emission scenarios and three time periods

Annual Average Air Temperature Projection (Gilbert Islands)				Sea Level Rise Projection (Kiribati)			
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	0.2-1.2	0.7-1.9	1.0-2.4	Low emissions scenario	4-13	9-25	16-45
Medium emissions scenario	0.2-1.4	0.9-2.3	1.7-3.5	Medium emissions scenario	5-14	10-29	19-57
High emissions scenario	0.3-1.3	1.0-2.2	2.2-3.8	High emissions scenario	5-14	10-28	20-58

Source: PCCSP, 2011. *Current and future climate of Kiribati Brochure*. Kiribati 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.

5.0 Consultation and Stakeholder Engagement

5.1 Background and Approach

As required by WB Safeguards Policies and the Kiribati Environment Act 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 BEIA and EMP will remain a draft until public disclosure and consultation has been completed. This will allow for the BEIA and EMP to be updated with details of consultation and disclosure as and when this is completed. Disclosure and consultation will be the responsibility of MCTTD either directly or through their nominated Consultant. Consultation regarding this BEIA and EMP will be undertaken in conjunction with the requirements of the KAIP RPF as the outcomes of consultation specifically regarding the perimeter fence will directly influence the designs.

5.2 Outcomes of Consultation to Date

The overarching KAIP EMP and Resettlement Policy Framework was publicised and consultation held with the neighbouring community on 9 August 2011. Subsequent consultation with the Bonriki community has been undertaken on 13 and 15 April 2013. Minutes from the consultation in August 2011 and April 2013 are presented in Appendix F.

5.2.1 Consultation Summary 9 August 2013

The following four communities met with Government representatives for the KAIP project on 9 August 2011:

- Kiribati Protestant Church (KPC) maneaba in Bonriki
- Roman Catholic maneaba in Bonriki
- Tekawai ae Boou maneaba
- AA maneaba in Bonriki

The community at the KPC and Tekawai ae Boou maneaba tend to be newer land owners and settlers to the area when compared to the community at the Catholic and AA maneaba in Bonriki. The Catholic maneaba had the largest number of attendees (total 50, comprising nine women) followed by the AA maneaba meeting (total 39, comprising nine women). The key issues the community expressed concern about are shown in the following table. Some of these issues could not be addressed at the time due to the project stage (e.g. detailed designs not complete) or are outside the scope of the KAIP.

Table 3 Consultation outcomes and KAIP response

Consultation Outcome	Response
Borrow sites, protection of lands and the lagoon.	No borrow sites on South Tarawa are to be used to source material for the KAIP construction works. It is assumed all material will be imported (subject to fumigation and quarantine requirements), unless material from the ESAT project is suitable.
Flooding and insufficient drainage	Detailed designs include new drainage system to prevent flooding around apron area. These will require ongoing maintenance to ensure they do not become blocked.
Fence and restricted access	Pedestrian gates have been included in the detailed designs. The agreed alignment of the perimeter fence means that vehicle gates are no longer required. General support for the fence as a safety precaution.
Waste storage – what waste to be generated and where will it be disposed of?	Construction type waste includes milled asphalt from the runway surface, building materials from the terminal and old electrical equipment. Some household type waste will be generated by the workers. All waste is to be collected and stored within the construction camp for re-use, recycling, and transport off island or to an approved landfill. Complaints procedure will be available to report any problems experienced or observed regarding waste management during the KAIP works.

Consultation Outcome	Response
Noise pollution – from normal airport operations and due to construction activities	Construction noise will be regularly monitored with a noise meter to ensure levels do not exceed health and safety levels and work restricted to normal work hours (e.g. Monday to Friday, 8am to 6pm). Any work outside normal hours will be publicised a minimum of 24 hours prior and the method for making complaints available on signs and through the airport. Operational noise will be harder to combat due to the proximity of the village however the Master Plan is being drafted at present which will look at airport operations.
Social and economic benefits associated with the airport operations and construction works	Both the Social Safeguards Report, and BEIA and EMP specify the use of local labourers where suitable and training of Government staff from other departments which could benefit from the experience (e.g. MPWU). Long term opportunities are harder to quantify as there are many other variables. However improved airport facilities should benefit all in relation to passenger experience (and return visits) and new business opportunities (e.g. concession stands, craft stalls) but these are not the responsibility of the MCTTD.
Road upgrades so vehicles and pedestrians do not use the runway	Improvements to the road are outside the scope of the KAIP however this issue has been noted by the Government.

