



Ministry of Infrastructure

Timor Leste

Project Management Unit

DRAFT

INITIAL ENVIRONMENTAL EXAMINATION

A03-01/02 Dili – Tibar - Liquiça

November 2011

**Asian Development Bank
Road Network Development Sector Project**

**ADB Grant No. 0180-TIM
Project Implementation and Support Consultants**



EXECUTIVE SUMMARY

This Initial Environmental Examination (IEE) has been prepared as a part of the 'Project Implementation and Support Consultants for the Road Network Development Sector Project – ADB Grant No. 0180-TIM' for the National Road Dili-Tibar-Liquica (A03-01 and A03-02) referred to as 'sub-project road'. This IEE is part of the continuing process of compliance with the Government of Timor-Leste's (GoTL) environmental regulations and guidelines and ADB environmental safeguards policies. This IEE with the integrated EMP shall likewise serve as the basis for securing environmental permit from the National Directorate for Environmental Services (DoE).

The proponent of the project is the Ministry of Infrastructure, Government of Democratic Republic of Timor-Leste and is supported by international and national consultants with funding support from the ADB.

The sub-project Road link A03-01 and A03-02 is located in the districts of Dili and Liquica. This road link has a total length of 28.4 km. The proposed works will include widening, repair and restoration with an option to apply full asphalt concrete overlay. The design width of the shoulder is 1.5m (one side) in flat terrain and 1.0 to 1.5m in mountainous terrain. The design width of asphalt pavement is 6m. In some cases where houses/structures are present and land is privately owned, the current road width (i.e. 0.75m shoulder and 5 to 6m asphalt pavement) shall be maintained. Slope trimming will be done in certain sections to attain width for the drainage and shoulder.

As for drainage, new works are proposed only in areas where present design is inadequate. Otherwise works will only consist of cleaning or reconstruction as necessary. Provision of retaining structures will also be part of the proposed works for A03-01 and A03-02. As part of road safety, the project will include provision of pavement marking, provision of road signs and regular maintenance of drainage.

This road is part of the most important east-west road link along the northern coastline which links the national capital Dili. The project road is an important trade link for Timor Leste, since it provides road connectivity to the Indonesian part of the island. The Indonesian part of the island of Timor is the source of international trade and freight movement by land into Timor Leste from Indonesia and vice versa. As planned, this road sub-project will improve connectivity on the local as well as regional level. It would support sustainable development, facilitate in reducing poverty, and improve access to the markets and social services for the residents of the districts served by the road.

Road A03-01 and A03-02 traverse the built up areas of Dili (at the start) and the District of Liquica (at the end part). The road hugs the coastline along the foot slope of headlands, through mudflats, and beaches. It crosses the wide alluvial plain of Comoro River and the migrating channels and floodplains of 3 relatively large rivers in Liquica. The habitats along the sub-project alignment consist of nearshore and coastal ecosystems of intertidal and reef flats, patches of mangroves, coastal vegetation dominated by mesquite and palm and savannah type of forest inland. Strip of human altered ecosystems (settlements, cultivated) generally borders the sub-project road. It is observed that the major rivers in the sub-project corridor are experiencing very high rates of sedimentation leading to river bed aggradation, flooding and river channel migration. This is a hazard that should be considered when working in these sections of the road during the rainy season.

Based on the initial environmental examination and screening of anticipated impacts over physical, ecological, and socio-economic environment; it is concluded that the proposed selective widening, repair, restoration and bituminous overlay for A03-01 and A03-02 is a 'Category – B' project as per the categorization criteria of ADB and statutory guidance of Timor-Leste. The proposed activity is unlikely to result in significantly adverse environmental impacts of irreversible nature. Most impacts would be of reversible nature and are expected to remain within the finite spatial limits of Project Influence Area (PIA) and would also likely remain within the temporal limit of the construction stage.

No significant environmental impacts associated with the road rehabilitation have been anticipated since rehabilitation will be confined within existing alignment and the works will be temporary in nature and of short duration. However, an EMP has to be crafted to protect the human settlements along the road, the sensitive ecosystems and cultural and heritage features that might be

encountered along the sub-project corridor. Corresponding mitigation measures are presented in the EMP. Among the potential key impacts identified during the construction stage of this sub-project are: fugitive dust, noise, pollution of water bodies, increased erosion and siltation, occupational and public health and safety and impacts on heritage and cultural resources

The institutional responsibility for EMP implementation is shared by the Ministry of Infrastructure (PMU) as implementing agency, the Project Implementation Support Consultant (PISC), the General Contractor, the stakeholders (host communities), the Directorate of Environment and ADB. The primary role for EMP implementation and monitoring belongs to the MoI / PMU with the support from the PISC. Additional support for monitoring is provided by the stakeholders who have been engaged early on. The DoE is primarily responsible for enforcing the GoTL's environmental regulations. Finally, as an ADB funded project, its responsibility is to ensure that the project complies with its safeguards policies.

Thus, it is concluded that the nature of the proposed activity and low volume of traffic on the sub-project road, now or in the foreseeable future, further supports the finding that there will be no significant indirect or induced impacts on the physical and ecological environment. Therefore the IEE for the sub-project road complies with the ADB's environmental safeguard policies. The Environmental Monitoring Plan given in the IEE provides sufficient guidance for the PMU to successfully implement the EMP and to monitor and report the environmental compliance throughout the project implementation period.

Despite the project road's alignment traversing through an ecologically sensitive and biodiversity significant area, signs of traffic-wildlife conflict are not apparent. Project road is neutral towards the illegal logging and hunting; which are subject to policing, law and order. By maintaining the road in its existing lane configuration, long term adverse impacts on the forested areas, mangroves, and protected areas are not likely to arise; therefore no additional or special studies are needed at this stage.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
1. INTRODUCTION.....	27
1.1 <i>Purpose of The IEE</i>	27
1.1.1 Identification of the Project and Project Proponent.....	27
1.1.2 The Nature, Size, Location and Importance of the Project	27
1.1.3 IEE Boundaries.....	27
1.2 <i>Legal and Administrative Framework for Environmental Protection in Timor-Leste</i>	28
1.2.1 Decree Law No 5/2011	28
1.2.2 Project categorization	28
1.2.3 Procedures for Processing and issuance of Environmental License	29
1.2.4 ADB Environmental Safeguards Policies	32
1.3 <i>Methodology Applied</i>	32
1.4 <i>Constraints and Limitations</i>	33
2. DESCRIPTION OF THE PROJECT	34
2.1 <i>Type of Project</i>	34
2.2 <i>Project Category</i>	34
2.2.1 ADB Safeguards Policies	34
2.2.2 GoTL Environmental Regulation	34
2.3 <i>Need for the Project</i>	34
2.4 <i>Location and Size of Operations</i>	35
2.4.1 Location	35
2.4.2 Pavement.....	35
2.4.3 Drainage	36
2.4.4 Retaining Structures	36
2.4.5 Road Safety	37
2.4.6 Project Implementation Schedule and Project Cost.....	38
3. DESCRIPTION OF THE ENVIRONMENT	40
3.1 <i>Physical Environmental Condition</i>	40
3.1.1 Climate	40
3.1.2 Tropical Cyclones	41
3.1.3 Air Quality	41
3.1.4 Topography	42
3.1.5 Geology	42
3.1.6 Geology of the Alignment.....	43
3.1.7 Erosion and Sedimentation	43
3.1.8 Seismicity.....	44
3.1.9 Geotechnical Assessment.....	45
3.1.10 Quarry Resources	46
3.1.11 Water Resources	47
3.1.12 Flooding	48

3.2	<i>Terrestrial Ecologic Condition</i>	49
3.2.1	Land Use and Vegetation.....	49
3.2.2	Faunal Wildlife	51
3.2.3	Terrestrial Biodiversity Conservation	53
3.2.4	Coastal Ecosystem	53
3.2.5	Marine Ecosystem.....	54
3.2.6	Coral Reefs	54
3.2.7	Seagrass.....	54
3.2.8	Fisheries	54
3.3	<i>Social Cultural and Economic Setting</i>	55
3.3.1	Human & Economic Development	55
3.3.2	Agricultural Development	55
3.3.3	Industrial Development	56
3.3.4	Infrastructure	56
3.3.5	Ethnic and Cultural Diversity	56
3.3.6	Poverty Levels	56
3.3.7	Education and Health	57
3.3.8	Land Tenure.....	57
3.3.9	Archaeological, Historical and Cultural Sites	57
4.	SCREENING OF POTENTIAL IMPACTS AND MITIGATING MEASURES	59
4.1	<i>Introduction</i>	59
4.1.1	Impact Due to Location and Design	59
4.1.2	Possible Impacts due to Construction.....	61
4.1.3	Impacts Due to Operations.....	65
4.2	<i>Mitigating Measure</i>	66
4.2.1	Impacts due to Project Location.....	66
4.2.2	Mitigation of Impacts During Construction.....	66
4.2.3	Contingency Preparedness	70
4.2.4	Mitigation of Impacts During Operations and Maintenance	70
5.	PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE	72
5.1	<i>Past Public Consultations</i>	72
5.2	<i>Public Consultations for Updated IEE</i>	72
5.3	<i>Public Disclosure</i>	74
6.	Grievance Redress Mechanism	75
7.	Environmental Management Plan (emp)	76
7.1	<i>Environmental Impact Mitigation and Monitoring</i>	76
7.1.1	Environmental Mitigation.....	76
7.1.2	Environmental Monitoring	76
7.1.3	Reporting Arrangement	88
7.1.4	Responsibilities and Authorities for Implementation of Mitigation Measures and Monitoring Requirements 88	
7.1.5	Environmental Monitoring Data Management and Analysis	89
7.2	<i>Capacity Building</i>	90

7.3	Estimated Cost of Environmental Monitoring.....	90
8.	FINDINGS AND RECOMMENDATIONS	91
9.	CONCLUSIONS.....	92
10.	LIST OF REFERENCES.....	93

List of Attachments

Attachment 1: Completed application form for environmental permit.....	94
Attachment 2: Relevant Environmental Regulation of GOTL.....	95
Attachment 3: Rapid Environmental Assessment Form.....	99
Attachment 4: Environmental Monitoring Checklist	101

List of Tables

Table 1 Environmental Classification of Road Projects in Timor-Leste.....	29
Table 2 Slope stability.....	36
Table 3 – Slope Stability Assessment.....	46
Table 4 Land cover and land use within the 200 m corridor of A03-01	49
Table 5 Population of the districts of Dili and Liquica.....	55
Table 6 Possible sources of fugitive dust during rehabilitation of A03 01 & A03-02	61
Table 7 Noise signatures of the different construction equipment used for various construction works.....	62
Table 8 IFC noise guidelines (IFC, 2007).....	62
Table 9 Mitigating measures for construction noise in populated areas.....	67
Table 10 Restrictions for the protection of water bodies	68
Table 11 Focus of Discussions with Institutional Stakeholders.....	73
Table 12 Environmental Mitigation Plan.....	78
Table 13 Environmental Monitoring Plan	84
Table 14 The agencies and their respective responsibilities in the implementation of the EMP	88
Table 15 Estimated cost of implementing the EMP	90

List of Figures

Figure 1 Review process for application for environmental permit in Timor-Leste	31
---	----

Figure 2 Map showing the alignment of the Dili-Tibar-Liquica sub-project	35
Figure 3 Typical cross section of the 2 types of new pavement construction in Flat Terrain and Mountainous Terrain	39
Figure 4 Monthly average ambient temperature in Timor Leste (after Kirono 2010).....	40
Figure 5 Monthly rainfall pattern of Timor Leste (after Dewi Kirono, 2010).....	40
Figure 6 Occurrence of tropical cyclones in past over Timor Leste (Crippen International, cited in Kirono 2010)	41
Figure 7 The process of accretion of Timor during the subduction of the Australian Plate based on the model of Hamilton.	42
Figure 8 River bed aggradation in Liquica.....	44
Figure 9 Historical earthquakes in the region of Timor Island from 1990 to present. Green star icon shows the location of the 26 April 2011 earthquake south of Dili (after USGS.....	45
Figure 10 Stability Zone of the northwest region of Timor-Leste	46
Figure 11 Watersheds of Timor-Leste showing watersheds and location of sub-project (after Costin and Powell, 2006).....	48
Figure 14 Important bird areas of Timor-Leste (after Trainor, et al., 2009).....	52
Figure 15 Coastal and Nearshore Ecologically Sensitive Receptors along the route of A03-01 &A03-02.....	60
Figure 16 Noise decay based on the doubling distance rule	62
Figure 17 Location of sightings of salt water crocodile in Timor-Leste (after UNIMTL, 2008).....	65

List of Abbreviations

ADB	Asian Development Bank
ALGIS	Agricultural Land-use Geographic Information System (ALGIS) based
BVA	biological value area
CBD	United Nation's Convention on Conservation of Biodiversity
CCD	United Nation's Convention to Combat Desertification
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CO	Carbon Monoxide
DTP	Directorate of Land and Property
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FCCC	Framework Convention on Climate Change
FI	Financial Intermediately
GDRTL	Government of Democratic Republic of Timor Leste
GIS	Geographic Information System
HC	Hydrocarbon
HDI	Human Development Index
HVAS	High Volume Air Sampler
IBA	Important Bird Area
IEE	Initial Environmental Examination
IUCN	International Union for Conservation of Nature
MAFF	Ministry of Agriculture and Forestry
MODIS	Moderate-Resolution Imaging Spectro-radiometer Images.
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautical and Space Administration
NASA	National Aeronautical and Space Administration (),
NGO	Non-Governmental Organization
NO _x	Oxides of Nitrogen
NW	North West
OCHA	United Nation's Office for the Coordination of Human Affairs
PIA	Project Influence Area
PM ₁₀	Particles of 10 micrometers or less in aerodynamic diameter
PM _{2.5}	Particles less than 2.5 micrometers in aerodynamic diameter
PMU	Project Management Unit
PSA	Poverty and Social Assessment
ROW	Right-of-way
RSMC	Regional Specialised Meteorological Centre
RSPM	Respirable Particulate Matter
SE	South East
SIEE	Summary Initial Environmental Examination
SLM	Sustainable Land Management
SMEC	Snowy Mountain Engineering Corporation
SO ₂	Sulphur Dioxide
SPM	Suspended Particulate Matter
SPOT	Satellite Pour l'Observation de la Terre

TA	Technical Assistance
THC	Total Hydrocarbons
TSP	Total Suspended Particulate
UK	United Kingdom
UN	United Nation
UNCED	United Nations Conference on Environment and Development – ‘Earth Summit’
UNDP	United Nations Development Programme
UNTAET	United Nations Transitional Administration for East Timor
USGS	United States Geological Survey
WGS84	World Geodetic System 84
WHO	World Health Organization
WMO	World Meteorological Organization

1. INTRODUCTION

1.1 Purpose of The IEE

This initial environmental examination (IEE) is part of the continuing process of compliance with the Government of Timor-Leste's (GoTL) environmental regulations and guidelines and ADB guidelines in relation to Road Network Development Sector Project under ADB Grant No. 0180-TIM' for the National Road from Dili-Tibar-Liquiça (A03-01 to A03-02).

