Environmental Management Plan

Cassidy Airport to London Village Road Rehabilitation
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Prepared for
Government of Kiribati

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<th>Description</th>
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<tr>
<td>CAD</td>
<td>Civil Aviation Directorate</td>
</tr>
<tr>
<td>Category B</td>
<td>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.</td>
</tr>
<tr>
<td>CEP</td>
<td>Contractor’s Environmental Plan</td>
</tr>
<tr>
<td>Contractor</td>
<td>The civil works contractor awarded the contract for the road rehabilitation works as specified in the Bidding Documents Procurement of Rehabilitation of Kiritimati Cassidy Airport Road.</td>
</tr>
<tr>
<td>CXI</td>
<td>Cassidy International Airport</td>
</tr>
<tr>
<td>ECD</td>
<td>Environment Conservation Division of the Ministry of Environment, Land and Agriculture Development</td>
</tr>
<tr>
<td>EMP</td>
<td>Environmental Management Plan</td>
</tr>
<tr>
<td>GoK</td>
<td>Government of Kiribati</td>
</tr>
<tr>
<td>HAT</td>
<td>Highest astronomical tide</td>
</tr>
<tr>
<td>IATA</td>
<td>International Air Transportation Association</td>
</tr>
<tr>
<td>ICAO</td>
<td>International Civil Aviation Organisation</td>
</tr>
<tr>
<td>KAIIP</td>
<td>Kiribati Aviation Infrastructure Investment Project</td>
</tr>
<tr>
<td>KANGO</td>
<td>Kiribati Association of Non-Governmental Organisations</td>
</tr>
<tr>
<td>maneaba</td>
<td>A community’s central meeting house where communal concerns are discussed, and decisions taken about matters that affect the whole community.</td>
</tr>
<tr>
<td>MCTTD</td>
<td>Ministry of Communication, Transport and Tourism Development</td>
</tr>
<tr>
<td>MELAD</td>
<td>Ministry of Environment, Land and Agriculture Development</td>
</tr>
<tr>
<td>MPWU</td>
<td>Ministry of Public Works and Utilities</td>
</tr>
<tr>
<td>NZAid</td>
<td>New Zealand Government’s Aid Programme</td>
</tr>
<tr>
<td>PEO</td>
<td>Principal Environment Officer</td>
</tr>
<tr>
<td>PMU</td>
<td>Project Management Unit</td>
</tr>
<tr>
<td>QMP</td>
<td>Quarry Management Plan</td>
</tr>
<tr>
<td>RPF</td>
<td>Resettlement Policy Framework</td>
</tr>
<tr>
<td>Stakeholder</td>
<td>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.</td>
</tr>
<tr>
<td>Supervision Consultant</td>
<td>Consultant engaged to undertake project management, detailed design and supervision of contractors on behalf of GoK.</td>
</tr>
<tr>
<td>TMP</td>
<td>Traffic Management Plan</td>
</tr>
<tr>
<td>TOR</td>
<td>Terms of Reference</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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Executive Summary

The Kiribati Aviation Infrastructure Investment Project (KAIIP) aims to improve Kiribati’s airport infrastructure, meet International Civil Aviation Organisation (ICAO) standards (for international airports), and to ensure sustainable operation of the civil aviation sector in Kiribati. This Environmental Management Plan (EMP) has been prepared for the Cassidy Airport to London Village road rehabilitation investment under the KAIIP to meet funding and Kiribati legislative requirements. The Ministry of Communication, Transport and Tourism Development (MCTTD), through the Ministry of Public Works and Utilities (MPWU), is responsible for road infrastructure development and maintenance.

This EMP looks to outline the potential environmental impacts and the measures needed to prevent, minimise, or mitigate adverse impacts and improve environmental performance for the road rehabilitation investment. This includes rehabilitation works on improving the road surface, road safety measures (e.g. street lighting and signage), and drainage works.

Overall the KAIIP is a Category B project under World Bank (WB) environmental and social screening guidelines and requires development of the project EMP. Category B projects have potentially limited adverse social or environmental impacts that are few in number, site-specific, largely reversible, and readily addressed through mitigation measures. The Cassidy Airport to London Village road rehabilitation investment is also a Category B project. This EMP is a dynamic document which must be updated if the road designs vary in order to address potential impacts and revise mitigation measures as required. This EMP includes information on mitigation, monitoring, capacity development and training, and implementation costs (in accordance with WB Operational Policy 4.01 Environmental Assessment).

The majority of potential adverse impacts will occur during the construction phase of the road rehabilitation. However given that this primarily involves the rehabilitation of existing infrastructure, mitigation measures should be able to alleviate or lessen any potential negative impacts. The key potential impacts that are being mitigated are:

- Solid waste generation
- Soil erosion through vegetation clearing
- Hazardous materials handling and storage
- Noise and vibration disturbances from machinery and transportation of materials
- Air pollution from dust and equipment
- Traffic disruption during construction activities
- Transport of quarry and fill materials
- Disposal of waste materials
- Safety hazards for workers and users of the facilities where upgrades are occurring
- Water demand management for freshwater resources
- Wastewater discharges
- Rehabilitation of disturbed areas

This EMP is designed to address these issues through:

- Implementation of this EMP through the Contractor’s Environmental Plan.
- Regular supervision and monitoring of the implementation of the EMP (refer EMP monitoring plan).
1.0 Introduction

The Kiribati Aviation Infrastructure Investment Project (KAIIP) aims to improve Kiribati’s airport infrastructure, meet International Civil Aviation Organisation (ICAO) standards (for international airports), and to ensure sustainable operation of the civil aviation sector in Kiribati. This Environmental Management Plan (EMP) has been prepared for the Cassidy Airport to London Village road rehabilitation investment under the KAIIP to meet funding and Kiribati legislative requirements. The Ministry of Communication, Transport and Tourism Development (MCTTD), through the Ministry of Public Works and Utilities (MPWU), is responsible for roading infrastructure development and maintenance.

An over arching EMP for all investments funded through the KAIIP has been prepared to provide a high level review of potential impacts and mitigation measures for all investments providing guidance for detailed designs and more development of investment specific EMPS. This EMP is specific to the Cassidy Airport to London Village road rehabilitation investment and builds on the KAIIP EMP by detailing investment specific issues. All impacts and mitigation measures outlined in the KAIIP EMP relevant to the road rehabilitation investment have been incorporated and expanded in this specific EMP.

Funding for the Cassidy Airport to London Village road rehabilitation has been provided by the World Bank (WB).

1.1 Environmental Management Plans

The KAIIP EMP pertains to all investments of the KAIIP of which the Cassidy Airport to London Village road rehabilitation is a part of. A number of funding agencies have agreed to fund different components of the KAIIP project including the WB, therefore, in accordance with the WB funding requirements their safeguard policies are applied to all components of the KAIIP project.

The KAIIP is a Category B project under WB environmental and social screening guidelines and requires development of the overall project EMP and specific investment EMPS. The road rehabilitation investment is also a Category B project, as the project works are expected to have moderate site specific and reversible environmental impacts for which mitigation measures can be readily designed and implemented. In accordance with the WB Operational Policy 4.01 Environmental Assessment this EMP includes information on mitigation, monitoring, capacity development and training, and implementation costs. The EMP outlines the potential environmental impacts and the measures needed to prevent, minimise, mitigate or compensate for adverse impacts and improve environmental performance.

This EMP is a dynamic document which must be updated if there are variations to the detailed designs or information as a result of ongoing consultation requires it. Effective implementation of the EMP is a requirement of the WB and so monitoring is an integral component of implementation. A Monitoring Plan is included in Section 9 of this EMP. This EMP is to form part of the procurement documents for the road rehabilitation contract awarded under the KAIIP and will form the basis of the Contractor’s Environmental Plan (CEP). Development of this EMP has been based on reliable secondary information and information gathered from those who are familiar with the road rehabilitation scope, construction methodology and have conducted site visits of the existing road route.

---

1 Terms of Reference on Detailed Design and Supervision of Kiritimati Cassidy Airport Road and Preparation of Safeguard Documents; Aide Memoires, planning documents and correspondence; GoK Kiribati Road Rehabilitation Project Environmental Management Plan; Kiribati legislation; ADB technical assistance reports for recent growth centre and population development projects; Pacific Programme for Water Governance Kiribati reports.
2.0 Road Rehabilitation Investment Description

2.1 Overview of Works

The Government of Kiribati wishes to undertake surface rehabilitation to the main road from London Village to the Cassidy Airport (CXI) (locally called the A1 road) for a total length of approximately 30 kms including the airport feeder road, the port link road and the fish market in London Village.