Where applicable these concerns have been addressed either in this BEIA and EMP which is subject to further consultation and the Social Safeguards Report. There will be another formal round of consultation regarding the project and this BEIA and EMP (dates to be confirmed). Outcomes from future consultation will need to be incorporated into this BEIA and EMP.

There will also be opportunity throughout the project to provide feedback and obtain information through the complaints procedure (refer to section 8.2).

5.2.2 Consultation Summary 13 and 15 April 2013

The community meeting on the 13 April was held at KPC during a Children's Day function and the community meeting on 15 April was held at the Bonriki Catholic Church maneaba. The key discussion points for both these meetings were the community facility and toilet blocks which have been proposed as a general social mitigation measure for the general negative impacts caused by the presence of an airport beside the village (e.g. loss of land and potential recreational facilities). Further details regarding social issues and mitigation are presented in the Social Safeguards Report. The KAIP Task Force Committee has been responsible for undertaking consultation and is an inter-agency committee who has led the iterative design process of the perimeter fence location. The Bonriki community are supportive of both the TRW perimeter fence (which includes pedestrian access gates) and the community and toilet facilities.

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 KAIP EMP has been made available on the WB Infoshop website and in hard copy at government offices (most applicable and accessible) and the ECD website. A draft of this updated KAIP TRW BEIA and EMP should also be made available online (WB and government websites) and hard copies available at government offices and community centres in South Tarawa.

5.4 Sensitive Receptors

South Tarawa is densely populated with little available landmass for expansion and so homes and community facilities (churches and maneaba) are located very close to the runway and airport. 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) or noise. Sensitive receptors do not usually include places of business or public open space. Specific consultation should be undertaken with the Bonriki community before and during construction activities to ensure impacts are minimised and community safety in ensured. This is particularly important for the transport of materials and equipment from the port to the construction camp. Mitigation measures may include construction works or transport during specific hours which do not impact school hours or specific traffic (includes pedestrian) safety management like flag controls and route diversions.

6.0 Environmental and Social Impacts

6.1 Overview of Impacts

The KAIP scope is to rehabilitate the existing runway surface (including drainage) and upgrade the terminal, and navigation aids. New land acquisition for airport operations or physical resettlement 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 KAIP 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. A Social Safeguards Report has been prepared which looks specifically at the social impacts of the airport perimeter fence and addresses the land lease dispute regarding the location of the terminal.

Possible negative impacts related to the airport 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 BEIA and 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 Historical Development Activities and Environmental Impacts

Historical development activities at TRW have had a detrimental effect on the environment, as seen during the site inspection tour in October 2012. Equipment such as a roller and crusher were abandoned in Bonriki village and left to deteriorate (refer to Figure 12). Vegetation is growing through some of the machinery indicating the length of time the equipment has been insitu. Abandoned equipment can leach contaminants from any remaining fuel and oil and also from the material itself (e.g. heavy metals and chemicals from the paint).

Figure 12 Abandoned equipment in Bonriki village

On the north eastern side of the runway is a bitumen dump, understood to be left from the last airport works (1990's). There has been a fire and the bitumen has spread over the beach to the ocean. The heat and sunshine also melts the bitumen and causes it to spread further. The bitumen appears very thick in parts (refer to Figure 13). This area has been identified as a potential temporary lay down area for use during the pavement works. This area will require remediation by the contractor prior to use. The bitumen will need to be dug out for disposal or recycling off island.

Figure 13 Bitumen dump adjacent to runway (north eastern corner) showing extent and spill onto beach

The World Bank operational policies and Kiribati legislation provide mechanisms and tools for preventing environmental damage and ongoing impacts as a result of development activities. This BEIA and EMP has been developed in accordance with these requirements (as detailed in Section 3) with the goal to ensure that impacts such as those described above do not occur and responsibility for mitigation measures and impacts is clearly defined.

The contractor(s) are responsible for implementation of this EMP and ensuring that all waste material and all equipment (that cannot be reused or recycled on island) is removed at completion of the works. MCTTD is responsible for ensuring the contractor(s) perform in accordance with their contract. This BEIA and EMP has been included in all procurement documentation to inform contractor(s) of their responsibilities. Included in the contractor's contract will be a requirement to remove from island old machinery and unserviceable equipment associated with the airport at completion of the project works.

More recently the Cassidy International Airport (CXI) runway on Kiritimati Island underwent pavement rehabilitation works similar in scope and scale to the pavement works proposed at TRW. The TRW pavement works component of the KAIP will be managed in a similar manner to the CXI pavement works to ensure compliance with the site EMP, contractor's EMP and legislative requirements.

