Construction
ENVIRONMENTAL
MANAGEMENT PLAN
Bonriki International
Airport (TRW)

mcttd/G/NAV-AIDS-01
NAVIGATIONAL AIDS & AIRFIELD GROUND LIGHTING (AGL)

V.1/14.04.2015

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

All acronyms and abbreviations used in the Environmental Management Plan are listed below.

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
GECl:  GECI Española S.A.
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/ m² / m³	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
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
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.

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).

UHF/VHF  Ultra-High Frequency / Very High Frequency

UOX  Unexploded Ordnance

VOC  Volatile Organic Compound

WB  World Bank

WHO  World Health Organization
CONTACT INFORMATION

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1. INTRODUCTION

1.1. SCOPE OF CEMP

This Construction Environmental Management Plan (CEMP) is a summary of environmental and operational management plans that will be developed for works that will be undertaken by GECI Española S.A. (or its sub-contractor) during the construction and installations phases of the Airfield Lighting and Air Navigation Aids systems projected for the Bonriki International Airport in Tarawa, Kiribati under the contract "MCTTD/G/NAVAIDS-01".

It’s 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 CEMP is to provide a framework for managing the airport upgrade works in a manner that incorporates the principles of environment sustainability while minimising adverse effects on the local community and environment and meeting the requirements of our Environmental Management System according to ISO 14001. To do this it is necessary:

- Comply with all of the project-specific environmental obligations and assurances,
- Identify roles and responsibilities of the environmental management team
- Identify monitoring and reporting requirements
- Ensure legal and contractual compliance
- Comply with the Pacific Aviation Investment Program (PAIP) Basic Environmental Impact Assessment - Bonriki International Airport (TRW) Final Draft
- Expand and update throughout the term of the contract to reflect changes in site conditions and weather-dependent contingency measures.

The CEMP will guide the development of environmental work plans for construction/installation activities and any required site-specific management plans, and will provide effective environmental protection during the construction and operations phases of the Project.

1.1.1. OVERVIEW OF WORKS

The scope of the works at Bonriki International Airport includes:

- **Airfield Lighting:**
  - New Wind Direction Indicators (WDI) for Runways 09 & 27
  - Replacement Precision Approach Path Indicator (PAPI) installation for approach to Runway 09
  - New PAPI for approach to Runway 27

- **Air Navigation Aids:**
  - New Uninterruptible Power Supply (UPS)
  - Non-Directional Beacon (NDB)
  - New Automatic Weather Station (AWS)
  - New Air Traffic (ATC) Radio Installations (VHF)
Ancillary Works:
- New standby Diesel Generator
- Ducting and cabling
- Supports, plinths and associated structures

More information of the scope is detailed in the document "478D478-SD-01.E-TRW_System Design Document".

1.1.2. 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 CEMP will be undertaken by MCTTD. The implementation of this CEMP is the responsibility of GECI. The diagram below shows the reporting and responsibilities for this CEMP. The ECD has a statutory responsibility to respond to pollution complaints, and ensuring impacts are managed as per the CEMP.

1.2. 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. It understood that noise meters will be required.
1.3. 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 24 hours. 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 outlining the complaints procedure and contact details for making complaints.

1.4. RESPONSABILITIES

The responsibilities for environmental management during the construction phase and descriptions of the key individuals are described in the following paragraphs.

Other general responsibilities and tasks of the involved people are described in the document: “478D478-QL-05.C_Management Team”.

1.4.1.1. MCCTD/AECOM PROJECT ENVIRONMENTAL MANAGER

The Client’s Environmental Manager would be responsible for monitoring the performance of the project against statutory requirements and the agreed objectives and targets. Duties would include:

- Review and approve the CEMP, prepared by GECI, and specialist procedures and identify any areas for improvement.
- Identify the environmental competence of all contractors (and sub-contractors) working on the project.
- Review method statements for environmental aspects and advise of any suggested improvements prior to work starting.
- Monitor construction activities to ensure that identified and appropriate control measures are effective and in compliance with the CEMP.
- Act as a main point of contact between GECI and the MCTTD’s project team on environmental issues.
1.4.1.2. GECI’S PROJECT ENVIRONMENTAL MANAGER

The project environmental manager would be responsible for coordinating and managing all the environmental activities during the construction/installation phase. The project environmental manager would carry out the following duties:

- Develop and review the CEMP, Method Statements, Quality Plan and other specialist procedures
- Identify environmental competence requirements for all staff working on the project and ensure delivery of environmental training to personnel within the project team.
- Review and improve method statements for environmental aspects prior to work starting.
- Monitor construction activities performance to ensure that identified and appropriate control measures are effective and ensure compliance with the CEMP.
- Act as main point of contact between the regulatory authorities and the project on environmental issues.
- In conjunction with the site environmental representative, overall monitoring of the programme for the environmental works, and provision of status reports as necessary.
- Provision of advice and liaison with the construction teams to ensure that environmental risks are identified and appropriate controls are developed and included within method statements.
- Assistance in the development and delivery of environmental training for site personnel and subcontractors
- Liaison with the clients environmental manager
- Liaison with the project’s public liaison officer
- Management of the environmental monitoring programme, including noise, vibration and dust and review of the routine reports
- Environmental audit of subcontractors and suppliers

1.4.1.3. GECI’S SITE ENGINEER

The GECI’s site engineer would report to the project manager and would be directly involved in managing and coordinating environmental activities on-site. These would include:

- Assist environmental manager in developing and maintaining the CEMP, MS and various registers and checklists.
- Monitor construction activities to ensure that identified and appropriate control measures are effective and in compliance with the CEMP.
- Undertake weekly site inspections, initiate actions, and complete a weekly environmental inspection report.
- Provide advice and assistance to site personnel on environmental matters.
- Assist GECI’s subcontractor site foreman in maintaining environmental records.
- Assist in investigating and resolving complaints.
- Undertake monitoring when required.
- Ensure correct procedures are followed in the event of an environmental incident.
- Dissemination of waste reduction and waste management procedures to all relevant personnel on site

1.4.1.4. GECI’S SUB-CONTRACTOR SITE FOREMAN

The foreman will report on environmental activities to the site engineer and will be responsible for the following:

- Develop and review the CEMP, Method Statements, Quality Plan and other specialist procedures
- Identify environmental competence requirements for all staff working on the project and ensure delivery of environmental training to personnel within the project team.
- Review and improve method statements for environmental aspects prior to work starting.
- Monitor construction activities performance to ensure that identified and appropriate control measures are effective and ensure compliance with the CEMP.
- Act as main point of contact between the regulatory authorities and the project on environmental issues.
- In conjunction with the site environmental representative, overall monitoring of the programme for the environmental works, and provision of status reports as necessary.
- Provision of advice and liaison with the construction teams to ensure that environmental risks are identified and appropriate controls are developed and included within method statements.
- Assistance in the development and delivery of environmental training for site personnel and subcontractors
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- Management of the environmental monitoring programme, including noise, vibration and dust and review of the routine reports
- Environmental audit of subcontractors and suppliers

1.4.1.4. GECI’S SUB-CONTRACTOR SITE FOREMAN

The foreman will report on environmental activities to the site engineer and will be responsible for the following:
Implement and maintain environmental controls on site.
Attend to any spills or environmental incident that may occur on site.
Report any activity that has resulted, or has the potential to result, in an environmental incident immediately to the site engineer/environmental manager.
Ensure correct waste management procedures are being implemented.

1.4.1.5. EMPLOYEES

All employees engaged on the Construction/Installation tasks, of GECI o his subcontractors, are required to operate within the requirements of this CEMP.

2. ENVIRONMENTAL AND SOCIAL ENVIRONMENT

2.1. PHYSICAL ENVIRONMENT

2.1.1. 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).

Kiribati's exclusive economic zone (area of the ocean in which it controls fishing and other rights) covers more than 3 million km².

The Gilbert Group which is comprised of 17 islands has a total land area of 286 km². 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.
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 km2, 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.

2.1.2. LAND USE

Land at TRW is primarily leased from some 300 plus individual landowners. 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 (milkfish).

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.

The seawall at the eastern end of the runway is more substantial and was constructed as part of the Kiribati Adaptation Program. However during high tide waves were observed overtopping this seawall.

2.1.3 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 °C and the average minimum temperature is 25 °C.

Average rainfall in central Tarawa is over 2,000 mm (White, 2011). Drought conditions are usually associated with La Nina conditions. 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.

2.1.4 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.

2.1.5 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 30 m 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. These galleries will have a pump station for extraction and or a monitoring bore for collecting water quality samples.

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.

2.2. BIOLOGICAL ENVIRONMENT

2.2.1. 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 tonga 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.

Aggregates will be imported from Fiji. The project will also take necessary precautions and measures to ensure that the construction activities will not pollute the lagoon environment.

2.2.2. 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.

2.2.3. 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 in “Mitigation Measures”.

### 2.3. SOCIO-ECONOMIC CONDITIONS

#### 2.3.1. POPULATION AND DEMOGRAPHICS

The total population of Kiribati is 103,058 people (2010 Census). South Tarawa has an official land area of 15.76 km² and a population of 50,182 (52% female), giving a population density of 3,184 people per km² 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)

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

** This village is adjacent to the airport

#### 2.3.2. 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.

2.3.3. LIVELIHOODS AND ECONOMIC ACTIVITIES

The primary source of income in South Tarawa is from formal work (wage earners) but unemployment and underemployment 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.

2.3.4. 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.

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, sports fields, 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).
2.4. 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 °C 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 following figure for details of emission scenarios).

![Graph showing CO₂ concentrations over time](image)


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

The following Table 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.
Air temperature and sea level rise projections for the three emission scenarios and three time periods

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.

3. POLICY, LEGAL AND ADMINISTRATION FRAMEWORK

GECI will comply with all applicable laws and will carry out the appropriate procedures during the project execution in terms of environmental management is concerned.

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 CEMP 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”.

### 3.2. 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. old equipment) 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 CEMP. 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 CEMP 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 CEMP is a requirement of the funding agencies and local legislation so monitoring is an integral component of implementation.

4. ENVIRONMENTAL MANAGEMENT APPROACH

GECI has since 2005 an Environmental Management System based on ISO 14001:2004. This system is integrated into a Management System with other standards (ISO 9001:2008, EN 9100:2010, EN 9120:2011, AQAP 120). The general OBJECTIVES that GECI intends to meet by applying the directives define in its Management Policy on a daily basis are the following:

1. Make quality an essential element of the company’s culture.
2. Achieve the recognition and commitment of all GECI employees with the Company's Management Policy and develop a participative Management System that takes advantage of the abilities of the entire workforce.
3. Permanently optimize all the processes to reduce the cost of the “no-quality”.
4. Direct our Integrated Management System towards continuous improvement.
5. The continuous improvement of preventive actions can only be achieve through information, consultation and personal participation, at all company levels and classes.
6. Achieve a high level of safety and health at the workplace by meeting as a minimum, current legislation regarding occupational safety and health prevention.
7. Develop, apply and maintain a Prevention Management model aimed at constant improvement of the Working Conditions.
8. Ensure Company participation and information and make effective the right of workers to ask questions.
9. Pollution Prevention for protecting the environment.
10. Use natural resources in a rational way.
11. Promote adequate use and energy conservation.
12. Reduce the production of urban as well as hazardous residues and dispose or manage the properly.
13. Comply with the laws and regulations applicable to its activities and installations.
14. Promote the awareness and training of all personnel as well as partner companies (suppliers and subcontractors) in the understanding and acceptance of this policy as well as the rest of the Environmental Management System.
15. Periodically review this policy to update it with the purpose of establishing and reviewing the goals and objectives.

4.1. INTERLINKAGES WITH OTHERS DOCUMENTS

This plan should be read in conjunction with the following Project Documentation:
4.2. STAFF RESOURCING, COMPETENCE, ORGANISATION AND REPORTING STRUCTURE

Adequate staffing resources will be responsible of monitor and audit the effectiveness of the environmental management and protection procedures.

A simple and functional organisation and reporting structure will be established that reflects the hierarchy of responsibility for environmental management. This is documented in the chapter “1.1.2 ROLES AND RESPONSABILITIES”.