The road, built in the 1950s, was surfaced with 25 to 40mm Marshall Asphalt which is now in a poor condition. It has only received minor repairs by the MPWU. Following a road condition survey (RCS) undertaken in June 2011, distressed sections of road requiring different rehabilitation needs have been identified and specific treatments recommended by specialist consultants. Due to the low traffic volume (approximately 100 vehicles per day) pre-treatment and resealing of most of the road has been proposed. Three seal types were investigated, a sand seal, a polymer modified seal and Otta seal. The Otta seal was selected as the most appropriate seal type for the existing road condition (surface cracks but structurally sound), available materials and labour requirements for ongoing maintenance. The Otta seal requires a bitumen rejuvenation spray followed by application of the Otta seal binder and aggregate, and finished with a sand binding layer.

Reconstruction is proposed for the specific distressed sections identified in the RCS. These sections are: London village Fish Market approximately 60 metres, Tennessee to JSS School approximately 450 metres, Port link road approximately 250 metres, and the cemetery approximately 1000 metres. Reconstruction will include a 200mm base course followed by the Otta seal and in the area of the cemetery it will be milled and base replaced up to a depth of 70mm and finished with the Otta seal.

Treatment details for each section of road are outlined below and correspond to the detailed design drawings and technical specifications in the procurement documents.

<table>
<thead>
<tr>
<th>Road Section</th>
<th>Chainage</th>
<th>Proposed Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish Market Pavement and Surfacing</td>
<td>Outside road chainage (Length 60m)</td>
<td>This section requires the existing basecourse to be repaired and re-compacted and sealed with a new Asphalitic Concrete (mix 14) (AC14) surfacing.</td>
</tr>
<tr>
<td>Port to Main Road (250m)</td>
<td>CH3.145 to Port</td>
<td>Reconstruct existing base as subbase, provide a 200mm base course and seal using 40mm AC14.</td>
</tr>
<tr>
<td>London to Oil Company (1,300m)</td>
<td>CH-0.135 to CH1.165</td>
<td>Rejuvenate the existing sealed surface and reseal using an Otta seal.</td>
</tr>
<tr>
<td>Oil Company to Tennessee (935m)</td>
<td>CH1.165 to CH2.100 (speed hump)</td>
<td>Rejuvenate the existing sealed surface and reseal using an Otta seal.</td>
</tr>
<tr>
<td>Tennessee to JSS (450m)</td>
<td>CH2.100 to CH2.550</td>
<td>Reconstruct existing base as subbase, provide a 200mm base course and seal using a membrane seal and 40mm AC. Some concrete works in the form of edge restraints and/or mountable kerbs are required. Refer to latest drawings for details and extent.</td>
</tr>
<tr>
<td>JSS to Cemetery (12,450m)</td>
<td>CH2.550 to CH15.000</td>
<td>Rejuvenate the existing sealed surface and reseal using an Otta seal.</td>
</tr>
<tr>
<td>Cemetery (1,000m)</td>
<td></td>
<td>Rejuvenate the existing sealed surface and reseal using an Otta seal.</td>
</tr>
</tbody>
</table>

The total estimated quantity of material for the aspects of the road rehabilitation is as follows:
- Base course 1,260 m³
- Asphaltic Concrete 1,500 m³
- Otta Seal 170,000 m² (single coat – 2 coats to be applied)

To enhance road safety, solar street lighting and pedestrian signs are proposed at schools, government buildings and public gathering places. Existing pedestrian crossings and speed humps will be retained and repainted. Additional work in terms of the construction of concrete edge restraints is proposed in critical areas to prevent deterioration of pavement edges (e.g. high pedestrian areas and road intersections). Drainage improvements are proposed in terms of shoulder reshaping and vegetation clearance (4m shoulder). The road will have a 3% camber to stop ponding of water on the road surface and allow runoff to shoulder drains. Currently the road shoulder in many places is higher than the road surface due to build up of sand and vegetation creating problems with ponding and localized flooding on the road surface. The soil on the island is highly porous therefore provided vegetation is cleared and the road shoulder is lower than the road surface, water will be able to freely flow into the surrounding soil.

This is predominantly a surface rejuvenation project which will occur straight over the existing road surface. Only those sections identified above will require reconstruction to correct major structural failures. The road width will follow the existing seal surface and for the most part is approximately 6.7m.
Figure 1 is a general plan of Kiritimati which shows the road route, villages, and key infrastructure. The plan shows the location of the Cassidy Airport and the main road from the airport to London. An A3 version of this map is provided in Attachment 1. Typical cross sections and intersection layouts of the road rehabilitation are also included in Attachment 1.

2.2 Construction Methodology

The contract for the physical works of the road rehabilitation has not yet been awarded, so the precise methodology is unknown. However the detailed design is complete and provides an indication of the nature of the work. The CEP will address specific methodological measures or impacts.

2.2.1 Material and Equipment

Most of the materials (excluding aggregate), equipment and tools for this type and scale of work are not available on Kiritimati and so will be brought in by ship or air freight. All cargo will need to be processed in accordance with Kiribati laws. Equipment could include crushers for quarrying activities, loaders and excavators, mobile bitumen plant etc.

2.2.2 Quarrying/ Borrow Pits

Aggregate testing for the Cassidy Airport runway upgrade identified suitable material at a quarry site south west of the Airport (refer Figure 3, section 3.1.4). If suitable, material from this area could be used for the road rehabilitation. The quarry is located in an area with no settlements or development nearby. It is located on the edge of the designated environmental protection area for the Island’s bird sanctuary, but is some a long way from the wildlife sanctuary areas classed as closed districts (refer section 4 for explanation). Plate 1 and 2 below show the current operations at the existing quarry.
Plate 1  Current quarry operations (south west of Cassidy Airport)

Plate 2  Crushing and sorting equipment in operation at the existing quarry
The quarry is currently being mined by Downer EDI, the civil works Contractor for the Cassidy Airport runway upgrade. There is a QMP in place and they hold the current environment and mining licenses for the site.

It is the civil works Contractor's responsibility to ensure permits and licenses are in place for any existing quarries or borrow pits or apply for new permits and licenses as required for aggregate mining. A Quarry Management Plan must be prepared for each quarry or borrow pit site which outlines the opening activities, operations, site closing activities and the environmental effects and management of them. The Contractor is to determine the most appropriate quarry site(s) based on test results for suitable aggregate. Mining Licenses and Environment Development Licenses must be applied for by the civil works Contractor for each quarry or borrow pit required. Licenses can take approximately 4-5 months if an Environmental Impact Assessment is required and consultation takes place.

Approximately 8,500m$^3$ of aggregate from the quarry is required for the road rehabilitation with additional aggregate from cut and undercut of the existing road. The crushing and preparation of aggregate will be done at the quarry site. The current extraction rate is approximately 25% of material quarried. Waste material will be used to restore the quarry once operations cease.

### 2.2.3 Construction Camp and Temporary Lay Down Areas

The Contractor is responsible for identifying the most suitable temporary construction camp for offices and storage of equipment and materials, and any temporary lay down areas required along the route of the road rehabilitation. The location, size and exact details of site management (including health and safety, solid waste management, water management and wastewater management) and restoration of the site once work is finished must be documented in the Contractor's environmental plan and be approved by MCTTD and the Supervising Consultant. The following elements need to be considered when developing a construction camp or lay down area.

Construction camp size should be kept to a minimum, be fenced (if easily accessible to the general public) and materials and equipment kept secure to prevent access and use by non authorised personnel. Ideally existing hard stand (e.g. unused Airport hardstand or MPWU depot) could be used for the main construction camp to reduce the need for vegetation clearance and impact on local habitat, water resource demands and waste management. Noise, dust, vibration and increased traffic are impacts that can negatively affect communities and sensitive receptors. When selecting the location of the construction camp or lay down areas consideration needs to be given to the proximity of residential dwellings, hospitals, schools, and community facilities to ensure minimal impact on the well-being of the community. The nearest settlement to Cassidy Airport is Banana village, approximately 1km west of the Airport.