6.3 Environmental Impacts

6.3.1 Solid Waste

Scarification, replacement of unsuitable pavement material, clearing of old terminal and derelict equipment would lead to the generation of excess soil and debris waste. South Tarawa 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 of any unusable waste (including hazardous substances) at the end of the project. The island cannot manage the potential level of waste generated from the demolition and construction activities and burning of waste can cause odour and health effects on the surrounding community. Waste material or equipment which cannot be reused or recycled on island must be removed and disposed of off island at completion of the project.

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 standard 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 be generated from the excavations associated with navigational aids concrete pads, cable trenches, and the apron surface and drainage rehabilitation. 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 MPWU and the community. The asphalt millings from the runway can also be used as constructed fill and will be used to backfill behind the seawall at the eastern end of the runway (to be coordinated with the seawall rehabilitation works and mitigation measures). Any re-use of asphalt millings must have a paved surface to prevent asphalt dust from being mobilised and thus impacting the environment and human health. Due to the

milling process the waste product (which can also be reheated and reused in roading surfaces) has high levels of polycyclic aromatic hydrocarbons (PAHs) in particulate form. Sealing the surface of any asphalt milling fill will prevent mobilisation.

The types of waste expected to be generated are:

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

Demolition materials, packaging, rubble and waste oil/ lubricants are traditionally taken to landfills for disposal. South Tarawa has limited capacity at their landfills which are generally not constructed nor managed to international standards with impermeable liners, leachate and gas collection systems and daily cover. Therefore the impact of waste generated through the project has potential to create long term capacity and contamination problems for the community.

6.3.2 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.

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

The project scope does not change the catchment area and recharge rates of the freshwater lens. Localised flooding around the taxiway and apron has been addressed through upgrading of the existing apron cut off drain, installation of soakage pits and fuel spill interceptors where runoff has potential to be impacted by hydrocarbon contamination.. Potential contamination of the freshwater lens due to hydrocarbon contamination is discussed in Section 6.3.4.

6.3.3 Biological Resources

The KAIP will rehabilitate and upgrade the existing infrastructure. The southern boundary of the airport is shared with Bonriki village which is very densely populated and developed. The northern boundary is shared with the water reserve protection area. It is evident that even within the water reserve protection area 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 or the construction camp) could impact on potential habitats. The habitats surrounding the runway are primarily open grass with foot traffic and adhoc roads in the area. Mitigation measures will include liaison with the ECD should any fauna (reptile, avian, or mammal) are encountered that affect construction activities (e.g. nesting bird).

6.3.4 Hazardous Substances and Materials

Potential soil and surface water pollution from construction run-off with fuel and lubricants are expected to be temporary and minor, provided best practice methods are implemented by the construction contractor. 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 downpipes and guttering on the terminal).

There is potential for subsurface hydrocarbon impact in the vicinity of the old fuel hydrant pipes and aboveground storage tanks (AST). Excavation or disturbance of this material could mobilise contaminants and have a potential effect on human health (such as inhalation or dermal) and the environment (soil and groundwater). The

excavation and exposure of the pipes also poses an explosive risk if vapours and product has built up within the pipe and tank system.

The primary risks of hydrocarbon contamination as a result of airport operations and or construction activities relate to vapours and proximity of residential settlements and contamination of the freshwater lens. Due to the limited level of treatment of water extracted from the freshwater lens and the use of local bores to access the freshwater lens any groundwater hydrocarbon contamination would likely affect a number of people depending on the length of time product has been entering the environment and in what volume. The only way to establish potential hydrocarbon contamination is sampling of insitu soils suspected of contamination (see Section 7.2) and or sampling and analysis of groundwater from local bores in the vicinity of the apron and above ground fuel tanks (refer Section 7.4).

6.3.4.1 General Information on Hydrocarbon Contamination

The presence and extent of hydrocarbon contamination at TRW is unconfirmed and unquantified as the risk of encountering it during construction activities are low due to implementation of best practice mitigation measures as detailed in Section 7.2 and construction methodology as described in Section 2.0. The following information relates to the type of fuel used at the TRW and the known properties and impacts of contamination generally.

Hydrocarbon contamination has 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. The onset of symptoms may not be immediate, particularly in relation to the carcinogenic compounds. Human exposure pathways include respiration, dermal contact, and ingestion (likely through contaminated drinking water). With the Jet A1 fuel the most likely exposure pathway is dermal contact due to the low vapour pressure[3].