The IEE provides a road map to the environmental measures needed to prevent and/or mitigate negative environmental effects associated with the development project. The IEE provides a detailed description of the direct and indirect environmental effects associated with the proposed subproject during key periods of work. The IEE (1) describes the extent, duration and severity of the impacts, (2) analyzes all significant impacts, (3) formulates the mitigation actions and presents it all in the form of an Environmental Management Plan or EMP. The IEE also serves as a basis for ADB to assess the project's environmental thresholds and determine whether a more thorough environmental assessment in the form of an environmental impact assessment (EIA) is needed to address the more significant components and impacts.

This IEE report presents the findings and recommendations of the environmental assessment of the sample road proposed by the Ministry of Infrastructure. Its purpose is to ensure that environmentally sound practices are incorporated into project design and potential negative impacts are avoided or mitigated to acceptable levels. The environmental assessment process follows and complies with Timor-Leste regulatory framework and ADB requirements.

This IEE with the integrated EMP shall likewise serve as the basis for securing environmental clearance from the National Directorate for Environmental Services (DoE) for the repair and rehabilitation of road section A03-01 and A03 -02.

1.1.1 Identification of the Project and Project Proponent

This Initial Environmental Examination (IEE) is prepared as a part of the 'Project Implementation and Support Consultants for the Road Network Development Sector Project – ADB Grant No. 0180-TIM' for the National Road from Dili-Tibar-Liquiça (A03-01 to A03-02) referred to as 'sub-project road'.

The Ministry of Infrastructure, Government of Democratic Republic of Timor-Leste is the project proponent with support from international and national consultants provided through this Grant.

1.1.2 The Nature, Size, Location and Importance of the Project

National road from Dili to Liquiça, with a total length of 28.4 kilometers, is part of the main trunk road between the national capital, Dili, and the border post with Indonesia at Mota Ain. It is also a part of the main trunk road between Dili and the coffee-growing areas of the Timor Leste highlands as it connects to national road A03-03 and A03-04 as well as the major center of Maliana. The road starts at the roundabout at the Dili airport junction and ends in the town center of Liquiça which continues toward the border with Indonesia. The existing alignment runs in a west to south west direction and the road mainly follows the coast.

1.1.3 IEE Boundaries

For purposes of establishing the environmental conditions, overview of regional data is followed by the description at the sub-project level if data is available. This IEE covers the entire length of the sample road. For purposes of impact assessment, an envelope of 200 meters wide on each side of the project road over its entire length is identified as the primary impact area. This distance takes into account the common impacts associated with road works such as noise, dust and emissions. However, the project impact area maybe widened depending on conditions on the ground. The road sections where sensitive receptors are present, such as schools, hospitals or other places where

people congregate are given particular attention so that ample mitigation is formulated. For road sections that cross rivers or located near the coastline, impact assessment is expanded to cover the identified continuous extent of any ecologically important habitats / features along the project corridor.

1.2 Legal and Administrative Framework for Environmental Protection in Timor-Leste

The government's mandate to protect the environment emanates from the Constitution of the Democratic Republic of Timor-Leste. The Constitution of Timor-Leste stipulates that a healthy environment is a constitutional right and declares that:

- 1. Everyone has the right to a humane, healthy, and ecologically balanced environment and the duty to protect it and improve it for the benefit of the future generations.*
- 2. The State shall recognize the need to preserve and rationalize natural resources.*
- 3. The State should promote actions aimed at protecting the environment and safeguarding the sustainable development of the economy. (WB, 2009)*

1.2.1 Decree Law No 5/2011

To realize this constitutional mandate, the Government of Timor Leste has recently enacted its Law on Environmental Licensing, Decree Law No 5 / 2011, published in the Official Gazette Series I, No. 5, 9 February 2011. The decree promulgates the environmental licensing system to ensure that public and private development projects in Timor-Leste are implemented with due regard for the protection of the environment, socially acceptable and respectful of cultural traditions and practices. The law contains among others the following provisions:

- The procedure for scoping, the conduct of the environmental assessment, the review of application for environmental license, issuance and renewal of license.
- Categorization of the project according to severity of the environmental impacts (i.e. Category A, B and C)
- Procedures and information requirement for Category A projects (Environmental Impact Assessment) and Category B projects (Initial Environmental Examination)
- The review process for EIA and IEE documents, application for environmental license and the organization and composition of the review committee and its duties and responsibilities;
- Specific provisions for public consultation and the protection of the traditional customs and cultural practices, specifically the Impacts and Bargain Agreements (IBA) for projects required to submit EIA;
- The issuance of the decision by the Environment Authority on the review of the application and the rights of the project owner to appeal the decision;
- Classifications of environmental license, its duration and renewal; change of conditions of the license;
- The requirement for projects issued environmental license prior to the enactment of this decree-law to register with the Environmental Authority;
- The requirement for environmental monitoring, reporting obligations and duties of the license holder;
- The law also contains sanctions and penalties for violation of this decree.

1.2.2 Project categorization

Under the Decree-law No 5/2011, projects are classified according to 3 categories as follows:

- a. Category A - includes projects that may potentially cause significant environmental impacts, and are subject to the procedure of Environmental Impact Assessment (EIA), this based on Impact Analysis and Environmental Management Plan (EMP) in accordance with the provisions in this law.
- b. Category B - includes projects that may cause environmental impacts, and are subject to the procedure of Initial Environmental Examination (IEE), this based on the Environmental Management Plan in accordance with the provisions of the Decree Law.
- c. Category C - includes projects where environmental impacts are negligible or nonexistent, and not subject to any procedure for Environmental Assessment in accordance with the provisions of this law

For categorization of this road rehabilitation sub-project, Guideline No 6 was referred to. Guideline No 6 states that upgrade of national road, regardless of the scale, belongs to Category B which requires the submission of an IEE and Environmental Management Plan (EMP). Based on this guideline, the rehabilitation and repair of the Dili-Tibar-Liquica road is Category B.

The GoTL's environmental classifications for environmental permitting requirements for road projects are listed in Table 1

Table 1 Environmental Classification of Road Projects in Timor-Leste

TYPE OF PROJECT	SCALE OF PROJECT	CATEGORY	DOCUMENTATION
Construction of national highways	All	A	EIA
Construction of rural roads (>15 km)	All	A	EIA
Upgrade of National Roads	All	B	EMP
Upgrade of rural roads	All	B	EMP
Construction of bridges	All	B	EMP

In compliance with Decree-Law No 5/2011, the prescribed Application form shall be submitted to the DoE for screening. The duly accomplished prescribed Application Form for environmental license is enclosed as **Attachment 1**.

The list of the other relevant legislations dealing with environmental and natural resource management with pertinent institutional responsibility is presented in **Attachment 2**.

1.2.3 Procedures for Processing and issuance of Environmental License

Presently, the Government of Timor has consigned the authority to enforce the environmental licensing function to the Directorate of Environment, under the Ministry of Economic Development.

The process for processing and issuance of environmental permit according to Decree-Law No 5/2011 is shown in Figure 1. The application for environmental permit starts with the submission of basic project data to the Environmental Authority for screening. It is during this stage that the requirement for environmental permit is determined. Category A projects are required to conduct an environmental impact assessment (EIA), while Category B projects are required to conduct an initial environmental examination (IEE). The processing of application for environmental permit by a Category A project is described in the following sections:

- Scoping

The Category A projects are then subjected to scoping to define the project coverage. To initiate this process, the proponent has to submit basic project information. The opinion on the environmental scope is issued by the Environmental Authority within 15 days of the receipt of the documentation.

- Conduct of the EIA and Submission of Application

Subsequently, the proponent prepares the EIA according to the determined scope and format prescribed in Decree-Law No 5/2011. The document is then submitted to the Environment Authority together with the duly accomplished application form for environmental permit.

- Evaluation and Approval

Upon receipt, the Environment Authority has 10 days to convene an Evaluation Committee. The Evaluation committee is composed of representatives of various government offices and it is their duty to evaluate and recommend the approval/denial of the application for environmental permit. As part of the evaluation process, a public consultation is conducted starting 10 days after the formation of the evaluation committee. The public has 24 days to submit to the Evaluation Committee comments, recommendations or proposals on the EIA and EMP.

The Evaluation Committee has 50 days, commencing 5 days after the organization of the Evaluation Committee to complete the technical evaluation and render a decision on the application. As part of the evaluation process the Evaluation Committee may ask the proponent, the affected communities, or government Ministries with interest in project additional information related to the application. The Evaluation Committee may also ask the Proponent to reformat, supply new information or analysis based on the outcome of the evaluation. During this time, the prescribed duration of the review of 50 days is suspended until the required information is received. According to Decree-Law No 5/2011, the Evaluation Committee has 10 days to review the additional information submitted by the proponent.

Upon completion of the technical evaluation, the Evaluation Committee prepares a report and recommends the approval or denial of the application for environmental permit. The recommendation is then submitted to the Superior Environmental Authority who issues the final approval and the order for the issuance of the environmental permit within 15 days of receipt of the Evaluation Committee report. For application that is denied, the process ends with the notification of the proponent of the decision.

Under ideal condition processing of environmental permit for Category A is about 90 days as prescribed in Decree-Law No 5/2011.

- Post Evaluation Requirement

A post evaluation requirement for Category A project is the Impacts Benefits Agreement, negotiation for which may commence once approval of the environmental permit is published.

For Category B projects, the processing of the application for environmental permit is much simpler than for Category A. The application for environmental permit is initiated by the submission of a document which contains the project information, the EMP and accompanied by the duly accomplished application form for granting of environmental permit.

The Environmental Authority has 30 days to complete the technical evaluation of the application. During this period, the Environmental Authority may require additional information from the proponent, the affected community or Ministries of the government with interest in the project. During this time the prescribed period of 30 days for technical evaluation is suspended until the receipt of the required additional information. The Environmental Authority has 10 days to review additional information. A public consultation may also be required as part of the evaluation process.

Upon completion of the evaluation, the Environmental Authority submits to the Superior Environmental Authority a recommendation, i.e. approval or denial of the application for environmental permit. The Superior Environmental Authority, within 10 days of receipt of the evaluation report, shall then issue an order for the issuance of the environmental permit.

For Category C projects, the Environmental Authority recommends that the project maintains an environmental management plan.