Transport to and from the camp(s), particularly of materials and equipment, must occur on the existing road network and measures undertaken to prevent dust, noise and vibration nuisance (e.g. wheel wash, covering of loads, servicing of vehicles). If the transport of material or equipment is likely to impact on normal pedestrian and vehicle traffic or pose an increased safety hazard, consideration should be given to moving these items during off peak times. Hard stand areas must be available for storage of hazardous substances and other equipment that poses a potential risk to the environment (e.g. leaking lubricant from machinery). Runoff from hard stand areas used to store machinery will need to be collected and treated (e.g. oil water separator) to prevent contamination of soil or water bodies. Hazardous substances (e.g. fuel, lubricants or oil) must be stored in a bunded area.

Solid waste and wastewater must be managed in such a way to prevent the spread of vector-borne diseases and contamination of soil and water bodies. There are four formalised waste disposal cells on Kirimati Island managed by the Kirimati Island Council (KIC). However there is pressure on these landfill sites and so all solid waste not able to re-used either by the project or community must be removed. There is no sewer network on the island.

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

Temporary lay down areas for stockpile of material or equipment may be suitable to reduce the need to transport items on the road. All temporary stockpiles must be kept small (no higher than 2m) and bunded to prevent dust and sediment laden runoff being generated. If need be the stockpiles should be wetted or covered to prevent dust. Lay down areas should not be sited near sensitive receptors or within the water reserve protection areas or environment conservation designations (refer Figure 4). Any land required for a temporary lay down area will need to be negotiated with the landowner or lease holder as per the KAIIP Resettlement Policy Framework (RPF).
2.2.4 Duration of Construction Activities

Construction activities should be scheduled to occur between May and December as this is considered the dry season where rain and excess winds are likely to be less frequent. Construction activities near settlements should be confined to between 7.30am and 6pm from Monday to Friday and 8am to 4pm on Saturday, with the majority of works occurring outside of peak times (8-9am and 4-6pm). When works are to be carried out near sensitive receptors (e.g. school, hospital) then consultation should be undertaken with the affected facility and suitable operating hours determined.

No work shall be carried out on Sundays or public holidays with the exception of plant maintenance, work to ensure the security of the Site, or traffic way maintenance, unless prior approval of the Supervision Consultant is obtained.
3.0 Description of Kiritimati Environment

3.1 Physical Environment

3.1.1 Location and Geography

The Republic of Kiribati is composed of small islands located between Longitude 170 degrees East and 150 degrees West in the Central Pacific Ocean, on either side of the equator. See Figure 2 for the general location of Kiribati and a map of the islands. The three groups of islands namely the Gilberots, the Line and the Phoenix are coral atolls with the exception of Banaba which is a raised limestone island. Of the 33 islands comprising the Republic of Kiribati only 21 are inhabited.

![Kiribati location map and Islands](http://www.kiribatitourism.gov.ki/index.php/aboutkiribati/maps)

Figure 2 Kiribati location map and Islands

Kiritimati has the largest land area of any coral atoll in the world and measures 384.5 km$^2$. The atoll rises to approximately 13m above sea level on the southeast peninsula. The lagoon is approximately the same size as the land area and opens to the ocean on the north western side.

3.1.2 Climate

Due to its geographical location, Kiribati has a predominantly hot dry equatorial climate with prevailing south easterly winds most of the year. Temperatures vary between 25°C and 33°C with maximum possible annual sunshine of 4,134 hours. Kiritimati Island experiences average temperatures between 28°C and 29°C. The wet season extends from December to May. Kiritimati Island is located in an equatorial dry zone and is drier than most other islands with an average rainfall of 975mm per year. Kiritimati Island regularly experiences droughts during La Niña conditions.

Low temperatures are experienced during heavy downpours accompanied by strong winds over long periods. Easterly trade winds of 10 to 20 knots prevail. Prolonged drought periods are not uncommon and can result in the loss of many valuable food crops including coconuts ($Cocos nucifera$) and breadfruits ($Artocarpus sp.$).

3.1.3 Soils

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.

### 3.1.4 Water Resources

Freshwater resources in Kiritimati are extremely vulnerable to over extraction and contamination from pollution and salt water intrusion. Groundwater in the form of freshwater lenses overlying seawater, are the primary source of water on the island. The upper surface (groundwater table) of a freshwater lens is typically about 1.5 to 3 m below ground and varies with the tide and rainfall. Rainwater harvesting is increasing but is not yet widely practiced. The high porosity of the soils means that there are no surface freshwater resources. The freshwater lenses on Kiritimati Island are listed in Table 2 below and shown in Figure 3.

<table>
<thead>
<tr>
<th>Major Freshwater Lenses</th>
<th>Minor Freshwater Lenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decca*</td>
<td>Tabwaka (formerly known as Lease village)*</td>
</tr>
<tr>
<td>Four Wells*</td>
<td>North West Point*</td>
</tr>
<tr>
<td>Main Camp*</td>
<td>Poland village</td>
</tr>
<tr>
<td>Banana*</td>
<td>Area between Poland and Paris</td>
</tr>
<tr>
<td>New Zealand Airfield</td>
<td></td>
</tr>
</tbody>
</table>

* Lenses located along the road rehabilitation route

Source: Falkland and White, 2007

Figure 3 Approximate boundaries of major and minor freshwater lenses along the road rehabilitation route (adapted from Falkland and White, 2007)

Water reserve protection areas are designated over the main water lenses on Kiritimati. However there are no regulations in place on Kiritimati protecting these water reserve protection areas. Urban areas are placing higher demands on water supply and any development needs to consider water demand and sanitation carefully both during construction and operation. Figure 4 shows a general land use plan of Kiritimati including conservation areas and water reserves. The road rehabilitation follows the main road from London village (shown as Ronton on the plan) to Cassidy Airport and passes over two water reserve protection areas and environmental conservation areas. The first protection area contains the Decca and Four Wells lenses and starts at approximately CH7,500 and extends to CH14,500. The second protection area incorporates Banana village and the airport and contains the Main Camp and Banana lenses. This area starts at approximately CH22,000 and extends beyond the end of the road rehabilitation project area. The exact demarcation of the water reserve protection areas must be confirmed on site with GoK Officials.

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3.2 Biological Environment

3.2.1 Coastal Resources

The coastal areas of Kiritimati are characterized by white sandy beaches, reef flats, reef patches, lagoons, scrub 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.

Ministry of Fisheries and Marine Resources is responsible for the management of marine resources including production of aggregates and sand from the coastal areas. Preventing the destruction of marine resources including coral reefs is necessary. Therefore, all material to be used for the road rehabilitation investment shall be sourced from approved quarries or borrow pits and be extracted in such a way that it does not cause significant adverse environmental impacts on the coastal and marine environment. While the road is some distance from the lagoon, all necessary precautions and measures will be taken to ensure that construction activities will not pollute the lagoon environment. These include provision of toilet facilities for workers and diversion of runoff from disturbed areas.

3.2.2 Forest Resources

Kiritimati Island is vegetated by low shrubland and grassland. The only woodland is open coconut palm (Cocos nucifera) plantations with small groves of Catchbird Trees (Pisonia grandis), at Southeast Point, Northwest Point, and on Motu Tabu. There are approximately 50 introduced plant species found mostly around settlements, former military sites and roads. The only vegetation clearance associate with the road rehabilitation will be along the road shoulders (see Plate 3).
Beach Naupaka (\textit{Scaevola taccada}) is the most common shrub and dominates the vegetation on much of the island, either as pure stands or interspersed with Tree Heliotrope (\textit{Heliotropium foertherianum}) and Bay Cedar (\textit{Suriana maritima}). Bay Cedar is dominant on the drier parts of the lagoon flats where it grows up to 2m tall, and Tree Heliotrope is found slightly inland from the sea or lagoon shore. The wetter parts of the lagoon shore are often covered by abundant growth of Shoreline Purslane (\textit{Sesuvium portulacastrum}).

3.3 Socio-Economic Environment

3.3.1 Population

The original inhabitants of Kiribati are Gilbertese, a Micronesian people. Approximately 90\% of the population of Kiribati lives on the atolls of the Gilbert Islands. Owing to overcrowding in the capital on South Tarawa, in the 1990s, a program of directed migration moved nearly 5,000 inhabitants to outlying atolls, mainly in the Line Islands.