If hydrocarbon product (likely Jet A1 as this is the product used most frequently and in large volumes) is spilt or leaks from the pipe or tank system, the hydrocarbons will exist in the subsurface as free product (light, non-aquious phase liquid – LNAPL), dissolved in groundwater and/or as vapour. Middle range distillate group of hydrocarbons (which includes diesel, kerosene and jet fuel) tend to be a heavier hydrocarbon fraction, be less volatile, less water soluble, and less mobile than the compounds in the petrol/gasoline hydrocarbon fraction range. The middle distillates also contain less of the lighter-end aromatics such as BTEX (benzene, toluene, ethylbenzene, and xylenes). Soils impacted by diesel fuel are not expected to contain high proportions of aromatics such as BTEX. Typically, with older releases, BTEX constituents will have degraded or dispersed to leave very low, or possibly undetectable concentrations[4]. Naturally occurring biodegradation (by bacteria and fungi) occurs best under aerobic conditions provided sufficient nutrients are present for conversion of the hydrocarbons to microbial biomass.

The range of effects in marine organisms for soluble aromatic hydrocarbons (which are comparatively more toxic in comparison to other hydrocarbon compounds) are, in order of increasing hydrocarbon concentration[3]:

- Bioaccumulation may occur
- Behavioural pattern changes
- Growth and reproduction changes
- Lethal to larval and juvenile stages
- Lethal to adults

6.3.5 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 South Tarawa residential houses and businesses are located in close proximity 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

[3] American Petroleum Institute Petroleum HPV Testing Group, 2010. *Kerosene/Jet Fuel Category Assessment Document, Submitted to the US EPA*.
[4] Ministry for the Environment, 1999. *Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011). Module 2 Hydrocarbon Contamination Fundamentals*.

issue throughout the construction stage and to a lesser degree the operational phase (e.g. aircraft landing and take-off). As the airport is existing infrastructure any noise or vibration impacts are probably already being experienced by the local community.

At the operational phase of the project local residents have expressed concern regarding noise from aircraft. The scope of work for the KAIP is general maintenance and improvement with a view to ensuring the continued operation of the airport, 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.

6.3.6 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 or land clearing activities, particularly for navigational aids and within the construction camp (estimated area is 1 ha). Excavation will also be required for the terminal however details of these excavations have yet to be defined. Likely excavation requirements will be for rainwater harvesting and installation of septic tank system and associated pipework.

6.3.7 Air Emissions

Air pollution can arise due to improper maintenance of equipment, dust generation (from excavations and pavement milling), bitumen smoke / fumes arising from application of the new pavement seal and maintenance work, and emissions from the asphalt plant to be located in the construction camp. Impacts are expected to be localised and short term with only minor negative impact on the ambient air quality in the vicinity of the construction areas. No ongoing impact to air quality is expected as this is rehabilitation of existing infrastructure. As stated in section 6.3.5 South Tarawa is densely populated, while air quality impacts are likely to be short term they will affect more people.

Asphalt plants emit hazardous substances which are known to have a detrimental effect on human health depending on the level of exposure. Emissions tend to consist of water (as steam), particulate matter, products of combustion (e.g. carbon dioxide, nitrogen oxides, and sulphur oxides), carbon monoxide, and small amounts of organic compounds of various species (including VOC, methane).

6.3.8 Traffic and Airport Operations

Traffic impacts will occur in transporting equipment and materials from the port and to and from the airport and construction camp. 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 (residential dwellings, markets, churches etc). Upon completion of the construction phase of works traffic and road safety impacts caused by the KAIP should cease.

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.

Effects of light pollution have been raised in previous discussions with the ECD. Upgrading the airfield lighting for night time operations is not included in the scope of the PAIP. The PAPI approach lighting system is included in upgrade works however this lighting is located at ground level and is only activated on aircraft approach for landing. As there are no scheduled night time flights the PAPI will only be activated at night time if there is an emergency landing required.

6.3.9 Wastewater Discharges

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

Uncontrolled wastewater (e.g. sewage, grey water, wash water) discharges have the potential to contaminate soil, water and spread disease. Wash water from equipment can be contaminated with hydrocarbons (e.g. oil and fuel) which have a detrimental effect on aquatic life, water quality and soil quality. There are also human health impacts regarding hydrocarbon exposure which vary in severity depending on type and length of exposure. Wash water from concrete processing and cutting is highly alkaline and can burn vegetation, result in fish kills and also cause burns to the skin. Sediment loads in wash water if allowed to discharge to either marine or freshwater systems can also adversely impact aquatic life and water quality. While the potential impacts of uncontrolled discharges of wastewater can adversely affect the receiving environment, they can be easily mitigated through planning and implementation of mitigation measures (as outlined in Section 7.8).

