Initial Environmental Examination

November 2011

Kiribati: Road Rehabilitation Project

Prepared by Ministry of Public Works and Utilities, Government of Kiribati for the Asian Development Bank.

GOVERNMENT OF KIRIBATI

KIRIBATI ROAD REHABILITATION PROJECT

IMPROVEMENT OF THE MAIN BETIO-BUOTA ROAD, TEMAIKU ROAD AND FEEDER ROADS IN BETIO, BAIRIKI & BIKENIBEU

CONTRACT No. KIR-11/01

World Bank Grant H645 and
Asian Development Bank Loan No.44281-KIR

BIDDING DOCUMENT

November 2011

VOLUME 4
Environmental Management Plan

B I D D I N G D O C U M E N T S

Issued: November 2011

for

Procurement of

IMPROVEMENT OF THE MAIN BETIO-BUOTA ROAD, TEMAIKU ROAD AND FEEDER ROADS IN BETIO, BAIRIKI & BIKENIBEU

World Bank Grant H645 and
Asian Development Bank Loan No.2718-KIR

Project: **KIRIBATI ROAD REHABILITATION PROJECT (KRRP)**

CONTRACT No. KIR-11/01

Employer: *Ministry of Public Works and Utilities*

REPUBLIC OF KIRIBATI

ENVIRONMENTAL MANAGEMENT PLAN

(OCTOBER 2011)

TABLE OF CONTENTS

fcI. EXECUTIVE SUMMARY 1
II. Policy, Legal, and Administrative Framework 3
III. Description of the Project 3
A. The Executing Agency 3
B. Project Rationale 3
C. The Proposed Project 4
IV. Description of the Environment 5
A. Physical Environment 5
B. Biological Environment 8
1. Coastal Resources 8
2. Forest Resources 8
C. Socio-Economic Environment 9
1. Population 9
2. Economy 9
3. Infrastructure, Public Services and Utilities 10
V. Anticipated Environmental Impacts and Mitigation Measures 10
A. Design/Pre-Construction Phase 11
1. Protection of Sensitive and Ecologically Important Areas 11
2. Environmentally Sound Design and Road Maintenance 11
3. Road Safety 11
4. Cultural Heritage 12
5. Social or Community Concerns (Pre-Construction) 12
B. Construction Phase 13
1. Social or Community Concerns (construction) 13
2. Soil Erosion 13
3. Controlling Sediment 13
4. Controlling Storm Water 13
5. Management of Stockpiles and Spoil-heaps 14
6. Air Quality and Dust Control 14
7. Noise Control 14
8. Aggregate Management 14
9. Offsite and Waste Management 15
10. Safety and Health 15
11. Site De-commissioning 16
C. Operation Phase 16
1. Road Safety 16
2. Rehabilitation and Maintenance Practices 17
VI. Analysis of Alternatives 17
VII. Information Disclosure, Consultation, and Participation 18
VIII. Grievance Redress Mechanism 19
IX. Environmental Management Plan 19
A. Overview 19
B. Environmental Management Plan 20
1. Design/Pre-Construction Phase 20
2. Construction Phase 21
3. Operational Phase 23
C. Environmental Monitoring Plan 24
D. Institutional Implementation and Reporting Arrangements 24
1. Project Implementation 24
2. Reporting Arrangements 24
X. Conclusion and Recommendation 41

ANNEXES

A. Excerpts of the Relevant Sections on Environmental Impact Assessment System of the Environment Act
B. Environmental Monitoring Plan

ENVIRONMENTAL MANAGEMENT PLAN
(Kiribati: Road Rehabilitation Project)

I. EXECUTIVE SUMMARY

1. The country‘s statutory framework requiring compliance to the Environmental Impact Assessment (EIA) System for all projects that will affect environmental quality is embodied in the Environment (Amendment) Act 2007, an amendment to the Environment Act 1999 (No. 9 of 1999), ―Act to Provide for the Protection Improvement and Conservation of the Environment of the Republic of Kiribati and for Connected Purposes”.

2. Environmental impact assessment of all development projects whether public or private is a legal requirement under Part III of the Act, Development Control, Environmental Impact Assessment, Review and Monitoring, of the Kiribati Environment Act of 1999. Prescribed development projects as listed in the Schedule in Section 14 will need to prepare an Environmental Assessment Report (Initial Environment Evaluation or Environmental Impact Statement) and submit a Development Application which will be processed and reviewed by the Environment and Conservation Division (ECD).

3. The proposed Kiribati Road Rehabilitation Project involves rehabilitation of an estimated 35 kilometers of main road, approximately 8 kilometers of principal feeder and access roads and 10km of water main on South Tarawa. Extensive damage, primarily because of unusually prolonged periods of wet weather over the past year and increase in traffic volume plying the roadways, has made the existing roads difficult to traverse.

4. The Republic of Kiribati which became an independent republic in 1979, is composed of 33 small islands located between Longitude 170 degrees East and 150 degrees West in the Central Pacific Ocean, on either side of the Equator at the intersection of the International Dateline and the Equator. The three groups of islands, namely, the Gilberts, the Line and the Phoenix are either coral atolls or coral islands with the exception of Banaba which is a raised or elevated lime stone. Only 18 of the 33 islands are inhabited. Due to its geographical location, Kiribati has a predominantly dry equatorial climatic conditions characterized by a hot dry climate with prevailing South Easterly winds most of the year.

5. The population of Kiribati, as enumerated on 7 November 2005, was 92,533 people: 45,612 males and 46,921 females. This is an increase of 8,039 persons in 5 years compared to the 2000 census (84,494) with an annual rate of growth of 1.8 per cent. Kiribati‘s population has steadily increased since the 1930s when the first census was conducted. With a population of just under 30,000 people in 1931, 56,000 people in 1978, and over 90,000 in the year 2005, the Kiribati population more than tripled in size during the last 74 years. The country's economy is predominantly subsistence, with copra, seaweed and fisheries being the main source of foreign exchange earnings. Revenue from the licensing of foreign vessels in the Kiribati Exclusive Economic Zone (EEZ) contributes some $2-3 million per annum. Tourism plays a fairly modest role in the Gilbert but in the Northern Line Islands especially Christmas Island, tourism is high.

6. The infrastructure of Kiribati is generally rudimentary. Wherever practicable, roads are built on all atolls, and connecting causeways between islets are also being built as funds and labor permit. A program to construct causeways between North and South Tarawa was completed in the mid-1990s. Kiribati has about 640 kilometers of roads that are suitable for motor vehicles. All-weather roads exist in Tarawa and Kiritimati.

7. Excavation works and the clearing of vegetation will result in erosion. However, with well designed drainage and good planning during design stage, erosion can be minimized and adverse environmental impacts can be minor and temporary. Road accidents have a substantial impact on the pedestrian and community safety and can be reduced by good design and selection of appropriate design alternatives.

8. Displacement of people is not envisaged during implementation of the proposed project. The proposed rehabilitation works are expected to be carried out within the right-of-way (ROW) of the existing road and limited acquisition will be required for the project for bus stops, sidewalks and drainage. The projected disturbances during construction are expected to be minor and temporary and can be readily mitigated.

9. The objective of erosion prevention is to minimize the amount of sediment lost from the site. Proper application of mitigation measures will ensure that the residual impacts are minor and temporary during the construction phase. Storm water runoff from the road will be diverted to the nearby drainage ditches for discharge to the ocean or to, where appropriate, freshwater collection ponds for secondary uses.

10. Air quality problems created by road traffic are not a critical issue along the road. However, to minimize dust nuisance during road rehabilitation, the Contractor will regularly spray water on exposed surfaces during dry periods and minimize on site storage. Noise is one of the most obvious impacts of construction activities and daily road use. In Tarawa, it will mainly affect rural centers and villages near the road and where the traffic is heavy.

11. To minimize ongoing impacts of disturbed areas after the construction is completed, the Contractor will be responsible for the proper decommissioning of the used sites. Recommended measures will include: (i) raking or loosening of compacted ground surfaces and (ii) establishing site re-vegetation. Where possible involve local communities / women‘s groups will be contracted to implement re-vegetation.

12. With the implementation of the project, economic development of the area (South Tarawa) will be induced. Travel time between Bairiki and Tanaea will be reduced as a result of better road conditions and connectivity. Vehicle operation costs such as fuel and maintenance will also be reduced as better road conditions would result in more efficient vehicle operation and reduced damage to vehicles.

13. Without the implementation of the project, road conditions will remain very bad and continue to deteriorate. Transport operators, especially taxis, will further reduce service or refuse to operate in the area. Travel to and from Bairiki and Tanaea will be very difficult owing to the bad road conditions. Vehicle operation costs will remain high as damage to vehicles will continue. Economic development of the area will remain stagnant or decline as transport of goods and services will remain costly. Health concerns, as is being experienced now will remain as it is, with dust being generated during the dry season by the unpaved areas. Ponding/stagnant water will continue to serve as breeding grounds for mosquitoes during the rainy season.

14. The project assessment concludes that with appropriate mitigation strategies described in the EMP, and the positive social / economic and environmental benefits which will flow from the Project, the construction related environmental impacts can be managed within acceptable levels. There are no significant environmental impacts needing in-depth assessment. All potential and associated impacts can be addressed through proper implementation of the mitigation measures as proposed in the EMP. Provisions will be made in the Project Budget to cover the environmental mitigation and monitoring costs.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

15. The country s statutory framework requiring compliance to the Environmental Impact Assessment (EIA) System for all projects is embodied in the Environment Act 1999 (No. 9 of 1999), Act to Provide for the Protection Improvement and Conservation of the Environment of the Republic of Kiribati and for Connected Purposes".

16. Environmental impact assessment of all public or private development projects is a legal requirement under Part III of the Act, Development Control, Environmental Impact Assessment, Review and Monitoring, of the Kiribati Environment Act of 1999. Prescribed development projects as listed in the Schedule in Section 14 require an Environmental Assessment Report (Initial Environment Evaluation or Environmental Impact Statement) and submission of a Development Application which is processed and reviewed by the Environment and Conservation Department (ECD). Annex A presents excerpts of the relevant sections on Environmental Impact Assessment System and the Schedule of the Prescribed Developments covered under the Act.

III. DESCRIPTION OF THE PROJECT

A. The Executing Agency

17. The Executing Agency for the Project will be the Ministry of Finance and Economic Development. The Implementing Agency will be the Ministry of Public Works and Utilities (MPWU). During project implementation, engineers and technicians of the Civil Engineering Division of the MPWU will work with the design and supervision consultants on day to day technical management.

B. Project Rationale

18. The existing road is in poor condition as evident with excessive pot holes, gaps and cracks, surface rain puddles, etc., and is need of urgent repairs. Every time it rains, expensive repair work is needed. While parts of the South Tarawa road network were rehabilitated in 2008[1], no major maintenance works have been done on the remaining paved roads for more than 20 years. These roads have already reached the end of their economic life. The damage to the roads have greatly affected travel in South Tarawa with the average travel speed reduced to 20 km/h and vehicles traversing large and deep depressions filled with water during rainy seasons. During dry seasons, dust from the unpaved sections of the road has become a nuisance and health hazard to the adjacent communities. An increase in upper respiratory diseases has been noted among the residents of the adjacent communities from excessive dust generation.

19. Most of the South Tarawa road traverses a ribbon development area composed of residential dwelling units, small commercial and business concerns, churches, schools, etc. These are all situated within the confines of the atoll which is generally no more than 100 meters wide. Virtually the entire population lives in close proximity to the road and is greatly affected by the existing conditions of the road.

20. In accordance with the basic issue improve the standard of roads" in the Kiribati development plan, currently the road standard is not satisfied. Since life of the people of

[1] Town roads in Betio and Bairiki, as well as a section of the main road at Bikenibeu were upgraded under an A$12 million project financed by the Government of Japan as part of the Fisheries Project.

Kiribati, especially on South Tarawa, is heavily dependent on road transportation, the reconstruction or improvement of South Tarawa road is an urgent matter.

C. The Proposed Project

21. The purpose of this project is to replace the existing surface with an improved structure. This will reduce future road deterioration and to solve the problem of the continuous road repairs. The rehabilitated road will also minimize breakdown of vehicles, accommodate the increase traffic density, and cater for pedestrians and other non-motorized traffic.

22. The South Tarawa road upgrading will consist of 6-7 m wide sealed road with 1.5 m sealed shoulders which will act as footpaths and improved siting for drainage and service lines (electricity, water supply, telephone line, and other services). The road rehabilitation and upgrading will cover the road from St. Anne Pre School (Bairiki) to Tanaea including Buota and Temaiku roads – about 27.5km but will exclude section linking Bonriki Airport to the Tarawa bailey bridge (and which includes a short single lane carriageway)

Figure 1: Satellite Photograph Showing Proposed Main Investments

23. The road upgrading will include scarifying the existing pavement; laying, mixing, spreading and compacting up to 30 cm of new imported crushed gravel base, and a new bitumen surface. The road will have concrete edging to prevent the propagation of edge breakdown of the new road. The project will also include the construction of speed humps at suitable locations, and construction of 166 bus stops at locations, agreed through council/community consultation. Wherever physical drainage measures are installed, to ~~c~~apture" stormwater flows, discharge will be to the lagoon or ocean as appropriate and practical. The existing sealed roads will be rehabilitated to a similar level and the roads that are currently unsurfaced will be slightly raised. Improved camber will ensure surface drainage of the road, and drains either side of the road will be improved.

24. The Project will also include sealing of unsealed urban feeder roads with high traffic volumes. Currently, these roads consist of earth road with many depressions creating stagnant water after rain causing severe difficulties to cars in navigating the road. The feeder road will be sealed and provided with improved drainage.

25. Under an associated technical assistance program, the Project will support improved institutional arrangements, including drafting of the requisite legislation for managing the Kiribati Road Assets to ensure a systematic and adequately financed regular and periodic maintenance programs. Specifically, the Project will support the creation of the Road Maintenance Fund to be financed by user charges and build the capacity of the MPWU for management of the road assets as well as creation and training of microenterprise units for outsourced road maintenance.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Environment

1. Location and Geography

26. 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 at the intersection of the International Dateline and the Equator. See Figures 2 and 3 for the general location of the proposed Project and map of Kiribati. The three groups of islands namely the Gilberts, the Line and the Phoenix is either coral atolls or coral islands with the exception of Banaba which is a raised or an elevated limestone island. Of the 33 islands comprising the Republic of Kiribati, only 18 are inhabited. Kiribati became an independent republic in 1979.