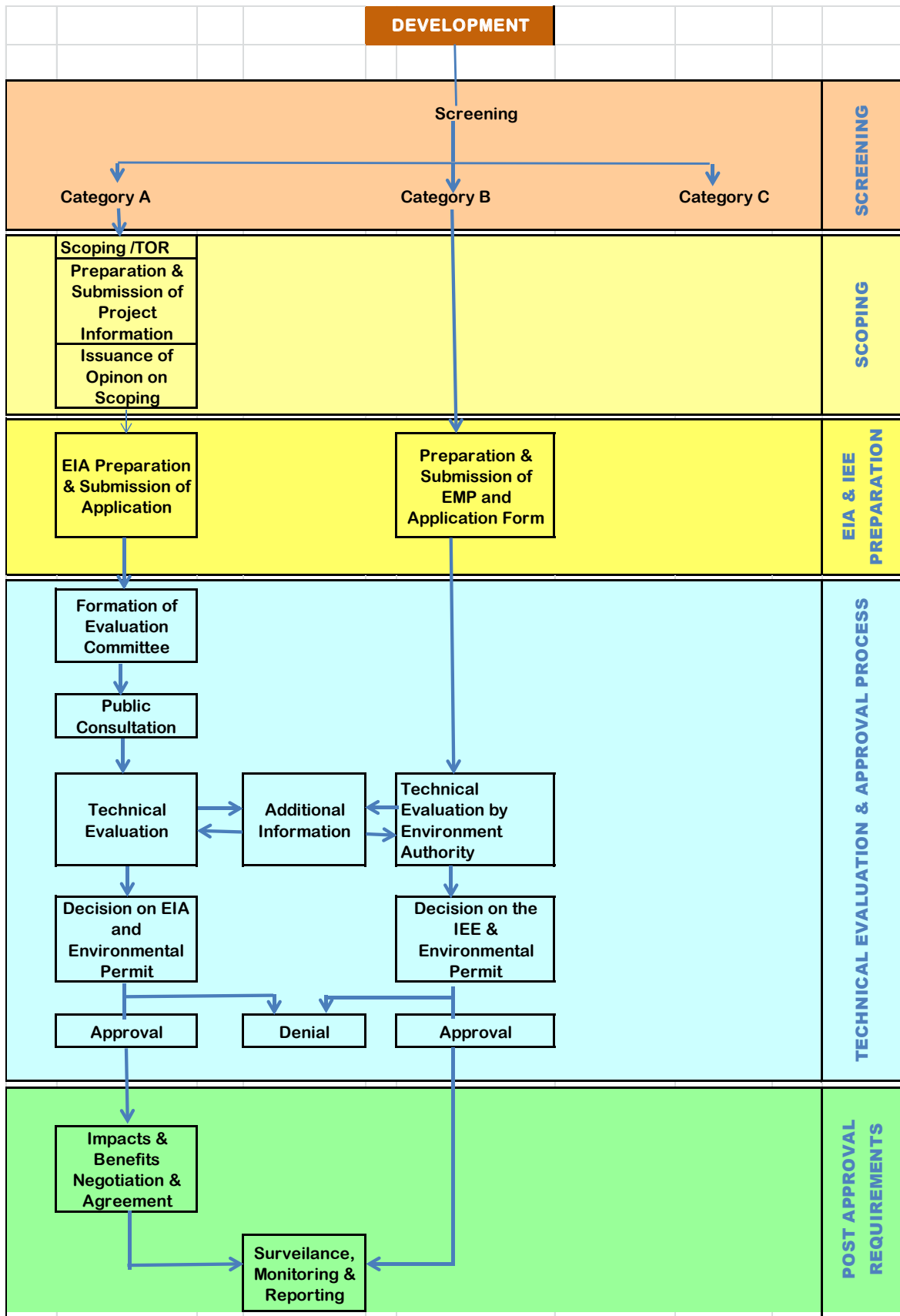


Figure 1 Review process for application for environmental permit in Timor-Leste

1.2.4 ADB Environmental Safeguards Policies

In as much as the project is being supported by ADB, the project has to subscribe to the Bank's environmental safeguards policies contained in the July 2009 Safeguard Policy Statement. The ADB's key safeguard areas are: (i) environmental safeguards, (ii) involuntary resettlement safeguards, and (iii) Indigenous Peoples safeguards. The environmental safeguard policy outlines the requirements that need to be complied with for projects supported by the Bank. Under the environment safeguard policies, projects are required to undertake environmental assessment. These requirements include assessing impacts, planning and managing impact mitigations, preparing environmental assessment reports, disclosing information and undertaking consultation, establishing a grievance mechanism, and monitoring and reporting. Safeguard requirements for biodiversity conservation and sustainable management of natural resources, pollution prevention and abatement, occupational and community health and safety, and conservation of physical cultural resources are also covered by the Bank's environment safeguard policies. The applicability of particular requirements is established through the environmental assessment process and compliance with the requirements is achieved through implementation of environmental management plans agreed to by ADB and the borrower/client.

Guidelines and procedures for complying with the environment safeguard policies, particularly environment impact assessment, are provided in a number of ADB publications.

The 2009 ADB SPS also contains the Screening and Categorization of projects depending on the significance of its environmental impacts associated with the project and location, the sensitivity, scale, nature and magnitude of its potential impacts. The screened projects are classified according to the following categories:

- Category A. Projects could have significant adverse environmental impacts. An environmental impact assessment (EIA) is required to address significant impacts.
- Category B. Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
- Category C. Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
- Category FI. Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

ADB will post the safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation: These documents are:

- For environmental category A projects, draft EIA report at least 120 days before Board consideration;
- Final or updated EIA and/or IEE upon receipt; and
- Environmental Monitoring Reports submitted by Implementing/Executing Agencies during project implementation upon receipt

1.3 Methodology Applied

This environmental assessment is the progression of the 2009 IEE prepared by the Ministry of Infrastructure under the feasibility study stage of this project. As such, this document has freely used the 2009 IEE as a reference for the preparation of this IEE with due acknowledgement.

Other reports that have been used as reference for updating the IEE include the Poverty and Social Impact Analysis prepared for the *Project Implementation and Support Consultants for the Road Network Development Sector Project – ADB Grant No. 0180-TIM' for the National Road from Dili to Tibar (A03-01)*.

The baseline environmental condition of the project site is compiled from reports published in the worldwide web and site inspection. References taken from the internet were screened for reliability and credibility of the sources of information.

The preliminary screening of potential environmental impacts of the proposed rehabilitation and repair of the roads included in the Roads Network Development Sector Project (RNSDP) was done during the feasibility study stage wherein GIS analysis was carried out to determine roads impacts on ecologically sensitive areas. In addition to this process, for this stage of the project, ADB's rapid environmental impact assessment checklist (**Attachment 3**) was utilized.

1.4 Constraints and Limitations

One of the limitations in undertaking environmental assessment in Timor-Leste at the moment is the lack of environmental laboratory services. The only laboratory in Dili that can perform water quality analysis is the Rural Water Sanitation Service (SAS) under the Ministry of Infrastructure, but its laboratory capability is limited. Another limitation in conducting environmental studies in Timor-Leste is the paucity of baseline information on ambient environmental quality. Also, as a new government, it is still in the process of completing its regulatory framework, including that for environmental protection.

2. DESCRIPTION OF THE PROJECT

2.1 Type of Project

This sub-project pertains to the widening, strengthening, repair and bituminous resurfacing of the National Road from Dili to Liquica. This road alignment was identified as one of the two sample roads in the 'Ten Year Investment Plan for Timor-Leste National Road Network', developed during the Phase-1 of ADB's TA 7100-TIM.

2.2 Project Category

2.2.1 ADB Safeguards Policies

Based on the existing ADB Environmental Safeguards Policy (2009), this sub-project falls under ADB's project category B. This category is defined as "Projects with potential to cause less significant fewer environmental impacts than Category A, yet still require a prescribed level of environmental management to protect the environment. For these projects an initial environmental examination (IEE) could be considered as final environmental assessment report if the stated document determines that an environmental impact assessment (EIA) is not required for the project under examination".

Considering the type and magnitude of activities and the absence of land acquisition and new road construction, no significant impacts that will warrant the conduct of an EIA are foreseen.

2.2.2 GoTL Environmental Regulation

The GoTL's law enforcing the environmental impact assessment is contained in Decree-Law No 5/2011. This decree-law defines the scope, categorization of projects according to environmental impacts, the procedure for securing environmental permit, the approval process and post approval requirements. In as much as secondary regulations supporting the Decree-Law No 5 are yet to be enacted, the existing relevant guideline, Guideline No 6 was referred, as advised by the DoE to define the category of this sub-project. As per Guideline No 6, upgrading of national roads, such as this sub-project, belongs to Category B. As a Category B, project it is required, under Decree-Law No 5/2011 to submit an IEE with EMP for securing environmental permit.

2.3 Need for the Project

The sub-project is part of the road that has served as a link between Timor-Leste and western half of the island. . The project road is part of an important trade link since it provides road connectivity to the Indonesian part of the island, which is the source of international trade and freight movement by land route from Indonesia to Timor-Leste and vice versa. Within the country, the project road is the most important east-west road link along the northern coastline which connects to the national capital Dili.

During the Indonesian regime the road received maintenance and some of the major bridges and cross drainage structures were constructed. But the civil unrest and struggle for independence resulted to severely damaged road condition particularly after 1999 elections. In post-independence years (post 2002) the road received basic emergency repair in its severely damaged sections to keep it traffic worthy. A decade or more of lack of strengthening and absence of bituminous overlay has left this vital road in very poor condition.

The Government of Timor-Leste has recognized the importance of developing physical infrastructure including road network as part of its program to reduce poverty in the country. With the realization that improvement of the road infrastructures will contribute to economic growth and poverty reduction, the Government of the Democratic Republic of Timor-Leste (the Government) has taken up the preparation of the Road Network Development Sector Project, with financial assistance from the ADB (Project TA 7100). The overall objective of this Project is to reduce vehicle operating costs, improve

accessibility to market opportunities and economic and social services, as well as generate employment opportunities and income.

2.4 Location and Size of Operations

2.4.1 Location

The sub-project road is located in the northwest region of Timor-Leste. It is within the jurisdictions of the districts of Dili and Liquica. Figure 2 below shows the location of the alignment.



Figure 2 Map showing the alignment of the Dili-Tibar-Liquica sub-project

The first alternative proposed rehabilitation works for this sub-project road includes widening of carriageway, repair and restoration (pothole repairs, edge damage, ravelling, crack sealing, construction of new pavement on flooded sections and on sections of complete disrepair, etc), reconditioning of shoulders (removal of vegetation, scarify and add additional material to level with pavement elevation, reconditioning of drainage structures (clearing, damage repair, provision of river training structures, etc), replacement of inadequate drainage culverts, construction of new drainage cross culverts and stone masonry lined ditch, vegetation control, construction of slope protection structures and other ancillary works. The second alternative includes repair and rehabilitation similar to Alternative 1 plus an asphalt concrete overlay is recommended for the existing and restored pavement to improve the quality of wearing surface. The proposed works for A03-01 are described in the following sections.

2.4.2 Pavement

The proposed works will include widening, repair and restoration with an option to apply full asphalt concrete overlay. The design width of the shoulder is 1.5m (one side) in flat terrain and 1.0 to 1.5m in mountainous terrain. The design width of asphalt pavement is 6m. In some cases where houses/structures are present and land is privately owned, the current road width (i.e. 0.75m shoulder and 5 to 6m asphalt pavement) shall be maintained

In Alternative 1, the road would be widened, repaired and restored to a maintainable condition. The scope of work will include repair of pavement distress areas such as potholes and edge damage, reconstruction of the pavement structure (wearing course, base and subbase) where necessary, repair or rehabilitation of shoulders, reconditioning of existing drainage structures, construction of new drainage structures, repair or construction of stone masonry walls, installation of road signs, pavement markings, and bio engineering works. Where the pavement structure is reconstructed the new surface will be hot laid asphalt concrete. In other cases the existing surface will be retained.

In Alternative 2, the approach will be to repair and restore the existing road, then provide a full asphalt concrete overlay. The work will be similar to that in Alternative 1 except that in distressed areas the repairs will bring the base course up to the pavement level and the full length of the road will then be overlaid with 50 millimeters of hot-laid asphalt.

Figure 2 shows the typical cross sections of pavements in flat terrain and mountain terrain.

2.4.3 Drainage

The lack of routine maintenance is the main reason for the road drainage infrastructure to fall into disrepair. The basis of the drainage works design will be to repair the existing infrastructure and provide new works only where the present design is inadequate based on field conditions. Existing drains are to be cleaned or reconstructed where necessary. New construction may be required as part of the works.

Free discharge from culverts and bridges will be an important aspect of the drainage designs. The works will include, where necessary:

- building cascades to carry water away from the road formation and embankment;
- cleaning/clearing out streams of accumulated debris; and
- constructing weirs and drop structures to prevent further streambed scouring
- constructing river training walls to prevent scouring on banks

Culvert inlets which habitually become blocked will be cleared of debris or be reconstructed to improve the hydraulic capacity.

The changing drainage requirements resulting from the effects of anticipated climate change will be included in the design of the drainage facilities.

2.4.4 Retaining Structures

A detailed geotechnical investigation of the road was conducted as part of this study. The study found a number of locations where remedial action is required to stabilize geotechnical weaknesses affecting either the existing cut and fill batters or the integrity of the formation. Details of slope stability problems found during the geotechnical field investigation are provided in Table 2 below.

Table 2 Slope stability

Dili-Tibar Section	
Location (Km)	Description
3.2	Slope Failure and Rockfall
4.6	Collapsed Mountain Slope, Rockfall and Erosion at Gully
4.8-5.70	Slope Failure and Lack of Drainage Structure
5.80	Erosion at Gully
6.0	Lack of Drainage Structure
Tibar-Liquica	
1.7	Rockfall
7.7	Cut slope failure
7.9	Slumped formation
8.5	Cut slope failure
8.55	Embankment slope failure
12.8	Embankment slope failure
15.5	Cut slope failure
17.8	Embankment slope failure
18.1	Embankment slope failure

The following types of earth retaining structures are considered during the scoping of works.

- **Gabion Walls**

These are typically used to retain fill slopes. These will be placed typically to support the fill side of the formation on a slope. They can be used to remedy existing slope failures provided that they are suitably founded, i.e. in or on stable material.

- **Stone Masonry Walls**

These are typically used to retain back slopes on cuts that are prone to landslides and on embankment formations. The height varies from a minimum of 1.5m to a maximum of 5.0 meters. They can be constructed in conjunction with bioengineering works

- **Breast Walls**

These are similar to stone masonry walls but are generally shorter in height (1.5m high or less) and more commonly used to contain minor slips at the toe of the cut slope. These types of structure will be founded on stable soil or on compacted ground.

- **Bioengineering**

This technique covers a variety of specific treatments, all involving planting of selected vegetation to reduce slope erosion and water infiltration. It can be used to improve near surface stability over a wider area. It will typically be effective where stability problems are caused by low strength soils or rock rather than in steep terrain. Actual effects can be hard to quantify, however the probability of large scale failures will be reduced if the work is done correctly.

- **Catch Drains**

These are constructed to divert water away from areas or structures where it will cause stability problems. They are typically placed around the upper extremity of a slope, diverting water away from the slope. Normal table drains, culverts etc. should also be considered as an integral part of the water diversion.

- **Check Dams**

These are constructed to control the flow of surface water to reduce the velocity of the surface runoff and minimize erosion. They act as small weirs to dissipate the energy. They can be constructed of a variety of materials including bamboo and other plantings, stone and wooden palisades.

- **Earthworks (Cut/Fill)**

This refers to removing material from mountainsides and/or constructing embankments on the hill side to improve the stability of the formation. This would generally involve removal and disposal of material from landslide or excavation for the construction of lined ditches. This would also apply to design for new construction.

There are a number of areas in Timor-Leste that are geo-technically unstable and subject to regular landslides. It is not possible to prevent the land movement in these areas and hence there will be a recurring cost to reconstruct the road sections crossing these areas.

At many locations along the road, there is a substantial number of existing retaining walls which either support the cliff side of the road or support the cut slope of the road. The natural material is mostly strong and close enough to the surface to allow the construction of walls without excessive earthworks. However some of the existing walls have been damaged as a result of drainage failures. These damaged walls will be assessed in conjunction with the drainage works (especially cascade outfalls) and repaired or reconstructed as part of the works. Cut slopes along the road are prone to minor landslides through scouring and minor erosion. Such slopes will be reshaped and treatments will be applied to minimize future slips and eventual damage to the drains and road. Where considered viable, bioengineering will be applied to stabilize the slopes, and retaining walls (stone masonry wall or breast walls) will be constructed to prevent landslips.