Kiribati’s population, as at the 2005 census was 92,533 people, estimated to increase to 101,000 by 2010\(^4\). The population of Kiritimati was 5,115 people (2005 census) living in four settlements on the island, Tabwakea (1,881 people), London (1,829 people), Banana (1,170 people), and Poland (235 people). The settlement of Paris, located on the south eastern peninsula, is no longer listed on the census report but anecdotal information suggests that a small number of people have recently settled here again.

3.3.2 Economy

The country's economy is predominantly subsistence, with copra, seaweed and fisheries as the main source of foreign exchange earnings. Kiribati’s per capita GDP of US$ 700 is one of the lowest in the world. Only 14.2\% of the workforce participates in the formal wage economy and over 60\% of all formal jobs are in South Tarawa. The Kiritimati Island economy is dominated by the services sector, accounting for about 80\% of total GDP for the island. The GDP of Kiritimati Island is estimated at 8.6\% of the estimated national GDP for 2005, which corresponds to the island’s population share of 6.1\%.

There is a high import dependency, a low level of exports and small-scale manufacturing activity for the local market (e.g. bakery, building materials) on the island. The primary export from the island is pet fish and overall exports account for 7\% of GDP. Tourism is estimated to account for around 11\% of GDP.

Most islanders engage in subsistence activities ranging from fishing to the growing of food crops like bananas, breadfruit, and papaya. Other exports include copra (which accounts for about two-thirds of national export revenue), aquarium fish, shark fins, and seaweed.

\(^4\) The next census was completed in 2010, however results have not yet been published.
3.3.3 Infrastructure, Public Services and Utilities

The infrastructure of Kiribati is generally rudimentary. Whenever practicable, roads are built on atolls, and connecting causeways between islets are also being built as funds and labour permit. All-weather roads exist in Tarawa and Kiritimati. A 2010 traffic count found 40% of the vehicles were passenger vans, 32% were light 4 t trucks, and 28% were passenger cars\(^5\).

There are 21 airports/ airstrips, three of which were constructed to international standards and the remaining are used only for small domestic aircraft. The international standard airports are located on Kiritimati, Tarawa, and Kanton with only Kiritimati (Cassidy Airport) and Tarawa (Bonriki Airport) currently serviced by international flights.

Vehicle movement on Kiritimati Island mostly consists of light motor vehicle movements between London and Banana villages (approximately 24km). This is estimated at less than 100 vehicle movements per lane per day. Heavy vehicle movements do not form a daily pattern and are rather dependant on the once a week arrivals and departures of aircraft from the Cassidy Airport. The nature of these movements is however light and mainly consisting of airfreight and deliveries on the Island. The speed limit on the island is 50km/h however there are no regulatory signs enforcing this speed limit. Speed humps are found on approaches to schools, churches, villages and community facilities (e.g. sportsfield and library).

Heavy vehicle traffic is mostly associated with the transportation of jet fuel from the port to the fuel depots in London and Banana villages. It is estimated that the jet fuel delivery to the airport generates a traffic loading of about 220 Equivalent Standard Axles (ESA's) per year. Container deliveries from the port to the business enterprises on the Island are estimated to generate an additional 100 ESA’s per year. The estimation of the fuel delivery is based on 5 refuel operations per month of approximately 15,000 litres each, delivered by trucks of 10,000 litre capacities.

There is currently no public transport system on Kiritimati so bus stops have not been allowed for in this contract.

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4.0 Environmental Regulatory and Institutional Framework

MCTTD, the Project’s implementing agency, has engaged the Supervision Consultant to provide engineering expertise and supervision for the roading rehabilitation. The Environment and Conservation Division (ECD) may also be involved in ensuring Kiribati environmental regulations are adhered to including any inspections or pollution response call outs. All land on Kiritimati is Government owned, except for some freehold plots in Tabwakea and Poland villages. Land is leased from the Government for 25 year periods. The Land Planning Ordinance (Cap. 48) and the State Land Act 2001 apply to land leases and ownership on Kiritimati.

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 for the administration of the environment including providing for sustainable development and implementing the Environment Regulations (2001). 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 EMP is equivalent to the Environmental Impact Assessment required under the Environment Act 1999 (Part III). The civil works Contractor will be responsible for obtaining all necessary development Environmental permits and consultation that may be required as directed by the PEO. 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 road rehabilitation.

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 road rehabilitation requires aggregate) must apply for a Mining License and will need a Quarry Management Plan in support of the Mining License application.

Existing Environmental Licenses can be transferred with written approval from the PEO. Given the potential aggregate source for the road rehabilitation project is an existing quarry, if the existing Environmental License is still valid it may be able to be transferred. Written application must be made with the PEO.

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. Kiritimati Island has been listed as a wildlife sanctuary under Schedule 2 of the Wildlife Conservation Ordinance. “Closed areas” are wildlife sanctuary areas which are only accessible by license holders, wildlife wardens and public officers. The area lying north and west of the Decca Waterhole and the A1 road (the road in this project) is listed as a “closed area” in Schedule 2. The following islets within Kiritimati are also listed as “closed areas”: Cook Island; Motu Tabu; Motu Opua. These closed areas are outside the project area.

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. Kiritimati Island is not listed in the Prohibited Areas Ordinance. The Closed Districts Act 1990 allows for parts of islands to be declared for conservation purposes. On Kiritimati the following areas (refer to Figure 4) are closed to non-license holders: Ngaontetaake; Dojin; Tanguoua; Koil; Toyota; Mouakena; Motu Tabu; Motu Upua; and Cook Islet. None of these areas are near the road rehabilitation project route.

Figure 4 in Section 3.1.4 shows the general land use plan for Kiritimati Island. This plan allows for the controlled development of land on the island and forms the basis by which State lands can be selected for development within the short and longer term6. The existing road passes through land which has been set aside for water reserve protection and environment conservation. The Land Planning Ordinance (Cap.48, 1977) is the legal instrument that allows for these designations and defines a general land use plan as "indicating the use or class of

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use to which every part of the land depicted thereon may be permitted to be put on for development or 
redemption”. Therefore no further development is allowed for outside the village development areas (as 
shown on Figure 4). The road is the main road on the island and this project is for the rehabilitation of the road 
surface for continued operation.
5.0 Information Disclosure, Consultation and Participation

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

5.1 Consultation

Consultation regarding the overall KAIIP and specifically Bonriki Airport and Cassidy Airport has been undertaken. However it is understood that consultation specifically for the Cassidy Airport to London Village road rehabilitation has not taken place since completion of the detailed design. Further consultation, including release of this EMP and identification of Affected Persons (APs) is scheduled to take place in early 2012 (most likely February or March).

It should be noted that the road rehabilitation will occur within the existing designations and involve existing infrastructure. Therefore no physical displacement is anticipated and environmental impacts will be localised, occurring primarily during the construction phase. APs will probably not be titled land-holders. The RPF (section 4.2) outlines categories of potentially displaced persons. All APs will be taken into account, regardless of age, sex or social status. Individuals suffering project related loss of assets of income will be recognised. The foreseeable categories of displaced person are:

- Vehicle users of the 23 kms of road between Cassidy Airport and London, affecting most of the population of around 6,000, and an estimated 1,500 motor vehicles
- Pedestrians - men, women and children using the Cassidy Airport – London road on Kiritimati Island to access their villages, schools and other public infrastructure, places of work or recreation
- Informal stall or shop operators within the road reserve
- People who may informally cultivate sections of road reserve, or gather firewood, timber or produce from road verges
- Graziers of animals using the road reserve.

The RPF outlines how this consultation should be managed and includes details of a sample plan for focus group discussions (Appendix D), socio-economic survey for APs (Appendix E), and the entitlement matrix (Appendix F).

The consultation process should involve (but not limited to) representatives of the Kiritimati Local Council; Council of Elders and Council of Women; local NGOs and civil society organisations; residents particularly village leaders, public representatives such as elders or church leaders, youth, women’s groups or associations, of London, Tabwakea, and Banana; local business people and small enterprises; and, as well as families potentially affected by the rehabilitation activities. Public consultations should be based in maneaba (a community’s central meeting house) as the most appropriate avenue for addressing the communities and identifying affected individuals. Separate meetings should be held for women as they do not traditionally speak at the maneaba.