Figure 2: Map of Kiribati

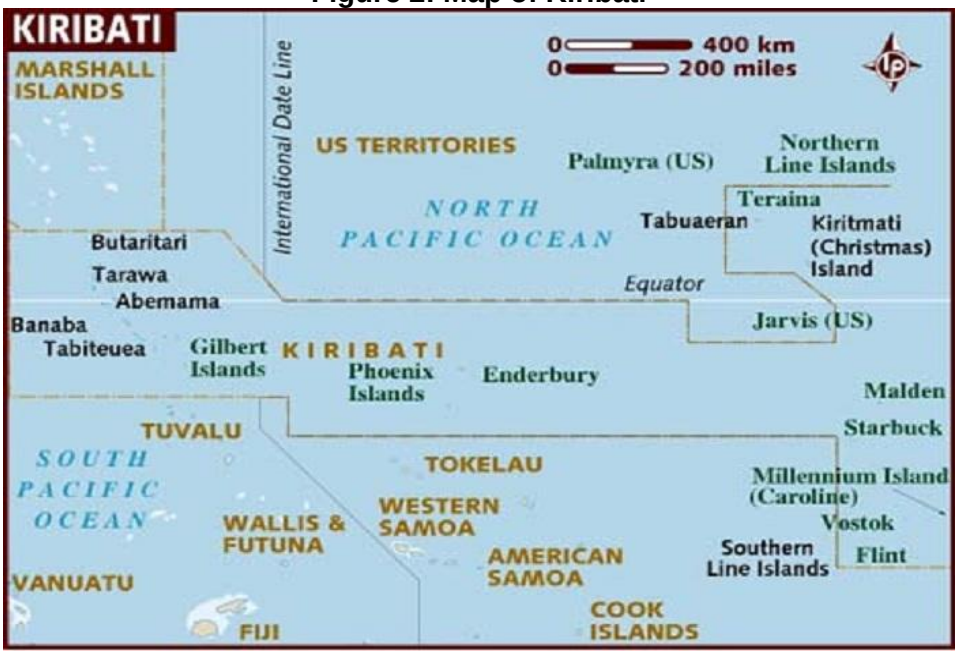
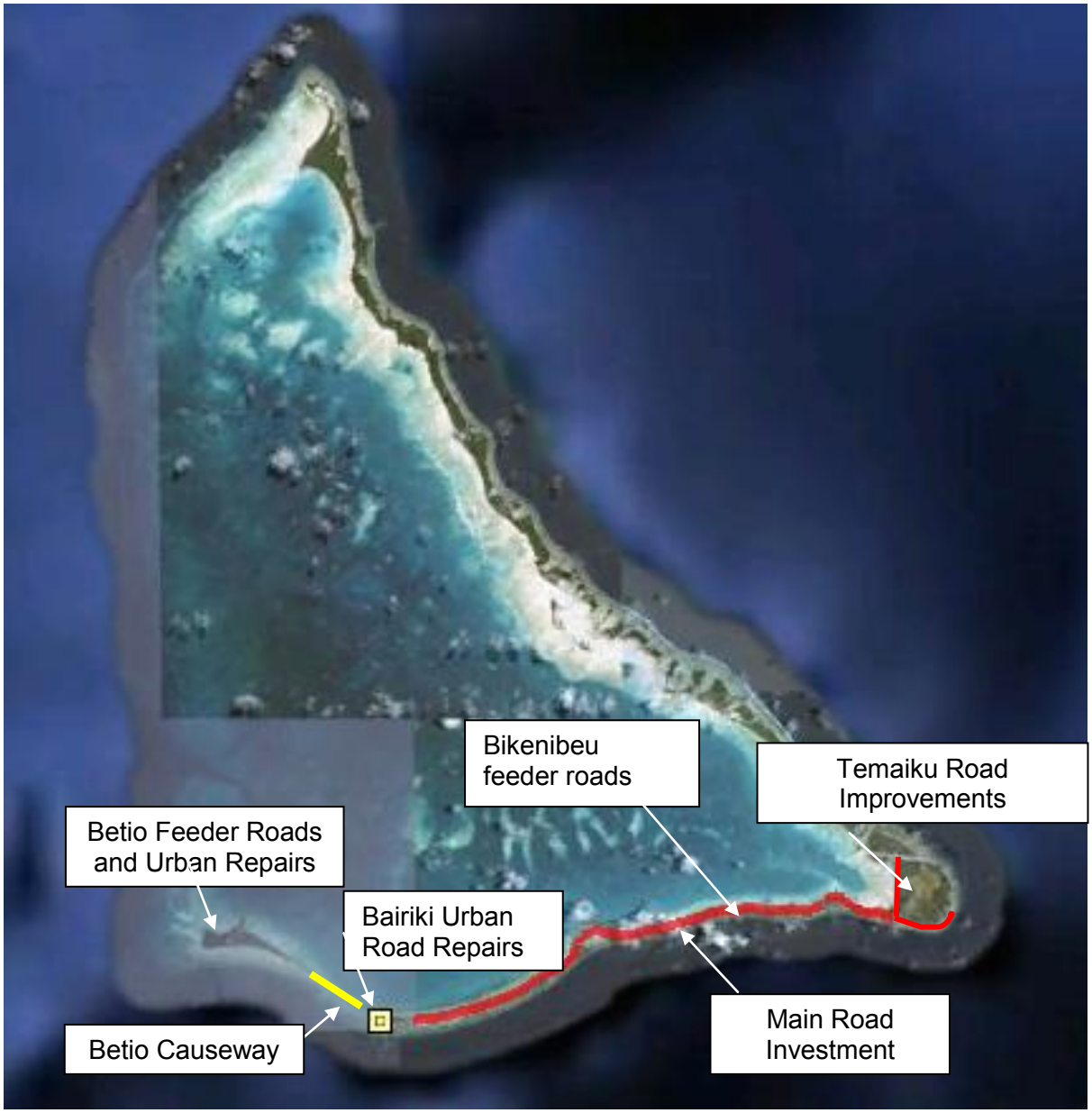


Figure 3: Project Investments



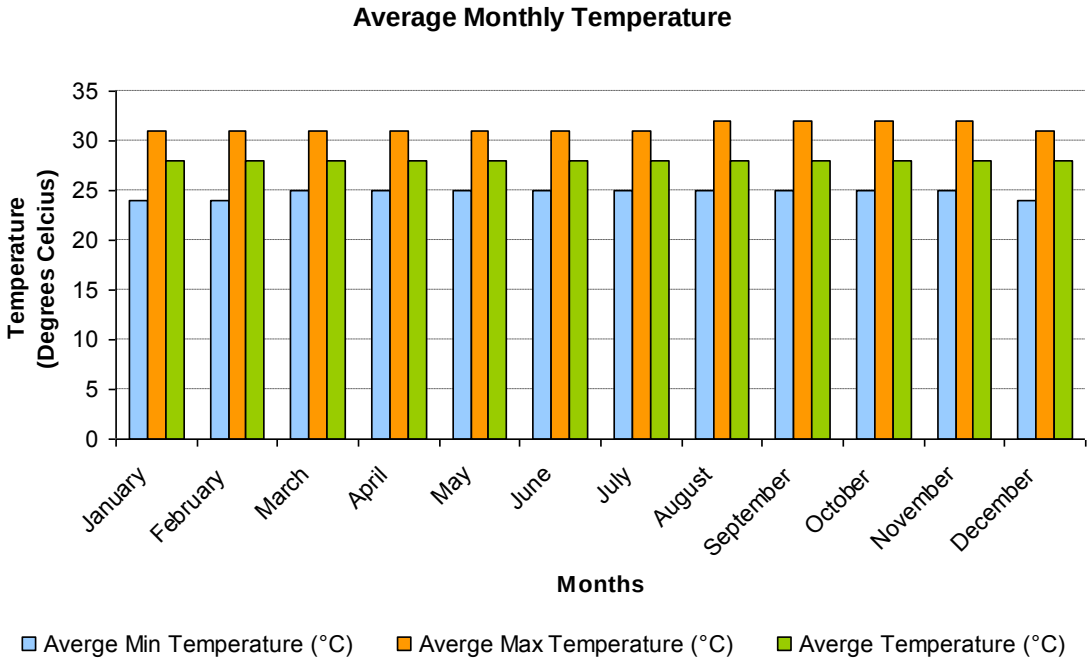
27. The Gilbert Group which is comprised of 17 islands has a total land area of 286 square kilometers. Tarawa, an atoll in this group, is home of the Kiribati government, the port of entry, and the international airport. Eight islands and atolls constitute the Phoenix Group. The Line Islands consists of a total of 8 islands and atolls covering an area of 497 square kilometers, including Kiritimati with a land area of 384.5 square kilometers, which is the largest atoll in the world. While Banaba (Ocean Island) rises some 78 meters above sea level, the rest of the islands are no more than 3 meters above sea level. The national capital Bairiki is located on the Tarawa atoll. Betio is the port of entry while Bonriki is the international airport.

2. Climate

28. Due to its geographical location, Kiribati has a predominantly hot dry equatorial climatic conditions with prevailing South Easterly winds most of the year. Temperature varies

between 25°C and 33°C with maximum possible annual sunshine of 4134 hours. The wet season extends from December to May and rainfall variation is high on most of the islands. A gentle breeze from the easterly quarter is predominant. Tables 1 below displays average monthly climate indicators in Tarawa based on 8 years of historical weather readings.

Figure 1: Average Monthly Temperature (degrees C), Tarawa Island
1° 35"S, 172° 93"E, 4m asl



29. Rainfall differs from year to year and from island to island. The drier Southern islands have an average yearly rainfall of 1,000 mm while that of the Northern part is 3,000 mm. Low temperatures are experienced during heavy downpours accompanied by strong winds over long periods. Prolonged drought periods were encountered in 1988 to early 1989 and followed by another in 1998 extending into mid 1999 and resulting in the loss of many valuable food crops including coconuts (*Cocos nucifera*) and breadfruits (*Artocarpus sp.*).

3. Soils

30. 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. There is no andesitic rock formation in South Tarawa that can be used as quarry sources for road construction. The soil is alkaline and therefore it does not support the growth of certain plants and trees. The poor and infertile nature of the soil is due to its alkalinity, porosity and lack of essential elements which makes it unable to support plant life. Consequently, it is incapable of supporting intensive agricultural activities.

31. The topsoil which is composed of decaying or composted organic matter mainly decaying leaves and plant materials 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 plant species that survive are coconuts (*Cocos nucifera*), pandanus or screw pine (*Pandanus tectorius*), salt bush (*Scaevola sericea*), and other tolerant indigenous plants and trees.

4. Water Resources

32. Freshwater resources exist underground as water lenses floating on seawater. These are derived from the infiltration of rainwater into the water table below the ground. The lens resembles the appearance of a convex lens which is thickest at the center and thinnest on the sides facing the ocean or lagoon throughout the length of the atoll or island. The lens is formed where the width of the island is sufficiently wide so as to reduce the outward flow of the accumulated underground lens. The freshwater lenses in low coral atoll and islands are extremely vulnerable to occasional environmental influences. Groundwater is the principal source of fresh water in Kiribati. Urban or South Tarawa water supply originates from water wells located in water reserve areas with restricted use and access in the villages of Bonriki and Buota. Well water is pumped from wells and conveyed through a system of pipes to consumers. Chlorination without preliminary treatment of urban water supply is carried out at the source.

B. Biological Environment

1. Coastal Resources

33. 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 eco systems and marine organisms. The coastal areas support fishing, recreation, trade and communication. With constant mining of beach sand, gravel and other aggregates for construction purposes, the coastal areas are greatly threatened. The European Union (EU) is currently funding a project on Environmentally Safe Aggregates for Tarawa (ESAT) Project, implemented by SOPAC. The ESAT project aims to protect the vulnerable beaches of South Tarawa from damage caused by aggregate mining and provide an alternative supply of material through environmentally safe lagoon dredging. However, the earliest implementation of the ESAT Project is expected to be in early to mid 2012.

34. 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, the Project will ensure that material to be used for road rehabilitation and upgrading, or any works to existing shipping channels within the lagoon to enable access by ocean going barges bringing material will not cause significant adverse environmental impact on the coastal and marine environment. The proposed Road Rehabilitation Project will not use the reef mud from the EU funded project, but instead will import material from Banaba, Nauru, Fiji Islands or elsewhere. The project will also take necessary precautions and measures to ensure that the construction activities will not pollute lagoon environment.

2. Forest Resources

35. Except for a few uninhabited islands in the Northern Line Islands and the Phoenix Group, where ―te buka" (*Pisonia grandis*) and other wild trees grow, there are no natural forest of major significance in terms of size, age and biological diversity. Forests in the Lines and Phoenix are resting and nesting places for long distance flying migratory birds all the year round. Mangrove forests also exist on muddy shores and coastal beaches where water is calm and in areas that are protected from waves and strong currents. Mangrove rehabilitation is undertaken by the Government under 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 the mangroves are found in Kiribati namely the white mangroves (*Sonneratio alba*), the tongo buangui (*Bruguiera gymnorhiza*), te aitoa (*Lumnitzera littores*), and the red mangrove (*Rhizophora stylosa*).

36. The road to be rehabilitated under the Project runs through built up areas with no natural vegetation. There is no forest areas located along or close to the road and no mangrove will be adversely affected by the proposed Project. However, new mangrove plantation occurs on the airport road at 1+090 – 2+080, and this shall be protected from accidental damage during the works.

C. Socio-Economic Environment

1. Population

37. 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. Although the Line Islands are about 2,000 miles east of the Gilbert Islands, most inhabitants of the Line Islands are also Gilbertese. 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.

38. The population of Kiribati, as enumerated on 7 November 2005 consisted of 45,612 males and 46,921 females or a total of 92,533 people. This is an increase of 8,039 persons in 5 years compared to the 2000 census (84,494) with an annual rate of growth of 1.8%. Kiribati‘s population has steadily increased since the 1930s when the first census was conducted (Figure 4). With a population of just under 30,000 people in 1931, 56,000 people in 1978, and over 90,000 in the year 2005, the Kiribati population more than tripled in size during the last 74 years.

39. Population growth varied extensively by Island and Island Groups. While the overall growth rate of Kiribati was 1.8% per annum, the Gilbert Group of Islands grew only at a rate of 1.4% while the Line and Phoenix Group of Islands grew at a very rapid rate of 6.7% per annum. Islands that experienced significant population increase include: South Tarawa (3,594); Kiritimati (1,684); Tabuaeran (782); Makin (694); Abemama (262); and North Tabiteuea (235).

40. Almost 44% of the population of Kiribati lived in South Tarawa in 2005. Its population increased from 25,380 in 1990 to 36,717 in 2000, to 40,311 in 2005. The census counted 13,999 private households with 88,644 household members, which is 6.3 persons per household on average. In South Tarawa, 7.5 persons share a household on the average. Almost a third (26,798) of all persons that live in private households live in households with 10 persons or more, and 7,191 persons live in households with 15 persons or more. The long term trend of rural to urban (South Tarawa) migration has eased. The 2005 census data show a net flow of people from the Gilbert Group Islands towards the Line Islands during the inter-census period 2000-2005.

2. Economy

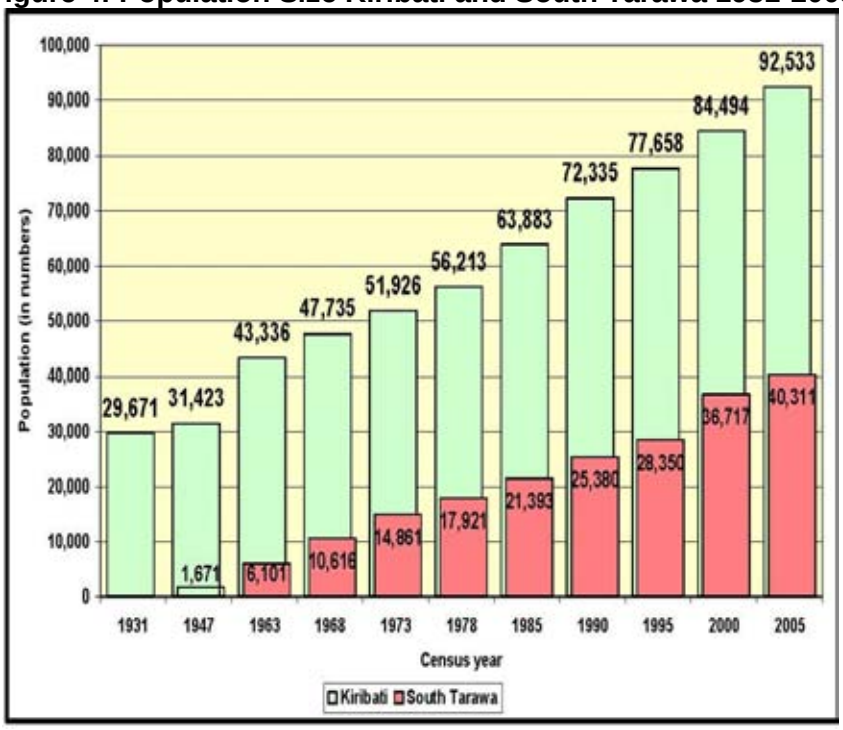
41. The country's economy is predominantly subsistence, with copra, seaweed and fisheries as the main source of foreign exchange earnings. Kiribati's per capita GDP of US$1322, is one of the lowest in the world. Only 16% of the workforce participates in the formal wage economy and over 60% of all formal jobs are in South Tarawa. The monetary economy of Kiribati is dominated by the services sector, representing a GDP share of over 73%, and the public sector which provides 80% of monetary remuneration. Tourism is one of the largest domestic activities. Between 3,000 and 4,000 visitors per year provide $5-$10 million in revenue. Attractions include World War II battle sites, game fishing, ecotourism, and the Millennium Islands, situated just inside the International Date Line and the first place on earth to celebrate every New Year.

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

3. Infrastructure, Public Services and Utilities

43. The infrastructure of Kiribati is generally rudimentary. Whenever practicable, roads are built on all atolls, and connecting causeways between islets are also being built as funds and labor permit. A program to construct causeways between North and South Tarawa was completed in the mid-1990s. In 2008, the roads in Betio and Bairiki were improved with Japanese aid. Kiribati has about 640 kilometers (398 miles) of roads that are suitable for motor vehicles. All-weather roads exist in Tarawa and Kiritimati. In 1998, there were some 2,000 motor vehicles registered in the islands, of which some 75% were motorcycles. Traffic counts undertaken early in the design phase indicated that the Average Daily Traffic (ADT – both directions) at km 4.5 and km 14.7 is around 4,300 and 3,50 respectively, indicating significant growth.