2.4.5 Road Safety

The project's response to improving road safety outcomes is constrained by the general design approach. The design approach, as detailed in Section 2.4, is to restore the condition of the road and widen the carriageway provide shoulders. Therefore the main road improvements provided by the project will be the condition of the roadway, the condition and width of the shoulders, provision of pavement marking, provision of road signs and conducting routine maintenance of the drainage systems. The main road safety benefits the project will deliver are the following:

1. reduced risk of vehicles leaving their lane to avoid potholes and surface deformations;
2. reduced risk of accidents due to road hazards, e.g. flooding of roadway, foreign objects (falling rocks) on roadway;
3. better information to drivers on infrastructure hazards;
4. improved sight distances due to improved vegetation control;
5. better separation between pedestrians and vehicles; and
6. better night driving conditions due to wider carriageway and improved pavement centerline markings.

Some of these advantages could be partially offset by the higher speeds which will be possible after the road improvements.

2.4.6 Project Implementation Schedule and Project Cost

As noted earlier, two alternatives have been considered for the improvement of the condition of the road. The two alternatives are similar, with the main difference being that Alternative 1 retains much of the existing pavement surface while Alternative 2 provides a full asphalt concrete overlay. This has a considerably higher cost but will provide a better riding surface and resulting lower vehicle operating costs. It will also provide a better seal, a higher bearing strength and a longer effective life for the road. Alternative 2 is the preferred option.

The total financial cost for Alternative 2 is US\$ 22 million, Project implementation is tentative set to start 2nd quarter of 2012 with a construction duration period of 21 months.

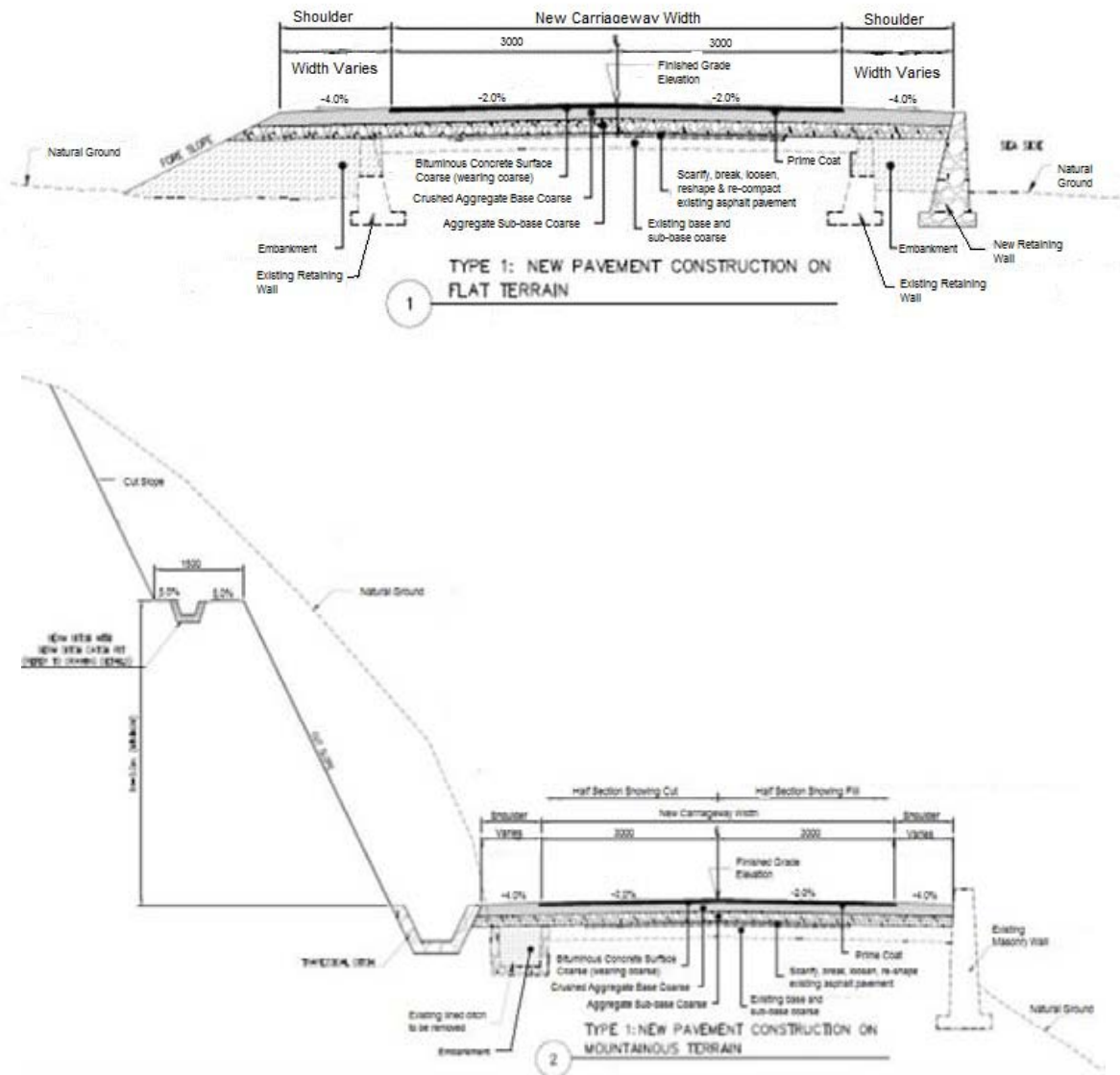


Figure 3 Typical cross section of the 2 types of new pavement construction in Flat Terrain and Mountainous Terrain

3. DESCRIPTION OF THE ENVIRONMENT

3.1 Physical Environmental Condition

3.1.1 Climate

Timor-Leste lies in the tropical region where temperature varies within a narrow range the whole year round. The average temperature in coastal areas is around 27°C in coastal areas and around 25°C in the highlands. But temperature fluctuation within the day can be larger than the monthly variation throughout the year. The graph in Figure 3 shows monthly average temperature in different parts of Timor Leste and how temperature decreases with altitude.

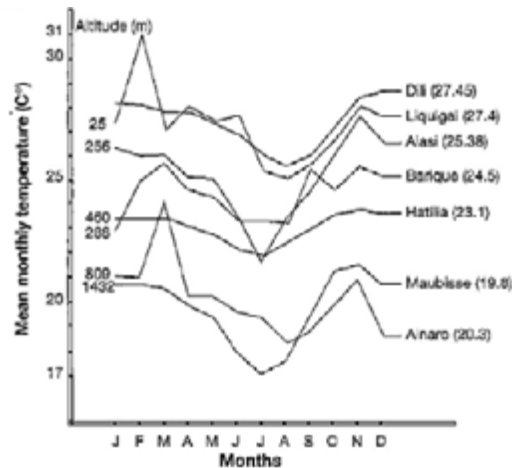


Figure 4 Monthly average ambient temperature in Timor Leste (after Kirono 2010)

The MOI (2009) IEE described the climate of Timor-Leste as hot and humid tropical, with large variations in rainfall and temperature over short distances due to the steep topography. Broadly speaking there are two annual seasons determined by the monsoon, which varies in length according to location, the monsoon lasting longer in the south than in the north. These climate patterns are described as follows:

- The Northern Monomodal rainfall produces rain during 4-6 months from December which affects a big part of North and the East.
- The Southern Bimodal rain pattern, which produces rain as long as 7-9 months with rapidly rainfall start in December and again in May, which is influencing the Southern part of Timor-Leste.

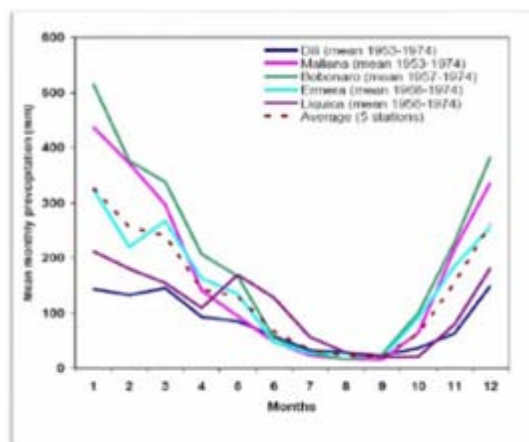


Figure 5 Monthly rainfall pattern of Timor Leste (after Dewi Kirono, 2010)

Topography has a strong influence on rainfall quantity, with marginal to low rainfall observed along the northern coast of Timor-Leste (< 1,000mm / year), low to moderate rainfall in the country's center and on higher elevations (1,500-2,000mm / year), and relatively high rainfall (2500mm or more /year) on the highest mountains and plains mainly in the west of Timor-Leste. In Dili more than 30 percent of the total annual rainfall may be received in a single day this type of rainfall not only causes extremely high rates of erosion and agricultural and infrastructure damage, it also runs off rapidly and may not effectively recharge groundwater sources.

Given the rainfall pattern over the region of the sub-project, it is important that season be considered in the planning of the implementation of the repair and rehabilitation of A03-01 particularly for areas susceptible to flooding and landslides.

3.1.2 Tropical Cyclones

Formation of tropical cyclones generally occurs within a band between 5° and 25° from the equator. Cyclones bring exceptionally high rains and winds. In the past, they occasionally develop in the Banda, Arafura, Timor and Sawu seas, especially during April and May and move in a south-westerly direction (Figure 5) (Monk et al. 1997 cited in Kirono 2010). As indicated by Figure 5 the tropical cyclone mean occurrence over the Timor-Leste region is around 0.2 per year (Abbs 2010 in Kirono 2010).

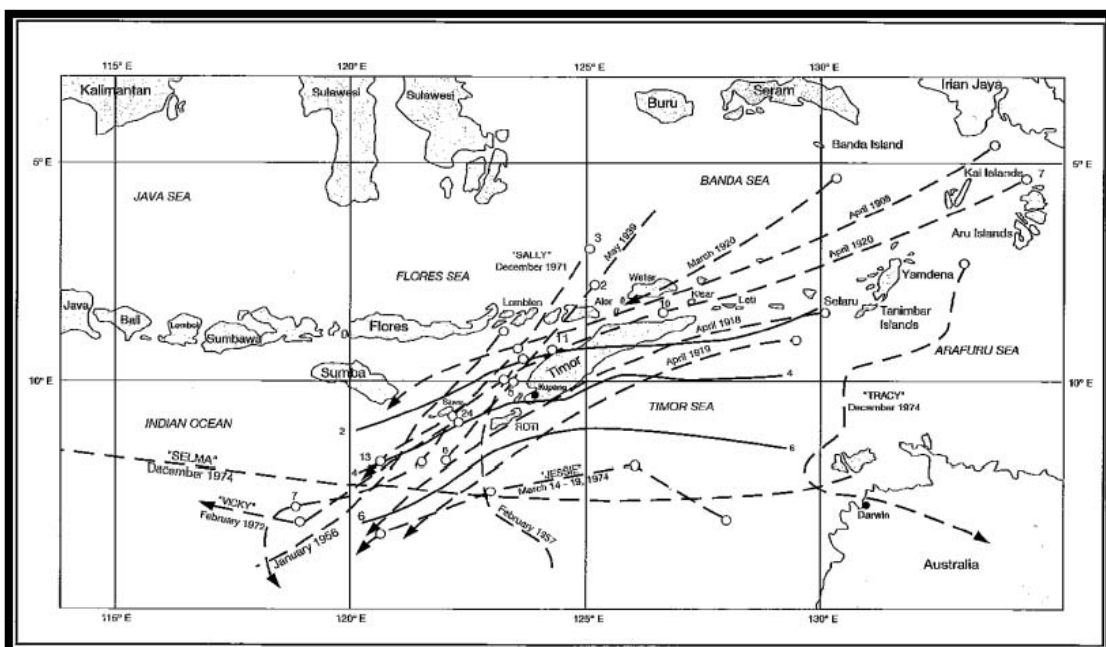


Figure 6 Occurrence of tropical cyclones in past over Timor Leste (Crippen International, cited in Kirono 2010)

3.1.3 Air Quality

According to the WB's assessment (2009) outdoor air pollution in Timor Leste is currently a minor problem. Ambient air quality concern is mainly limited to Dili, but the situation nevertheless needs attention considering the prevailing rapid urban population growth rate and the potential economic growth of the country. Dili already accounts for 20 percent of the population.

Another possible source of air pollution in Tibar is the open dump. Burning in the landfill has been noted, probably caused by spontaneous combustion. The closest distance of the dump to A03-01 is about 1 km. The impact of the burning in the open dump to the ambient air quality is unknown at the moment due to lack of air quality measurement.

It is inferred that fugitive dust and particulates are relatively high along the sub-project alignment due to a number of natural and anthropogenic reasons. Among these are the presence of fine

weathering products from metamorphic rocks; low soil moisture and lack of road maintenance and poor slope management.

3.1.4 Topography

The UNESCAP (2003) reported that Timor-Leste's landscape is dominated by mountain ranges which are estimated to cover about 1/3 of the land area (UNESCAP, 2003). Among the prominent mountain ranges is the Ramelau Range with the highest peak elevation of 3,037 m asl represented by Foho Tatmailau. The rugged topography of the country is exemplified by the fact that more than 40% of the land has more than 40% slope (MOI, 2009).

Within the location of the sub-project, specifically in Dili District, the topography is dominated by the low lying floodplain of Comoro River. A substantial portion of Dili is built on this floodplain. Towards the west, the floodplain is bounded by a hill that abuts the sea which makes up the headland of Acollo Point. The road traces the foot of Acollo Point along the coast up to Tibar. The road elevation is no more than 8 m asl from starting point to end point in Tibar.