5.1.1 Sensitive Receptors

Along the route of the road rehabilitation there are a number of sensitive receptors and community significant facilities where specific consultation will need to take place, before and during construction activities. This is particularly related to traffic management (pedestrian and vehicle) and access. Sensitive receptors include the hospital (not directly on section of road works, but access needs to be maintained) and schools. Other community facilities include the police station (CH0.390), churches, local markets and cemeteries. Refer to Figure 1 for location of community facilities.
Plate 4 JSS School located at CH2,300, school is set well back from the road
Plate 5  JSS School entrance from road, approximately CH\$4,425
The road traverses through London, Tabwakea, and Banana villages. Residential homes are also considered sensitive receptors, so direct consultation will need to be undertaken with residents adjacent to the road to ensure access is maintained and to deal with any encroachment from structures (e.g. road side stall, fence) or crop (e.g. fruit tree).

5.2 Disclosure

Disclosure does not equate to consultation (and vice versa) as disclosure is about transparency and accountability through release of information about the project. The draft KAIIP EMP and RPF have been made available on the WB Infoshop website, GoK websites (e.g. Environment Conservation Division website) and in hard copy at selected GoK offices (most applicable and accessible) and community centres. A draft of this road rehabilitation EMP should also be made available online (WB and GoK websites) and hard copies available at GoK offices and community centres on Kiritimati. A follow up Project Information Bulletin (PIB), specifically for the road rehabilitation, will be produced by MCTTD and published in local media and maneaba. Full details of disclosure are documented in the RPF.
6.0 Environmental and Social Impacts

The Cassidy Airport to London Village road investment is for rehabilitation of the existing road pavement and improved road safety. New land acquisition is not expected to be necessary and the investment is unlikely to cause any major negative environmental or social impacts. A KAIIP Resettlement Policy Framework (RPF) has been prepared for the overall project which will be invoked should any activities extend beyond the current road corridor. The RPF addresses any land acquisition (even if temporary), assets acquisition, impacts to assets, and any impacts to businesses, formal or informal (including temporary relocation). The RPF allows for the development of an Abbreviated Resettlement Plan (ARP) or Resettlement Plan, depending on the severity of impacts, should any of the impacts described in the RPF (summarised above) be encountered. At this stage it is not envisaged that an ARP will be required. However any vegetation clearance or lay down areas required outside the current road corridor will require negotiation with residents. If necessary an ARP or Resettlement Plan must be developed.

Possible negative impacts related to the road rehabilitation are expected to be confined to the construction segments and the construction camp. Affected people will be notified during consultation and disclosure for the RPF. Where appropriate warning notices will be posted. With timely and proper implementation of this EMP and application of appropriate mitigation measures, most if not all the potential negative impacts can be prevented or minimized. These impacts are expected to be limited to:

- **Solid waste.** Generation of excess excavated materials and construction waste. Scarification, replacement of unsuitable road material and clearing of road shoulders of excess soil and vegetation would lead to the generation of excess soil and debris waste. This waste will be used in restoring the quarry or by local communities. Any waste material that cannot be used in restoration of disturbed sites or by the community must be removed from the island by the contractor.

- **Soil erosion.** Although no major clearing of vegetation is envisaged, some soil erosion may occur as a result of the removal of shrubs and earth cover during resurfacing, and restoration of pavement areas and drainage. The impacts on vegetative cover will be short-term and reversible through natural regeneration. There is only a thin topsoil layer in most parts and runoff is easily filtered into the underlying freshwater lenses. Where topsoil is required to be cleared this will be set aside for use in restoration of disturbed areas.

- **Hazardous materials.** Potential soil and water pollution from construction run-off with fuel and lubricants are expected to be temporary and minor. Work practices and mitigation measures for spills will be implemented, including spill response plan and bunded areas for storage (during construction and operation phase). There are no formal hazardous substance disposal facilities on the island, therefore all hazardous waste must be removed upon completion of the project.

- **Noise and vibration disturbances.** Noise and vibration disturbances are particularly likely during construction related to the transportation of construction materials and truck traffic. These impacts will be short-term and affect different people at different times. Impacts include noise during road resurfacing and possible effect of vibration caused by operation of heavy machinery, increased traffic in some sections of roads, etc. Generation of noise and vibration will also occur at quarry and borrow pit sites. Where possible these are to be located away from inhabited areas.

- **Air pollution.** Air pollution can arise due to improper maintenance of equipment, dust generation and the bitumen smoke / fumes arising from application of Otta seal and road maintenance work. Impacts are expected to be localised and short term with only minor negative impact on the ambient air quality in the vicinity of the construction areas. No ongoing impact to air quality is expected as this is rehabilitation of an existing road.

- **Traffic and road safety.** Impacts will occur during the road resurfacing and maintenance works, and also in transporting quarried aggregate but will be short-term and through good mitigation and traffic management the impacts should be low. The Contractor is responsible for developing and implementing a Traffic Management Plan (TMP). The TMP will need to consider pedestrian traffic as well as vehicle traffic management, and particular attention will need to be given to management near sensitive receptors (schools, residential dwellings, markets etc). Generally traffic and road safety should be improved once the construction works are completed with improved drainage, road surface and safety measures (e.g. street lighting, pedestrian crossings).
- **Safety hazards.** During construction and operation health and safety is to be managed through a Site Specific Safety Management Plan and application of international environmental and health and safety (EHS) standards. The primary hazards identified are construction on a public road under normal traffic conditions, construction works involving hot bituminous products (up to 165 °C), and working in extreme ambient temperatures.

- **Water demand management.** 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 unit for non-potable water purification.

- **Wastewater discharges.** Sanitary facilities for workers will be provided at all sites to prevent lagoons or other areas being used.

- **Protection of water reserve areas.** Impacts on the fresh water reserve protection areas are expected to be minimal and short term but can be effectively managed through mitigation and careful planning of construction activity within the reserve areas. For example stockpiles should be located outside the reserve areas, no lay down or storage areas to be located within the reserve areas, and soil compaction and vegetation clearance (road shoulders only) kept to a minimum. There is also a potential for contamination from future spills or crashes which may occur on the road within the reserve areas. This project will rehabilitate the surface of the existing road, built in the 1950’s. Therefore any current impacts on the freshwater lenses are not expected to change.

- **Quarry or borrow pits.** Potential adverse impacts from uncontrolled quarrying or mining are high and include all of the above listed impacts. The Contractor is responsible for developing a Quarry Management Plan (QMP) for suitable aggregate supply location(s). The QMP will be provided in Environmental and Mining License applications and will outline how the site will be managed and restored. The primary concern in the quarrying of aggregate in coastal regions is the removal of the protective fore dune which on Kiritimati Island is a rubble mound of dead coral washed up during storm surges. This protects inland areas from seawater inundation and coastal erosion. The existing quarry site has left this protective mound in place and does not infiltrate the underlying water table (seawater due to proximity to coast).

The social outcomes of the road rehabilitation are expected to be positive by improving safety, accessibility and mobility of island communities. There will also be a need for temporary construction workers. No land acquisition is required thus no physical resettlement will be necessary.
7.0 Mitigation Measures

Due to the nature of the rehabilitation activities proposed there are some mitigation measures which should be applied to the length of the road as the works progress. Sensitive receptors and environmental values have been identified along the route which will require specific mitigation measures for safety and environmental protection. These universal mitigation measures are outlined in Attachment 2, Table A2.1. 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 road rehabilitation detailed design has been completed with reference to the KAIIP EMP. Any future changes to the detailed design and during the pre-construction phase of works this EMP must be referenced and any site specific environmental impacts or mitigation measures can be incorporated into the construction, also informed by feedback from stakeholder consultations. This EMP should also be updated to include any variation from the current scope or addition of newly identified impacts and mitigation measures that may arise through the bidding and contracting process, if not addressed in the CEP.

7.1 Site Specific Mitigation Measures

7.1.1 Aggregate Quarrying

For the Cassidy Airport runway upgrade investment a government owned borrow pit at the north eastern point of Kiritimati Island just south of the airport was identified as being able to supply the necessary aggregate for the runway rehabilitation. Provided the material is suitable this quarry could be used to provide aggregate for the road rehabilitation as well. The Contractor will need to confirm this. The Contractor will be responsible for ensuring that a QMP is been prepared along with the necessary Environmental and Mining License applications are made. The QMP will incorporate details of quarry opening activities; quarrying operations; quarry closing activities and environmental effects and how these will be managed. The borrow pit is located away from any settlements; however impacts from dust and noise will need to be managed for the site workers and to ensure that these are not transferred off site. The quarry site will include all crushing and sorting operations.