Figure 4: Population Size Kiribati and South Tarawa 1931-2005



Note: Data for South Tarawa for year 1931 is not available.

44. In early 1998, work began on a major project to rehabilitate the port terminal and facilities at Betio. Financing for the project was provided by a grant from Japan of US$22 million. There is a small network of canals, totaling 5 kilometers (3.1 miles), in Line Islands as well as ports and harbors such as Banaba, Betio, English Harbor, and Kanton. There are 21 airports, 4 of them with paved runways. Only Tarawa and Christmas Island are served by international flights.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

45. Safeguard measures have been incorporated in the Project as follows: (i) **Design-Preconstruction Phase**, the period before the actual construction starts and designs are being prepared (Section A). This allows the designers to incorporate the environmental

management plan (EMP) in the project design, technical specifications and contract documentations; (ii) **Construction Phase**, the period from the time that the ~~"N~~Notice to Proceed" is given to the Contractor until the issuing of the ~~"C~~Certificate of Completion" (Section B). The Contractor would construct the Project as per the design and technical specifications and implement the EMP; and (iii) **Operation and Maintenance Phase**, the period starting with the issuing of the ~~"C~~Certificate of Completion" issued by the MPWU until the end of the 20 year lifetime of the project (Section C).

A. Design/Pre-Construction Phase

1. Protection of Sensitive and Ecologically Important Areas

46. Improvements to the airport road involve revetment of the pavement close to areas where mangroves are being re-established. In order to prevent damage to the young mangrove plants, revetment will be achieved by construction of a small wall using cement filled sand bags, well clear of the mangrove stands, avoiding the formation of a slope that may affect the plants. Further measures will be:

- To ensure construction personnel are aware of locations and importance of the sensitive areas and avoid disturbing them;
- Construct temporary fences to prevent accidental damage to the plants.

2. Environmentally Sound Design and Road Maintenance

47. Excavation works may induce soil erosion. However excavation will be limited to drain laying works, as no bulk earthworks are required for the project.

48. The design provides for improved drainage by (i) construction of U drains in areas where space is constricted and runoff water is prone to build up, (ii), where there is space for water to disperse naturally, small rain gardens will be constructed, consisting of areas where soil is scarified and planted to permit infiltration, and protected by bollards. This will prevent the occurrence of depressions of compacted soil, formed by vehicle movements, where water currently accumulates and very little infiltration occurs. The improvements to the Anderson and Temaiku causeways will involve the removal of trees. These will be replanted with suitable species, identified by local residents.

3. Road Safety

49. Road accidents have a substantial impact on the community and this can be reduced through proper attention and incorporation of safety in the design. The MPWU will ensure that all safety aspects of the road are integrated into the project design and implemented during the construction phase. During project preparation, a road safety audit was done to identify the engineering issues to be addressed on the project. This information has been used by the design engineers to ensure the design is as safe as practicable. The design will incorporate:

- Proper signs along the entire highway.
- New footpaths and pull-off bays in selected areas of the roads; e.g. through villages; and near markets, schools, and other community facilities.
- Safety instructions for the construction activities in the contract documents.
- Sufficient visibility along the road section according to standard specifications.
- Speed humps near schools, hospitals, and markets.
- Safe bus stops with sufficient turn out area.

- Provision of footpaths where feasible, on both sides of the main Betio – Buota road and on one side of the roads at Buota and Temaiku
- Provision of speed control areas which feature the provision of solar lighting, raised curbs, speed humps and village gateways (prominent signs giving the name of the village, displaying the speed limit, and with road markings that give the impression of road constriction and encourage slower driving).

50. During the project additional road safety activities will be addressed through the road safety Technical Assistance activities.

4. Cultural Heritage

51. Historical sites from the World War II consisting large canons and bunkers are located along the beach in Betio area. However, these sites are located outside the project area. No specific cultural / archeological sites have been identified along the road section from St. Anne to Tanaea. However, in case a cultural/historical heritage site is identified during the construction, the Contractor will be asked to stop work immediately and notify the MPWU supervision consultant who in turn will notify the relevant Government agencies.

5. Social or Community Concerns (Pre-Construction)

52. Because the project is concentrating on rehabilitation of the existing road only, there is limited concern regarding the negative effects of the road construction. Road improvements are generally aimed at bringing benefits to surrounding communities through lower transport costs and better access to market places, jobs, and services such as health and education. The rehabilitated road has safety features such as better pedestrian facilities. It will also reduce costly breakdowns and damages to private and commercial motor vehicles. Road reconstruction and rehabilitation projects can lead to changes in the community or social environment around the road, influencing various aspects of lifestyles, travel patterns, social and economic activities.

53. No displacement of people will be required for the proposed Project. The proposed rehabilitation works will be carried out along the existing road alignment and within the right of way. The only potential impacts are from (i) provision of 166 bus stops; (ii) the inclusion of footpaths as described above; and (iii) temporary easements for drainage. Measures to minimize the social impact of any necessary land acquisition and compensation of loss of crops include:

- Identification of land acquisition needed, and trees and plants or other items which may be affected by road reconstruction and rehabilitation, and compensation requirements;
- Prior discussion of project impacts and proposed measures with the affected community; local government officers and non-governmental organizations.
- Conduct surveys before activities commence to identify all members of the affected population.
- Identification of other land-based natural resources, infrastructure, and services that will be lost to the affected community.
- Preparation of resettlement plan to address the land acquisition, trees/plants losses, and other social impacts.

B. Construction Phase

1. Social or Community Concerns (construction)

54. The objective is to minimize social disturbance and maximize community benefits from the Project. Measures to achieve this objective are:

- Advise the local community of project plans in advance of the construction, and seek their views.
- Avoid or minimize disturbances near living areas.
- Control run-off and manage sediments near farms / garden areas.
- Arrange employment and training for local people.
- Include women and other community groups in project activities.
- Train teams of local people for routine road maintenance activities

55. The projected disturbances in the communities are minor and temporary, and the Contractor will make appropriate arrangements during the construction period. The general practice is that Contractors employ workers from the communities. The clan leaders will be consulted when recruiting workers for the Contractors. Communities may be engaged to provide catering services for road workers. The Contractor will abide by the laws of the Republic of Kiribati relating to employment and use of labor.

2. Soil Erosion

56. Proper application of mitigation measures will ensure that impacts of surface erosion are temporary and minimized to acceptable levels. Measures to achieve these objectives are:

- Minimize work areas.
- Keep vegetation clearing to a minimum.
- Encourage re-vegetation as soon as the construction activities finish, or plan to immediately rehabilitate the disturbed sites after use.

3. Controlling Sediment

57. Risks of damage to land, property and drain lines are limited as topography is very flat and there are no bulk earthworks involved in the works. The following mitigation measures are included:

- Installing silt traps at drainage ditches and around materials stockpiles.
- Preparing all disturbed areas for re-vegetation or for natural re-vegetation.
- Phasing and limiting ground disturbance to areas of a workable size.
- Scheduling construction to limit disturbance of large areas of soil during wet seasons.
- Discharge of sediment bearing water to the lagoon will be prohibited.

4. Controlling Storm Water

58. The objective to control storm water is to minimize the impact of contaminated run-off water. Implementation of proper mitigation measures will accordingly ensure that impacts can be minimized to acceptable levels. Measures to achieve the objective are:

- Pass stormwater run-off from construction areas through geotextile traps to remove soil and petroleum-based organic pollutants before disposal.
- Store oil and bituminous products at a contained location away from drainage ditches.

5. Management of Stockpiles and Spoil-heaps

59. To minimize dust and sediment run-off, material stockpiles and spoil heaps (if any) require proper management. All material arising from excavation and scarification of the pavement will be re-used, and only minimal disposal will therefore be measure. Mitigation measures are:

- Discuss dumping locations with the government officials and local landowners including plans for future use of the spoil materials.
- Include all drainage provisions suggested for construction sites in the site plans.
- Choose the locations of waste spoil piles to avoid blocking surface run-off or drainage ditches.
- Cover all spoil heaps or stockpiles during rainy season to prevent erosion and sediment run-off.
- The maximum height of any stockpile will be 3m
- Silt traps will be placed around materials stockpiles

6. Air Quality and Dust Control

60. Dust problems created by road traffic are a nuisance but not a very critical issue along the proposed road section, mainly because the traffic volumes are relatively small. However, to control unnecessary dust from the road section under construction, the Contractor will:

- Spray water on exposed surfaces during dry periods especially near schools, hospitals, rural communities, etc.
- Cover all dust generating loads carried in open trucks.

7. Noise Control

61. Noise mainly affects urban areas, villages, hospitals, schools, etc. along the roads. To control noise during construction the suggested measures are:

- Use modern and well-maintained equipment (with mufflers where appropriate)
- Carry out noise construction activities during daylight hours (0700hrs – 1900hrs).
- Advise schools, hospitals, churches, etc. when there will be unusual or unavoidable noise. A schedule of hospitals, clinics, schools, churches and religious establishments is provided

8. Aggregate Management

62. Aggregates for the road construction will be imported from Banaba, Nauru, Fiji Islands or elsewhere with aggregate size 5 to 20 mm. The aggregate may be stored in Betio port area, (currently an empty field, located next to the port, and about 250 m from the closest settlements), or a similar isolated area towards Temaiku or elsewhere. Measures to address potential environmental impacts are:

- Avoid overloading trucks and cover trucks to minimize dust and loss of load from trucks during transportation;

- Use water sprays or covered chutes to reduce dust emission during loading and unloading of materials from barges;
- Maintain crushing and mixing plants in good working condition so as to reduce emission from the plant;
- As far as possible, plan truck trips between the processing plant in Betio to the sites during low traffic hours; and
- Implement safety procedures to reduce the potential for road accidents in village or urban areas.

63. In order to enable barge access to the shore for the delivery of the imported materials, dredging may be required to existing channels to allow adequate clearance of the beam and draft of an ocean going barge. Potential effects are increased sedimentation in the lagoon waters and pollution from leakage of fuel or oil dredging machinery. Measures to minimize the effect of sedimentation from dredging activities on water quality and benthic communities are

- Removal of all excavated materials from the dredging site to land
- Prompt removal of excavated material, as soon as is practicable following excavation
- Storage of dredged material in the tidal zone will not be allowed
- All machinery used in dredging will be maintained in sound condition, and checked daily to ensure that there are no leakages of oil, fuel or hydraulic fluid.

64. The Contractor will have to obtain the requisite permits and clearances from the ECD. The Environmental permit will be one of the conditions required prior to starting the construction work.

9. Offsite and Waste Management

65. To manage waste the objective is to avoid contamination from solid wastes and sewage. Measures to achieve this objective are:

- Contain all stored wastes within construction sites and remove to landfill.
- Properly dispose of all used fuel and lubricant oils in environmentally sound manner, either by recycling or for other use such as fuel for hot mix plant, etc.
- Crush and remove all inorganic solid waste to landfill.
- Develop a plan for handover, sale or removal of all plant, vehicles and machinery at the end of the contract, ensuring that no unserviceable items of equipment are left on the island.
- Install onsite toilets with appropriate management arrangements for effluent and collection of sludge to prevent any release of contamination into the soil. Liaise with the Public Utilities Board for appropriate collection and disposal of sludge.
- Compost all green or organic wastes or use as animal food.

10. Safety and Health

66. Occupational health and safety risks of road works can be limited by clearly defining procedures for handling construction materials, conducting tests, paving, operating heavy equipment, etc. Specific equipment and training may be needed to:

- Prepare a site safety plan specifying responsibilities and authorities within the Contractor‘s staff for adhering to safety and health requirements, and arrange training of Contractor‘s staff to ensure that the plan is understood. The plan will:

- Ensure all occupational health and safety requirements are in place on construction sites and in work camps; Provide for the use of personal protection equipment (PPE) and processes for obtaining relevant PPE;
- Provide for installation of lights and cautionary signs in hazardous areas;
- Set rules to ensure that operators of vehicles and equipment are properly licensed and trained. Provide for posting notices on emergency assistance and location of first aid kits and other emergency equipment
- Ensure safety and inspection procedures, setting schedules for regular checking
- Set procedures for safe handling of toxic materials and other hazardous substances
- Set arrangements for provision of first aid facilities, rapid availability of trained paramedical personnel, and emergency procedures.

67. The design has included provision for footpaths and 166 bus stop bays along roads through villages, near markets, schools and other community facilities;

- Penalties for violation of rules and regulations.= will be dealt with under the provisions of the contract.

68. General Health and Safety Awareness for construction workers will include:

- Introduction to health and safety issues in construction sites;
- Education on basic hygienic practices to minimize spread of tropical diseases;
- HIV/AIDS and STD awareness, including information on methods of transmission and protection measures;
- Prohibition of drugs and alcohol on construction sites; and
- Availability of medical assistance in emergency or non-emergency situations and availability of other health-related assistance.

11. Site De-commissioning

69. To minimize ongoing impacts after construction is completed, the Contractor will be responsible for the proper decommissioning of the temporary construction sites. Measures to achieve this objective would involve:

- Rake or loosen all compacted ground surfaces.
- Implement revegetation / rehabilitation of the sites involving, where possible, local women‘s / community groups.

C. Operation Phase

1. Road Safety

70. Road safety features will be included as an essential element in the design for road upgrading projects, particularly along sections of roads where there is pedestrian traffic within and between settlements, or between settlements and gardens, and set down points or bus stop turn out bay.

71. Community requirements for road safety measures will be discussed with the affected communities during the initial awareness program, and their inputs will be integrated into the design phase. Issues which have been incorporated into detailed design for specific projects in more densely settled areas include:

- Measures to slow traffic; e.g., install speed bump at selected places (e.g., settlements, schools, markets, etc.).
- Off-road set down stops.
- Improvements in road signage and pavement markings.
- Attention to road accident black spots.

2. Rehabilitation and Maintenance Practices

72. Routine maintenance refers to activities such as grading, grass cutting, drain clearing, pothole patching, brushing sand off the road and shoulder repairs, which are performed at regular intervals. Periodic maintenance activities are typically scheduled over periods of several years and include resurfacing and repairs. Other maintenance activities considered to be periodic include seasonal maintenance, such flood repairs, emergency maintenance to reinstate roads after major failures, and the regular upkeep of safety features and road signs. The project provides for the Contractor to train teams of local people for routine maintenance activities. The government will ensure that there is sufficient funding available to carry out routine and periodic maintenance of the road. This will be addressed by a Technical Assistance activity to be done under the project.

VI. ANALYSIS OF ALTERNATIVES

73. This is the only east-west corridor through South Tarawa so there is no alternative to ensuring that it meets the basic access needs to the community and remains passable.

74. With the implementation of the project, economic development of South Tarawa will be induced. Travel time between Bairiki and Tanaea will be reduced substantially as a result of better road conditions and connectivity. Vehicle operation cost such as fuel and maintenance will also be reduced as better road conditions would reduce damage to vehicles and promote more efficient vehicle operation. Transport of goods and services within the area and within Tarawa Atoll will be enhanced and would in turn, spur economic development as cheaper goods and services will be made available as a result of better transport conditions.

75. Health risks such as the occurrence of upper respiratory diseases and mosquito vectored illnesses will be reduced since there will be fewer large depressions that will pond with stagnate water that will serve as breeding grounds for mosquitoes. The generation of dust from unpaved busy roads will be eliminated.

76. Without the implementation of the project, the road conditions will remain bad, and travel to and from between Bairiki and Tanaea will continue to deteriorate owing to the bad road conditions. Vehicle operation costs will remain high due to damage to vehicles and fuel consumption will remain high. The economic development of the area will stagnate as transport of goods and services will remain costly. Health concerns will remain as is with the dust being generated from unpaved roads during dry seasons and ponding/stagnant water will continue to serve as breeding grounds for mosquitoes during the rainy season. Also because of the narrowness of the atoll, there are no other road alignment alternatives. Hence, the implementation of the Road Upgrading and Rehabilitation Project on the current alignment is a necessity.

77. The main alternatives considered were with regard to road design options and, importantly, material selection. Cement concrete pavements were considered but rejected due to their high capital costs and also the high volumes of water required for their construction—fresh water is a scarce commodity in South Tarawa. The normal practice for materials supply is the use of coral. While the government is considering implementing a dredge for deep-water dredging of coral from within the atoll, it was instead decided for the

project to import high quality material from sustainably sourced suppliers in Banaba, Nauru and/or Fiji Islands. This will minimize the negative environmental impact of the project.