4.3. IMPLEMENTATION

4.3.1. METHOD STATEMENTS

This CEMP provides the project strategy for management of environmental issues and it’s complemented with the document “478D478-QL-01.C-TRW_Method Statements” setting out the operational requirements for maintaining a functioning airport throughout the construction process construction methodology to the staff involved in the works.

4.3.2. WORK INSTRUCTIONS (WIS)

Environmental work instructions (WI’s) are the most detailed form of environmental controls and provide “hands on” directions for on-site staff. They are related to specific environmental aspects on-site and provide clear and concise instruction to site personnel in dealing with situations such as:

- Environmental incidents (if any)
- Adverse weather conditions
- Complaints
- Controls and commitments detailed in the EMP
- A trigger point contained in the environmental inspection checklist or log
- General good site practice

4.4. CHECKING AND CORRECTIVE ACTION

4.4.1. MONITORING AND REPORTING

Monitoring is an integral part of the EMS as it establishes how the project is performing against objectives and targets set in the CEMP. A schedule and procedures for monitoring and reporting should be developed at the outset in order to:

- Identify any negative impacts from construction activities
- Assess the effectiveness of control measures
 Demonstrate compliance with regulatory conditions and objectives and targets set in the CEMP
 Identify if further controls/corrective action is required

Monitoring may be required as a result of a complaint, a request by a statutory body or a trigger point in an inspection or checklist being exceeded. Monitoring and reporting should also reflect any requirements identified or commitments made in the Method Statements.

4.4.2. ENVIRONMENTAL INSPECTIONS, AUDITS AND REGISTERS

In addition to the routine monitoring detailed above a schedule of regular inspections, audits and reporting will be required. These inspections etc. will provide a record of site conditions and activities and provide a mechanism by which GECI can establish the effectiveness of its CEMP.

These checklists and reports should be kept at each site office and should be updated and used in the day to day operation of the site.

4.4.3. COMPLIANCE AND NON-CONFORMANCE/CORRECTIVE ACTION REPORT

If criteria within the CEMP are not fulfilled and appropriate and corrective action is not taken a non-conformance may be raised by the environmental manager. Examples of circumstances where this may arise include:

 Receipt of a complaint regarding pollution or other environmental impacts caused by the project
 Departure from approved or agreed procedures
 Non-conformance identified as a consequence of any self-assessment, formal audit or other environmental survey or inspection

Corrective action may include changes to work instructions (frequency of testing, test method etc.), alterations to the MS, further staff training etc. Non conformances should be reviewed by the environmental manager and form part of construction meeting agendas.

In addition, non-conformance/corrective action reported to GECI by the client must immediately initiate corrective actions and, once completed, provide details of the actions undertaken on the non-conformance/corrective action report and return it signed to the client’s environmental manager within an agreed timeframe.

5. PROJECT DESCRIPTION

5.1. DESCRIPTION OF THE PHYSICAL WORKS

The equipment relative to the 5KVAs UPS, AGL as CCRs and RCMS Cabinet will be installed in the Equipment room of the ground floor in the ATCT Building, which is provided of air conditioner and a vertical construction duct to communicate all floors.
On the other part, the racks corresponding to AWS, VHF and NDB systems will be installed in the Library room located on the first floor of the ATCT Building.

5.1.1. **Civil Works**

- **Drawing: 478D478-DW-02.C-TRW LAYOUT SHEET 1**

  - Install foundation for Wind Direction Indicator / AWOS anemometer
    - Connect conduit for anemometer to existing SIT pit
    - Supply and install long sweep conduits bend for the WDI cables
- Install foundation for PAPIs adjacent to the existing PAPIs.

- Install SIT pits for each new PAPI foundation (4 pits)
  - Install one (1) 63mm diameter conduit from the existing sit pit and the new PAPI SIT pits.
  - Install a long sweep conduits bend for each PAPI Box (4 bends)

**Drawing: 478D478-DW-03.B-TRW_LAYOUT SHEET 2**

- Install foundations for AWOS equipment
  - Install the conduits required for the Sensor Station
  - Install long sweep conduits bends for Sensor Station
  - Connect conduit for Sensor Station equipment to existing new heavy duty pit type D pit

- Install one (1) new heavy duty pit type D (900x900x900) at cable entry point into the existing Control Tower building
  - Requires removal of two (2) existing SIT pits and connection of two (2) existing 63mm diameter conduits to new type D pit

- Install foundation for Generator container
  - Install two (2) 150mm diameter conduits from generator container to new heavy duty pit type D at Tower cable entry point
  - Install long sweep conduits bends for entry into generator container

- Install two (2) foundations for NDB Masts approximately 50m from the existing fence behind ATC building.

- Install foundation for NDB ATU
  - Install two (2) 63mm diameter conduits to extend from existing SIT pits to ATU
  - Install long sweep conduits bends for entry into ATU

**Drawing: 478D478-DW-04.B-TRW_LAYOUT SHEET 3**

- Install four (4) foundations for PAPIs
  - Connect conduit for PAPI equipment to existing SIT pit
  - Install a long sweep conduits bend for each PAPI Box (4 bends)
o Install foundation for Wind Direction Indicator

5.1.2. PAPI INSTALLATION

The PAPI installation must be performed as follows:

Threshold 09:

Threshold 27:
As per ICAO recommendations the correct location of the new PAPI system must be installed on the opposite side that where is projected but physically is not possible.

During the tasks of installation and adjustment, a surveyor will be present at all times checking the correct installation

5.1.3. UPS INSTALLATION

- Install the 5KVAs UPS rack in the Equipment room on the ground floor of the ATCT Building.
- Run and connect a power cables from the Main Distribution Switchboard of the ATCT Building to the UPS rack.
• Run and connect a power cable from the 5KVA UPS rack to the CCR and AGL control and monitoring cabinet.

• Install the 10KVA UPS racks in the Library room on the first floor of the ATCT Building.
• Run and connect a power cable from the Main Distribution Switchboard of the ATCT Building to the UPS racks.
• Run and connect a power cable from the 10KVA UPS rack to the different communication racks.