The following bulleted points identify potential effects from quarrying and how these can be mitigated. Details of which should be provided in the QMP.

**Destruction of habitat.** The potential quarry site is an existing quarry site so no further habitat degradation is anticipated. However if an alternative site with no previous quarrying activity is identified then an assessment of vegetation cover (including quantity and quality) and terrestrial, avian and aquatic life habitats will need to be completed by a suitably qualified Environmental Specialist.

**Sediment and erosion.** Runoff on the site must be managed to prevent ponding and scouring of slopes. Clean water diversion drains must be used to direct runoff away from disturbed areas and other diversion drains used to direct sediment laden runoff to settlement ponds or filtration devices before discharge to land or water body. Sediment fences can be used at the bottom of slopes to protect undisturbed land or water bodies.

**Dust generation.** Dust can be generated from earth moving activities, crushing, and transport. Due to the porosity of the ground only freshwater should be used for wetting of exposed areas (e.g. stockpiles, tracks, exposed aggregate). Revegetation should take place when areas are no longer actively being used.

**Water demand management.** Freshwater is a valuable resource in Kiritimati and already supply and demand issues are arising. Therefore the quarry activities cannot place any more pressure on the island’s freshwater supplies. Where possible, rainwater harvesting should be set up and nonpotable (e.g. drinking water for workers) demands quantified for ongoing management and planning.

**Health and safety.** All workers must be trained to operate machinery they are assigned to operate, have available PPE suitable to their tasks (e.g. dust mask, protective footwear), and be trained in the site’s accident and spill response plans.

**Hazardous substances.** Storage of hazardous substances must be in bunded, hard stand areas and handling of hazardous materials must be as per manufacturer’s directions including use of required PPE.

7.1.2 Hazardous Substance Use and Storage

The road passes through water protection areas. The open terrain allows for groundwater recharge during rain events. Therefore hazardous liquids (e.g. fuel and lubricants) must be managed within hardstand and bunded
areas to prevent runoff to surrounding permeable ground. A spill response plan must also be in place and all workers trained in correct implementation of the spill response plan.

There are also a number of sensitive receptors along the road rehabilitation route; JSS School, Tennessee School, St. Francis School, London Village, Tabwakea Village and Banana Village. It is particularly important that care be taken when hazardous substances are used near these receptors. Consultation should be undertaken with the schools to determine suitable times for work given pedestrian traffic at the start and end of the school day. This information should be included in the TMP.

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

7.1.3 Road Safety and Traffic Management

The road from London Village through to the airport is the main road on the island therefore access along the route must be maintained at all times, whether through diversions or one way traffic management. The hospital while not located on the section of road to be rehabilitated is at the northern tip of London Village so island residents must be able to access the hospital at all times. Safety will be a primary concern during road rehabilitation. Mitigation of potential safety impacts will be managed through development and implementation of a Traffic Management Plan (TMP) produced by the Contractor for implementation during construction. The TMP shall include details of lay down areas (to be negotiated with individual land owners as required, refer RPF), site entry and exit layout, use of signage and flag operators (including night-time safety), and personnel protective equipment to be worn by workers (e.g. high visibility vests).

As this is an existing road the corridor has already been established. Construction activities for the rehabilitation of the road surface can be managed through good design and implementation of measures as outlined in Table A2.1.

7.1.4 Stormwater and Water Management

Groundwater recharge is very important for freshwater supply on Kiritimati therefore the road rehabilitation has been designed with a 3% fall from the centre line to allow water to drain freely from the road surface. During resurfacing the road shoulders will be regraded where required and cleared of vegetation to allow water to infiltrate the porous soil into the water lenses. This is an existing road built in the 1950’s and there is not expected to be any changes in number of vehicles or potential for contamination of the freshwater lenses.

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. Where possible rain water should be collected or non-potable water should be used, provided there will be no risk of contamination of groundwater. Non-potable water can be treated to use in construction (e.g. mobile osmosis unit).

7.1.5 Bitumen, Asphalt and Concrete Plant

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

The project requires the installation of concrete edge restraints in selected areas. It is unknown whether the edge restraints will be prefabricated off island, at a concrete plant on the island or in-situ. If the edge restraints are to be constructed on the island care needs to be taken with slurry and runoff from the concrete. Concrete production should only take place when there is no rain forecast. Concrete slurry is highly acidic and cannot be diluted. Sand bags or diversion drains must be used to divert runoff from concrete cutting or setting areas. Any concrete fines and debris must be collected and disposed of as a hazardous substance. Wastewater from concrete cutting or production must be collected and treated. All equipment used in concrete production must be cleaned in designated wash down areas away from surface water and outside the freshwater lens protection reserves.

7.1.6 Construction Camp

The construction camp will be used to store equipment and materials for 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 secure to prevent access by unauthorised personal. Areas within the compound must be
clearly marked for solid waste collection, machinery maintenance, hazardous substance storage, plant operations (concrete, bitumen, asphalt) and toilet facilities for workers. Each of these areas must be constructed in such a way to prevent any potential adverse impacts on the surrounding environment. Including hard stand areas, protection from wind and rain, bunding (hazardous substances), clean water diversion drains, and collection and treatment of waste water from site operations (e.g. concrete production, machinery maintenance).
8.0 Roles and responsibilities

The MCTTD is ultimately responsible for delivery of the KAIIP project (including all investments), funding received and contracts awarded under the KAIIP. MCTTD is the Implementing Agency in regards to funding received from donors including the WB. A Project Management Unit (PMU) will be established to undertake the day to day management of the project. Aspects of the monitoring required by the EMP will be undertaken by the Supervision Consultants on behalf of the PMU and MCTTD. The Supervision Consultant for the Kiritimati Island civil works investments is AECOM New Zealand Ltd. The implementation of this EMP is the responsibility of the contractor awarded the contract for the civil works. The diagram below shows the reporting and responsibilities for this EMP.

The Environment Conservation Division (ECD) has a statutory responsibility to respond to pollution complaints, and issuing of development licenses. MPWU will work alongside the Supervision Consultant in order to capacity build within the department and for ongoing maintenance of the road seal.

8.1 Training and Capacity Building

Personnel from the MPWU will work alongside the Supervision Consultant to capacity build and gain a better understanding of the type of road 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 Environmental Monitoring and Compliance Division to work with the Contractor and Supervision Consultant’s environmental officer.

An indicative training budget is as follows:

- Training for Contractor’s and PMU / MPUW personnel (on site training in Kiritimati) US$ 5,000-7,000
- Procurement of 2 noise meters for monitoring (plus duty and delivery) US$ 1,000
- Miscellaneous (e.g. ECD participation) US$ 2,000
- TOTAL Budget US$ 10,000
9.0 EMP Compliance and Monitoring Plan

9.1 Contingencies, Complaints and Incident Reporting

It is recommended that the Contractor prepare a Tsunami Preparedness Plan and ensure that in the event of a Tsunami alert all staff are fully aware of their responsibilities in respect of human safety and environmental risk reduction. The procedure should clearly delineate the roles and responsibilities of staff, define the functions to be performed by them, the process to be followed in the performance of these functions including tools and equipment to be kept in readiness, and an emergency medical plan. All of the Contractor’s staff should undergo training/induction to the Plan.

Environmental complaints and incidents should be referred to the Supervision Consultant’s Environmental 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
- 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.