VII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

78. As required by the World Bank and Asian Development Bank Safeguards Policies, public consultations were undertaken during the preparation of EMP. Preliminary consultations were undertaken on 10 and 11 July, 2010 during the field visit to Tarawa. Additional public consultations and information disclosure will be carried out in August/September 2010. The EMP will be disclosed to the Public and will be available locally to the communities at the MPWU office and Community centers.

79. The 10-11 July 2010 site visit consultations with twelve individuals and small groups of people most likely to be affected by the project revealed that:

- Most respondents were not aware of the proposed project.
- All the respondents considered the project very important and would be happy if it was implemented as soon as possible.
- Most would like the road to be widened to prevent accidents especially near the end of the causeway.
- All would like to reduce the height of the speed humps because there is tendency for the trucks, buses, cars, motorbikes, bicycles to evade the hump and pass on the side jeopardizing the pedestrians.
- Dust was not perceived as an issue since most are already used to it. However, they universally welcomed the improvement to the road.

80. Further consultations took place during the design phase. These revealed:

- Consistent satisfaction with the proposed improvements, particularly the proposed safety measures
- Interest in realizing income through provision of services or employment during construction
- Concern over possible threat to mature trees from widening / footpath construction
- Some individual concerns over land acquisition issues.
- While there is acceptance that noise, dust, traffic impedance and fume emissions associated with construction are temporary, these can be intolerable (on previous projects)

In order to address these, the design provides for improved drainage, minimizes the removal of trees and provides for replacement with species chosen by the communities, and land acquisition arrangements, conforming to government and funding agency requirements, have been developed. The EMP provides for minimizing noise, dust and fume emissions through requiring high quality plant and equipment to be used, sound site supervision, and provision of advance information to affected communities and to schools, clinics and hospitals.

81. Beneficiary consultations will be conducted during the construction phase, and records of environmental and social issues raised and complaints received during consultations, field visits, informal discussions, formal letters, etc., will be followed up and the records will be kept in the project office at MPWU.

VIII. GRIEVANCE REDRESS MECHANISM

82. The MPWU project office will receive and document issues and concerns that the local populace and stakeholders will have relative to the project and its implementation. Resolution of these issues and concerns will be undertaken expeditiously so as to minimize any impacts that may affect the project implementation.

83. The following process will be followed to address the issues and concerns that stakeholders and Affected People may have on the proposed development:

- The first step towards resolution of issues and concerns relevant to project is the filing of a formal notice/complaint by the Affected Person/People (AP) with the MPWU. For minor complaints such as excessive dust, noise, safety violation, the person assigned to supervise environment and social aspects by the Supervising Engineer will respond within 24 hours of lodging the complaint and a resolution will be conveyed to the AP within 48 hours. For more substantial complaints about land occupation, damage by contractor‘s equipment, drainage issues, etc. the Supervision Engineer will respond within 24 hours and set up further discussion / meetings with the complainant to reach a satisfactory resolution acceptable to all parties within seven days. For land issues, the timeframe may be longer.

- The MPWU will maintain a register where all complaints are logged by: date, name and contact address and details of the complaint. A duplicate copy of the register entry will be given to the AP for their record. The AP may, if so desired, discuss the complaint directly with MPWU or its representative at a mutually convenient time and location. If the complaint of the AP is dismissed, the AP will be informed of his/her rights in taking the complaint to the next step. However, every effort will be made to resolve the issue to the mutual satisfaction of both the parties.

- Should the AP be not satisfied with the decision of the MPWU, the AP may file a written complaint with the Environment and Conservation Division (ECD) of the Ministry of Environment, Land and Agricultural Development (MELAD). The time horizon for the investigation and resolution of the complaint will vary and is dependent on the investigating officer of the ECD.

- Should the AP still be not satisfied with the decision of the ECD-MELAD, the AP may then take the grievance to the Kiribati Judicial System. This will be at the AP‘s cost, but if the court shows that MPWU have been negligent in making their determination, the AP may seek costs.

IX. ENVIRONMENTAL MANAGEMENT PLAN

A. Overview

84. The proposed road traverses a flat terrain, and no specific risks are foreseen with the upgrading of the road section aside from possible land acquisition, disruption of traffic, and disturbance to the adjoining areas. Possible impacts are detailed above and will be mitigated during the design/pre-construction, construction, and operation Phases, as summarized in the Environmental Management Plan.

85. According to the Kiribati Government‘s *Environmental Act, 2007, An Act to Amend the Environment Act 1999*, the Project will require to prepare Basic Environmental Impact Assessment, which is equivalent to ADB‘s Initial Environmental Examination and the World

Bank's Environmental Management Plan (EMP). According to the Act, MPWU will need to comply with environmental requirements as detailed in the EMP and secure Environment License from the Ministry of Environment, Lands, and Agricultural Development (MELAD).

86. An environmental assessment of the proposed South Tarawa road reconstruction and rehabilitation project concluded that the construction impacts will be minor, reversible and manageable if the mitigation measures as given in the EMP are properly implemented. The EMP (Table 1 and Table 2) is based on the type, extent and duration of the identified environmental impacts. The IEE has been prepared by close reference to best practices and in line with the ADB and World Bank's *Safeguard Policies* The effective implementation of the EMP will be audited as part of the Grant conditions. In this regard, the MPWU (the Implementing Agency) will guide the design and supervision engineers and contractors on the implementation of the EMP.

87. The EMP has been reviewed and updated to ensure that it complies with the proposed design and any additional changes made at the design stage (e.g., location, scale, source of materials, safety, etc.) and which have impacts on the environment are reflected in the EMP. The EMP needs to be reviewed by MPWU and MELAD prior to the commencement of construction.

B. Environmental Management Plan

88. The findings and proposed mitigation measures have been compiled into an Environmental Management Plan (EMP). It summarizes all the anticipated environmental impacts and its associated mitigation measures during the design, construction and operational phases. It makes reference to the relevant law and contract documents, approximate location, timeframe, mitigation costs (in US dollars), and the responsibility for its implementation and supervision.

89. The recommendations and proposed mitigation measures will be attached to the Project Bidding Documents and subsequently the Contractors' contracts. There are no environmental mitigation costs as these are incorporated in the civil work design and included in contractor's contract. Many of the mitigation measures will be incorporated as part of the standard design and construction practices and as such their costs will be included in the construction cost. This will be refined during the detailed design stage.

1. Design/Pre-Construction Phase

90. Experience shows that inadequate application of the EMP by the contractor may occur due to weak linkages of the EMP with the contract documents. The EMP is a part of the work program and as such it must be addressed by the contractor and carried out as required.

91. In the Bid and Contract section ~~"~~Special Conditions of Contract", the Project Supervision Consultant (PSC) of the MPWU will, prior to the tender being called, will revise and update the EMP and the EMP as forming part of the Bid and Contract document. The contractor will use this document to cost his compliance with the EMP.

92. Bid evaluation and selection of contractor: The contractor will be required to provide a short statement that confirms that:

- the EMP conditions have been costed into the bid price,
- the contractor has experience of working with an EMP,

- the contractor has a qualified and experienced person on the contractor‘s team who will be responsible for the environmental compliance requirements of the EMP.

93. Land acquisition and compensation will be discussed with the affected communities, including identification of the land to be acquired, trees and plant or other affected by road reconstruction and rehabilitation, and compensation requirements. MPWU will discuss measures with the affected community and work with the local government officers to implement land acquisition and provide compensation as described in the Resettlement Plan.

2. Construction Phase

94. During the construction, the contractor will work according to the requirements of the Contractor‘s Environmental Plan (CEP) (based on the EMP) which has been prepared by the contractor. Supervision and monitoring of the CEP activities will be undertaken as follows:

(i) The contractor has the initial responsibility for preparing and implementing the CEP as per the works contract.
(ii) The Resident Engineer (RE) will direct the contractor with regard to compliance with the CEP.
(iii) The MPWU will carry out independent monitoring of the work and can issue Defect Notices to the PE who will transmit these to the contractor.
(iv) The contractor will have his own representative on site – the Site Engineer (SE) who will be responsible for implementing the contract and complying with the CEP.

95. Contractor prepares CEP: following the award of the contract and before commencing the work, the contractor will prepare a Contractor‘s Environmental Plan (CEP) that addresses the conditions of the construction in the EMP that has been attached to the Bid and Contract Documents. The CEP will amplify how the contractor will address the activities in the construction section of the EMP. The contractor will submit the CEP to the MPWU for approval.

96. Induction of contractor to site: Following the selection of the contractor and the approval of the CEP, the contractor together with the person on the contractor‘s staff who will be responsible for supervising the CEP will meet the PSC (Environment) on-site. If the plan is appropriate and implementable, the PSC will advise the PE that the contractor can now commence work.

97. Preparation of site and establishment of contractor‘s facilities: This applies to all of the contractor‘s facilities, storage areas, workshops, labour camps (when needed), concrete batching areas, asphalt plant, etc. The location and development of the contractors‘ facilities will be approved by the PE. The sites will be selected so that:

- they do not interfere with the environment and social well being of the surrounding communities re noise, dust. vibration, etc.,
- The size of contractor‘s facilities are limited to absolute minimum to reduce unnecessary clearing of vegetation,
- sanitary waste and grey waters are treated before release into surface water systems,
- the sites are properly drained. Paved areas, including vehicle parking areas, workshops and fuel storage areas are to drain to an oil and water separator, and
- fuel storage areas are not located within 20m of a water course. The contractor‘s facilities are to be contained within an adequate security fence.

98. Clearing of sites and removal and disposal of vegetation:

- Wherever possible limit area to be cleared and avoid excessive machine disturbance of the topsoil.
- Wherever practical 10 m wide buffer zones are to be established at sites abutting to the lagoon.
- Cleared material is to be piled into manageable sized heaps according to disposal or re-use requirements.

99. Prevention of soil erosion on construction site: The contractor will be responsible for ensuring that the erosion is contained by appropriate soil conservation protection methods. While excavation will be limited to the formation of U drains in certain locations, this is particularly important since the work location is close to the lagoon. The contractor will:

- Limit the extent of excavation to reduce soil erosion potential.
- Apply soil conservation protection methodology to susceptible areas to prevent / minimize storm water runoff carrying eroded materials off-site.
- Avoid excavation and operating machinery in wet ground conditions.
- Upon completion of excavation, the contractor will ensure that U drain construction is promptly completed.

100. Storage and handling of construction materials, fuel and lubricants: Construction materials will include aggregates, gravel and cement for concrete manufacture, reinforcing rods and steel mesh, wood and other construction materials, fuel and lubricants, etc. Fuel and oil will be stored in dedicated areas at least 20 m away from the lagoon areas. Where fuel in excess of 5,000 liters is stored on site, it will be stored in sealed tanks on a concrete base that is bunded to hold 110% of the tank capacity. All workshops would be provided with oil and water separators. Vehicles and machinery will not to be refuelled within 20 m of the lagoon. The contractor must have trained personnel who are competent in fuel handling procedures and for cleaning up accidental spills. Any major spill in the vicinity of the lagoon will be reported to MELAD. All waste oil, oil and fuel filters will be collected and disposed of in secure landfill areas. At the closure of the site, all contaminated soil will be excavated, removed and replaced with fresh topsoil.

101. Noise and Vibration: This applies to all machinery, vehicles and construction sites where noise and vibration may affect susceptible receptors. The contractor will be responsible for ensuring that noise and vibration does not affect the adjacent communities. While it is unlikely that noise and vibration will be an issue due to the large distances between the activities and the communities the contractor will confine all work to daylight hours (0700hrs - 1900hrs) should the community find that any night time operations become a nuisance.

102. Dust management: This applies to all of construction sites and haul roads. During construction, when dust may be generated, the contractor will monitor the worksite conditions and apply dust control measures, which include reducing construction traffic movements and spraying water on exposed areas.

103. Community safety from increased vehicle movements: This applies to all vehicles and particularly to haul trucks that pass through villages. The contractor will ensure that all vehicles which pass through villages are operated safely without endangering these communities. The contractor is to ensure that:

- all trucks and equipment is maintained in a safe operating condition,
- all drivers and machinery operators are properly trained and act responsibly (to be stipulated in the contractor‘s site safety plan),

- all loads are secured and all loads with potential dust generating materials (e.g. excavated soil and sand) will be covered with tarpaulins,
- the contractor will immediately remove any drivers that ignore any of the community safety requirements.

104. Safety and Hazard: Before commencing work, the contractor will be required to identify potential hazards. Provisions for emergency responses are to be included in the contractor's site safety plan which is to include nomination of a person who will be immediately contacted should an accident occur. The site safety plan will be submitted to the PSC for approval one week prior to starting work.

- The contractor will be required to keep the site free of drugs and alcohol.
- The contractor's site safety plan will include provision for a safe work environment and provide safety measures and protective equipment to all workers including; hand, head, eye and ear protection and safety footwear.
- The site safety plan will include provision for first aid facilities on-site and employ a trained first aid person.
- The contractor will provide supplies of potable water, toilets and wash water to the workers.

105. Disposal of waste materials: All construction waste materials including drums, lumber, sand and gravel, cement bags etc are to be suitably disposed of. If these cannot be recovered for scrap value these materials should be taken to an approved landfill sites for safe disposal. Hazardous waste will be stored and removed from the island on demobilization.

106. Clearance and rehabilitation of construction sites and removal of contractor's facilities: It is the contractor's responsibility to address site cleanup. This includes the removal of all waste materials, machinery and any contaminated soil. The contractor will develop a plan for handover, sale or removal of all plant, vehicles and machinery to ensure that no unserviceable items are left on the island. All construction sites and work areas will be rehabilitated so that these can be returned as close as possible to their previous uses. This includes the stabilization and landscaping of all of the construction sites. No waste will be left on site after the work is completed. Should the contractor fail to remove the waste, the MPWU is entitled to withhold payment and arrange the clean up and deduct the cost of the clean up and appropriate administrative charges from the final payment.

3. Operational Phase

107. People Safety: During operation, road safety features will include (i) measures to slow the traffic; e.g. installation of speed hump at selected places (e.g. settlements, schools, markets, etc), (ii) bus stop turn out bay that allow the passengers to get in and out of the bus safely, (iii) dust suppression sealing, (iv) improvements in road signage and pavement markings, and (v) attention to road accident black spots.

108. Road Maintenance: Routine maintenance (grading, grass cutting, drain clearing, and pothole patching and shoulder repairs) will be undertaken on regular basis. Seasonal maintenance such as flood repairs, emergency maintenance to reinstate roads after major failures, and the regular upkeep of safety features and road signs will be undertaken as necessary. Major maintenance that include resurfacing and repairs are typically scheduled over periods of several years.

109. Noise control: Considering the low traffic volume, noise is not considered a major concern in the area. For occasional houses, dust fence barriers (using traditional material such as coconut leaves mat) commonly used in Tarawa might be considered.

C. Environmental Monitoring Plan

110. A monitoring plan for the proposed Project (Table 3) has been prepared. The main components of the monitoring plans include:

- Environmental issue to be monitored and the means of verification,
- Specific areas, locations and parameters to be monitored;
- Applicable standards and criteria;
- Duration and frequency and estimated monitoring costs; and
- Institutional responsibilities for monitoring and supervision.

111. The cost of implementing the monitoring plan during the construction phase is $51,000 covering the engagement of an environment specialist, providing 5.75 months of input over the 23 month construction period, and incidental costs.

112. A field monitoring checklist has been prepared based on the EMP and monitoring plan (Annex 2). The field monitoring checklist will be used by the supervising field engineers. The signed checklists will be provided to the MPWU who will be responsible for the appropriate follow-up and compliance reporting.

113. The MPWU will maintain a Complaints Database, which will contain all the information on complaints received from the communities or other stakeholders. This would preferably include: the type of complaint, location, time, actions to address these complaints, and final outcome.

D. Institutional Implementation and Reporting Arrangements

1. Project Implementation

114. MPWU is the Implementing Agency for the Project and will be responsible for the implementation and compliance with the EMP and Monitoring Plan. Day-to-day implementation and compliance will be the task of PSC.