6.3.10 Biosecurity

All aggregate material and equipment will most likely need to be imported as there are very limited natural resources available on Tarawa. Imported aggregate and equipment can harbour plant and animal species which may pose a threat to Kiribati'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.

6.3.11 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 put pressure on existing resources and utilities (e.g. water supply). Secondary and cumulative impacts also often cannot be managed solely by the project executors (MCTTD). Town planning (e.g. restricting development and clearing of land) and conservation are two examples of external influences which can assist in reducing secondary and cumulative impacts.

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

The airport is existing infrastructure which has existing impacts (e.g. noise and dust generation). In most cases the KAIP 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 without appropriate drainage has caused localised flooding which can be mitigated through the design of improved drainage.

6.3.12 Coastal and Marine Environment Impacts

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 and mangrove forest), to reduced or contaminated water quality and loss of aquatic life due to pollution.

6.4 Social Impacts

A Social Safeguards Report has been prepared to specifically address the social impacts of the perimeter fence and land lease arrangements for the terminal. Details of the impacts and mitigation measures are provided in the Social Safeguards Report. The primary long standing social issue related to the presence of the airport (as documented in Dr. Ueantabo MacKenzie (2011) due diligence report titled *Kiribati Infrastructure Improvement Project Due Diligence Social Assessment Report*) is overcrowding in Bonriki village. Other identified impacts include[5]:

- Loss of access ways across and around the airport.
- Loss of areas for sport and recreation.
- Loss of areas for defecation.
- Effects of airport pumping on village groundwater.

[5] As referenced in Section 2.1 of the Social Safeguards Report – Implementing the Resettlement Policy Framework (Dec, 2013).

6.4.1 Health and Safety

During construction and operation health and safety is to be managed through a Site Specific Safety Management Plan (to be developed by the contractors for their respective works) and application of international environmental and health and safety (EHS) standards. The primary hazards identified are construction on an active runway, construction works involving hot bituminous products (up to 165 °C), and working in extreme ambient temperatures.

If the trench required for the navigation aids cabling is to be dug to a depth greater than 1.5 m the sides of the trench will need either batter slopes or shoring to prevent collapse. 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.

Tarawa experienced intense fighting during World War II. While the airport was constructed after the main battle (Battle of Tarawa) and has undergone extensive expansion and upgrade works since its construction in 1943 there exists the potential for unexploded ordnance (UXO) to be encountered, particularly in areas outside the current airport footprint. As a precaution the measures detailed in the Kiribati Road Rehabilitation Project Environmental Management Plan (Revision 3, October 2013) should be adopted at all sites where UXO are suspected. MCTTD and MELAD (and any other identified Government departments) should be consulted to assist in identify suspected UXO sites.

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. the terminal. Sensitive receptors and environmental values have been identified around the airport site 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 BEIA and 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 in Tarawa to ensure no plant or animal pests are accidently 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 Ministry of Public Works and Utilities 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 imported as construction materials.

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.

Stockpiles of aggregate and other materials (e.g. sand and topsoil) are to occur within the construction camp only. Small (less than 2m high) temporary stockpiles are permitted adjacent to work sites with approval by MCTTD and ECD. All stockpiles are to be managed in accordance with measures detailed in Sections 7.4, 7.7 and 7.10, and Appendix B with site specific management requirements detailed in the contractor's EMP.

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 residents to ensure hours of work are known and the procedure for complaints is readily available on signage.

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) is suspected in some building materials used in the terminal. 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 persons involved in operations and maintenance activities, including the ECD and Ministry of Health should this be necessary. 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 Kiribati 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 advisable to have an officer from ECD and or National Health Department 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.

Hydrocarbon product and contamination has the potential to be encountered during work on the fuel hydrant system. The process for sealing these pipes will require the pipeline to be flushed with high pressure water (saltwater can be used) to remove any product residue. It is essential that this water is collected and treated through an oil water separator prior to discharge. It is recommended that the treated wash water be discharged to land outside the water reserve catchment area. During all operations involving the pipeline and associated tanks, the area should be cordoned off and no smoking or open flame allowed within at least 10 metres.

A photoionization detector (PID) to monitor the worker breathing zone for parts per million (ppm) concentrations of volatile organic compounds (VOCs) should be used to quantify the potential risk to workers. If the breathing zone concentration exceeds 5 ppm, workers should move to an upwind location until vapours clear.