9.2 Monitoring Plan

The Environmental Monitoring Plan identifies the environmental monitoring requirements to ensure that all the mitigation measures identified in this EMP are implemented effectively. Environmental monitoring methodology (refer Attachment 3, Table A3.1 for details) for this project includes:

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

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

9.2.1 Monitoring Plan Reporting

Throughout the construction period, the Supervision Consultant will include results of the EMP monitoring in a monthly report for submission to the GoK and financing agencies. 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, including relevant complaints received through the RPF Grievance Mechanism.
- Key environmental issues to be addressed in the coming month.
A day to day contract diary is to be maintained pertaining to administration of the contract, request forms and orders given to the Contractors, and any other information which may at a later date be of assistance in resolving queries which may arise concerning execution of works. This day to day contract diary is to include any environmental events that may arise in the course of the day, including incidents and response, complaints and inspections completed.
Attachment 1

Figure 1  Kiritimati Island road rehabilitation overall layout plan (A3 size)
Figure 3  Kiritimati Island general land use plan (A3 size)
Typical cross sections of road rehabilitation
Typical intersection layout
I, Honourable Tema Onorio, Minister of Environment, Lands and Agriculture Development, approve this amended plan.
TYPICAL INTERSECTION:
LAYOUT PLAN
CH 2-889 (Yellow CL)
NOT TO SCALE
Attachment 2

Environmental Management Plan – Impact and Mitigation Tables
<table>
<thead>
<tr>
<th>POTENTIAL NEGATIVE IMPACT</th>
<th>ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES</th>
<th>IMPLEMENTING LOCATION</th>
<th>ESTIMATED MITIGATION COSTS</th>
<th>EXECUTING AGENCY</th>
<th>SUPERVISING AGENCY</th>
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<tbody>
<tr>
<td></td>
<td><strong>DETAILED DESIGN/ PRE-CONSTRUCTION STAGE</strong></td>
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<tr>
<td>Road traffic safety</td>
<td>Include traffic management (e.g. signage) for quarry or borrow pit entrance and exits in the Contractor Quarry Management Plan(s) (as required). Provide for Traffic Management Plan to be developed by Contractor, to include signage, flag operators, personnel protective equipment (e.g. high visibility vest), and specific actions to be implemented around sensitive receptors (e.g. residential dwellings, schools, markets). TMP to include vehicle and pedestrian traffic. Include renewal of any signage (e.g. speed limits) or other traffic calming measures (e.g. speed bumps) in design for ongoing safety of road users.</td>
<td>Quarries and /or Borrow Pits</td>
<td>Minimal (requirement of bidding documents)</td>
<td>Design Consultant</td>
<td>MCTTD</td>
</tr>
<tr>
<td></td>
<td>Soil erosion</td>
<td>Schedule earthworks and construction activities outside of wet season (Dec to May). Minimize erosion and design erosion protection measures according to international best practice standards, including incorporation of effective drainage systems (for groundwater recharge) and consideration of surface flow paths.</td>
<td>Length of road rehabilitation</td>
<td>Minimal (part of standard design practices).</td>
<td>Design Consultant</td>
</tr>
<tr>
<td></td>
<td>Water and soil pollution</td>
<td>Road design should have sufficient camber (designed for 3%) to ensure rainwater flows off the road to side drains or permeable lands. Ensure any drainage designed allows for infiltration into freshwater groundwater lens. Include clearing of road shoulders of vegetation and excess soil to allow water to flow freely off the road.</td>
<td>Length of road rehabilitation</td>
<td>Minimal (part of standard design and construction practices).</td>
<td>Design Consultant</td>
</tr>
</tbody>
</table>

**CONTRACTOR SET UP AND CONSTRUCTION STAGE**
<table>
<thead>
<tr>
<th>POTENTIAL NEGATIVE IMPACT</th>
<th>ENVIRONMENTAL AND SOCIAL MITIGATION MEASURES</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Traffic (vehicle and pedestrian) and construction safety</td>
<td>Implement the traffic management plan to ensure smooth traffic flow and safety for workers and passing vehicle and pedestrian traffic. Where appropriate, employ flagmen on the road to prevent traffic accidents. The workers shall have relevant safety equipment. Arrange necessary measures for pedestrian and passer-by safety and all means of transportation safety (e.g., establish protection zones, bypass these areas during transportation of materials, etc.) Special care must be taken when construction works reach the schools (JSS, Tennessee and St. Francis schools). Coordination with School Representatives must occur for safe passage of students and parents through a construction area.</td>
<td>Length of road rehabilitation JSS and Tennessee School (CH2100 to 2500); St. Francis School (CH6000)</td>
<td>Safety equipment included in construction cost.</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
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<tr>
<td>Soil erosion</td>
<td>Minimise time and size of ground disturbing activities to workable size at any one time. Install silt fences and diversion drains as required around earthworks areas and stockpiles. Keep construction vehicles on defined tracks. Encourage revegetation of disturbed areas (loosen ground; apply topsoil; or seed or plant) that are not being paved as soon as practicable. Borrow and disposal sites no longer in use to be restored as per the approved QMP.</td>
<td>Length of road rehabilitation Quarry / borrow pits</td>
<td>Minimal (part of standard construction practice).</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
</tr>
<tr>
<td>POTENTIAL NEGATIVE IMPACT</td>
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<tr>
<td>Waste disposal</td>
<td>Ensure all construction waste material is recycled or disposed of at an approved waste disposal facility/area. Ensure waste collection and disposal areas are clearly marked/sign posted to avoid cross contamination. Install waste collection facilities at construction camps to allow for collection and disposal at an approved facility/area. Strictly no dumping of rubbish. Include awareness training in general environmental training. Workers must be provided with a sanitary system to prevent fouling of surface water or surrounding soils. Allow for re-use of as much material as possible either within the specific project, other investments, for community use, or rehabilitation of borrow pits.</td>
<td>Length of road rehabilitation Construction camp(s)</td>
<td>Minimal (part of standard construction practice).</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
</tr>
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<tr>
<td>Water and soil pollution</td>
<td>Develop a spill response plan and provide training to all contract workers on how to implement the spill response plan in order to minimise risk to groundwater and surrounding soil. When planning construction camp ensure bunded areas and hard stands are allocated for the storage of fuel, lubricants and other potential hazardous substances required for the project. Lubricants shall be collected and recycled, or disposed of according to Kiribati regulations. Zones for preliminary accumulation of wastes are designated in areas that will cause no damage to the vegetation cover or leach into groundwater. Arrange transport and disposal of wastes according to the established procedure and in the approved dump sites designated for the specific purpose. There is a water reserve protection area surrounding the water purification works (CH 9700) and around Banana village. Vegetation and soil clearing must be restricted to the shoulder only and stockpiling of material should be kept to a minimum or only occur outside the reserve area to prevent pollution or compaction of the surrounding soil.</td>
<td>Length of road rehabilitation Construction camp(s)</td>
<td>Minimal (part of standard construction practice).</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
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<tr>
<td>Generation of dust</td>
<td>Identify and locate borrow sites, waste disposal sites, stockpile sites and crusher sites to minimize impacts on the environment and nearby population. Ensure all equipment serviced and issued with warrant of fitness (as required). Determine adequate water supply for dust suppression during construction phase. Use closed/covered trucks for transportation of construction materials. Cover stockpiles containing fine material (e.g. sand, topsoil) when not actively being used. Keep hard stand work areas clean with regular sweeping. Due to freshwater supply constraints large scale water sprinkling should be kept to a minimum and only used near sensitive receptors (e.g. hospitals or schools). Seawater or brackish water should not be used due to potential salination of underground freshwater or surrounding soils, however non-potable freshwater can be used. Only small areas should be cleared of vegetation at any one time and revegetation should occur as soon as practicable. Dust masks and personnel protective equipment must be available for workers during dust generating activities (e.g. at quarry sites).</td>
<td>All locations (road corridor, construction camp, stockpile / lay down areas, quarry)</td>
<td>Minimal (part of standard construction practice).</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
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<tr>
<td>Noise and vibration disturbances</td>
<td>Minimise nuisance from noise, especially closer to residential areas, through establishment and communication to affected parties of standard working hours (07:30 to 18:00, Monday to Friday and 08:00 to 16:00 Saturday). Adjust working hours nearby schools and other similar institutions to avoid disturbing their routine operations. Regularly check and maintain machinery, equipment and vehicle conditions to ensure appropriate use of mufflers, etc. Workers in the vicinity of sources of high noise shall wear necessary protection gear.</td>
<td>Length of road rehabilitation</td>
<td>Minimal (part of standard construction practice)</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
</tr>
<tr>
<td>Loss of archaeological artefacts or sites</td>
<td>Work to stop in specific location of unearthed artefacts or site and MCTTD or Supervision Consultant notified immediately for instruction to proceed.</td>
<td>All locations (road corridor, construction camp, stockpile / lay down areas, quarry)</td>
<td>No marginal cost</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
</tr>
<tr>
<td>Water supply</td>
<td>Obtain necessary approvals as required for access to freshwater (potable and non-potable).</td>
<td>Length of road rehabilitation</td>
<td>Minimal (part of standard design practices)</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
</tr>
<tr>
<td>Quarries, borrow pits and construction debris/spoils disposal sites.</td>
<td>Identify existing, licensed/approved quarries, borrow pits and waste disposal sites that could be used for the project. To the extent possible eliminate the need for opening new borrow pits and waste disposal sites. Apply for necessary permits and develop QMP(s) as required.</td>
<td>Length of road rehabilitation</td>
<td>Minimal (part of standard design and construction practices)</td>
<td>Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
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<tr>
<td>Landscape degradation</td>
<td>Arable land shall not be used as earth borrowing. If unavoidable the topsoil shall be removed, stored and reused for rehabilitation after construction is over.</td>
<td>All locations (road corridor, construction camp, stockpile / lay down areas, quarry)</td>
<td>Minimal (part of standard construction practice)</td>
<td>Construction Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
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<td></td>
<td>Restoration of landscape after completion of rehabilitation works and after use of quarries; restore the vegetation cover in accordance with the design.</td>
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<td>Use plant species characteristic for the landscape in the course of restoration of the vegetation cover.</td>
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<td></td>
<td>If ground has become compacted through temporary construction activities (e.g. construction camp, stockpile areas, traffic diversion) ensure soil is raked or loosened to restore porosity for groundwater recharge.</td>
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<tr>
<td>Hazardous substances</td>
<td>Store and handle hazardous substances in bunded, hard stand or designated areas only.</td>
<td>All locations (road corridor, construction camp, stockpile / lay down areas, quarry)</td>
<td>Safety equipment included in construction cost</td>
<td>Construction Contractor</td>
<td>MCTTD &amp; Supervising Consultant</td>
</tr>
<tr>
<td>safety and pollution</td>
<td>Provide hazard specific personnel protective equipment to workers directly involved in handling hazardous substances (e.g. chemical or heat resistant clothing, gloves).</td>
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<tr>
<td>Hazardous substance management</td>
<td>Strictly apply and enforce manufacturer’s recommendations for handling and storage. These measures include sealing of drums, and avoiding extreme heat. Compliance with international good practice. Security of storage areas to facilitate transport, handling and placement to be maintained (e.g., fences and locks fixed immediately if broken or vandalised). Staff to wear manufacturers recommended personnel protective equipment (e.g., gloves and overalls) when handling or mixing hazardous substances. Emergency vehicles are to be serviced and maintained at existing airport workshop areas.</td>
<td>MPWU Maintenance Depot(s)</td>
<td>No marginal cost (standard operating procedure).</td>
<td>MPWU</td>
<td>MCTTD &amp; ECD</td>
</tr>
<tr>
<td>Water or soil pollution</td>
<td>Workshops or maintenance areas to be fitted with bunded areas for storage of oil, fuel drums and bitumous material (and any other hazardous substances). Used oil drums should be returned to the suppliers or, after being cleaned, sold in secondary local market if there is demand for this. Used oils may be used for emergency drills/preparedness exercises as appropriate. Spill response kits available for accidents or spills which occur on the road to prevent contamination of surrounding soils and freshwater lenses.</td>
<td>MPWU Maintenance Depot(s)</td>
<td>No marginal cost (standard operating procedure).</td>
<td>MPWU</td>
<td>MCTTD &amp; ECD</td>
</tr>
<tr>
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<tr>
<td>Maintenance of drainage and groundwater recharge systems</td>
<td>Drainage systems shall be periodically cleared to ensure appropriate flows. Groundwater recharge systems to be kept clear of sediment build up and clogging due to excess vegetation growth.</td>
<td>All locations</td>
<td>No marginal cost (standard operating procedure).</td>
<td>MPWU</td>
<td>MCTTD &amp; ECD</td>
</tr>
</tbody>
</table>