5.1.4. NDB INSTALLATION

The NDB installation tasks will include:

5.1.4.1. Transmitters Cabinet

• Install the Transmitters Cabinet in the Library room on the first floor of the ATCT Building.
• Run and connect a power cable from the 10KVA UPS to the Transmitter Cabinet.

5.1.4.2. Remote Control

• Install the Remote Control Panel on the desks of the ATCT Cab.
• Run and connect a communication cable from the Transmitter Cabinet to the Remote Control Panel through the vertical duct of the ATCT building.

5.1.4.3. ATU and Antenna

• Mount the masts fixing the corresponding guy-wires.
• Install the antenna extremes to both masts.
• Excavate and install the Radio Earth system.
• Install the ATU cabinet.
• Run and connect the Antenna and Radio Earth with the ATU.
Run and connect power and coaxial cables from the transmitter cabinet to the ATU through the new ducting.

5.1.5. **AWOS INSTALLATION**

The AWS installation tasks will include:

5.1.5.1. **SENSOR ARRAY**

5.1.5.1.1. **Wind Sensor**

- Install the ultrasonic wind sensor on the top of the windsock located near the 09 touchdown zone.
- The windsock height is low and it has an extension on top, so the wind sensor will be installed at a height of 9m.

5.1.5.1.2. **Other sensors**

- Install the other meteorological sensors on the concrete pads.
- Install the field data collector (FDC) with the sensors.
- Run and connect power and fiber optic data cables between the wind sensor and the FDC.

5.1.5.2. **AWS RACK**

- Install AWS central processor (CP) rack in the Library Room on the first floor of the ATCT Building.
- Run and connect a power cable from the 10KVAs UPS to the AWS central processor (CP) rack.
- Install AWS VHF radio antenna on the ATCT Cab Terrace.
- Run and connect coaxial cable between the VHF radio in the CP rack and the antenna.
- Run and connect telephone cable between the BT jack in the CP rack and a suitable telephone extension outlet in the ATCT Cab.
- Run and connect fiber optic cable between FDC in the meteorological station and the fiber optic path panel in the CP rack.
5.1.5.3. **REMOTE DISPLAYS**

- Install the AWOS workstation (remote display) in the ATC Cab.
- Run and connect Ethernet UTP cable between CP Rack and the remote display of the ATCT Cab.
- Install the AWOS workstation (remote display) in the Manager Office in the base of the ATCT Building.
- Run and connect Ethernet UTP cable between CP Rack and the remote display of the Manager Office.

5.1.6. **VHF INSTALLATION**

**5.1.6.1. VHF RACK**

- Install the VHF rack in the Library Room.
- Run and connect a power cable from the 10KVAs UPS to the VHF rack.

**5.1.6.2. REMOTE CONTROL PANELS AND STANDBY RADIOS**

- Install the two Radio Remote Controller Panels and Standby Radios in the desk of the ATCT Cab.
- Run and connect communication cables between Radio Remote Controller Panels and the VHF rack.

**5.1.6.3. ANTENNAS**

- Install VHF radio antennas on the ATCT Cab Terrace.
- Run and connect coaxial cables between the VHF radios in the VHF rack and antennas.
- Run and connect coaxial cables between the Standby Radios and antennas.
5.1.7. **GENERATOR CONTAINER**

- Install the container over the foundation.
- Run and connect a power cables from the main distribution board located outside of the ATCT Building to the ATS located inside of the 20’Generator Container

![Existing main distribution board](image1)
![20’Generator Container location](image2)

* For more information about the physical works, see the "478D478-SD-01.E-TRW_System Design Document" and "478D478-DW-XX.D-TRW_Reviewed Drawings."
5.2. CONSTRUCTION METHODOLOGY

5.2.1. Method statements

The Method Statements is a required document for any major construction works within the boundaries of an airport. It includes the concessions and alternative arrangements that may need to be made 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.

For more information, see the document “478D478-QL-01.C-TRW_Method Statements”.

5.2.2. CONSTRUCTION ACTIVITIES

The following construction activities are anticipated during construction phase of this project, please refer to Section 5.1 - DESCRIPTION OF THE PHYSICAL WORKS for additional info:

- Vegetation Clearance: Where vegetation are required to cleared for civil work (foundation, conduits, SIT PITs, etc.), manual labour will be utilize using hand held tool. Duration for vegetation clearance will be minimal except for proposed NDB area where 4-5 days are anticipated to clear all the vegetation.

- Earthwork: Manual labour and/or excavator/digger will be utilized for required earth needed for foundation, SIT-PITs and conduit installation. Duration for earthwork will be minimal since construction area is flat terrain except for proposed NDB area where an excavator/digger is required to be use for 3-4 days since sand/gravel mining was done previously at this location.

- Trenching: Some trenching work is anticipated to lay down the required conduits. Only manual labour with hand held tools will be utilize to do the trenching work. Please note that major trenching/conduit work has already been done by another contractor at this project. 3-4 weeks duration for required trenching/conduits is anticipated for entire project.

- Concrete Foundations: Concrete foundations for PAPIs, Diesel Generator, WDIs, and NDB components are required for this project. Manual labour with concrete mix machines (diesel & electricity operated) and concrete vibrator will be utilize to do the concreting work on this project. At environmental sensitive areas like at proposed location of NDB, only electricity operated concrete mix machine will be used. Concrete vibrator will be placed on plywood at environmental sensitive areas like at NDB proposed location. 3-4 weeks of concreting work expected for entire project. It is anticipated to finish all the concreting in one day at proposed location of NDB.

- NDB Equipment: NDB equipment like ATU radials and masts will be installed using manual labour. If it is necessary to bring crane to install masts, crane with not older than 5 years in good working condition with no oil dipping will be utilized at proposed NDB area. 2-3 days’ work is anticipated for installation of NDB equipment at proposed location of NDB.

5.2.3. MATERIALS AND EQUIPMENT

All materials and equipment for each component of the KAIP will either need to be imported or will be procured locally. 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 GECI but may include machinery used in construction activities or machinery to support construction processes. Please refer to Annex B for proposed schedule of equipment to be used on this project.

Excess materials not used (and unable to be re-used or recycled on island) may include excess 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...). Re-use or recycling of excess material and waste within Kiribati is only permitted with prior arrangement and approval by MCTTD.