A combustible gas indicator (CGI) should also be available to monitor the lower explosive limits of the area around the pipe and discharge location. If the lower explosive limit exceeds 10%, work should cease and workers should move to an upwind location until vapours clear. Combined PID and CGI instruments are also available and are acceptable. If any staining of the soil is observed or odour experienced a sample of the affected soil material should be collected and measured using the PID. If the PID returns readings greater than 10 ppm the material should be treated as contaminated fill. Depending on the volume of material it may be appropriate to excavate the affected soils and prepare for transport off island to a facility licensed to accept hazardous waste.

The apron area will be sealed with a minimum 50 mm thick pavement (maximum 120 mm) which will prevent ingress of water. Sealing a potentially contaminated area of soil will reduce the risk of migration of the contaminants as water will not be able to permeate through to the area. There is still a risk from groundwater mobilising contaminants that may be present if the groundwater level is high enough to interact with the contaminated soil. An ECD pollution/ contamination officer should be notified when the hydrant work is to commence to allow for monitoring and external validation of procedure for managing any contamination that may be encountered. In the absence of any national contaminated land management requirements the IFC EHS Guidelines should be applied, specifically Section 1.8 Contaminated Land and Section 4.1 Construction and Decommissioning, Contaminated Land.

The new drainage system for the apron will include two fuel spill interceptors to treat runoff from the apron area. The apron is where refuelling of aircraft occurs and aircraft park thus posing the greatest risks for hydrocarbon

contamination as a result of leaks and spills. The fuel spill interceptors require ongoing maintenance to remove hydrocarbon product and other contaminates from the collection chambers (sludge and oil traps). The manufacturer will provide information on cleaning regimes based on inflow however as a guide the interceptors should be inspected after significant rain storms and or a spill has occurred. The interceptors are a secondary mitigation measure and do not replace the implementation of emergency spill response procedures and use of spill kits.

7.3 Safety and Traffic Management

A road runs parallel to the runway on the southern side which at it closest is approximately 25m from the edge of the runway. There are roads at both ends of the runway that follow the ocean and lagoon coast. It was observed that the runway is also used by private vehicles as the pavement surface is better than the adjacent road. Therefore the construction of the perimeter fence is to take place prior to the runway resurfacing component to restrict private vehicle use of the runway to ensure safety of the workers, aircraft and also of vehicle drivers and passengers. Pedestrian and vehicle safety will also be an issue when transporting materials and equipment from the port and to and from the airport site and the construction camp. The Contractors are responsible for developing a TMP which will specify how traffic (vehicle and pedestrian) will be managed, including transport times (outside peak hours), maximum speed and loads of trucks, use of flag controls at site entrances (construction camp) and around specific work areas.

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 South Tarawa is limited and houses are located close together and close to the road and runway edges. Localised flooding occurs on shoulders where compaction has occurred and drains have blocked. The runway apron is being designed with new drains suitable for aircraft traffic and the type of rain events experienced in Tarawa and include oil interceptors for capture of hydrocarbons. Stormwater soakage pits will allow stormwater to percolate to the underlying groundwater.

During construction clean water diversion bunds will be used to direct any runoff from undisturbed areas away from work areas, stockpiles and storage areas. The diversion bunds will direct this clean water to land for soakage. Runoff will not be directed to discharge directly to the lagoon or ocean (other than natural overland flow).

Water required for construction activities such as dust suppression and concrete production will need to be managed carefully so as not to impact on the island's freshwater supply. 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.

Due to the proximity of the water reserve protection area monitoring of selected bores should be completed prior to construction works commence, during construction works and at completion of all construction works. Depending on what works are being undertaken (e.g. terminal versus runway pavement) different bores may be selected to provide information on groundwater quality at any given time in that area. As a minimum the bores that should be included in the monitoring programme are the terminal bore, to capture activities related to the terminal upgrade and apron pavement works, and the bores located adjacent to the runway (e.g. BN5 and BN14, refer to Figure 10 in Section 4.1.4), to capture any potential effects of the runway pavement rehabilitation. Other bores may also be identified by the ECD as requiring monitoring to determine effects from construction and or operational activities.

Parameters that should be monitored include pH, electrical conductivity and total petroleum hydrocarbons (TPH).

Runoff from disturbed areas is not to be discharged directly to the marine or coastal environment. Sediment laden runoff is to be treated (via small settling pond or tank) and discharged to land (outside the water reserve protection area) 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 (the construction camp) 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 within bunded areas (both should be available at the construction camp). The equipment must be fitted with a dust scrubber to prevent the dispersal of fine coral particulates. The pavement asphalt should not be applied during wet weather to reduce the possible leaching of contaminants from the bitumen.