2. Reporting Arrangements

115. The findings of the regular monitoring activities, as specified in the Monitoring Plan (Table 3) will be included in the quarterly PSC progress reports. The person assigned for environmental and social affairs of the MPWU will be responsible for the reviewing of Environmental Safeguard sections of the quarterly progress reports. This will include an overview of the status of the implementation of the EMP‘s and compliance to the national environmental regulations. The progress reports will be submitted for information to the EDC-MELAD, the Asian Development Bank and the World Bank.

Table 1: Environmental Management Plan: Design/Pre-Construction Phase

ENVIRONMENTAL ISSUE AND OBJECTIVE:	MITIGATION MEASURES	TREATMENT DURING PRE-CONSTRUCTION
DESIGN/PRE-CONSTRUCTION PHASE		
Protection of (sensitive) Natural areas To minimize negative impacts on sensitive ecosystems, or the natural environment:	• Identify potential environmentally sensitive / natural areas • Locate optional construction sites/activities away from them. • Ensure construction personnel are aware of locations of sensitive areas and avoid them • If the proposed construction passes close to these areas, include temporary fences to restrict machines and activities from encroaching in the area.	The project road alignments were inspected and consultations undertaken. While most of the road alignment passes through densely populated areas where natural ecosystems have been substantially altered by human habitation, some widening is to take place adjacent to mangrove stands, including some being established under the KAP. Improved revetment of the road is required, and this will be achieved by the construction of a small wall using cement filled sand-bags, well clear of the mangrove stands. The EMP for the construction phase provides for protection of the mangroves during the course of construction activities. Trees removed from the Anderson and Temaiku causeways will be replanted with suitable species, identified by local residents.
Environmentally Sound design To avoid erosion and damage to the road:	• Roads should have sufficient camber (5-8% cross fall) so that the rainwater flows away from the road. • Road structures should have effective drainage systems (side-drains, culverts, etc.). • Cross drainage flows are properly taken care of at causeways, bridges, culverts, etc.	A camber of 3% has been included in the design, which ensures adequate flow of water from the road surface. Observations of natural drainage patterns during rainfall events shows that, on reaching bare soil surfaces, water usually seeps rapidly through the soil profile, except where the soil has been heavily compacted by vehicle movements. Testing of soils from roadside areas has demonstrated that , if uncompacted, water drains freely and rapidly through the soil profile. The main drainage problems occur in depressions where the soil has become compacted through vehicle movements. This existing situation will be remedied by the provision of ~~r~~ain gardens" which comprise areas of 25 – 50 sq m, protected by bollards where the soil is to be scarified and planted with grass and shrubs. This concept has been discussed in the public consultations and is considered acceptable. U drains will be provided in sections of the road where, due to the presence of walls or buildings, water cannot disperse naturally.
Road Safety To avoid accidents during and after construction of the road:	• Include occupational health and safety requirements are in place on construction sites in work camps. . • Include install of lights and cautionary signs in hazardous areas. • Ensure that footpaths and pull-off bays along roads; through villages; and near markets, schools, and other community facilities are included in the design. • Include safety instructions for the construction activities in the contract documents. • Ensure that speed bumps near schools, hospitals, and markets are included in the road design. • Ensure sufficient visibility along the road section according to standard specifications.	Villages and sections of road passing hospitals, schools and manaebas have been treated as speed control zones. With these zones, the following safety measures are provided (i) ~~v~~illage gateways", which display the village name and speed limits (in English and I-Kiribati) and have road markings to give the impression of constriction and encourage slower driving (ii) marked pedestrian walkways, (iii) speed humps (iv) raised kerbs, (v) marked bus bays and (vi) lighting. In all other areas, safety measures include footways on either side of the road wherever space permits, appropriate signage and trimming of vegetation where required to achieve adequate visibility. The EMP for construction provides for measures to ensure safety to workers and the public from construction activities.
Cultural Heritage To avoid any serious damage to cultural heritage site (i.e., ceremonial sites and burial grounds):	• In case a cultural heritage site is identified during the construction, the Contractor will cease all work immediately and notify the PSC	Excavation is only required for the formation of U drains in certain locations. Consultations confirm that artifacts of cultural or historic importance do not occur during excavation activities that are undertaken regularly to build or extend homes and public buildings. However, the updated EMP for the construction phase includes provision for ceasing work and notifying the Project Steering Committee should artifacts of cultural or historical importance be unearthed.

ENVIRONMENTAL ISSUE AND OBJECTIVE:	MITIGATION MEASURES	TREATMENT DURING PRE-CONSTRUCTION
Social or Community Concerns To minimize social impact of an relocation or resettlement of people:	• Plan activities to avoid/minimize displacement of residents • Discuss the projected impacts and negotiate proposed measures in advance with the affected community; work with local government officers and NGOs • Conduct surveys before activities commence to identify all members of affected populations • Identify other land based natural resources, infrastructure and services which may be lost to the affected community • Identify suitable land (if possible, land having the same clan ownership) for resettlement.	Consultations have taken place with groups of villagers according to a publicized schedule. These identified little some concerns related to design and minor concern over construction activities. Concerns related to design were (i) the need to correct existing problems with drainage (ii) possible removal of trees to make way for footways and (iii) some concerns over land acquisition issues. These are addressed by (i) provision for drainage as described above, (ii) allowing for retention of trees in designing footways and (iii) development and implementation of a comprehensive land acquisition plan, including a 100% inventory of losses and enactment of specific compensation policies acceptable to affected persons, the government and the financing agencies. Where practicable, labor based techniques have been provided for. This includes the prescribed concrete surfacing of feeder roads, which makes use of labor rather than heavy machinery.
To minimize damage to personal and community property:	• Ensure works will be restricted to the ‗right-of-way' of the existing road; • Ensure projected impacts and proposed measures have been discussed in advance with the affected community; work with local government officers and non-governmental organizations. • Conduct surveys before activities commence to identify all members of affected populations.	Project impacts and proposed mitigation measures have been discussed with communities and councils during design. Detailed surveys of affected property will be completed prior to construction

Table 2: Environmental Management Plan: Construction and Operation Phase

ENVIRONMENTAL ISSUE AND OBJECTIVE:	• MITIGATION MEASURES	LOCATIONS	TIMEFRAME	ESTIMATED MITIGATION COSTS	IMPLEMENTATION	SUPERVISION
CONSTRUCTION PHASE						
Social or Community Concerns To minimize social disturbance and maximize community benefits from the project:	• Advise the local community of project plans in advance of construction, and involve them in planning, as necessary (specific sites given in Appendix 3). • Avoid or minimize disturbances near living areas, schools, hospitals, etc. • Control runoff and manage sediments near cultivated areas • Abide by the laws of the Republic of Kiribati relating to employment and use of labor • Maintain liaison with community representatives and arrange for the involvement of community groups where practicable, such as the provision of catering services Include women's and other community groups in project activities	Along road alignment	During mobilization and commencement of construction activities in the communities	Minimal (part of standard design practices).	Contractor	MPWU/CSC

Soil Instability and Erosion To minimize the amount of sediment lost from the site:	• Reduce the time excavated drainage channels remain unsupported • Keep vegetation clearing to a minimum • Place geotextile silt traps as appropriate • At sites where vegetation is removed, encourage re-vegetation immediately after construction activity finishes	All areas where clearing is required	Continuous	Minimal (part of standard construction practices)	Contractor	MPWU/CSC
Controlling Sediment To minimize impact of storm water containing sediment on streams and coasts including suspended sediment in the lagoon:	• Install silt traps at drainage ditches and materials stockpiles • Revegetate all areas where vegetation was removed which are not to be paved after final land shaping • Limit ground disturbance to areas of a workable size • Schedule construction to minimize areas of soil disturbance during wet seasons • Contain or isolate construction areas using a bund or trench, from other surface runoff. Clean and rehabilitate when construction is complete • Discharge of sediment bearing contaminated water to the lagoon is prohibited • Assess in detail the requirements for channel rehabilitation and upgrading. • Remove of all excavated materials from the dredging site to land • Ensure all dredged materials are removed as soon as is practicable following excavation • Storage, temporary or othwerise, of dredged material within the lagoon zone is not allowed • Check all machinery used in dredging to ensure sound condition, and no leakages of oil, fuel or hydraulic fluid. No machinery showing any leakages shall be allowed to work in the lagoon until completely repaired.	All areas where clearing is required.	Continuous	Minimal (part of standard construction practices).	Contractor	MPWU/CSC
Controlling Storm water To minimize the impact of contaminated runoff water:	• Pass storm water run-off from construction areas through geotextile silt traps before discharge into culverts or drainage systems. • Store oil and bituminous products in a contained location away from drainage ditches.	All areas where clearing is required.	Continuous	Minimal (part of standard construction practices)	Contractor	MPWU/CSC
Management of Stockpiles and Spoil-heaps To minimize dust and runoff	• Discuss dumping locations with local landowners • Ensure proper drainage to isolate the sites. • Ensure stockpile or spoil-heap locations do not block surface runoff or drainage lines • Cover or re-vegetate spoil-heap or stockpiles if prolonged exposure is envisaged, to minimize erosion and sediment runoff • Maximum stockpile height shall be 3m • Place geotextile silt traps around materials stockpiles	Dumping areas and areas where materials are stored.	Continuous	Minimal (part of standard construction practices)	Contractor	MPWU/CSC
Dust Control To minimize health risk or inconvenience due to dust production:	• Spray water on exposed surfaces during dry periods, especially near schools, hospitals and community areas. • Ensure trucks are not overloaded and are covered when transporting friable materials.	Cleared areas, material transport	During dry periods	Minimal (part of standard design practices).	Contractor	MPWU/CSC

Noise control To minimize nuisance from noise:	• Use modern and well maintained equipment with mufflers • Carry out noisy construction activities during daylight hours (0700 – 1900) • Advise local people, schools, hospitals, etc., when there will be unavoidable noise activities.(specific sites given in Appendix 3)	All construction areas, access routes	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Material Management To minimize impacts of materials delivery and waste disposal	• Extraction of materials from beach or lagoon or any other site locally is not allowed • Develop materials delivery and waste disposal handling plan • Place silt fences around materials stockpiles • Develop safety measures to avoid loss of load from trucks • Implement methods to reduce dust emission from the loads • Number and timing of truck trips to and from the unloading site • Implement site safety plan with regard to vehicle operation and use. Restrict peak traffic delivery. • Limit maximum stockpile height to 3m	All materials management areas	Continuous	Minimal (already part of standard design practices)	Contractor	MPWU/CSC
Offsite and Waste Management To prevent / minimize contamination from solid wastes and sewerage:	• Contain all solid waste within construction sites and remove to landfill • Prepare procedures for managing spillages to ensure rapid containment, immediate site cleaning and appropriate disposal (as for depots and workshops) • Crush, and remove all inorganic solid waste to landfill • Develop a plan for handover, sale or removal of all plant, vehicles and machinery at the end of the contract, ensuring that no unserviceable items of equipment are left on the island • Install onsite toilets with appropriate management arrangements for effluent and collection of sludge to prevent any release of contamination into the soil. Liaise with the Public Utilities Board for appropriate collection and disposal of sludge • Compost or use as animal food all green or organic wastes	All off-sites storage and disposal sites	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Storage and handling of fuel and lubricants To minimize hazards relating to fuel, oil, paints etc	• Fuel and oil will be stored in dedicated areas at least 20 m away from the lagoon areas. • Where fuel in excess of 5,000 liters is stored on site, it will be stored in sealed tanks on a concrete base that is bunded to hold 110% of the tank capacity. • All workshops would be provided with oil and water separators. • Vehicles and machinery will not to be refuelled within 20 m of the lagoon. • Nominate authorized personnel for fuel handling • Develop procedures for cleaning up accidental spills. • Report any major spill in the vicinity of the lagoon to MELAD. • Collect and dispose of all waste oil, oil and fuel filters at the landfill.					

Safety and Health To ensure maximum safety of construction personnel and local residents:	• Ensure all occupational health and safety requirements are in place on construction sites and in work camps • Install lights and cautionary signs in hazardous areas • Establish footpaths and pull-off bays along roads through villages, near markets, schools and other community facilities • Limit construction activities from 0700 hr to 1900 hr to limit exposure to dust, noise etc. • Enhance safety and inspection procedures • Use Personal Protection Equipment (PPE)	All construction sites.	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
General Health and Safety Awareness for construction workers:	• Prepare a site safety plan specifying responsibilities and authorities within the Contractor's staff for adhering to safety and health requirements, to cover adherence to occupational health and safety requirements, provide for use of personal protective equipment, provide for lighting and warning signs at hazardous areas, set rules for operation of vehicles and equipment by authorized personnel, set procedures for safe handling of toxic and hazardous materials, set arrangements for first aid and emergency procedures, provide for posting notices about medical assistance and location of emergency equipment, set schedules for regular checking of adherence to the plan and train staff to familiarize them with the plan their obligations to implement it and main areas of risk to workers and others • Education on basic hygiene practices to minimize spread of tropical diseases • Increase workers' HIV/AIDS and STD awareness, including information on methods of transmission and protection measures • Prohibit usage of drugs and alcohol on construction sites •	Construction camps and all worksites	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Disruption of utilities	• Ensure high standards of site supervision and vehicle and plant operation to reduce risks of damage to water, power and telecommunication lines • Prepare procedures for rapid notification to the Public Utilities Board and assistance with re-instatement, in the event of any disruption	All construction sites	Continuous	Minimal (part of standard design practices).	Contractor	MPWU/CSC
Site de-commissioning To minimize ongoing impacts after construction is completed:	• Rake or loosen all compacted ground surfaces • Ensure that waste and surplus materials are removed from site, or otherwise dealt with according to the wishes of landowners or local residents • Excavate any contaminated soil from fuel depots / workshops, remove and reshape the area.	All construction and camp sites	After completion of construction	Minimal (part of standard design practices).	Contractor	MPWU/CSC

OPERATION PHASE						
Peoples Safety To enhance safety following increased vehicle speed :	• Install speed bump at selected places (e.g., settlements, schools, markets, etc.) to slow down traffic at critical locations. • Promote off-road let down stops for PMVs. • Enhance improvements in road signage and pavement markings. • Pay increased attention to road accident black spots.	Sensitive areas (settlements, schools, markets)	As required	part of standard design practices	MPWU	MPWU HQ, Provincial Government, ADB/World Bank
Rehabilitation and Maintenance of Practices To avoid drainage / erosion problems,	• Conduct regular monitoring and inventory of risks for erosion and drainage problems • Conduct routine maintenance like grading, grass cutting, drain clearing, pothole patching and shoulder repairs.	Entire road section	As required	part of standard design practices	MPWU	MPWU HQ, Provincial Government, ADB/World Bank

Table 3: Environmental Monitoring Plan

ENVIRONMENTAL ISSUE AND OBJECTIVE:	WAYS FOR VERIFICATION	LOCATION	STANDARDS/CRITERIA	DURATION/FREQUENCY AND ESTIMATED COSTS	IMPLEMENTATION	SUPERVISION
CONSTRUCTION PHASE						
Social or Community Concerns Minimization of social disturbance and maximize community benefits.	Verbal or formal complaints. Project progress reports.	Along the entire road alignment	Resettlement Guidelines and international *Best Practices*' (see WB Handbook on Roads), as necessary.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Soil Instability and Erosion Minimization of the amount of sediment lost from the site.	Visual check for sediment load and waste management procedures. Verbal or formal complaints.	All areas where clearing is required.	Construction and waste materials should be controlled. Waste can only be disposed of at approved sites.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Controlling Sediment Minimizing storm water containing sediment from discharging into streams. Ensuring that dredged material from channel improvement operations is removed promptly from the dredge site and that all machinery operating in the lagoon is free of leakages of fuel, lubricant or hydraulic fluid	Visual and field Inspection. Verbal or formal complaints.	All areas where clearing is required.	Erosion should be controlled. No storage, temporary or otherwise, of dredged material within the lagoon Sound condition of machinery operating in the lagoon, ensuring no leakages of any kind	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Controlling Storm water Minimizing contaminated runoff water.	Visual check for water and drainage management. Verbal or formal complaints.	All areas where clearing is required and construction sites.	No increase of drainage problems or water logged areas. Waste can only be disposed of at approved sites.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Management of Stockpiles and Spoil-heaps Manage to minimize dust and runoff.	Visual field checks. Verbal or formal complaints.	Dumping areas.	Construction and waste materials should be controlled. Waste can only be disposed of at approved sites .	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Air Quality and Dust Control Ensure there is no health risk or inconvenience due to dust production:	Visual field checks. Verbal or formal complaints.	Cleared areas,	International *Best Practices*' (see ADB's Environmental Assessment Guidelines, WB Handbook on Roads and the Environment and WHO Guidelines), as necessary.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Noise control Ensure nuisance from noise is minimized.	Visual field checks. Verbal or formal complaints	All construction areas, access routes	International *Best Practices*' (see ADB's Environmental Assessment Guidelines, WB Handbook on Roads and the Environment and WHO Guidelines), as necessary.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU

ENVIRONMENTAL ISSUE AND OBJECTIVE:	WAYS FOR VERIFICATION	LOCATION	STANDARDS/CRITERIA	DURATION/FREQUENCY AND ESTIMATED COSTS	IMPLEMENTATION	SUPERVISION
Safety and Health Ensure maximum safety of construction personnel and local residents.	Visual field inspections Verbal complaints by workers	All construction sites.	International *Best Practices*' (see ADB's Environmental Assessment Guidelines, WB Handbook on Roads and the Environment and WHO Guidelines), as necessary.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Avoid disturbance by the constructions workers.	Verbal and formal complaints by communities.	Construction camps	As listed in the EMP.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Health and Safety Awareness for construction workers.	Verbal and formal complaints by communities and workers.	Construction camps	As listed in the EMP.	Continuous (minimal costs, included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
Site de-commissioning Minimize ongoing impacts after construction is completed	Counting of replanting. Agreement with Communities	All construction and camp sites	No increase of soil erosion	After completion of construction (included in standard supervision)	Joint monitoring by the MPWU Engineer and the Contractor.	ES and Engineer of MPWU
OPERATION PHASE						
Peoples Safety Mitigate increased vehicle speed.	Visual checks. Verbal and formal complaints by communities.	Sensitive areas (settlements, schools, markets)	Routine and Periodic Maintenance of traffic signs, road hump maintenance, etc	Annually after construction (included in standard supervision)	MPWU Engineer	MPWU HQ, Provincial Government, World Bank
Rehabilitation and Road Maintenance Practices Avoid drainage problems, aggravation of erosion, and reduced visibility.	Verbal and formal complaints.	Entire road section	.Routine and Periodic Maintenance	Annually after construction (minimal costs, included in standard supervision)	MPWU Engineer	MPWU HQ, Provincial Government, ADB/World Bank

Table 4: Specific Mitigation Measures

LOCATIONS:				ITEM	SPECIFIC MITIGATION ACTIVITY
Abarao Village; Ambo Village; Bairiki Village; Banraeaba Village;	Betio Town; Bikenibeu Town; Bonriki Village; Buota Village;	Eita Village; Nanikaai Village; Tabaonga Village; Taborio Village;	Teaoraereke Village; Temaiku Village; Tengaruru Village	Villages / Residential Areas	Advise communities of project plans in advance of construction. Information should be posted at maneabas, will state location duration, dates of any operations that generate noise, dust, or fumes or that affect traffic. , and provide contact information for requests, concerns or suggestions. Adapt plans to take account of feedback as practicable.
Main Road: 6+950 RHS 6+970 RHS 7+820 RHS 9+300 RHS 9+780 RHS 10+180 RHS 10+910 RHS	11+150 RHS 11+720 RHS 15+170 RHS 15+440 LHS 16+270 RHS 19+300 RHS 21+280 LHS 22+560 LHS	Buota Main Road 0+165 LHS 0+630 RHS Buota Feeder Road 0+630 RHS	Temaiku Road 2+400 LHS 4+675 LHS	Churches and other religious establishments	
Main Road: 7+730 RHS 10+060 RHS 22+840 LHS 23+400 RHS 23+920 RHS				Hospital and clinics	Advise local people, schools, hospitals, etc., when there will be unavoidable noise activities
Main Road: 5+835 LHS 5+915 RHS 6+075 LHS 7+070 RHS 7+080 LHS 8+280 RHS 9+900 RHS 10+180 LHS	12+250 RHS 13+875 LHS 15+290 LHS 15+460 LHS 15+660 RHS 17+280 LHS 17+340 LHS 18+080 LHS 18+680 RHS	21+160 LHS 21+320 RHS 21+330 LHS 21+610 LHS 22+550 LHS Buota Main Road 0+630 LHS 0+880 LHS	Buota Feeder Road 0+880 LHS Temaiku Road 0+280 LHS 2+430 LHS 5+190 LHS 5+570 LHS	*Maneabas*	
Main Road: 7+630 RHS 7+680 RHS 14+385 RHS 14+520 RHS 15+550 RHS	15+930 RHS 18+540 RHS 18+620 RHS 22+26 LHS 23+73 LHS	Temaiku Road: 1+525 LHS 1+860 RHS		Schools and colleges	

Main Road	12+500 RHS	20+905 LHS	Bikenibeu Feeder Roads	Water System Assets	
5+850 LHS	12+700 LHS	21+095 RHS	Road 1 0+627 RHS		
5+900 RHS	13+010 RHS	21+140 RHS	Road 1 1+059 LHS		
6+040 LHS	13+050 RHS	21+160 RHS	Road 1 1+153 RHS		
6+830 LHS	13+275 LHS	21+395 RHS	Road 3 0+018 LHS		
7+080 LHS	13+665 RHS	21+825 RHS	Road 3 0+020 LHS		
7+265 RHS	13+830 LHS	22+040 RHS	Road 3 0+040 LHS		
7+670 RHS	13+840 RHS	22+225 RHS	Road 4 0+059 RHS		
7+750 RHS	14+225 RHS	22+355 RHS	Road 4 0+262 RHS		
7+950 RHS	14+565 RHS	22+500 LHS	Road 4 0+780 RHS		
8+080 LHS	14+650 RHS	22+880 RHS	Road 4 0+823 LHS		
8+125 RHS	14+865 RHS	23+035 RHS	Road 4 0+978 LHS		
8+270 RHS	15+350 RHS	23+175 LHS	Road 4 0+986 RHS		
8+460 RHS	15+455 RHS	23+195 LHS			
8+515 LHS	15+660 LHS		Temaiku Road		
8+650 RHS	15+780 RHS	Betio Feeder Roads	0+035 LHS		
8+670 RHS	15+865 RHS	Road 2 0+242 RHS	0+295 RHS		
9+145 RHS	15+870 RHS	Road 4 0+130 RHS	0+360 RHS		
9+150 RHS	15+875 RHS	Road 4 0+217 RHS	0+376 RHS		
9+415 RHS	16+025 RHS	Road 5 0+286 LHS	0+423 RHS		
9+425 RHS	16+030 RHS	Road 7 0+050 RHS	0+815 RHS		Ensure supervision of all works close to these items to avoid accidental damage
9+550 RHS	16+340 LHS	Road 7 0+052 LHS	1+773 RHS		
9+700 RHS	16+380 RHS	Road 7 0+070 LHS	1+783 RHS		
9+760 RHS	16+400 RHS	Road 7 0+071 LHS	3+162 RHS		
9+910 RHS	16+545 LHS	Road 7 0+161 LHS	6+110 LHS		
10+145 RHS	16+775 LHS	Road 8 0+356 LHS			
10+260 RHS	17+015 RHS	Road 8 0+418 RHS	Buota Main Road		
10+330 RHS	17+020 RHS	Road 8 0+447 LHS	0+170 LHS		
10+365 LHS	17+205 RHS	Road 8 0+451 RHS	0+173 LHS		
10+410 LHS	17+220 RHS	Road 8 0+547 LHS	0+322 RHS		
10+475 RHS	17+345 RHS	Road 8 0+560 LHS	0+395 RHS		
10+550 RHS	17+470 RHS	Road 8 0+577 LHS	0+920 RHS		
10+850 LHS	17+650 RHS	Road 10 0+095 LHS	1+010 RHS		
10+860 RHS	17+740 RHS	Road 10 0+096 LHS	1+087 LHS		
10+930 RHS	17+830 RHS	Road 10 0+098 LHS	1+154 LHS		
10+950 RHS	17+905 RHS	Road 10 0+180 RHS	1+210 LHS		
11+290 RHS	18+360 LHS	Road 11 0+068 RHS	1+243 LHS		
11+325 RHS	18+400 RHS	Road 11 0+146 RHS	1+872 RHS		
11+345 RHS	18+585 RHS				
11+350 RHS	18+630 RHS				
11+495 LHS	19+475 RHS				
12+100 RHS	20+875 RHS				

Main Road	18+865 LHS	20+225 RHS	Betio Feeder Roads	Streetlight Poles	
0+375 LHS	18+915 RHS	20+290 LHS	Road 2 0+002 LHS		
0+550 LHS	18+950 LHS	20+300 RHS	Road 2 0+002 RHS		
0+715 LHS	19+045 LHS	20+390 LHS	Road 2 0+013 RHS		
0+875 LHS	19+085 LHS	20+615 RHS	Road 2 0+022 RHS		
1+200 LHS	19+135 LHS	20+660 LHS	Road 2 0+027 LHS		
1+350 LHS	19+155 RHS	20+790 RHS	Road 2 0+030 RHS		
1+375 LHS	19+210 RHS	20+850 LHS	Road 3 0+150 RHS		
1+550 LHS	19+310 LHS	20+910 LHS	Road 6 0+000 LHS		
1+875 LHS	19+335 LHS	20+930 LHS	Road 7 0+087 RHS		Ensure supervision of all works close to these items to avoid accidental damage
2+050 LHS	19+405 LHS	20+955 LHS	Road 8 0+000 LHS		
2+200 LHS	19+750 LHS	21+010 LHS	Road 10 0+375 RHS		
2+540 LHS	19+760 RHS	21+115 LHS	Road 11 0+055 LHS		
2+700 LHS	19+785 LHS	21+175 LHS	Road 11 0+460 RHS		
2+875 LHS	19+855 RHS	21+270 LHS			
3+030 LHS	19+860 LHS	21+300 LHS			
3+200 LHS	19+935 RHS	21+365 LHS			
3+250 RHS	20+075 RHS	21+520 RHS			
3+330 LHS	20+125 LHS	21+790 RHS			
18+590 LHS	20+200 LHS	21+835 RHS			
18+770 LHS					

Main Road	10+630 LHS	15+220 LHS	19+050 RHS	Groundwater Wells	
	10+655 LHS	15+245 LHS	19+235 LHS		
4+640 LHS	10+810 LHS	15+250 LHS	19+235 RHS		
5+730 RHS	11+140 LHS	15+270 LHS	19+440 LHS		
5+860 LHS	11+220 RHS	15+300 LHS	19+530 RHS		
7+090 LHS	11+450 LHS	15+310 LHS	19+540 RHS		
7+125 LHS	11+450 RHS	15+310 RHS	20+540 LHS		
7+375 RHS	11+725 LHS	15+325 LHS	20+740 RHS		
7+400 LHS	11+840 RHS	15+335 LHS	20+900 LHS		
7+560 LHS	11+850 RHS	15+460 RHS	21+120 LHS		
7+620 LHS	11+900 LHS	15+525 LHS	21+525 LHS		
7+820 LHS	11+915 LHS	15+680 RHS	21+525 RHS		
7+890 RHS	11+925 RHS	15+685 LHS	21+555 LHS		
7+980 LHS	11+930 LHS	16+035 LHS	21+600 LHS		
8+030 LHS	12+130 LHS	16+050 LHS	21+610 RHS		
8+180 LHS	12+210 RHS	16+120 RHS	21+645 RHS		
8+205 LHS	12+295 LHS	16+140 LHS	21+680 LHS		
8+265 LHS	12+995 LHS	16+155 LHS	21+860 LHS		
8+280 LHS	13+115 LHS	16+160 LHS	22+185 LHS		
8+460 LHS	13+200 LHS	16+205 LHS	22+205 LHS		
8+490 RHS	13+250 LHS	16+210 LHS	22+240 LHS		
8+650 RHS	13+270 LHS	16+275 LHS	22+250 RHS		
8+770 RHS	13+375 RHS	16+310 LHS	22+905 RHS		Ensure supervision of all works close to these items to avoid accidental damage
8+850 LHS	13+410 RHS	16+330 LHS	22+940 LHS		
8+850 RHS	13+540 RHS	16+495 LHS	22+940 RHS		
8+870 LHS	13+600 RHS	16+505 LHS	23+385 LHS		
8+925 LHS	13+800 RHS	16+555 LHS	23+615 RHS		
9+095 LHS	13+805 LHS	16+570 LHS	23+725 RHS		
9+225 RHS	13+850 LHS	16+605 LHS	23+730 RHS		
9+610 RHS	13+870 LHS	16+630 RHS	23+740 LHS		
9+940 RHS	13+905 LHS	17+070 LHS			
9+990 LHS	13+945 LHS	17+160 RHS			
10+025 LHS	13+945 RHS	17+315 LHS			
10+030 RHS	13+975 RHS	17+340 RHS			
10+075 LHS	14+065 LHS	17+380 RHS			
10+085 LHS	14+125 LHS	17+910 RHS			
10+110 RHS	14+220 RHS	17+970 LHS			
10+115 LHS	14+310 RHS	17+980 RHS			
10+140 RHS	14+365 LHS	18+095 LHS			
10+150 LHS	14+405 LHS	18+170 RHS			
10+180 LHS	14+490 LHS	18+180 LHS			
10+230 LHS	14+680 RHS	18+260 RHS			
10+290 LHS	14+725 RHS	18+360 RHS			
10+440 LHS	14+750 RHS	18+380 RHS			
10+455 LHS	15+030 LHS	18+385 LHS			
10+480 LHS	15+135 RHS	18+980 LHS			

Betio Feeder Roads	Bikenibeu Feeder Roads	Temaiku Road	1+460 LHS	Groundwater Wells (cont.)	
Road 2 0+232 RHS	Road 1 0+231 RHS	0+060 LHS	1+750 RHS		
Road 2 0+343 LHS	Road 1 0+325 RHS	0+160 LHS	1+807 RHS		
Road 3 0+005 LHS	Road 1 0+400 LHS	0+260 LHS	1+935 LHS		
Road 3 0+098 LHS	Road 1 1+058 LHS	0+315 LHS	1+950 RHS		
Road 4 0+090 LHS	Road 1 1+076 RHS	0+335 LHS	1+965 LHS		
Road 4 0+106 LHS	Road 1 1+105 LHS	0+355 RHS	2+002 LHS		
Road 4 0+125 LHS	Road 1 1+140 RHS	0+382 LHS	2+030 RHS		
Road 4 0+136 LHS	Road 1 1+165 RHS	0+385 LHS	2+030 LHS		
Road 4 0+138 RHS	Road 2 0+051 Road centre	0+390 RHS	2+100 LHS		
Road 4 0+144 LHS	Road 2 0+155 LHS	0+422 RHS	2+137 LHS		
Road 4 0+169 LHS	Road 3 0+038 RHS	0+425 LHS	2+308 LHS		
Road 4 0+171 LHS	Road 3 0+095 RHS	0+458 LHS	2+336 LHS		
Road 4 0+176 LHS	Road 4 0+025 LHS	0+458 RHS	2+500 LHS		
Road 4 0+198 LHS	Road 4 0+162 LHS	0+478 LHS	2+690 LHS		
Road 4 0+217 LHS	Road 4 0+334 RHS	0+495 LHS	2+800 LHS		
Road 4 0+228 LHS	Road 4 0+463 RHS	0+580 RHS	2+820 RHS		
Road 4 0+232 LHS	Road 4 0+484 RHS	0+600 LHS	2+887 RHS		Ensure supervision of all works close to these items to avoid accidental damage
Road 5 0+050 RHS	Road 4 0+550 LHS	0+605 RHS	3+008 RHS		
Road 5 0+060 LHS	Road 4 0+564 LHS	0+651 LHS	3+100 RHS		
Road 5 0+140 LHS	Road 4 0+573 RHS	0+728 LHS	4+507 LHS		
Road 6 0+011 LHS	Road 4 0+579 LHS	0+735 RHS	4+511 LHS		
Road 6 0+117 RHS	Road 4 0+635 LHS	0+744 RHS	4+955 RHS		
Road 6 0+034 RHS	Road 4 0+637 RHS	0+770 LHS	5+002 LHS		
Road 6 0+164 LHS	Road 4 0+639 LHS	0+788 LHS	5+196 LHS		
Road 6 0+316 LHS	Road 4 0+687 RHS	0+822 LHS	5+287 LHS		
Road 7 0+058 RHS	Road 4 0+758 RHS	0+867 RHS	5+315 LHS		
Road 8 0+021 LHS	Road 4 0+771 RHS	0+872 LHS	5+441 LHS		
Road 8 0+025 LHS	Road 4 0+818 RHS	1+070 LHS	5+628 RHS		
Road 8 0+038 RHS	Road 4 0+976 RHS	1+348 RHS	5+783 LHS		
Road 8 0+077 LHS	Road 4 0+991 LHS	1+353 RHS	5+798 LHS		
Road 8 0+407 RHS	Road 5 0+044 RHS				
Road 8 0+422 RHS			Buota Feeder Road		
Road 8 0+718 RHS			0+655 LHS		
Road 8 0+602 LHS			0+813 RHS		
Road 10 0+327 LHS					