3.1.5 Geology

Timor Island is located in a tectonic region known as the Banda Arc. The Banda Arc is a west facing horse-shoe shaped arc in eastern Indonesia which marks the collision zone of the Indo-Australian Plate, the Pacific Plate and the Eurasian Plate. Timor Island is an aggregation of continental fragments (part of Australian plate), deep marine sediments, oceanic crust and the Quaternary sediments brought about by the collision between the northwestern edge of the Australian continent and a former oceanic subduction zone. Geophysical evidences suggest that Timor Island is an accretionary prism (or wedge) formed from marine sediments and slices of the old Australian cratonic rocks. It is hypothesized (Hamilton 1979 and 1980 cited in UNESCAP 2003) that these mixture of marine sediments and slices of the Australian continental rocks formed on the surface of the leading edge of the subducting plate (Australian plate). This mixture was "accreted" during the subduction of the Australian plate as it brushed beneath the Eurasian plate. The following sketch illustrates this geologic concept of the emergence of Timor Island.

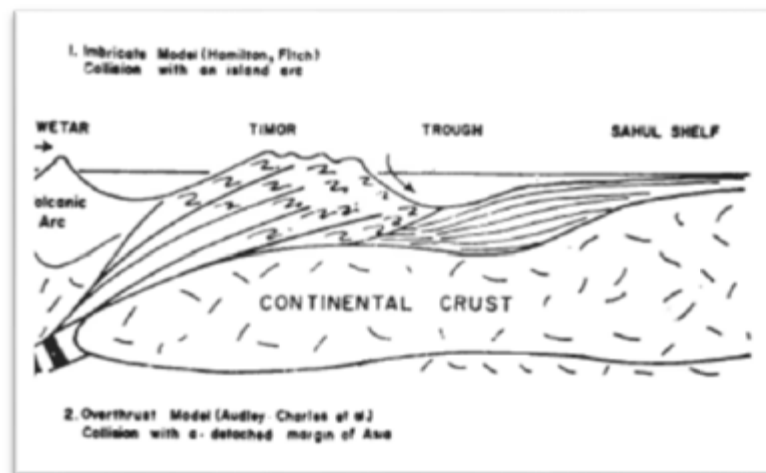


Figure 7 The process of accretion of Timor during the subduction of the Australian Plate based on the model of Hamilton.

Subsequent geologic study of the island confirmed the hypothesis based on the suite of rocks mapped in the island. These consist of rocks of continental origin (Australian origin), metamorphosed marine sediments (melange) and rocks associated with the oceanic crust, collectively referred to as ophiolite. The mélangé in Timor is found in about 60 per cent of the island throughout the 6,000 meters thick sequence of imbricated rock of the Miocene and older age (UNESCAP 2003).

Development of the accretion wedge proposed by Hamilton would have continued during the Late Miocene and Early Pliocene (Hamilton, 1979 and 1980). As the accretionary prism on the slope

thickened, the mass eventually emerged from the ocean. The forerunner of Timor and other nearby islands of the Outer Banda Arc began to emerge from the sea as a non-volcanic island arc. The axis of this topographic high became the Outer Banda Arc and consisted of exposed accretionary sediments, which were almost entirely derived from the cratonic sequence of the Australian plate. The accretionary prism continued to be uplifted throughout the Pliocene and Pleistocene time reaching heights of over 3,000 metres above the sea level (UNESCAP, 2003).

During the Quaternary Period, the eustatic fluctuation of the sea level and land uplift resulted to a sequence of shoreline features and fringing reefs in Timor Island. These included a well-developed shoreline located about 63 meters above sea level in Atauro Island and has been dated to have formed 120,000 years before present (Chappell and Veeh, 1978 cited in UNESCAP 2003). Based on this data, it is estimated that Atauro Island and Timor Island in general experienced an uplift rate of about 0.4m per 1000 years during the Quaternary Period (UNESCAP, 2003)

Audley-Charles (1986 cited in UNESCAP 2003) has identified 3 stratigraphic elements in Timor. These 3 stratigraphic elements include rocks that occur where they were originally deposited, the rocks that have Australian affinities in terms of facies, faunas and floras and the 3rd element is the allocthonous rocks. These include rocks ranging in age from Permian to early Pliocene and also includes suite of pre-Cenozoic metamorphic rocks and widespread sedimentary melange occupying superficial structural and stratigraphic position. These are rocks that have been moved far from where they were originally deposited.

One suite of metamorphic allocthonous rocks known as the Aileu Formation occurs widely in northern part of central Timor (Audley-Charles 1968 cited in Sahat Lumbang Tobing, 1989) including the general location of the sub-project. The Aileu Formation consists of a series of shales, phyllites, slates and occasional low-grade metamorphosed eruptive rocks. Interbeds of quartz-phyllites occasionally occur. This rock displays lustrous surfaces due to presence of chlorite and mica. This formation has been repeatedly exposed to deformation especially in the north coast. This deformation plus the pervasive presence of platy minerals like chlorite and mica structurally weakens the rock. These factors are contributory to the susceptibility to land slips of certain sections of the A03-01 and A03-02 (see photo at the right side).



3.1.6 Geology of the Alignment

The geology of the alignment varies from unconsolidated river sediments, coastal sediments and the Aileu metamorphics. Unconsolidated river deposit predominates the section of the road that traverses the floodplains of Comoro River, while coastal sediments (presumably a mixture of marine and terrigenous sediments) forms the substrate at the end of the road section in Tibar. The Aileu metamorphic makes up the Acollo Point headland.

3.1.7 Erosion and Sedimentation

The inherent weakness of the rocks, the steep terrain and the occurrence of intense rainfall makes erosion and sedimentation as the most active geologic processes in Timor-Leste. Erosion and sedimentation in the country consist of the both the slow erosion-deposition and rapid mass wasting processes which includes rock falls and landslides. Small slips have been observed along the sub-project alignment, particularly the section that goes around Acollo Point.

The other factor that contributes to soil erosion in the mountainous and hilly parts of the project area is grazing. Frequent grazing in the slopes by ruminant animals hasten soil erosion as indicated by the presence of grazing step terracettes.

The very high sedimentation rate of the rivers within the sub-project area is quite obvious. This is indicated by the presence of uplifted river alluvial terraces and wide alluvial filled river channels, from the lower reaches to the headwater sections. High sedimentation rate in the sub-project is resulting to river bed aggradation which reduces bankfull capacity and leads to overtopping and flooding and migration of river channel. Buildings, roads, farmlands and houses maybe buried in the process.

This condition is very evident in the major rivers crossed by A03-02 such as of Moraeloa River, Fanalaoa River and Gularloa River in Liquica. It is reported that part of the main road is regularly buried by stream sediments during the rainy season. The present condition of this river is shown in the following figure.



Figure 8 River bed aggradation in Liquica

3.1.8 Seismicity

Timor Island is prone to earthquakes being located in a tectonically active region, along the collision zone of the Australian plate and the Eurasian Plate. Compilation of major shallow earthquakes in Indonesia from 1897 to 1984 by the Southeast Asia Association of Seismology and Earthquake Engineering (SEASEE, 1985) showed a number of earthquake (magnitude 6 to 6.9) with epicenters located offshore north of Timor Island. A magnitude 8 or greater has been recorded in 1963 with epicenter located offshore southwest of Timor Island. Recently, a very shallow (depth of 1.1 km) earthquake with magnitude of 5.6 and epicenter located on-shore south of Dili occurred last 26 April 2011. The following figure shows the compilation of historic earthquakes in the region of Timor Island from 1990 to present (after USGS)

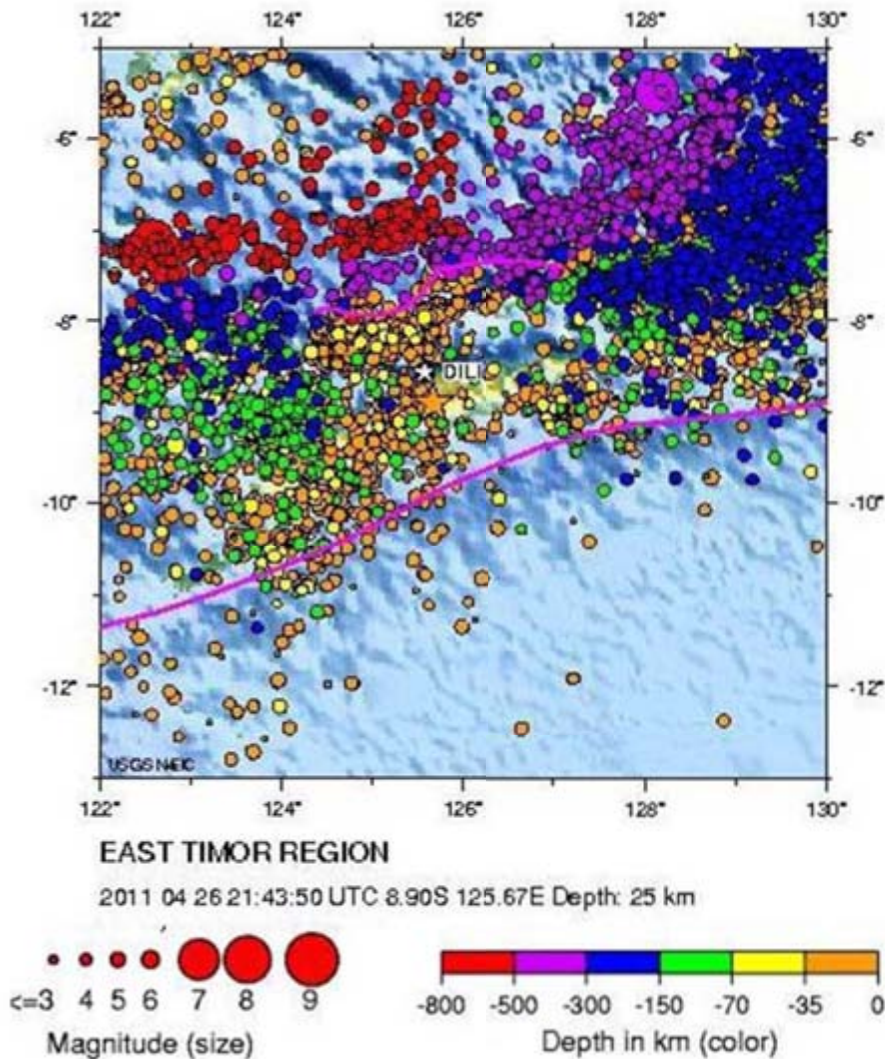


Figure 9 Historical earthquakes in the region of Timor Island from 1990 to present. Green star icon shows the location of the 26 April 2011 earthquake south of Dili (after USGS

http://earthquake.usgs.gov/earthquakes/eqarchives/last_event/world/world_east_timor.php)

3.1.9 Geotechnical Assessment

A geotechnical assessment was previously done during the feasibility study stage (MOI, 2009) and the study confirms that the above mentioned geologic factors produce severe problems in Timor-Leste for the construction and maintenance of civil engineering works. These factors are the presence of highly deformed rock formations, the presence of weak poorly consolidated strata; and high sedimentation rate.

The GIS based stability analysis of the sub-project region done in 2009 (MOI 2009) have classified the sub-project alignment into 5 stability classes and the A03-01 route is classified as Stability Zone 2 . The stability map is shown in Figure 9.

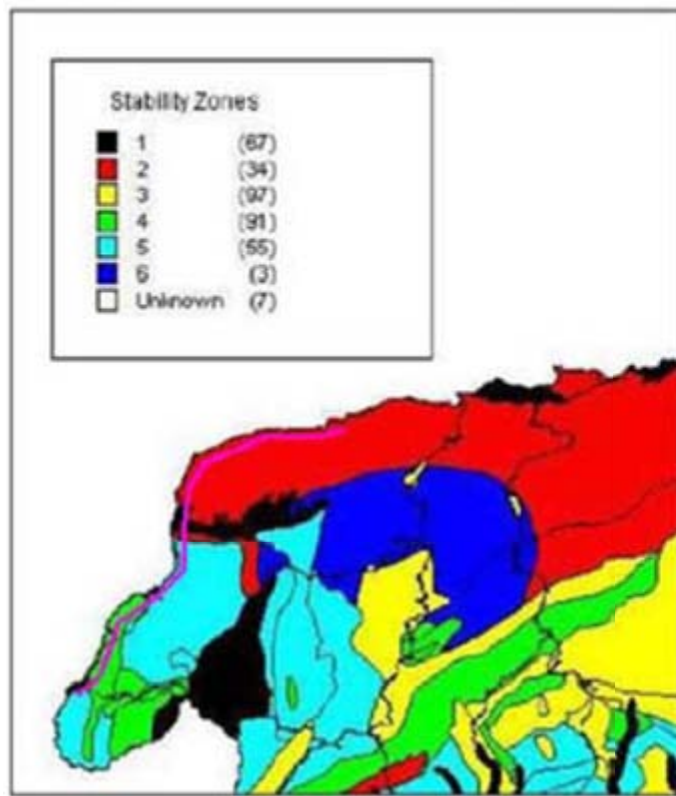


Figure 10 Stability Zone of the northwest region of Timor-Leste

A detailed geotechnical investigation of the road was conducted as part of this study. The study found a number of locations where remedial action is required to stabilize geotechnical weaknesses affecting either the existing cut and fill batters or the integrity of the formation. Details of slope stability problems found during the geotechnical field investigation are provided in the following table:

Table 3 – Slope Stability Assessment

Location – Odometer Reading Reckoned from Dili Airport Roundabout	Description
Km 3.2	Slope failure and rock block falling to the road
Km 4.6	Eroded gully; collapsed mountain slope; boulders falling to the road and road covered by mud
Km 4.8 to 4.9	Slope failure and poor drainage
Km 4.9 to 5.0	Under construction, slope trimming
Km 5.8	Erosion gullies
Km 6	Silted road and no drainage

3.1.10 Quarry Resources

No specific quarry sites have yet been identified for this sub-project. But the published report by UNESCAP on Geology and Mineral Resources of Timor Leste has identified possible sources of construction materials in Liquica and Bobonaro. The quarry resources are andesite and gabbro. In other areas of Timor-Leste, limestone and is used as aggregate.

Within the sub-project site, licensed quarries operate along the Tibar-Liquica road. In addition, river bed quarry operations are also noted to be active along the route of the sub-project. However, since there are numerous factors that need to be considered, the contractors may opt for other

sites. In which case, the contractor will have to secure the necessary permits, including environmental permit prior to start of work.