The project requires concrete production for the terminal, navigational aids and the perimeter fence. 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 if unable to be reused. 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 not be allowed to permeate to 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. 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 by compacted by the end of its use and so restoration will require scarification of the soil, application of topsoil and revegetation.

Prior to clearing any land for the construction camp an inventory of trees and vegetation (particularly food crops) must be undertaken and documented with the Department of Lands. Compensation may need to be paid to owners of the trees and vegetation. The procedures are also documented in the RPF, particularly Section 5.0 Eligibility Criteria and Section 7.0 Valuation Methodology.

7.7 Erosion and Sediment Control

The land on Tarawa 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 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. Stockpiles of any fine grain materials (e.g. sand and topsoil) must be covered to prevent dust and sediment laden runoff during rain events.

The eastern runway end is approximately 85 m from the lagoon foreshore and less than 20 m (at the nearest point) from the ocean beach (eastern end). Discharges from any construction activity at these locations are prohibited from discharging directly to the marine and coastal environment. Clean runoff should be diverted inland for percolation to underlying groundwater, and potentially contaminated runoff should be collected and treated. Treatment will be dependent on type of potential contamination (e.g. oil water separator for runoff contaminated with hydrocarbons, or settling pond or tank for sediment laden runoff).

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 for this area of the island, the contractor is responsible for the collection and 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 MCTTD, MPWU and ECD advice and approved by MCTTD and MPWU.

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 (or processed through a filtration system) 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 lay down areas.

Treated wash water where possible should be reused for dust suppression or within other processes. Direct discharge to the marine or coastal environment or to the water reserve protection area is prohibited. Discharges of treated wash water are to occur to land only (outside the water reserve catchment area). Sufficient measures to avoid direct discharges are required when working adjacent to the marine and coastal environment, particularly for the runway resurfacing component, which may include bunding (e.g. sand bags), demarcation of exclusion zones, and limited use of large machinery.

7.9 Solid Waste Management

Waste generated by the project that cannot be recycled or reused (to be determined in consultation with the MCTTD, MPWU, ECD and Teinainano Urban Council) is to be removed from Kiribati 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 MCTTD to ensure the facility is licensed or permitted.

General waste (including plastics and packaging) is not to be burnt or incinerated. Vegetative waste (from clearing construction areas) should be composted through existing composting schemes (contact the Teinainano Urban Council and or ECD) and topsoil stockpiled for rehabilitation of the construction camp and or lay down areas at completion of the project. If burning or incineration of vegetation is the only suitable disposal method and agreed to by MCTTD, ECD and the Teinainano Urban Council then it shall be undertaken with supervision by the onsite Supervising Engineer and in accordance with local legislation and regulations. Burning or incineration is not to occur near any residential or community facilities, areas of protected vegetation or during high winds.

Excess pavement/asphalt millings that cannot be reused within the project will be made available to MCTTD and MPWU for use as constructed fill or reheated and reused (if material is suitable). Use of the asphalt millings as fill will require sealing with a paved surface to prevent the mobilisation of asphalt dust. Stockpiles of asphalt millings must be located within the construction camp on an impermeable surface and managed to prevent dust. If the material is to remain on island as a construction material resource MCTTD and or MPWU will take responsibility and manage the material in accordance with this EMP and under guidance from the ECD.

7.10 Marine and Coastal Specific Mitigation Measures

The runway runs in an east to west direction with the lagoon at the western end (approximately 90m from the end of the runway) and the ocean at the eastern end (less than 20m at the closest point). 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. The ends of the runway are in close proximity to the coast as is a potential lay down area. Therefore work in these areas 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 pavement or inland and not venture on the beach or seawall. Temporary stockpiles and equipment parking is prohibited on the beach.