**5.2.4. AGGREGATE SUPPLY**

Aggregate sources on Tarawa are very limited. All aggregates for the project will be imported from Fiji.

**5.2.5. CONSTRUCTION LAY DOWN AREAS**

Land availability on Tarawa is scarce and so there are not many options for positioning of the construction camp.

The proposed location for a construction camp is the ATC area is shown in the document "478D478-QL-01.C-TRW_Method Statements", sharing this area with the construction camp of the pavement contractor (McConnel Dowell) The construction camp is not a residential camp, existing local accommodation will be used.

As McConnel Dowell Company is using it from time ago, GECI will comply with their Environmental and H&S requirement where the camp is concerned.

Transport to and from the construction camp, particularly of materials and equipment, must occur on the existing road network as its stated in the "478D478-QL-01.C-TRW_Method Statements" 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 bonded area which is constructed with an impermeable base and water tight walls to contain the largest 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. 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.

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 bonded 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 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. These temporary parking and lay down areas will be managed in accordance with this CEMP and the main construction camp.

6. ENVIRONMENTAL AND SOCIAL IMPACTS

6.1. OVERVIEW OF IMPACTS

Some additional land acquisition for airport equipment installation or physical resettlement is required but 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. Additional land acquisition is required for installation of NDB equipment installation. It is observed that some sand and gravel mining was carried out previously at proposed location of NDB behind the tower building. An area of around 90 metres in diameter will also need to be cleared and levelled to allow for the installation of the 36 copper radials. Shallow and narrow trenches will be dug using hand held tools.

Once installed the radials will be buried using the existing excavated material (sieved if necessary). The copper stakes will be driven into the ground, using the digger. Please note that copper is relatively non-toxic, non-corrosive, non-permeable means it doesn't absorb other substances with which it comes into contact so it protects against contaminants to the water supply and copper is a natural material that has been proven to be safe to health. The impact on the hydrology (underground water) from the construction and from the installation of NDB is minimal since upon completion of the works most of the affected areas will be left open and clear of vegetation, to facilitate ongoing maintenance and monitoring of the equipment, and to ensure the performance of the equipment is not compromised. These areas include sufficient clearance around the masts and guy wires, the entire area occupied by the radials, and an access strip from the NDB installation to the ATC compound wide enough for utility vehicles. Existing vegetation will needs to be removed and proposed area will be levelled before installation of NDB equipment. The physical work (foundations, ATU – 36; 45m long copper radials and masts) for NDB at proposed location will be very small and this proposed area will remain open/available for rainwater catchment. The Proposed area where the NDB will occupy will need to be kept clear of vegetation including the area over the radials, and near the masts and guy wires to avoid damage from falling branches etc. It is recommended that ongoing mowing/clearing of the area by the airport maintenance staff will be required for proper NDB functionality.

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 CEMP and application of appropriate mitigation measures, most if not all the potential negative impacts can be prevented or minimized. These impacts are
expected to be limited to the following impacts, however any changes in design or construction methodology may result in a reduction of impacts or additional impacts that will require mitigation.

6.2. PRECAUTION / MATIGATION MEASURES

The following mitigation/precautions will be implemented during construction phase of the project:

- All plant and equipment will be in good condition and must be inspected prior to first use.
- Any items of plant and equipment with evidence of oil or fuel leaks will not be used in on the project especially at proposed NDB location area.
- Each item of plant will be inspected at pre-start and at end of each day for evidence of oil or fuel leaks. If leaks are detected the plant item will be repaired before re-entering the proposed NDB location area.
- Each item of mobile plant will be equipped with a spill response kit.
- All personnel involved with the works will be trained in spill response and awareness of sensitivity of water reserve.
- Any spills to soil will be immediately cleaned-up and contaminated soil will be disposed of in accordance with MNRE requirements.
- No re-fuelling will be permitted within the water reserve area.
- When equipment will not in-use, it will be removed from the water reserve area.
- No concrete wash-out will be permitted in the water reserve area.
- No open defecation of urination will be permitted in the water reserve area.
- No environmentally-hazardous materials will be stored within the water reserve area.

6.3. HISTORICAL DEVELOPMENT ACTIVITIES AND ENVIRONMENTAL IMPACTS

Historical development activities at TRW have had a detrimental effect on the environment due to equipment such as a roller and crusher were abandoned in Bonriki village and left to deteriorate. Vegetation is growing through some of the machinery indicating the length of time the equipment has been in situ. 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).

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 CEMP has been developed in accordance with these requirements 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.

GECI is responsible for implementation of this CEMP 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 GECI perform in accordance with their contract.

GECI must to remove from island old machinery and unserviceable equipment associated with the airport at completion of the project works as is stated in the document "478D478-QL-07_Solid Waste Plan".
6.4. ENVIRONMENTAL IMPACTS

6.4.1. SOLID WASTE

Refer to the document “478D478-QL-07_Solid Waste Plan”.

6.4.2. WATER RESOURCES

Freshwater will be required for workers and some construction activities (e.g. dust suppression and concrete 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 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.

6.4.3. BIOLOGICAL RESOURCES

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).

6.4.4. HAZARDOUS MATERIALS

Potential soil and surface water pollution from construction run-off with fuel and lubricants are expected to be temporary and minor, providing best practice methods. Work practices and mitigation measures for spills will be implemented, including spill response plan and bunded areas for storage (during construction and operation phase).

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 and or sampling and analysis of groundwater from local bores in the vicinity of the apron and above ground fuel tanks.

6.4.5. 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. These impacts will be short-term and affect different people at different times.
Impacts include noise during pavement resurfacing and possible effect of vibration. 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 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.

**6.4.6. EROSION AND SEDIMENT CONTROL**

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, and within the construction camp.

**6.4.7. AIR EMISSIONS**

Air pollution can arise due to improper maintenance of equipment and dust generation from excavations. 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.

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.

**6.4.8. 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.

Refer to the document “478D478-QL-01.C-TRW_Method Statements” for more information about the Traffic Management Plan and it specifies safety measures required for the operation of the airport when construction work is underway.