Attachment 3

Monitoring Plan
### Table A3.1 Environmental Monitoring Plan

<table>
<thead>
<tr>
<th>PARAMETER TO MONITOR</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>
<td>Traffic safety</td>
<td>Design / bid documents</td>
<td>Contractor to develop TMP and submit to Supervision Consultant for approval.</td>
<td>Prior to start of construction activities, or as specified in bid documents</td>
<td>Contractor</td>
</tr>
<tr>
<td>Health and safety</td>
<td>Design / bid documents</td>
<td>Contractor to develop and submit to Supervision Consultant for approval a site specific Safety Plan</td>
<td>Prior to start of construction activities, or as specified in bid documents</td>
<td>Contractor</td>
</tr>
<tr>
<td>Implementation of EMP</td>
<td>Design / bid documents</td>
<td>Contractor to develop and submit to Supervision Consultant for approval a site specific Contractor’s Environmental Plan</td>
<td>Prior to start of construction activities, or as specified in bid documents</td>
<td>Contractor</td>
</tr>
<tr>
<td>Water supply</td>
<td>Design documents</td>
<td>Contractor to identify potable and non-potable water sources and obtain any approvals required for use.</td>
<td>Prior to start of construction activities, or as specified in bid documents</td>
<td>Contractor</td>
</tr>
<tr>
<td>Identify quarry / borrow pits for aggregate mining</td>
<td>Design / bid documents</td>
<td>Once quarry or borrow pits confirmed applications submitted for Environmental and Mining Licenses, including the QMP.</td>
<td>Prior to start of construction activities, or as specified in bid documents</td>
<td>Contractor</td>
</tr>
<tr>
<td><strong>CONSTRUCTION</strong></td>
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<td></td>
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</tr>
<tr>
<td>Material borrow sites and quarries</td>
<td>Construction Contractor’s records</td>
<td>Permits from MELAD received and QMP implemented.</td>
<td>Documentation viewed prior to construction works starting</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
<tr>
<td>Agreement for waste disposal</td>
<td>Construction Contractor’s records</td>
<td>Permits. Inspection of disposal sites.</td>
<td>Documentation viewed prior to construction works starting</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
<tr>
<td>Soil erosion</td>
<td>Areas of exposed soil and earth moving (e.g. quarries)</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 as applicable to schedule of works and after site restoration.</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
<tr>
<td>Waste disposal</td>
<td>At construction sites</td>
<td>Inspection to ensure waste is not accumulating and evidence waste has been dumped at approved waste facility.</td>
<td>Weekly as applicable to schedule of works and on receipt of any complaints.</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
<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.</td>
<td>Weekly as applicable to schedule of works and on receipt of any complaints</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
<tr>
<td>PARAMETER TO MONITOR</td>
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<tr>
<td>Dust</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 as applicable to schedule of works and on receipt of any complaints.</td>
<td>Supervision Consultant and 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. Site inspection and liaison with representatives when works are near sensitive receptors (e.g. schools or hospitals). Measurement with noise meter as required.</td>
<td>Weekly as applicable to schedule of works and on receipt of any complaints.</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
<tr>
<td>Storage of fuel, oil, bitumen, etc.</td>
<td>At work sites and construction camps. Contractors training log.</td>
<td>Regular site inspections to ensure material is stored within bunded area and spill response training for workers completed.</td>
<td>Weekly as applicable to schedule of works and on receipt of any complaints.</td>
<td>Supervision Consultant and 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 and workers wearing appropriate personnel protective gear. Inspections to ensure workers have access to and are wearing (when required) appropriate personnel protective equipment (e.g. for handling hazardous materials).</td>
<td>Weekly as applicable to schedule of works and on receipt of any complaints.</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
<tr>
<td>Construction workers and staff safety</td>
<td>At work sites</td>
<td></td>
<td>Weekly as applicable to schedule of works and on receipt of any complaints.</td>
<td>Supervision Consultant and MCTTD</td>
</tr>
</tbody>
</table>

### OPERATION

<table>
<thead>
<tr>
<th>PARAMETER TO MONITOR</th>
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<th>MONITORING</th>
<th>FREQUENCY</th>
<th>RESPONSIBILITY</th>
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</thead>
<tbody>
<tr>
<td>Accidents with hazardous materials or wastes</td>
<td>Maintenance depots and on road during maintenance</td>
<td>Accident report</td>
<td>Immediately after accident</td>
<td>ECD</td>
</tr>
<tr>
<td>Traffic safety</td>
<td>On the road during operation</td>
<td>Observation of obedience of speed and other traffic regulations</td>
<td>Randomly by decision of the Traffic Police</td>
<td>MPWU</td>
</tr>
<tr>
<td>Maintenance of drainage system</td>
<td>On site</td>
<td>Inspection</td>
<td>When needed</td>
<td>MPWU</td>
</tr>
</tbody>
</table>