The following map and photographs show the quarries and concrete plant along the Tibar-Liquica road.

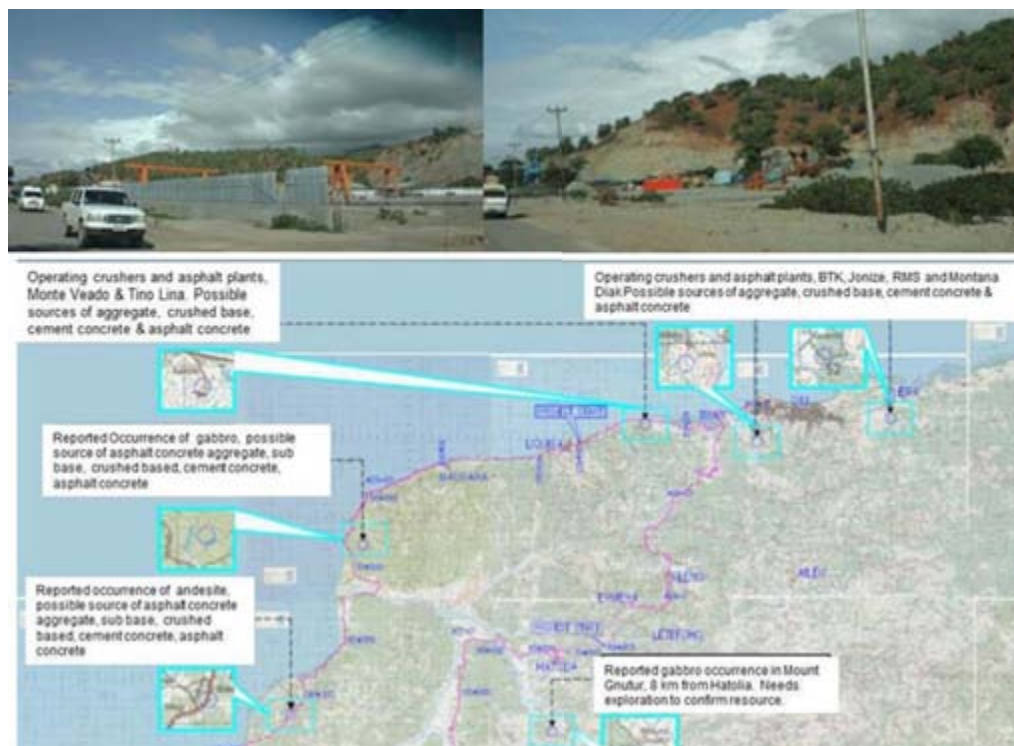


Plate 1 Commercial quarries along the Dili-Tibar-Liquica route

3.1.11 Water Resources

According to the 2009 IEE, rivers and springs are the main sources of water for domestic and agriculture. The major watershed of the country is formed by the Ramelau Mountain and is the source of all major streams. The larger catchment areas and greater rainfall on the south coast permit the formation of more permanent streams here than on the north coast. The largest river systems in the country, the Laclo and the Loes) flow from the mountains to the north coast. The sub-project is located in the lower reaches of these two river systems. The watersheds of these two perennial rivers are the largest in Timor-Leste with catchment areas of more than 2,000 sq. km. The watersheds of Timor-Leste are shown in the map below.

Surface water is scarce as most rivers are intermittent and there is only one lake of significant size, Lake Iralalaru in the eastern part of the country. With the presence of thick gravel deposit in most of the rivers and streams, it is interpreted that water is diverted to subsurface flow. Water quality is now threatened by the high levels of erosion and by the increasing amount of domestic waste that is discharged untreated into the environment. Extensive and continued clearing of forests and other ground cover substantially reduces the ability of the soil to retain water and can also be expected to add to the scarcity of surface water. According to a GoTL report, there is no reliable data on the quantity or quality of available groundwater resources in the country. Baseline water quality data are likewise not available for Timor-Leste.

There are a number of surface water bodies within the sub-project area. The A03-01 road traverses the lower reaches of Comoro which is part of the Laclo Watershed. Laclo Watershed is the second largest watershed in Timor-Leste (see Figure 10).

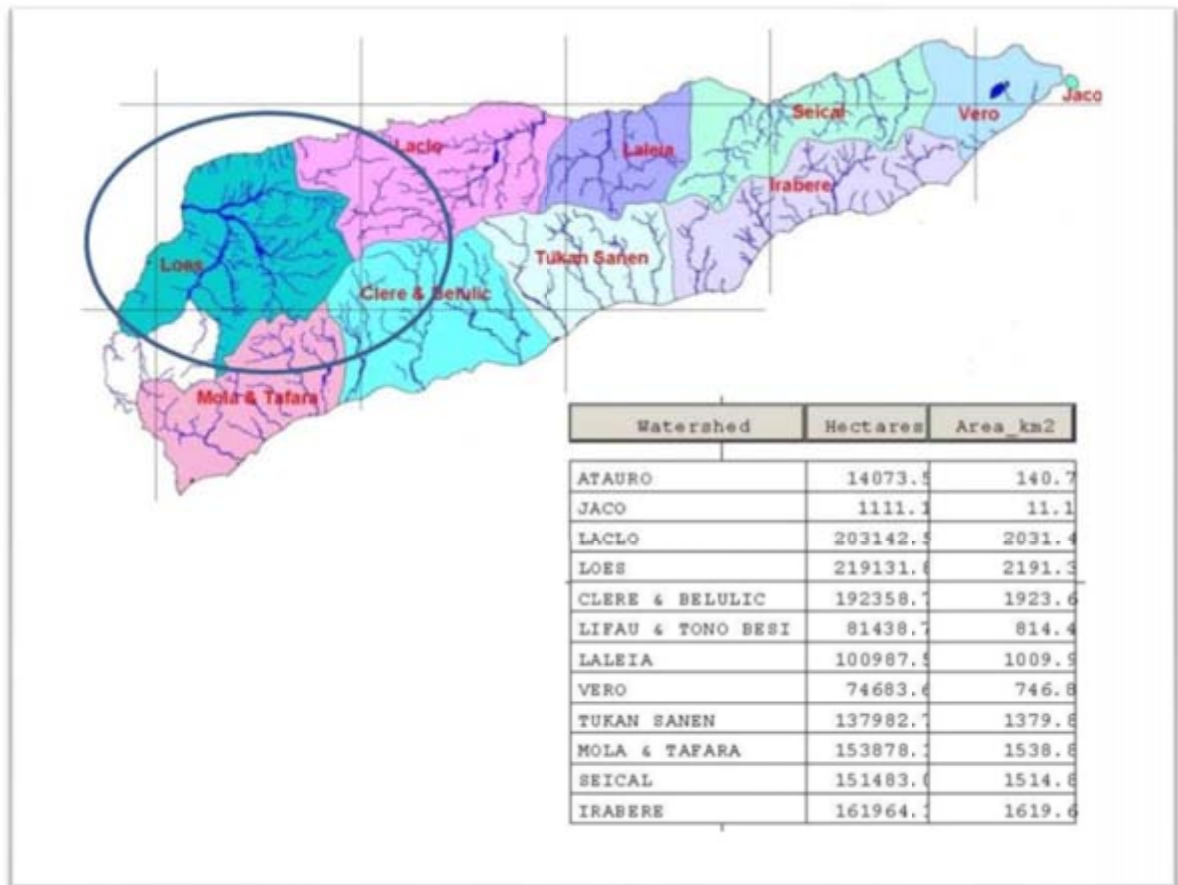


Figure 11 Watersheds of Timor-Leste showing watersheds and location of sub-project (after Costin and Powell, 2006)

In addition, Lake Tasi Tolu, a brackish water lake is present along the route of A03-01. The closest distance of the lake to the road is about 200 m.

A03-02 section, the Tibar-Liquica section traverses Moraeloa River, Fanalaoa River and Gularloa River. The rivers appear to be intermittent. It is possible that water flow is diverted to sub-surface flow during the dry season due to the presence of thick alluvial deposit.

Significant groundwater resources must exist along the sub-project location since it is reported that Liquica town is supplied by eight intakes (seasonal streams); one spring and two deep bore holes. These water systems were developed with JICA participation in the rehabilitation of the water supply of the city in 2001. Four bore holes, the most sustainable water source, have been destroyed during the 1999 violence.

The presence of sewage treatment ponds along the A03-01 route and the open garbage dump in Tibar pose threat to coast water quality.

3.1.12 Flooding

Flooding is one of the recognized natural constraints in Timor-Leste especially in the low-lying coastal plains along the southern shores. On a smaller scale, flooding from overflowing rivers can also occur in the sub-project route, particularly in the floodplains of Comoro River. This is part of the area that has been rated high for flooding risks in the 2008 District Atlas by UN Office for the Coordination of Human Affairs (OCHA).

Some of the effects of flooding on the road along the sub-project alignment are shown in the following pictures.



Plate 2 Left photo shows sediment deposited on the road pavement by surface runoff overtopping the road pavement and right photo shows deep undercutting along the cross drainage structure and erosion of road pavement

3.2 Terrestrial Ecologic Condition

3.2.1 Land Use and Vegetation

The land cover data of Timor Leste gives an indication of its present ecologic condition. While statistics of existing land cover have yet to be reconciled, the land cover mapping done by ALGIS in 2008 using remote sensing data showed that forest (various types of forests) is the dominant land cover of Timor-Leste. It is estimated that various types of forest covers 53.9% of Timor-Leste's land area, various types of cultivated land (agriculture) makes up about 28.7% and other land cover types, (including savannah, grassland, large towns and cities, bare, etc.) make up only 2%. Other researchers doubt the accuracy of this data believing that the forest cover is overestimated. It is believed that savannah formation is the predominant land cover in Timor Leste. The predominant vegetation species of savannah formation is *Eucalyptus alba*.



Plate 3 Shows the savannah type of vegetation along the A03-01 route. Right photo shows the hill slope in the vicinity of the sewage treatment facility. Note the grassland and the bare slopes and erosion gullies.

The land cover within the 200 meter corridor of road A03-01 is described in detail in the following table:

Table 4 Land cover and land use within the 200 m corridor of A03-01

Km	Land Cover/Land Use	Elevation and Landform
Km6+828 to Km8+700	Built up, mixed residential, commercial with institutional	Low elevation (<10 m) Alluvial plain, floodplain of Comoro River
Km9+000	Institutional / protected area – Tasi Tolu Peace Park	Low elevation (<5 m asl) coastal plain
Km9+300 to Km 9+700	Left side of road – Army camp Right side of road - beach, open area Open grassland	Low elevation (< 5 m asl), coastal plain
Km10+100 to	Right side– sea	Moderately elevated (<20 m

Km10+300	Left side of road – open grassland grading to savannah, with church above road	asl); road cut on rocky slope; eroding slope
Km10+300 to Km11+200	Right side of road is beach with beach vegetation, mostly thorny mesquite ; Maximum distance of beach from road is 60 m but beach tapers westward; Left side of road is brushland, with short woody plants – mostly mesquite; Dili waste water treatment ponds less than 20 m from road	Low elevation (<5 m asl); coastal plain
Km11+200 to Km13+300	Right side – sea Left side rocky slope, grassland grading into savannah above the road	Road along the slope of Point Acollo (headland), moderately elevated (<20masl); road cut on rocky slope; with sea wall /- retaining wall in some portions
Km13+300 to Km 15+400	Right side of road mudflat with fishponds with patches of mangrove; Left side of road, coastal flatland dominated by woody beach vegetation (<i>Prosopis Pallida</i>) and palms (<i>Borassus flabilifer</i> ;) . With small clusters of houses.	Low elevation (<5 m asl); mudflat and coastal flatland
Km15+500 to Km16+100	Headland vegetation is savannah type, open grassland with trees. Small mangrove patch along the coastline	Low elevation, road rounding a small headland
Km16+100 to Km16+500	Sparse coastal vegetation on the beach and mudflat; savannah vegetation on the hills; hotel atop a hill next to the road	Very low elevation; narrow beach and mudflat
Km16+500 to Km17+000	Savannah type vegetation on the hill, small mangrove patch along the coast; small oil terminal with jetty.	Low elevation; road at the foot of the hill slope on a narrow beach
Km17+000 to Km17+600	Open savannah type vegetation on the hill; ,	Road traversing footslope of a small headland, low elevation
Km17+800 to Km20+100	Dominant beach vegetation, including palms and brush beach vegetation; mangrove along the coast; bare areas; scattered houses; fishponds and salt beds present;	Very low elevation; mudflat
Km20+100 to Km22+300	Vegetation consist of shrubs and open spaces; savannah vegetation on the hills; scattered houses	Low elevation, road traversing two small embayments with alternating headland and small narrow beaches.
Km 22+300 to Km27+600	Bare areas with scattered houses; palms and beach vegetation;. patches of mangrove Savannah vegetation with bare grounds ; Km 26+000; rock quarry and concrete plant; with scattered houses	Very low elevation; narrow beach
Km27+600 to Km28+800	Grassland, with beach vegetation mostly brush and shrubs with settlements	Very low elevation, floodplains of Moraeloa River
Km28+800 to Km29+400	Bare grounds with grassland and sparse shrubs.	Very low elevation, narrow coastal plain
Km29+400 to Km30+000	Point Pilila mostly covered by savannah type vegetation community	Low elevation, road rounding a headland called Point Pilila, rocky coastal
Km30+000 to Km31+400	Natural land cover includes woody coastal vegetation and palms with planted fruit bearing trees; large tract of	Very low elevation, relatively wide coastal plain

	land between road and beach fenced off, future site of Eastern Petroleum facility	
Km 31+400 to end of sub-project	Built-up with mixture of settlements and commercial spaces along the road;	Low elevation (<80 m asl), town of Liquica built on the merging floodplains of Gularloa River and Fanalaoa River

The locations of the chainage can be approximated from the following maps:



Plate 4 The alignment of A03-01 and A03-02 with the stationing.