**6.4.9. WASTEWATER DISCHARGES**

Sanitary facilities for workers will be provided to prevent lagoons or other areas being used.

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.

**6.4.10. 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.

6.4.11. 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.

6.5. 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:

- 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.

6.5.1. HEALTH AND SAFETY

During construction and operation health and safety is to be managed through a Site Specific Safety Management Plan (See “478D478-QL-02_Health&Safety Plan”) and application of international environmental and health and safety (EHS) standards.

As the trench required for the navigation aids cabling is to be dug to a depth smaller than 1.5 m the sides of the trench will not 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 will be 30 m. Exposed trenches will be secured at night to prevent access by non-authorised personnel.

7. 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 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.

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.

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.

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 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 will 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. Consultation should be undertaken with residents to ensure hours of work are known and the procedure for complaints is readily available on signage.

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.

Pedestrian and vehicle safety will be an issue when transporting materials and equipment from the port and to and from the airport site and the construction camp. The TMP stated in the “478D478-QL-01.C-TRW_Method_Statements” details 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 will be carefully planned for at the pre-construction mobilisation stage. 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 tyres instead of washing to prevent dust.

Runoff from disturbed areas is not to be discharged directly to the marine or coastal environment. Sediment laden runoff is to be treated (via small settling pond or tank) and discharged to land (outside the water reserve protection area) or reused.

### 7.5. CONCRETE PLANT

The project requires a small concrete production on the island, so GECI will 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). 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. The ground of the construction camp will likely be compacted by the end of its use and so restoration will require scarification of the soil, application of topsoil and revegetation.
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.

### 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. GECI 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. 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 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 is to be removed from Kiribati at the completion of the work. GECI 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 are stated in the document “478D478-QL-07_Solid Waste Plan”.

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.

### 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.

### 8. MONITORING FRAMEWORK

The Monitoring Framework outlines the responsibilities of the MCTTD and GECI to monitor the environmental and social mitigation measures ensuring it is constructed and operated in a manner that is compliant with the regulations and CEMP commitments.

Monitoring shall start as soon as the project is given the go-ahead, and monitors shall be ready to be mobilized prior to the onset of construction activities. Monitoring shall be implemented throughout all project phases.

#### 8.1. MONITORING OBJECTIVES

The objectives of the Environmental Monitoring Framework are:

- To ensure project components are conducted in compliance with the laws and regulations.
To measure the success of proposed mitigation measures in minimizing and/or reducing potential environmental and socio-economic impacts.

To continuously monitor changes to baseline environmental and social conditions during construction and operation activities.

To implement corrective actions or new adaptive management programs, as required, if proposed mitigation measures are unable to reduce and/or eliminate potential project related impacts, or meet the predetermined level of performance.

8.2. MONITORING PLAN

The Environmental Monitoring Plan identifies the environmental monitoring requirements to ensure that all the mitigation measures identified in this CEMP are implemented effectively. Environmental monitoring methodology 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 CEMP will be advised to GECI in writing by MCTTD’s nominated Environmental Officer as required. The non-compliance notification will identify the problem, including the actions GECI needs to take and a time frame for implementing the corrective action.

The following table identifies the monitoring activities to be carried out during the during the pre-construction and construction phases of the project:

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>LOCATION</th>
<th>MONITORING</th>
<th>FREQUENCY</th>
<th>RESPONSIBILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DETAILED DESIGN / PRE-CONSTRUCTION PHASE</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Traffic safety</td>
<td>Design documents</td>
<td>Ensure TMP has been submitted and approved</td>
<td>Prior to sign off of final designs</td>
<td>Design Consultant</td>
</tr>
<tr>
<td>Aviation safety</td>
<td>Design documents</td>
<td>MOWP complete with details of flight schedules and emergency procedures.</td>
<td>Prior to sign off of final designs</td>
<td>Design Consultant</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Design documents</td>
<td>Construction scheduled for between May and December. Designs include erosion protection measures.</td>
<td>Prior to sign off of final designs</td>
<td>Design Consultant</td>
</tr>
<tr>
<td>PARAMETER</td>
<td>LOCATION</td>
<td>MONITORING</td>
<td>FREQUENCY</td>
<td>RESPONSIBILITY</td>
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<tr>
<td>Water supply</td>
<td>Design documents</td>
<td>Water reclamation systems included in designs (particularly terminal design).</td>
<td>Prior to sign off of final designs</td>
<td>Design Consultant</td>
</tr>
<tr>
<td>Importation of materials and equipment</td>
<td>Importation permits</td>
<td>Ensure inclusion in design and material specifications that material and equipment to be fumigated and free of contamination.</td>
<td>GECI to organize prior to export from country of origin.</td>
<td>GECI</td>
</tr>
<tr>
<td>Airport perimeter fence</td>
<td>Safeguards documents</td>
<td>Inclusion of consultation and public meeting details and minutes in the social and environmental safeguard documentation for the project. Bonriki village nominated representative identified for the Airport Safety committee and the KAIP Task Force Committee</td>
<td>Prior to issue of the Environment License</td>
<td>Design Consultant’s Safeguards Specialists and MCTTD</td>
</tr>
<tr>
<td>Agreement for waste storage</td>
<td>Construction Contractor’s records</td>
<td>Permits and/or agreements with local waste storage providers (e.g. Teinainano Urban Council and recycling contractors). Inspection of disposal sites. Permit and/or agreements with international waste facilities are in place (documented evidence) and correct transport containment methods are available.</td>
<td>Documentati on viewed prior to construction works starting weekly as applicable to schedule of works.</td>
<td>MCTTD</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Areas of exposed soil and earth moving</td>
<td>Inspections at sites to ensure silt fences, diversion drains etc. are constructed as needed. Inspection to ensure replanting and restoration work completed</td>
<td>Weekly inspection as applicable to schedule of works and after site restoration.</td>
<td>MCTTD</td>
</tr>
<tr>
<td>Waste storage</td>
<td>At construction sites</td>
<td>Inspection to ensure waste is not accumulating and evidence waste has been stockpiled for removal from island. At the end of the project ensure there is no remaining non-recyclable or reusable material remaining.</td>
<td>Weekly inspection as applicable to schedule of works and on receipt of any complaints.</td>
<td>MCTTD</td>
</tr>
<tr>
<td>PARAMETER</td>
<td>LOCATION</td>
<td>MONITORING</td>
<td>FREQUENCY</td>
<td>RESPONSIBILITY</td>
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<tr>
<td>Water and soil pollution</td>
<td>At construction sites</td>
<td>Inspection of sites to ensure waste collection in defined area; spill response plan in place and workers trained. Complete spill kits available where hazardous substances sorted and handled.</td>
<td>Weekly inspection as applicable to schedule of works and on receipt of any complaints</td>
<td>MCTTD</td>
</tr>
<tr>
<td>Dust and air emissions</td>
<td>At construction sites and adjacent sensitive areas.</td>
<td>Site inspections. Regular visual inspections to ensure stockpiles are covered when not in use and trucks transporting material are covered.</td>
<td>Weekly inspection as applicable to schedule of works and on receipt of any complaints</td>
<td>MCTTD</td>
</tr>
<tr>
<td>Noise</td>
<td>At work sites and sensitive locations</td>
<td>Site inspections to ensure workers wearing protective equipment when required. Measurement of noise level with hand-held noise meter not to exceed 70dB. Public signage detailing complaints procedure and contact people/person on display.</td>
<td>Weekly inspection as applicable to schedule of works and on receipt of any complaints</td>
<td>MCTTD</td>
</tr>
<tr>
<td>Storage of fuel, oil, etc.</td>
<td>At work sites and construction camp. Contractors training log.</td>
<td>Regular site inspections to ensure material is stored within bunded area and spill response training for workers completed. Visual inspection of spill kit for completeness and accessibility.</td>
<td>Weekly as applicable to schedule of works and on receipt of any complaints.</td>
<td>MCTTD</td>
</tr>
<tr>
<td>Vehicle and pedestrian safety</td>
<td>At and near work sites</td>
<td>Regular inspections to check that TMP is implemented correctly (e.g. flags and diversions in place) and workers wearing appropriate personnel protective gear.</td>
<td>Weekly inspection as applicable to schedule of works and on receipt of any complaints</td>
<td>MCTTD</td>
</tr>
<tr>
<td>Construction workers and staff safety (personal protective equipment)</td>
<td>At work sites</td>
<td>Inspections to ensure workers have access to and are wearing (when required) appropriate personnel protective equipment (e.g. for handling hazardous materials). WB/IFC Guidelines have been implemented.</td>
<td>Weekly inspection as applicable to schedule of works and on receipt of any complaints</td>
<td>MCTTD</td>
</tr>
<tr>
<td>PARAMETER</td>
<td>LOCATION</td>
<td>MONITORING</td>
<td>FREQUENCY</td>
<td>RESPONSIBILITY</td>
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<tr>
<td>Community safety</td>
<td>At work sites</td>
<td>Inspections to ensure signs and fences restricting access are in place and pedestrian diversion routes clearly marked (whether for access to a building or home or particular route).</td>
<td>Weekly inspection as applicable to schedule of works and on receipt of any complaints.</td>
<td>MCTTD</td>
</tr>
<tr>
<td>UXO</td>
<td>Known or suspected historical sites of fighting.</td>
<td>Adopt the procedures of the Kiribati Road Rehabilitation Project EMP (Version 3, October 2013), particularly Table 3: Environmental Monitoring Plan (page 45).</td>
<td>Continuous while work is occurring in high risk or suspected areas.</td>
<td>MCTTD</td>
</tr>
<tr>
<td>OPERATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accidents with hazardous materials or wastes</td>
<td>Airport sites</td>
<td>Accident report</td>
<td>Immediately after accident</td>
<td>ECD</td>
</tr>
<tr>
<td>Continuous while work is occurring in high risk or suspected areas.</td>
<td>On site</td>
<td>Inspection to ensure no visible sheen (hydrocarbon contamination) in discharge and inspection of maintenance records to ensure clean out of fuel spill interceptors occurring as per manufacturer's guidance. Inspection to ensure no blockages in drainage system.</td>
<td>When needed, particularly after storm events and during rainy season</td>
<td>MPWU</td>
</tr>
<tr>
<td>Wastewater management</td>
<td>Control tower</td>
<td>Proper maintenance of septic system</td>
<td>Quartery inspection (observation) at connection to septic system.</td>
<td>CAD</td>
</tr>
<tr>
<td>Solid waste collection and disposal (non-hazardous)</td>
<td>Control tower</td>
<td>Solid waste being collected and taken to approved disposal site (e.g. landfill)</td>
<td>To be arranged with Teinainano Urban Council as required</td>
<td>CAD</td>
</tr>
</tbody>
</table>
8.3. MONITORING PLAN REPORTING

Throughout the construction period, GECI will include results of the CEMP 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 GECI, 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 CEMP, 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.

The proposed major reports, as well as the individual roles and responsibilities for reporting are outlined in the following table:
<table>
<thead>
<tr>
<th>REPORT</th>
<th>PREPARED BY</th>
<th>SUBMITTED TO</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily Environmental Report</td>
<td>GECI's Sub-contractor Site Foreman</td>
<td>GECI's Site Engineer</td>
<td>Daily log of activities. Daily general discussion and communication with job site inspectors and contractors. Identification of specific issues and potential incidents. Forward planning and scheduling</td>
</tr>
<tr>
<td>Weekly Environmental Report</td>
<td>GECI's Site Engineer</td>
<td>GECI's Project Environmental Manager</td>
<td>On-going compliance activities, priority actions, review of completed and scheduled construction activities. Summary of incidents and reporting (as required).</td>
</tr>
<tr>
<td>Environmental Incident Report (as required)</td>
<td>GECI's Site Engineer</td>
<td>MCCTD/AECOM Project Environmental Manager and GECI's Project Environmental Manager</td>
<td>Issues, practices or incidents which may impact the environment. Actions taken to avoid, mitigate, investigate and respond to the incident, procedures for evaluation, follow-up of the success of actions taken and closure of actions.</td>
</tr>
<tr>
<td>Monthly Environmental Monitoring Report</td>
<td>GECI's Project Environmental Manager</td>
<td>MCCTD/AECOM Project Environmental Manager</td>
<td>Summary of monitoring data along with assessment of progress against CEMPs. Report on staffing and compliance issues. Summary of compliance auditing reports. Requirements for CEMP or procedure, reporting or communications adjustments. Record of any significant incidents and follow-up.</td>
</tr>
<tr>
<td>Internal Development Environmental Audit</td>
<td>GECI's Site Engineer</td>
<td>MCCTD/AECOM Project Environmental Manager</td>
<td>Assessment of progress against CEMP including non-compliance and corrective action reports where required.</td>
</tr>
</tbody>
</table>

**8.4. Non-Conformance, Incident and Corrective Action Reporting**

Where monitoring and/or audits indicate that performance does not conform to environmental management requirements, or further improvement in performance standards is necessary, corrective action will be required.