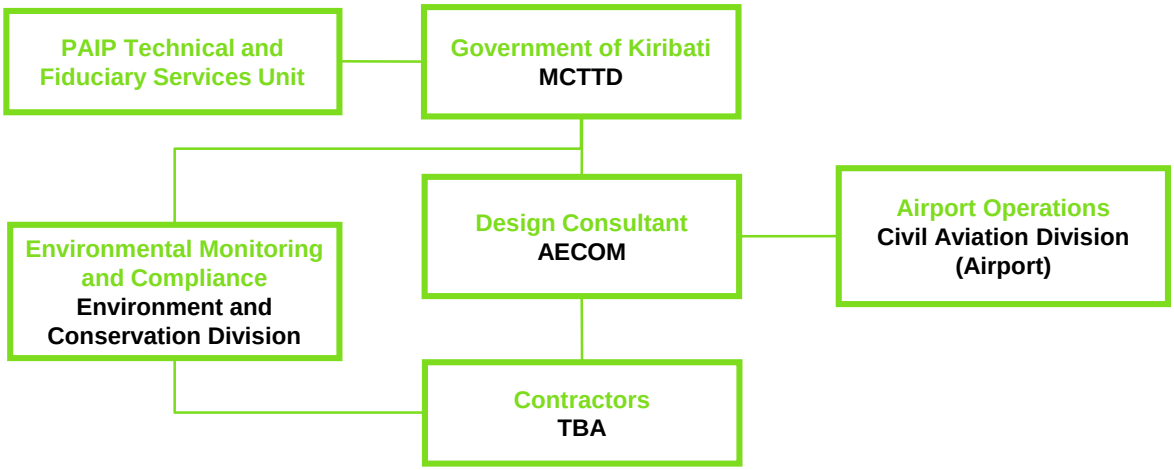
7.11 Social Mitigation Measures

As previously stated the detail regarding social assessment of the project impacts and mitigation measures are included in the Social Safeguards Report – Implementing the Resettlement Policy Framework (December 2013). The primary mitigation measure adopted to address impacts of the perimeter fence was the use of a constructive, iterative design process which included input from aviation experts, airlines, key government agencies and other stakeholders, and Bonriki leaders and residents. This process led to agreement of the fence alignment and pedestrian access gates which do not require physical resettlement, maintains access to the perimeter road and allows for pedestrian access to traverse the runway when there are no incoming or outgoing flights. The consultation and engagement of the local residents during this process has resulted in support for the perimeter fence as a necessary security and safety measure for airport operations. This was the first stage in implementing the social mitigation measures with subsequent actions including a Bonriki village representative being on the Airport Safety Committee and the KAIP Task Force Committee.

A community facility is planned to provide some mitigation of wider community effects and loss of the airport space. The location and specific details of the community facility are still being developed however the facility will include a recreation area for sports and toilet facilities.

8.0 Roles and Responsibilities

The MCTTD is responsible for delivery of the KAIP project (including all components), funding received and contracts awarded under the KAIP. MCTTD is the Implementing Agency in regards to funding received from donors including the WB. A Project Management Unit (PMU) within MCTTD has been established to undertake the day to day management of the project. Aspects of the monitoring required by the EMP will be undertaken by MCTTD. The implementation of this EMP is the responsibility of the contractors awarded contracts under the KAIP. The diagram below shows the reporting and responsibilities for this EMP. The ECD 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 ECD. The Department of Public Works will work alongside the Resident Engineer in order to capacity build within the department and for ongoing maintenance of the runway repairs.



8.1 Institutional Capacity

MCTTD will require environmental awareness training for monitoring the Contractors. Personnel from the MPWU will work alongside the Contractor and Resident Engineer to capacity build and gain a better understanding of the type of 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 ECD to work with the Contractor's environmental officer. X-ray equipment for security screening has been recommended however this may not be implemented as part of the KAIP. Costs for ongoing monitoring of x-ray equipment have been included below but are provisional based on whether x-ray equipment is actually installed. It is understood that noise meters will be required.

An indicative training budget is as follows:

Training for Contractors and CAD/ MPWU personnel (onsite training in Kiribati)	US$ 15,000
Operational monitoring of x-ray equipment (annual cost)	US$ 1,000
Procurement of two noise meters for monitoring (plus duty and delivery)	US$ 1,000
Miscellaneous (e.g. ECD 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 Project 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:

- Log complaint/incident, date of receipt and acknowledge complaint receipt, and gender of complainant
- 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 outlining the complaints procedure and contact details for making complaints.

The grievance redress mechanism is detailed in Section 10.0 of the RPF and includes information on mediation hearings and court hearings if resolution cannot be reached.

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 of implementation of environmental mitigation measures identified in the EMP will be advised to the Contractor(s) in writing by MCTTD'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 Contractor(s) will include results of the EMP monitoring in a monthly report for submission to the MCTTD who is responsible for submitting these monthly progress reports to the PAIP Technical and Fiduciary Services Unit (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 Contractor(s), 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 TRW Managers will include an environmental management section as part of their normal reporting the MCTTD. 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.

MCTTD is also responsible for project 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.

10.0 Contingency Plan

It is recommended that the Contractor(s) 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 on Tarawa is November to April which coincides with the cyclone season. 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 MCTTD if there are any concerns associated with the measures in place.