Main Road	11+245 RHS	16+580 RHS	20+970 RHS	Power Supply System Assets	
7+035 RHS	11+340 RHS	16+690 LHS	21+010 RHS		
7+070 LHS	11+420 RHS	16+735 RHS	21+060 RHS		
7+090 RHS	11+550 LHS	16+785 RHS	21+245 RHS		
7+270 LHS	11+575 RHS	16+865 RHS	21+355 LHS		
7+325 RHS	11+665 LHS	16+925 RHS	21+355 RHS		
7+400 RHS	11+840 LHS	17+000 RHS	21+440 RHS		
7+470 RHS	11+880 RHS	17+050 RHS	21+545 RHS		
7+560 RHS	11+960 RHS	17+280 RHS	21+640 RHS		
7+650 RHS	12+090 RHS	17+350 RHS	21+695 RHS		
7+700 RHS	12+340 RHS	17+460 RHS	21+740 RHS		
7+790 RHS	12+950 LHS	17+595 RHS	21+790 LHS		
7+960 RHS	13+025 RHS	17+670 RHS	21+840 RHS		
8+050 RHS	13+225 RHS	17+725 RHS	21+915 RHS		
8+150 RHS	13+415 RHS	17+805 RHS	22+010 RHS		
8+225 RHS	13+580 RHS	17+850 LHS	22+105 RHS		
8+310 RHS	13+695 RHS	17+955 RHS	22+205 RHS		
8+450 RHS	13+765 RHS	18+010 RHS	22+310 RHS		
8+520 RHS	13+810 RHS	18+065 RHS	22+335 LHS		
8+620 RHS	13+860 RHS	18+160 LHS	22+390 LHS		
8+720 RHS	13+935 RHS	18+310 LHS	22+445 LHS		
8+830 RHS	14+050 RHS	18+440 RHS	22+510 LHS		
9+200 RHS	14+105 RHS	18+510 RHS	22+610 LHS		Ensure supervision of all works close to these items to avoid accidental damage
9+270 RHS	14+315 RHS	18+585 RHS	22+865 LHS		
9+350 LHS	14+570 RHS	18+835 RHS	22+960 LHS		
9+410 RHS	14+610 RHS	18+925 RHS	23+095 LHS		
9+500 RHS	14+635 RHS	19+010 RHS	23+280 LHS		
9+625 RHS	14+705 RHS	19+205 LHS	23+325 LHS		
9+710 RHS	14+860 RHS	19+440 RHS	23+370 LHS		
9+940 LHS	14+940 RHS	19+905 RHS	23+480 LHS		
9+960 RHS	15+025 RHS	19+950 RHS	23+540 RHS		
10+010 RHS	15+105 RHS	20+025 RHS	23+565 LHS		
10+075 RHS	15+210 RHS	20+080 RHS	23+650 RHS		
10+130 RHS	15+320 LHS	20+165 RHS	23+730 RHS		
10+185 RHS	15+380 LHS	20+235 RHS	23+790 RHS		
10+310 RHS	15+500 LHS	20+270 RHS	23+805 LHS		
10+360 RHS	15+580 LHS	20+340 RHS	23+855 RHS		
10+450 RHS	15+580 RHS	20+380 RHS			
10+520 RHS	15+680 LHS	20+390 LHS			
10+605 RHS	15+860 RHS	20+460 RHS			
10+715 RHS	16+060 RHS	20+525 RHS			
10+780 LHS	16+105 LHS	20+580 RHS			
10+860 LHS	16+280 LHS	20+650 RHS			
11+020 RHS	16+320 RHS	20+730 RHS			
11+125 RHS	16+410 RHS	20+840 RHS			
	16+460 RHS	20+915 RHS			

Betio Feeder Roads	Road 2 0+184 RHS	1+225 LHS	Buota Main Road	Power Supply System Assets (cont)	
Road 7 0+043 LHS	Road 3 0+027 RHS	1+318 LHS	0+140 RHS		
Road 7 0+088 RHS	Road 3 0+103 RHS	1+386 LHS	0+240 RHS		
Road 8 0+000 LHS	Road 4 0+045 RHS	1+800 LHS	0+477 RHS		
Road 8 0+060 LHS	Road 4 0+197 LHS	1+875 LHS	0+569 RHS		
Road 8 0+270 LHS	Road 4 0+254 LHS	1+985 LHS	0+665 RHS		
Road 8 0+316 RHS	Road 4 0+284 LHS	2+050 LHS	0+768 RHS		
Road 8 0+445 RHS	Road 4 0+322 LHS	2+138 LHS	0+860 RHS		
Road 8 0+687 LHS	Road 4 0+425 RHS	2+198 LHS	0+928 LHS		
Road 9 0+038 LHS	Road 4 0+578 LHS	2+257 LHS	0+940 LHS		
Road 9 0+038 RHS	Road 4 0+602 RHS	2+365 LHS	1+084 LHS		
Road 10 0+042 RHS	Road 4 0+632 LHS	2+498 LHS	1+172 LHS		
Road 11 0+018 LHS	Road 4 0+691 LHS	2+665 RHS	1+270 LHS		
Road 11 0+068 LHS	Road 4 0+783 RHS	2+903 LHS	1+365 LHS		
Road 11 0+110 LHS	Road 4 0+926 RHS	2+992 LHS	1+430 LHS		
Road 11 0+357 RHS	Road 4 0+982 RHS	2+998 LHS	1+545 LHS		
	Road 6 0+047 LHS	3+190 LHS	1+638 RHS		
Bikenibeu Feeder Roads	Road 6 0+088 RHS	3+810 LHS	1+720 RHS		Ensure supervision of all works close to these items to avoid accidental damage
Road 1 0+070 RHS	Road 6 0+126 LHS	4+137 LHS	1+900 LHS		
Road 1 0+137 LHS		4+258 LHS	1+965 LHS		
Road 1 0+146 RHS	Temaiku Road	4+365 LHS			
Road 1 0+236 LHS	0+015 RHS	4+560 LHS	Buota Feeder Road		
Road 1 0+252 RHS	0+120 RHS	4+720 LHS	0+505 RHS		
Road 1 0+310 LHS	0+205 RHS	4+813 LHS	0+690 RHS		
Road 1 0+373 RHS	0+330 RHS	4+977 LHS	0+870 RHS		
Road 1 0+420 LHS	0+416 RHS	5+065 LHS	0+927 RHS		
Road 1 0+498 RHS	0+497 RHS	5+178 LHS			
Road 1 0+805 LHS	0+646 RHS	5+320 LHS			
Road 1 0+950 RHS	0+749 RHS	5+375 LHS			
Road 1 1+047 RHS	0+835 LHS	5+423 LHS			
Road 1 1+090 RHS	0+847 RHS	5+500 LHS			
Road 1 1+190 LHS	0+945 LHS	5+572 LHS			
Road 2 0+022 RHS	1+040 LHS	5+623 LHS			
Road 2 0+053 RHS	1+145 LHS	5+671 LHS			
Road 2 0+097 RHS	1+195 LHS	5+740 LHS			
Road 2 0+147 RHS					
Main Road	Temaiku Road			Septic Tanks	
0+100 RHS	6+100 RHS				
13+085 RHS					
14+030 RHS	Buota Main Road				
14+070 RHS	1+908 LHS				Ensure supervision of all works close to these items to avoid accidental damage
14+335 LHS					
15+105 RHS					
16+475 RHS					
18+135 LHS					
23+900 LHS					

Main Road 0+175 LHS 3+250 LHS 5+700 RHS 5+770 RHS 5+930 RHS 6+610 LHS 6+850 LHS 6+870 LHS 7+060 LHS 7+060 RHS 7+265 LHS 7+300 LHS 7+560 RHS 7+670 LHS 8+185 LHS 8+220 LHS 8+256 RHS 8+280 LHS 8+730 RHS 9+390 RHS 9+800 RHS 9+810 LHS 9+980 RHS 10+270 RHS 10+290 LHS 10+350 LHS 10+375 LHS 10+425 LHS 10+470 RHS 10+530 RHS 10+675 RHS 10+680 LHS 10+720 LHS 11+025 RHS 11+165 RHS 11+285 RHS 11+510 LHS 11+650 RHS 11+865 RHS 11+990 RHS 12+025 RHS 12+260 RHS	13+130 RHS 14+250 RHS 14+800 RHS 16+765 LHS 16+765 RHS 17+850 LHS 17+850 RHS 19+385 RHS 19+825 RHS 20+435 RHS 21+165 RHS 21+635 LHS 21+965 LHS 22+100 LHS 22+115 RHS 22+225 LHS 22+235 RHS 22+355 LHS 22+440 LHS 22+500 LHS 22+645 LHS 22+730 LHS 23+035 LHS 23+130 LHS 23+130 RHS 23+230 LHS 23+315 RHS 23+340 LHS 23+430 LHS 23+440 RHS 23+510 RHS 23+725 RHS 23+815 LHS 23+815 RHS 23+900 LHS Bikenibeu Feeder Roads Road 1 0+370 RHS Road 1 0+446 RHS Road 1 0+448 RHS Road 1 0+577 LHS Road 1 1+045 RHS Road 2 0+023 RHS	Road 4 0+069 RHS Road 4 0+110 LHS Road 4 0+188 LHS Road 4 0+310 LHS Road 4 0+480 RHS Road 4 0+500 RHS Road 4 0+569 LHS Road 4 0+665 LHS Road 4 0+672 RHS Road 4 0+699 RHS Road 4 0+755 LHS Road 4 0+842 LHS Road 6 0+030 RHS Road 6 0+087 RHS Road 7 0+000 RHS Temaiku Road 0+010 RHS 0+010 RHS 0+015 LHS 0+015 LHS 0+020 LHS 0+020 LHS 0+090 LHS 0+090 LHS 0+160 LHS 0+160 LHS 0+382 LHS 0+382 LHS 0+420 RHS 0+420 RHS 0+743 RHS 0+743 RHS 0+872 LHS 0+872 LHS 1+015 LHS 1+015 LHS 1+258 LHS 1+258 LHS 1+371 LHS 1+371 LHS 1+380 LHS 1+380 LHS 1+854 RHS	1+854 RHS 1+857 LHS 1+857 LHS 1+908 RHS 1+908 RHS 1+965 LHS 1+965 LHS 2+030 LHS 2+030 LHS 2+107 LHS 2+107 LHS 2+110 LHS 2+110 LHS 2+335 LHS 2+335 LHS 3+873 LHS 3+873 LHS 4+649 LHS 4+649 LHS 4+955 RHS 4+955 RHS 5+315 LHS 5+315 LHS 5+581 LHS 5+581 LHS Buota Main Road 0+030 LHS 0+086 RHS 0+150 LHS 0+212 RHS 0+225 RHS 1+460 RHS 1+917 RHS Buota Feeder Road 0+652 LHS 0+840 LHS	Telecommunication Assets	Ensure supervision of all works close to these items to avoid accidental damage
Main Road Air Valve. 14+860 LHS Fuel Tank. 22+810 RHS				Miscellaneous Services	Ensure supervision of all works close to these items to avoid accidental damage

X. CONCLUSION AND RECOMMENDATION

116. The project will introduce short-term negative environmental disturbances associated with the construction activities. This will be mitigated by operational procedures during construction, within the framework of a contractor‘s approved Environmental Management Plan to be supervised by the PSC and monitoring by the MPWU.

117. Positive impacts to the local economy will accrue through better travel conditions on the roadways, new income earning opportunities generated by demand for labor during construction, enhanced transport and access of goods and services and through the creation of new business opportunities in the surrounding areas.

118. The EMP concludes that in the context of appropriate mitigating strategies described above, and the positive environmental benefits to flow from the Project, environmental impacts can be managed within acceptable levels. There are no significant environmental impacts needing further detailed study or EIA. All potential and associated impacts can be addressed through implementation of the mitigation measures as proposed in the EMP. Provisions will be made in the Project Budget to cover the environmental mitigation and monitoring costs.

Annex A: Excerpts from the Environment Act (as Amended) 1999

ENVIRONMENT ACT 1999
(No. 9 of 1999)

AN ACT TO PROVIDE FOR THE PROTECTION IMPROVEMENT AND CONSERVATION OF THE ENVIRONMENT OF THE REPUBLIC OF KIRIBATI AND FOR CONNECTED PURPOSES

PART III
DEVELOPMENT CONTROL, ENVIRONMENTAL IMPACT ASSESSMENT, REVIEW AND MONITORING

General duty to consider environmental impact

In considering the grant of approval for any existing or proposed development or further expansion in any existing development, the Minister, acting in accordance with the advice of Cabinet after consultation with the Division and the relevant public authority and all other relevant and concerned shareholders shall have regard as far as practicable to the effect such development or expansion would have on the environment.

Declaration of prescribed development Schedule

(1) The development specified in the Schedule shall for purposes of this Act be classified as prescribed development.

(2) The Minister acting in accordance with the advice of Cabinet may by order from time to time as the Minister sees fit, include in or delete from the said Schedule any development or proposed development except for individual proposals.

Applications for approval

(1) Any developer who proposes to carry out any prescribed development in Kiribati shall make application to the Minister in the prescribed form.

(2) On receipt of a development application referred to in subsection (1), the Minister shall instruct the Secretary within fifteen working days of such receipt to advise the developer to submit either –

> (a) A development application accompanied by an Initial environment evaluation report, together with any additional requirements as notified by the Secretary; or
>
> (b) A development application accompanied by an environmental impact statement, together with any additional requirements as notified by the Secretary.

(3) Where the developer is a foreign investor, a certified copy of the Foreign Investment Commission's certificate of approval shall be attached with the application.

(4) Where the Minister acting in accordance with the advice of the Cabinet decides to dispense with the requirements of subsection (2), the Secretary shall advise the developer accordingly within the time stipulated in that subsection

(5) In determining as to whether the developer is required to submit a report referred to in paragraph (a) or (b) of subsection (2), the Minister acting in accordance with the advice of the Cabinet shall take into consideration the significant impact the development is likely to have on the environment and other factors that may be prescribed by regulations made under section 52.

Requirement for information concerning existing prescribed development

Any developer carrying on an existing prescribed development, who has not submitted a development application to the Minister as required under section 14 shall, if required to do so in writing by the Minister provide -

(a) Information of the nature of the activity carried on; and

(b) Unless exempted by the Minister, acting in accordance with the advice of the Cabinet –

(i) A development application; or

(ii) Initial environment evaluation report or environmental impact statement, as the case may require, in accordance with this Part.

Consent required for prescribed development

(1) No developer shall commence or continue to carry out any prescribed development unless-

(a) A development application has been submitted to the Minister, together with either a initial environmental evaluation report or an environmental impact statement, as specified by the Minister in section 14; and

(b) The developer has been issued with a development consent by the Minister, acting in accordance with the advice of the Cabinet under this Part; or

(c) The Minster acting in accordance with the advice of the Cabinet has exempted the development from the requirements of this Part.

(2) Any person who carries on any prescribed development in breach of subsection (1) commits an offence and shall be liable on conviction of a fine not exceeding ten thousand dollars or imprisonment for a term not exceeding twelve months or to both such fine and imprisonment.

Contents of initial environmental report

Any initial environmental evaluation report in respect of proposed and existing prescribed development shall -

(a) Describe the prescribed development in summary form, including its objectives and any reasonable alternatives to it;

(b) Describe any aspects of the prescribed development having or likely to have a substantial or important impact on the environment;

(c) Describe the environment likely to be affected by the prescribed development and any reasonable alternatives to it;

(d) Indicate the potential or actual impact of the prescribed development on the environment and of any reasonable alternatives to the prescribed development, including any enhancement of the environment;

(e) Outline the reasons for choice of the prescribed development;

(f) Describe and assess the effectiveness of any safeguards of standards intended to be adopted or applied for the protection of the environment;

(g) State any intended investigations or studies of the possible impact on the environment before the prescribed developments implemented;

(h) State any intended monitoring and reporting of the impact of the prescribed development; and

(i) Address any further matters that the Minister, acting in accordance with the advice of the Cabinet may specify.