Investigation and corrective action procedures shall be established to:

- determine the cause of non-conformance
- identify and implement corrective action
- initiate preventative actions
- apply controls to ensure that preventative actions are effective
- Record any changes in written procedure resulting from the corrective action.
### Inspection Checklist

**CEMP Monitoring Plan Checklist**

<table>
<thead>
<tr>
<th>Location:</th>
<th>Auditor:</th>
<th>Audit Date/Time (Start):</th>
<th>Audit Date/Time (Finish):</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

#### Environmental Issue: Inspection areas: Requirements met?

<table>
<thead>
<tr>
<th>1.0 Construction Phase</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.1 Soil Erosion</strong></td>
<td>- Silt fences and diversion drains in place</td>
</tr>
<tr>
<td></td>
<td>- Replanting and restoration work completed</td>
</tr>
<tr>
<td></td>
<td>□ Yes ☐ No</td>
</tr>
<tr>
<td></td>
<td>If No, details:</td>
</tr>
</tbody>
</table>

| **1.2 Waste accumulation and Disposal Agreements** | - Good housekeeping around the work sites  |
|                                                    | - Waste stockpiled in defined areas with signage ready for removal  |
|                                                    | - Waste/recycling permits/agreements in place  |
| □ Yes ☐ No  |
| If No, details:  |

<p>| <strong>1.3 Soil and Water Pollution</strong> | - Waste collected in defined area on impermeable ground  |
|                                  | - Appropriate spill response plan/kit in place for waste area  |
|                                  | - Freshwater lens water quality result sighted, and any remedial actions implemented.  |
| □ Yes ☐ No  |
| If No, details:  |</p>
<table>
<thead>
<tr>
<th>Environmental Issue:</th>
<th>Inspection areas:</th>
<th>Requirements met?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 Construction Phase</td>
<td></td>
<td></td>
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</tbody>
</table>
| 1.4 Dust | – Stockpiles covered or kept wet when not in use  
– Visual inspection of ambient dust conditions  
– Truck transports are covered | ☐ Yes ☐ No  
If No, details: |
| 1.5 Noise | – Workers wearing ear protection as required  
– Noise level maximum of 70dB | ☐ Yes ☐ No  
If No, details: |
| 1.6 Hazardous Substance Storage (fuel/oil) | – Hazardous substances within bund on impermeable surface  
– Spill kit complete and accessible  
– Spill training completed | ☐ Yes ☐ No  
If No, details: |
| 1.7 Traffic Management Plan Implementation | – Traffic Management Plan (TMP) implemented  
– PPE is being worn by workers | ☐ Yes ☐ No  
If No, details: |
| 1.8 Personal Protective Equipment Use | – Workers have access to, and using appropriate, PPE for the task. | ☐ Yes ☐ No  
If No, details: |
| 1.9 Community Safety | – Public signage of complaints procedure  
– Signs and fences restrict or direct pedestrians and public where appropriate | ☐ Yes ☐ No  
If No, details: |
| 2.0 Operational Phase |                  |                   |
| 2.1 Drainage Maintenance | – Inspect to check for blockages and debris, particularly after storm events | ☐ Yes ☐ No  
If No, details: |
| 2.2 Septic System Maintenance and Upkeep at Control tower | – Quarterly inspection of connections to system, for leaks | ☐ Yes ☐ No  
If No, details: |
## Environmental Issue:

**Inspection areas:**

### 1.0 Construction Phase

<table>
<thead>
<tr>
<th>Inspection areas</th>
<th>Requirements met?</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3 Solid Waste Collection / Disposal from Control Tower</td>
<td>Solid non-hazardous waste being removed to council approved disposal site</td>
</tr>
</tbody>
</table>

If No, details:

## Actions Required

<table>
<thead>
<tr>
<th>Issue No.</th>
<th>Action Required?</th>
<th>By Whom?</th>
<th>Date Action Required?</th>
</tr>
</thead>
<tbody>
<tr>
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</table>
Signoff

Signature: ___________________________   Date: ___________________________

ANNEX A

PLANS AND DETAILED DESIGNS
ANNEX B

SCHEDULE OF EQUIPMENT
SCHEDULE OF EQUIPMENT

The following equipment are proposed to be utilized on the construction phase of the project:

1. **Excavator / Digger**

![Excavator](image1)

MAKE: Hyundai  
Model: Robex 140w-9  
Year of Manufacturer: 2013  
Recent Service Date: TBD

2. **Power Generator Set**

![Power Generator](image2)

MAKE: PRESCOTT  
Model: PG0330002  
Year of Manufacturer: 2016  
Recent Service Date: Bought in 12/2016
3. Electrical Chain Saw

MAKE: MAKITA
Model: UC3520A
Year of Manufacturer: 2016
Recent Service Date: Bought in 12/2016

4. Concrete Mixer - Diesel

MAKE: BATON
Model: UNKNOWN
Year of Manufacturer: 2014
Recent Service Date: 12/2016
5. Concrete Mixer - Electrical

![Concrete Mixer](image1)

MAKE: BATON
Model: UNKNOWN
Year of Manufacturer: 2016
Recent Service Date: Bought in 11/2016

6. Concrete Vibrator – Petrol

![Concrete Vibrator](image2)

MAKE: ROBIN
Model: EY 20 3C
Year of Manufacturer: Unknown
Recent Service Date: 12/2016