3.2.2 Faunal Wildlife

One comprehensive report on the present status of terrestrial ecosystem including birds and other fauna is the report of Trainor et al. (2008) of Birdlife and this is used as the main reference for this section of the IEE.

Timor Leste is a part of Wallacea Zoogeographic Region, i.e. island is situated east of the Wallace line. This region is characterized by the biodiversity of Southeast Asia with certain elements of Australian continent. The data on wildlife and protected areas is still in the process of evolution. Up to date information on species, their population, locations of habitat is still a subject of research. In last decade some endemic species have been identified by the researchers, but it is presumed that the country has already lost most of its wildlife and birdlife.

About 224 species of birds have been recorded in Timor-Leste; out of which seven species and two genera are endemic to the island. Most of the birds and larger mammal species native to Timor Leste are arboreal and majority of these species are dependent on closed canopy tropical forest.

Terrestrial fauna of Timor-Leste is poorly known with recent surveys discovering new species of bats, frogs, geckos, and skinks, but the available evidence indicates that there are high levels of endemism in all faunal groups. While roughly half of the bird fauna originates from Southeast Asia and half from Australasia, the mammal, amphibian and reptile faunas are dominated by Southeast Asian families and species. At least 52 mammal species occur in Timor-Leste, mostly small and mobile species, since large and conspicuous mammals of continental South-East Asia have been hunted to the brink of extinction or have been unable to colonise this remote island. Bats are the best represented group in Timor-Leste with at least 34 species, including 12 species of fruit-bats. The group of mammals includes rats, mice and shrews, both native and introduced. The only marsupial found on the island is the Common Spotted Cuscus. The only primate present on the island is the long tailed macaque, and several domesticated species have been introduced in the process of human settlement. There are 15-20 amphibian species and 40 or more reptilians in Timor-Leste. Salt water crocodile is present in the coastal zone of Timor-Leste.

Trainor et al. (2009) have identified important bird areas in Timor-Leste. The most important bird area is the Nino Konis Santana National Park, at the eastern end of Timor Leste, the first protected area of the country. These bird areas are shown in Figure 10.

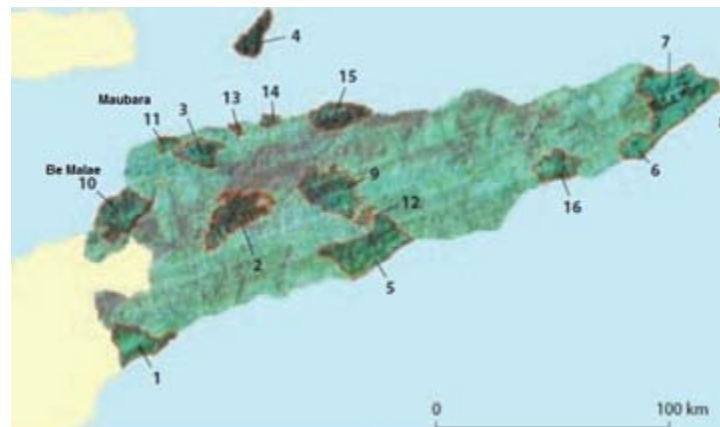


Figure 12 Important bird areas of Timor-Leste (after Trainor, et al., 2009)

Along the route of A03-01, the identified important bird area is Tasi Tolu Lake. Birdlife (<http://www.birdlife.org/datazone/userfiles/file/IBAs/AsiaCntryPDFs/Timor-Leste.pdf>) has identified Tasi Tolu Lake as an important bird since it supports several restricted range species of the Timor and Wetar Endemic Bird Area.



Plate 5. Saline Tasi Tolu Lake and savannah type vegetation cover of surrounding slopes (photo by Colin Trainor)

3.2.3 Terrestrial Biodiversity Conservation

Timor-Leste is still in the process of developing its conservation legislation and it has acceded to international conventions. The country acceded to the Convention on Biological Diversity (CBD) on 10 October 2006, and became a Party to the Convention on 8 January 2007. It also acceded to the Convention to Combat Desertification (CCD) in 2003 and ratified the Framework Convention on Climate Change (FCCC) in 2006.

UN regulation (UNTAET Regulation No. 2000/19) was passed in 2000 and declared 15 'Protected Wild Areas'. The National Directorate for Forestry under the Ministry for Agriculture, Forestry and Fisheries (MAFF) has prepared a list of a total of 30 protected areas (Status March 2009), which include the 15 existing 'Protected Wild Areas' (see Table 4.8 below). All protected areas are in various stages of biological assessment and planning. Most of the areas have not yet been systematically surveyed due to the GoTL's lack of personnel and funds. Formal boundaries have not been established. The issues of land ownership remain unresolved, which means the 15 'Protected Wild Areas' are not consistently recognized in land use planning.

Under UNTAET Regulation No.2000/19 hunting is prohibited, but it is noted that it is still a common means of food collection throughout the island. UNTAET Regulation No. 2000/19 also protects a number of marine and bird species. Nevertheless it is also observed that trading in wild birds and in marine tortoise carapaces occur especially around Dili.

However, these areas are likely to be managed in a way to allow activities in accordance with laws and tradition by local communities, such as a) the harvesting of non-forest products, b) the selective grazing of animals, c) the use of non-endangered animals and plants for religious and cultural ceremonies, d) the traditional hunting of non-endangered species and e) the traditional cutting of trees at elevations below 2000 meters, provided it is done in a sustainable manner and without the use of machinery.

3.2.4 Coastal Ecosystem

The coastline within the sub-project area consists of an alternation of mangrove forests, sandy beaches, rocky outcrops, coastal ridges, mudflats and saline marsh.

Mangroves are especially important since they have been assigned legal protection in Timor-Leste. Mangroves occupy approximately 7,500 acres along the coastline of Timor-Leste. On the north coast (within the PIA), they tend to form small communities at the mouths of streams and in marshy land. Seventeen (17) species of mangrove and mangrove associated species have been identified in Timor-Leste.

Some of the mangroves in the northwestern coastline of Timor-Leste, particularly in Tibar, have been cleared and converted to fishponds and salt beds. The following photos show status of mangrove in parts of the northwestern coastline.



Plate 6 Remnants of mangroves (*Rhizophora sp*) along the coastline of the route of A03-01. Extensive clearing of mangrove has occurred for conversion to fishpond (right photo) and salt production.

3.2.5 Marine Ecosystem

3.2.6 Coral Reefs

Timor-Leste is among those places on the planet, which has the highest coral species diversity. There are over 500 species of coral reported from the sea around Timor-Leste (Source: Veron and Stafford-Smith 2000). Timor requires a 500 m exclusion zone around any coral reef or intertidal shoal. A series of surveys conducted in Indonesian waters between 1990 and 1998 (Burke et al. 2002) determined that the ecology and health of coral reefs is in excellent condition, which means live coral covers of over 50%. Burke et al. (2002) also identified a number of coral reefs along the Timor Leste coast, which are considered to be at medium to high risk of impact from any activity along the coastline, coastal development projects, marine pollution, sedimentation, overfishing and destructive fishing.

The presence of fringing reef along the shoreline of Tibar is indicated in the topographic map. A headland near the boundary of Tibar and Dili in fact is a known as a scuba diving area. However there is no description of the general status of the coral reefs in this area.

3.2.7 Seagrass

Seagrass beds are noted to be present along the northern coasts of Timor-Leste. Currently, there is no information available as to its presence within the project impact area. It has been mentioned that a study has been done by the Griffith University but results has not yet been published.

3.2.8 Fisheries

FAO (2009) reported that small-scale coastal fisheries dominate the fisheries sector and are restricted to a relatively narrow area along the coastline. The small-scale nature of fishing operations means that fishing is no more than a supplementary activity for coastal communities, where inhabitants derive their livelihood from a variety of activities. It is estimated that fishing is the main source of livelihood only for about 20 percent of coastal fishers.

Among the more common reef fish landed in Timor Leste include Serranidae (groupers), Scaridae (parrotfish), and Lutjanidae (snappers). Local fishery officers reported that along the North coast small pelagics and small reef fish dominate. This is a consequence of the fact that the majority of fishing operations is carried out in very shallow waters near the beach. Fishing gears used are gill nets, fish traps, hook and line, crab pot and spear gun. Some of the reef fishes and mollusk caught along the northwestern coastal waters are shown in the following photo collage.



Plate 7 Some of the reef associated fish species and mollusc caught in the northwestern part of Timor-Leste (photo shows snappers, parrot fish, sweet lips, needle fish, rabbitfish, etc)

3.3 Social Cultural and Economic Setting

3.3.1 Human & Economic Development

Population and Economics

In 2008, the population of Timor-Leste was estimated to be 1,080,742 (based on Census 2004 projection) with an annual population growth rate (2001-2004) of 5.3%. The median age was 18.3 years with a life expectancy at birth of 55.5 years, well below the average for East Asian and Pacific Island countries. On average seven children per woman are born, which presents a very high fertility rate (2004 census).

The population is predominately rural, working in agriculture, fishing and forestry (78%). Timor Leste has one of the least developed economies in the region. The UNDP Human Development Index places Timor-Leste in the low human development category, ranking 167 among 191 countries. According to the 2001 Timor Leste Living Standard Survey, 40 percent of the population is estimated to live below the national poverty line of US\$ 15.44 per month. Based on the visual estimates of the international specialist during site visits, it appears that the incidence of poverty is much higher in the rural settlements within the PIA.

Road link A03-01 traverses the sub-districts of Dom Aleixo (Dili) and Bazartete (Liquica). The populations of these two sub-districts as of 2010 are as follows:

Table 5 Population of the districts of Dili and Liquica

District	Sub-district	Population
Dili	Dom Aleixo	105,328
Liquica	Bazartete	23,171

3.3.2 Agricultural Development

Most of the beneficiaries in the project target area are rural subsistence farmers who obtain a small amount of income by selling cash crops such as coffee, vegetables and fruits. In the districts through which the project road is traversing about 78% of the population is engaged in the agriculture, fishing or forestry sector. Vendors along the project road are a common sight. Local resident trade their produce for cash with locals and the travelling public in make shift shelters or small market places built by the government. These markets are neither getting impacted by the

planned activity for the project road nor do they pose any impact on the planned repair, restoration and bituminous overlay of the project road. The agricultural development is weak due to absolute dependence on monsoons, an inequitable land tenure system, lack of educated/trained farm workers and training for farmers.

3.3.3 Industrial Development

There are no major industries in the A03-01 route. Small size of domestic market, low purchasing power of the local population, relatively high wages compared to Indonesia, and high transport costs are constraints to industrial development.

3.3.4 Infrastructure

The physical infrastructure of Timor Leste is in most areas insufficient to support adequate economic and social development. In late 1999, about 70% of the physical and economic infrastructure of Timor Leste was laid waste by Indonesian troops and anti-independence militias, and 260,000 people fled westward. Over the succeeding three years, a massive international program, led to substantial reconstruction in both urban and rural areas. Growth, however, was held back in 2003 by extensive drought and the gradual winding down of the international presence.

Currently the country is facing great challenges in rebuilding its infrastructure, strengthening its civil administration, and generating jobs for young people. The road infrastructure is a constraint for the delivery of agricultural products to the main markets. There is as yet little infrastructure to support tourism and virtually there is no industry in the country. Since roads provide the dominant form of transportation, the lack of a serviceable road infrastructure contributes significantly to the incidence of poverty.

3.3.5 Ethnic and Cultural Diversity

In Timor-Leste, ethnic association is associated with language. There are 17 languages spoken across the country which are of quite independent linguistic origin. Broadly the languages of Timor are derived from one or two broad language groups; Austronesian (Malay-Polynesian) and Papuan (Melanesian). It is clear from the constitution and national vision statement that in developing the new nation, the government has ensured that any differences existing between Timorese people due to language, religion, ethnicity would be respected, valued would be preserved within the framework for establishing equal and universal rights for all Timorese.

3.3.6 Poverty Levels

Timor-Leste is one of the poorest countries in the world. Currently, it is estimated that 88 percent of Timor-Leste's population is poor, and 46 percent are very poor. More than 40% of the population is reported to live below the national poverty line of \$ 0.55 per day. The electrification ratio for all households is only 20%, in rural areas, 95 % of the households are without electricity. About 48% of the population does not have access to safe drinking water supply, and 69% does not have access to adequate sanitation facilities.

It has been envisaged that the improvement of the project road would benefit approximately about 58,000 persons. Indirectly, the population affected could be much larger, since the project road eventually leads to the capital Dili.

Poverty Analysis in the Project Area of Road A03-01

Timor-Leste is one of the poorest countries in the world. Currently, it is estimated that 88 percent of Timor-Leste's population is poor, and 46 percent are very poor. More than 40% of the population is reported to live below the national poverty line of \$ 0.55 per day. The electrification ratio for all households is only 20%, in rural areas, 95 % of the households are without electricity. About 48% of the population does not have access to safe drinking water supply, and 69% does not have access to adequate sanitation facilities.

Being located on the outskirts of the country's capital city, the poverty situation around the Dili section of Road A03-01 is better than around the section in Liquica district. According to TLSLS 2007, the poverty incidence in Dili is 43.3% whereas the same at the national level is 49.9% . Other measures of poverty are also better than the national figures which includes a poverty depth of 9.8% (whereas national poverty depth is 13.6%) and poverty severity 3.1% (whereas national poverty severity is 5.1%). With a population of 234,331, Dili accounts for 21.97% of the total population of the country, while Liquica having a population of 63,329 accounts for 6.94%. The poverty situation along the segment of the road falling in Liquica district is much worse than that of Dili district. Poverty incidence in Liquica is 44.9%, and the District accounts for 6.1% of the total poor

3.3.7 Education and Health

Based on the 2004 census, 54% of the population is illiterate, among the 15-24 year olds illiteracy climbs up to 73%. Currently, about a third of children are not enrolled in primary school and about 20% of the enrolled children do not attend classes. Access to health care and medical services is flimsy. Only 27% of all births in the country are attended by skilled health care personnel. Infant mortality (per 1,000 live births) is 98; Under Five mortality (per 1,000 births) is 136. Malnutrition is a serious problem for children under five years of age. The ratio of a qualified medical doctor is less than 1 in 1000.