Requirements for further information

The Minister acting in accordance with the advice of the Cabinet may, where the Minister, deems it necessary require the developer to submit further information within a specified period.

Publication of initial environmental evaluation report and procedure in respect of objections and appeal

(1) The Minister acting in accordance with the advice of Cabinet on being satisfied that a public environmental report meets the requirements of this Act shall cause the public environmental report to be published in such manner as he considers adequate or most effective for the purpose of bringing it to the attention of all public authorities and other persons, whose interests are likely to be affected by the proposed development.

(2) Any public authority or person whose interests are likely to be affected by the proposed development may within thirty days from the date of publication of the notice referred to in subsection (1) make written objections to the Minister in respect of the proposed development.

(3) On receipt of the written objections referred to in subsection (2), the Minister shall examine the grounds of objections and where the Minister deems it necessary after examining the objections of the affected parties either -

(a) Acting in accordance with the advice of the Cabinet consent to the development, or the continuation of that development, with or without conditions;

(b) Acting in accordance with the advice of the Cabinet require the developer to produce an environmental impact statement and to conform with the provisions concerning environmental impact statements under this Part; or

(c) Acting in accordance with the advice of the Cabinet refuse consent to the prescribed development.

(4) In making the decision the Minister, acting in accordance with the advice of the Cabinet shall take into account -

(a) The information contained in the development application in the initial environmental evaluation report;

(b) Any objections received under subsection (2) and any information provided in support of the objections; and

(c) The objects of this Act.

Contents of environmental impact statement

An environmental impact statement in respect of proposed and existing prescribed development shall -

(a) Contain a full description of the objectives of the prescribed development;

(b) Analyze the need for the prescribed development;

(c) Indicate the consequences of not implementing or carrying out the prescribed development;

(d) Include adequate information and technical data adequate to allow assessment of the impact of the prescribed development on the environment;

(e) Examine any reasonable alternatives to the prescribed development, including alternative sites for it;

(f) Describe the environment that is or is likely to be affected by the prescribed development and by any reasonable alternatives to it;

(g) Assess the actual or potential impact on the environment of the prescribed development and of any reasonable alternatives to it, including the primary, secondary, short term, long term, adverse and beneficial impacts on the environment;

(h) Outline the reasons for the choice of the prescribed development;

(i) Estimate the time period of any expected impacts;

(j) Describe the geographic boundaries of the impacts;

(k) State the methods of predicting and assessing each impact from the construction, operational and where relevant, the de-commissioning phase of an implemented development and for each alternative presented;

(l) Justify the prescribed development in terms of environmental, economic, culture and social considerations;

(m) Identify and analyse all likely impacts or consequences of implementing the prescribed development, including implications for the use and conservation of energy;

(n) Describe measures to prevent or reduce significant adverse impacts and enhance beneficial effects and an account of their likely success with estimated costs as appropriate;

(o) Describe residual impacts which cannot be mitigated or can only be mitigated partially;

(p) Describe proposed monitoring and reporting schemes with estimated costs as appropriate;

(q) Describe and assess the estimated cost-effectiveness of any safeguards or standards for the protection of the environment to be adopted or applied including its implementation, monitoring and reporting;

(r) Give an account of the impact on the environment of any of a series or programme of similar development (whether implemented or not) over a period of time;

(s) Give sources and references to information relied on and outline any consultations with any person's made during the preparation of the report;

(t) Include a site survey report concerning National Heritage items or traditional artefacts as specified by the Minister acting in accordance with the advice of the Cabinet;

(u) Address any further matters as the Minister acting in accordance with the advice of the Cabinet specifies; and

(v) Give a clear and concise summary printed on a separate page.

Publication of environment impact statement and procedures in respect of objections and appeal

(1) The Minister, acting in accordance with the advice of the Cabinet on being satisfied that an environmental impact statement meets the requirements of this Act, shall cause such statement to be published in such manner as he considers adequate or most effective for the purpose of bringing it to the attention of all public authorities, and other persons whose interests are likely to be affected by the proposed development.

(2) Any public authority or person whose interests are likely to be affected by the proposed development may within thirty days from the date of publication of the notice referred to subsection (1) make written objections to the Minister in respect of the proposed development.

(3) On receipt of the written objections referred to in subsection (2), the Minister acting in accordance with the advice of the Cabinet shall examine the grounds of objections, and where he deems it necessary, after examining the objections of the affected parties either-

(a) Acting in accordance with the advice of the Cabinet issue consent to the development with or without conditions; or

(b) Acting in accordance with the advice of the Cabinet refuse consent.

Development to be carried out in accordance with development consent

(1) A developer shall not carry on any development except in accordance with the development consent.

(2) An Inspector may at any time if he has reason to believe that any person is responsible for, or substantially involved in any development, request such person to produce within a reasonable time evidence of the development consent.

(3) If any Inspector is not satisfied that a development consent authorising the particular development exists, or where the person requested under this section fails within a reasonable period to produce such evidence, the Inspector may issue a notice in writing requiring all persons involved in the development to immediately discontinue such development.

(4) Any person who contravenes subsections (2) or (3) commits an offence against this Act.

(5) Any person who is satisfied or disagree with the decision of an inspector may appeal to the Minister within 21 days of the inspector's notice issued under subsection (3).

(6) Any person who is dissatisfied or disagree with the Minister's decision under subsection (5) may within 21 days of the Minister's decision appeal to the High Court.

Offence of providing false or misleading information

A developer who knowingly or recklessly provides false or misleading information to the Minister or Secretary or to any public authority concerning any matter required to be addressed in the initial environmental evaluation report or in an environmental impact statement commits an offence against this Act.

Prescribed forms

Initial environmental evaluation report and environmental impact statement shall be in such form as prescribed by regulations.

Secretary to keep records

(1) The Secretary shall keep proper records of all development applications, environmental impact assessments, public environmental reports and development consents.

(2) The Secretary shall make the records referred to in subsection (1) available for perusal to the public during normal working hours.

Minister to issue guidelines for assessment of reports and statements

The Minister, acting in accordance with the advice of the Cabinet, may issue guideline for assisting the Division and the relevant public authority in assessing and evaluating any report, statements or other information.

Responsibility for initial environmental evaluation reports, etc.

(1) The developer shall be responsible for all expenses incurred in the preparation of-

(a) An initial environmental evaluation report:

(b) The environmental impact statements; and

(2) The developer shall provide the necessary information for the preparation of the initial environmental evaluation report.

Monitoring environmental aspects of development and costs

(1) The Secretary acting in accordance with the advice of the Cabinet or the relevant public authority authorised by the Cabinet may at any time, whether before or after a development activity has been completed, monitor, or cause to be monitored, all or any of the environmental aspects of the implemented development activity.

(2) In the performance of any functions under subsection (1), the Secretary acting in accordance with the advice of the Cabinet or any relevant public authority authorised by the Cabinet shall have regard to the effectiveness of any safeguards or standards adopted for the protection of the environment and the accuracy of any forecasts of the environmental impacts of the development activity.

(3) The Minister, may acting in accordance with the advice of the Cabinet gives such directions to the developer to ensure that appropriate safeguards and steps are taken by the developer to mitigate any adverse environmental aspects.

(4) The developer shall comply with the directions of the Minister issued pursuant to this section.

(5) The developer of any prescribed development shall be responsible for the monitoring of such development and all the costs and expenses incurred for such monitoring.

Development consents non-transferable

(1) No developer shall transfer a development consent granted under this Part.

(2) Any transfer of shareholding in a company or other change of ownership which has the effect of substantially changing the identity of the development which has been granted development consent shall be deemed to be a transfer contrary to this section, and shall render the development consent invalid.

ENVIRONMENT ACT 1999
(No. 9 of 1999)

AN ACT TO PROVIDE FOR THE PROTECTION IMPROVEMENT AND CONSERVATION OF THE ENVIRONMENT OF THE REPUBLIC OF KIRIBATI AND FOR CONNECTED PURPOSES

SCHEDULE
(Section 14)

PRESCRIBED DEVELOPMENTS

1. FOOD INDUSTRIES including;

    (a) Fruit processing, bottling and canning
    (b) Brewing, making and distillery works
    (c) Abattoirs
    (d) Other food processing requiring packaging

2. IRON AND STEEL INDUSTRIES

3. NON-METALLIC INDUSTRIES including:

    (a) Lime production
    (b) Brick and tile manufacture
    (c) Extraction of minerals and mining
    (d) Extraction of aggregates stones or shingles, sand and reef mud, beach rock
    (e) Radioactive related industries
    (f) Manufacture of cement
    (g) Plastic manufacturing and moulding

4. LEATHER, PAPER, TEXTILE AND WOOD INDUSTRIES including:

    (a) Leather tanning and processing
    (b) Textile industry with dying facilities
    (c) Carpet industry with chemical dying
    (d) Manufacture of paper, pulp and other wood products

5. FISHING AND MARINE INDUSTRY PRODUCT

    (a) Fish processing
    (b) Seaweed farming
    (c) Land or marine foods processing or farming
    (d) Pet fishing licensing
    (e) Fishing ponds industries
    (f) Fishing activities in Kiribati waters
    (g) Introduction to Kiribati non-native (alien) species.

6. CHEMICAL INDUSTRY including:

    (a) Pesticide production and use
    (b) Pharmaceutical production
    (c) Fertiliser manufacture and use
    (d) Oil refineries

7. TOURISM INDUSTRY including:

(a) Hotels
(b) Golf courses
(c) Recreational parks
(d) Tourism resorts or estates

8. AGRICULTURE INDUSTRY including:

(a) Livestock development
(b) Agricultural development schemes
(c) Irrigation and water supply schemes
(d) Logging operations
(e) Saw milling, all forms of timber milling and treatment, copra processing

9. PUBLIC WORKS SECTOR including:

(a) Landfills
(b) Infrastructure developments
(c) Major waste disposal plants including recycling and collection systems
(d) Soil erosion, beach erosion and siltation control
(e) Hydropower schemes, desalination plants
(f) Reservoir development
(g) Airport developments
(h) Causeways, drainage and disposal systems
(i) Dredging
(j) Watershed management
(k) Ports and harbours
(l) Seawalls/land reclamation
(m) Boat channels
(n) Port and harbours

10. GENETICALLY ENGINEERED ORGANISMS (GEOs)

11. OTHER

(a) Industrial estates
(b) Housing multiple units
(c) Settlement and resettlement schemes
(d) Petroleum product storage and processing works.

Annex B: Field Monitoring Checklist

ENVIRONMENTAL ISSUE AND OBJECTIVE:	MITIGATION MEASURES	LOCATIONS	TIMEFRAME	ACHIEVED YES/NO	REMARKS
Social or Community Concerns To minimize social disturbance and maximize community benefits from the subproject:	• Advise the local community of project plans in advance of construction, and where possible involve them in planning • Avoid disturbances near living areas when possible • Control runoff and manage sediments near garden areas • Arrange for local people to be employed and trained • Include women's and other community groups in project activities • Negotiate with community about disposal areas, stockpiles	Potential road alignment.	During mobilization and start of construction activities in the communities		
Soil Instability and Erosion To minimize the amount of sediment lost from the site:	• Reduce the time surfaces remain bare • Keep vegetation clearing to a minimum • Avoid disturbance on steep slopes • Keep vehicles on defined tracks • Construct necessary temporary/permanent control structures • Encourage re-vegetation after construction activity finishes	All areas where clearing is required.	Continuous		
Controlling Sediment To minimize impact of storm water containing sediment on streams and coasts:	• Install control structures at the outset of construction phase These may need to include silt traps along flow lines • All disturbed areas which are not to be paved should be re-vegetated or prepared for natural re-vegetation after final land shaping • Ground disturbance should be phased so that it is limited to areas of a workable size • Construction should be scheduled so that large areas of soil are not laid bare during wet seasons • Construction sites should be placed on flat ground • Construction areas should be contained using a bund or trench, or isolated from other surface runoff, and cleaned and rehabilitated when construction is complete	All areas where clearing is required.	Continuous		
Controlling Storm water To minimize the impact of contaminated runoff water:	• Divert run-off from non-construction areas (temporarily) around the construction areas to keep the natural flow separate from construction run-off. • Pass stormwater run-off from construction areas through a gross pollutant trap (to filter plastics, cans, etc.) and over a vegetated surface to remove petroleum-based organic pollutants before discharge into culverts or drainage systems. • Design drains and culverts to remove all run-off water without scour. • Store oil and bituminous products at a contained location away from drainage lines in an appropriate manner.	All areas where clearing is required.	Continuous		

ENVIRONMENTAL ISSUE AND OBJECTIVE:	MITIGATION MEASURES	LOCATIONS	TIMEFRAME	ACHIEVED YES/NO	REMARKS
Management of Stockpiles and Spoil-heaps To manage features so dust and runoff are minimized.	• Discussions about dumping be held with local landowners • Site plans should include all drainage provisions suggested for construction sites • The stockpile or spoil-heap location should be chosen to avoid blocking surface runoff or drainage lines If this is not a ridge-crest or flat plain site, the base should be leveled and contained • If the spoil-heap or stockpile containing fine sediments is to remain bare for long in a high rainfall area, it should be covered to prevent erosion and sediment runoff • Spoil-heaps and stockpiles must be subject to stability calculations to safeguard against major slips occurring • After discussions with local landowners or community groups there may be plans to use spoil locally. If so a clear level site must be prepared on which the spoil can be dumped • Where possible spoil should be used to backfill quarry areas or waste disposal pits before they are re-vegetated	Dumping areas.	Continuous		
Air Quality and Dust Control To ensure there is no health risk or inconvenience due to dust production:	• Spray water on exposed surfaces during dry periods • Wet quarry loads or road fill loads being carried in open trucks	Cleared areas	During dry periods		
Noise control To ensure nuisance from noise is minimized:	• Use modern and well maintained equipment (with mufflers where appropriate) • Use noise screens or mounds near residential areas • Carry out noisy construction activities during normal working hours • Advise local people when there will be blasting or unusual unavoidable noise	All construction areas, access routes	Continuous		
Offsite and Waste Management To avoid contamination from solid wastes and sewerage:	• Contain all stores waste within construction sites • During site clean-up burn all spilled fuel oils • Crush, burn, and bury all inorganic solid waste in an approved disposal area. This includes paper used in bitumen spraying • Remove all disabled machinery from the project area • Use above-water table pit latrines or composting toilets at residential construction sites • Compost or use as animal food all green or organic wastes	All proposed quarry sites	From quarry development to closure		

ENVIRONMENTAL ISSUE AND OBJECTIVE:	MITIGATION MEASURES	LOCATIONS	TIMEFRAME	ACHIEVED YES/NO	REMARKS
Safety and Health To ensure maximum safety of construction personnel and local residents:	• Ensure all occupational health and safety requirements are in place on construction sites and in work camps • Install lights and cautionary signs in hazardous areas • Establish footpaths and pull-off bays along roads through villages, near markets, schools and other community facilities • limit time of exposure to dust particles, chemical, and noise; • enhance safety and inspection procedures; and • Safe handling of toxic materials, explosives, and other hazardous substances. • Use of Personal Protection Equipment (PPE)	All construction sites.	Continuous		
To avoid disturbance by the constructions workers:	• Prohibitions on hunting and poaching of wildlife, purchasing wildlife meat, fishing, gathering and harvesting medicinal or valued plants and trees, and possessing firearms, snares, traps and other hunting equipment; • Access to construction camps will be controlled and access restrictions for non-construction personnel will be applied. • Housecleaning and waste management requirements • Penalties for violation of rules and regulations	Construction camps	Continuous		
General Health and Safety Awareness for construction workers should include:	• Introduction to health and safety issues in construction sites and on Construction sites including main areas of risk to workers and others • Education on basic hygiene practices to minimize spread of typical tropical diseases • HIV/AIDS and STD awareness, including information on methods of transmission and protection measures • Prohibition of drugs • Prohibition of alcohol on construction sites • Procedures for seeking medical assistance in emergency or non-emergency situations and procedures for seeking other health-related assistance.	Construction camps	Continuous		
Site de-commissioning To minimize ongoing impacts after construction is completed:	• Rake or loosen all compacted ground surfaces • Establish a site re-vegetation plan. Where possible involve local women's groups to provide materials and implement re-vegetation	All construction and camp sites	After completion of construction		