3.3.8 Land Tenure

About 25% of the land tenure out of 200,000 land parcels in the country is formally registered. The vast majority of land parcels have been held by traditional landowners, mostly communities defined as 'origin groups' (equivalent to indigenous people in other countries). Origin groups define themselves as first possessors of certain areas of land and have authority over land in most parts of Timor Leste. Within the system of origin group authority there are highly individuated rights to land. Residential, garden and plantation plots are 'owned' by families rather than the group itself and remain under family control. The first land law of Timor Leste was promulgated in March 2003 via 'Law No.1/2003', which has been designed to serve as an umbrella law or the rest of the land and property regime. There are specific laws and guidelines concerning details of land acquisition and compensation.

While studying the legal system of the country it has been noted that the legal foundation for the right-of-way (ROW) for roads has not been established in Timor-Leste. When road works require additional land, the GoTL negotiates with the owners or users on case-to-case basis. According to usual practice, when land acquisition is required for project development, concerned parties under the direction of the local authorities will negotiate and reach an agreement on compensation rates, total compensation amount, and the procedures or mechanism for compensation and transfer. A preliminary draft of a new land law is currently on limited circulation within the Government.

3.3.9 Archaeological, Historical and Cultural Sites

Presently, the Government of Timor-Leste has not issued an official record or listing of historical and archaeological sites in Timor-Leste. There are colonial structures in Liquica established by the Portuguese in the 17th century but are not officially designated as heritage structures (see following photographs). The presence of other historical or archaeological sites along the A03-02 route is unknown at the moment.



Plate 8 Turn of the century structures in the District of Liquica

4. SCREENING OF POTENTIAL IMPACTS AND MITIGATING MEASURES

4.1 Introduction

This impact assessment and mitigating measures covers the entire cycle of the sub-project, from pre-construction to construction and operation and maintenance. The coverage of each of this sub-project phases is defined as follows:

- **Design-Preconstruction Phase**, the period before the actual construction starts (section 4.4.2). Certain safeguard requirements need to be complied with in order to allow the Contractor to implement the project.
- **Construction Phase**, the period from the time that the 'Notice to Proceed' is given to the Contractor until the issuing of the 'Certificate of Completion',
- **Operation and Maintenance Phase**, the period starting with the issuing of the 'Certificate of Completion' issued by the DOW until the end of the 20-years life time of the subproject.

The initial screening of this project was done by the MoI in 2009. The MoI (2009) report recognizes that the significance of environmental impacts of this road repair and rehabilitation project is dependent on the type and scale of the intended intervention as well as the sensitivity of the project or impact area. Road sector interventions may have direct physical impacts on sensitive environmental sites. They may infringe into natural resources such as forests, mangroves, wetlands, coral reefs, seagrass or protected areas if carried out within or adjacent to these areas. In addition, improved roads in particular are also known to facilitate access to sensitive areas previously protected by no or difficult access. These indirect impacts are experienced after construction and need to be considered in the environmental assessment process. Physical conditions such as topography, slope gradient, geological stability and rainfall intensity play an important role in determining sensitivity issues that can affect both the surrounding environment and road infrastructure investments. By combining scale and environmental sensitivity aspects of the subproject, a clearer prediction of the significance of environmental impacts can be given. For instance, a larger subproject in an area of low environmental sensitivity may have overall a less significant impact than a small subproject in a highly sensitive environment. A combination of these two criteria in a matrix or other format will better indicate the potential significance or severity of environmental impacts. The *magnitude of change* arising from the implementation of the proposed subproject can be rated as negligible, small, intermediate or large.

The key feature of the project that mitigates the overall adverse impact is the fact that the project will be confined within the existing road alignment and that existing ROW can accommodate the proposed carriageway widening. Work will consist of widening of carriageway, repair of pavement, shoulder, drainage and slope stabilization. Given these types of works, activities in any particular section of the sub-project shall be of short duration. Thus, the prescribed planned road improvement activities described are considered negligible, small or intermediate.

In addition, specific to this sub-project, the screening of the potential impacts was done using the ADB's rapid environment assessment checklist. Subsequently, the review of the existing condition prevailing along the alignment allowed the identification at a detailed level, the sensitive receptors such as important ecologic features and the location of human settlements. These areas within the sub-project alignment shall be given special attention with respect to environmental management.

4.1.1 Impact Due to Location and Design

a. Possible Impacts on Ecologically Sensitive Areas

Based on the gross classification of the predominant land cover of the sub-project alignment of dry tropical forest (single / sparse / mixed species) it can be said that the project will traverse an ecologically sensitive area. However, the natural land use within the 200 meter corridor on both sides of the roads is dominated by settlements and cultivated areas. Besides the road has been in existence for a long period of time and it can be expected that the ecosystem within the sub-project

corridor has long adapted to the presence of road and the changes attendant to it. Under these conditions, the road rehabilitation activities are not expected to have direct impacts on the forest.

But one possible source of adverse impact on the forest within the project corridor is encroachment by construction workers for collection of wood for fuel and other wildlife. Photo below shows the road side condition along the route. Dwellings interspersed among cultivated lands and coastal vegetation.



Plate 9 A03-01 route in Tibar traversing the mudflat. Vegetation alongside the road is mostly *Prosopis pallida*, a mesquite tree commonly found in coastal areas

In addition, the scale of the proposed rehabilitation and temporary nature of the works is not expected to generate significant adverse environmental impact, provided that an environmental management plan is prepared and properly implemented.

The proximity of certain road sections to the shoreline makes the coasts, fishponds and mangroves (Km13+300 to Km15+400; Km19+700 to Km20+300; and Km22+000 to Km23+200) susceptible to the impacts associated with the proposed rehabilitation. The section of the coastline that could be vulnerable to the sub-project's impacts is from Tasi Tolu Lake, the fringing reefs and reef flats from Tibar to Mota Ikun as well as the patches of mangroves. Status of the fringing reef is unknown at the moment. The following map shows the 200 m envelope (red line) of direct impact area and the identified sensitive ecological receptors such as Lake Tasi Tolu, coral reef and mangrove.



Figure 13 Coastal and Nearshore Ecologically Sensitive Receptors along the route of A03-01 & A03-02

b. Impacts Due to Design

The proposed work on the sample road A03-01 and A03-02 will involve widening of the road (carriage) and provision of shoulder (variable width). Since existing width of the ROW of A03-01 along most of its length is almost 8 meters, there will be no acquisition of new land required. For A03-02 section, widening will be done where it is feasible. There will be no widening where structures are present and when the land is privately owned.

Other possible sources of adverse environmental impacts off site during this stage of the sub-project are the siting of quarries, locations of asphalt mix plants and waste disposal sites. This is assuming that the Contractor will opt not to source materials from existing licensed quarries and asphalt mix supplier.

4.1.2 Possible Impacts due to Construction

a. Impacts on Air Quality

Impact on air pollution along the sub-project alignment is a concern in the section of the road from start to about KM1.9 which is within the urban area of Dili and at the end of A03-01. Fugitive dust can cause nuisance to residents in these areas. This is a concern in Km6+858 to Km8+700, Km14+000, Km18+200 to Km19+500; Km28+000 to Km28+700; Km31+000 to Km31+600; Km32+200 to end of the sub-project. The sub-project activities that may cause fugitive dust are enumerated in the following table.

Table 6 Possible sources of fugitive dust during rehabilitation of A03 01 & A03-02

Activities	Areas Where Activities will Take Place
Hauling and delivery of construction materials	All sections of the sub-project
Earthworks, excavation	All sections of the sub-project
Removal of old asphalt layer	Selected areas along the project where full restoration is to be done
Slope trimming	Km11+660; Km12+240; Km 12+400; Km15+800; Km17+052.95; Km17+263.87;
Quarry Operations	Off site
Operations of Asphalt Hot Mix Plant	Off site

Of the possible sources of fugitive dust listed in the preceding table, quarry operations maybe the most important source. The road rehabilitation work is generally intermittent and not permanent in a specific site, the works move along the sub-project road as work progresses. Quarrying on the other hand may operate continuously for longer times in a specific site. But quarrying site can be selected and it can be placed in an area where it can cause the least impact on human and ecologic receptors. The same conditions apply to the operations of the asphalt hot mix plant.

Any new quarry sites and asphalt mixing plant shall be the subject of separate environmental application under the responsibility of the contractor. These facilities will have site specific impacts which can only be assessed after site candidate sites have been selected.

Aside from residents of the sub-project corridor, the workers themselves are also exposed to health hazards of ultrafine suspended particulate matter (occupational hazard).

b. Impacts on Noise

Noise during the rehabilitation work will mostly come from the operations of construction equipment. Typical noise signatures of the different equipment for different construction activities

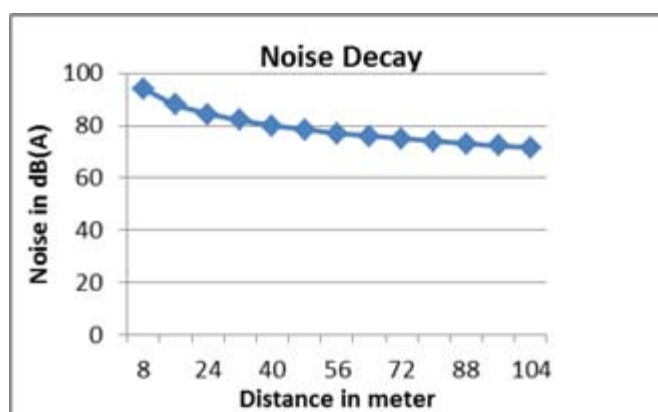
are enumerated below. The noise levels are dependent on the model and the maintenance status of the equipment.

Table 7 Noise signatures of the different construction equipment used for various construction works

Site Clearing		Excavation & Earth Moving		Structure Construction	
Equipment	Noise Level	Equipment	Noise Level	Equipment	Noise Level
Bulldozer	80	Bulldozer	80	Pneumatic tool	81-98
Front end Loader	72-80	Backhoe	72-93	Crane	75-77
Dump Truck	83-94	Dump Truck	83-94	Welding Machine	71-82
Grading & Compacting		Jack Hammer	80-93	Concrete Mixer	74-88
Grader	80-93	Landscaping & Clean Up		Concrete Pump	81-84
Roller	73-75	Bulldozer	80	Concrete Vibrator	76
Paving		Excavator	72-93	Air compressor	74-87
Paver	86-88	Truck	83-94	Bulldozer	80
Truck	83-94	Paver	86-88	Cement and dump trucks	83-94
Tamper	74-77				

Construction noise can be a nuisance to residents living along the road. Noise attenuation based on the doubling distance rule as shown in the following graph shows that residents living next to the road will occasionally be exposed to high noise levels if no mitigation measures are implemented.

Figure 14 Noise decay based on the doubling distance rule



The GoTL standard for ambient noise has adopted the IFC noise guideline which is presented in the following table.

Impacts of noise nuisance to communities along the road if no mitigations are implemented will be intermittent and of short duration.

Table 8 IFC noise guidelines (IFC, 2007)

Receptor	One Hour L_{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational ⁵⁵	55	45
Industrial; commercial	70	70

Noise is a concern in the following sections of the road: Km6+858 to Km8+700, Km14+000, Km18+200 to Km19+500; Km28+000 to Km28+700; Km31+000 to Km31+600; Km32+200 to end of the sub-project.

c. Impacts on Geology and Topography

The proposed rehabilitation works may have some impacts on slope stability, particularly during slope stabilization. Clearing of the slopes may hasten erosion and downslope movement of unstable materials. This can cause smothering of vegetation downslope and introduce unstable talus material which can be easily eroded to the coastline. The magnitude of this impact is moderate considering the length of the road section that is susceptible to this impact. Without intervention, this impact can linger until slope has naturally stabilize by vegetation growth or attrition.

The sections of the road where slope trimming will take place are Km11+660; Km12+240; Km 12+400; Km15+800; Km17+052.95; Km17+263.87

d. Impacts on Water Quality

The proposed rehabilitation work is not expected to affect water resources of the sub-project area. It can however, have the ability to affect quality of the water during the construction stage. The water bodies within the 200 m corridor that could be susceptible to pollution due to construction are Lake Tasi Tolu, intertidal channels and coastal waters where the road alignment is very close to the shore. The specific locations are listed in the following table

Stations / Chainage	Water Bodies Susceptible to Impacts
a. Km09+000 to Km23+000 b. Km25+000 to Km27+400	Coastal water, where road on the mudflat, around headlands, over beach and near shoreline.
c. Km28+600	Moraeloa River
d. Km29+400 to Km30+000	Coastal water
e. Km32+200	Fanaloa River
f. Km34+000	Gularloa River

Bare areas such as quarry, slopes that are being worked and unprotected spoils bank and aggregate stockpiles can be sources of silt. However, for rivers with very high sedimentation rate and in coastal waters where the major rivers drain into, silt contribution from work areas during rainy season can be insignificant compared to background levels. Based on this assessment, this impact is assessed to be low and of short term duration. It will persist only during the construction work.

The other possible source of water pollution is spillage of fuel and lubricant. But considering that the work will only be rehabilitation, it will be using relatively fewer construction equipment and vehicles compared with new road construction, hence it is assessed that this impact is low and temporary.

Wastewater from construction camp is another possible source of water pollution.

Based on the preceding discussion, indicators that might be used in monitoring impacts of the sub-project and the effectiveness of the mitigating measures is visual inspection of presence of spoils near water bodies and presence of turbidity in the water.

e. Impacts Due to Disposal of Solid Wastes

The rehabilitation and repair work shall generate solid wastes which include domestic wastes from the construction camp, construction waste materials, packaging materials. It may also include waste materials tainted with hazardous materials such as lubricant, solvents, etc. Improper disposal of these wastes can cause environmental health hazards and impairment of the aesthetic quality of the natural environment.

f. Impacts on Social, Cultural and Economics

In as much as the project is rehabilitation of the existing road only, it does not have the social, economic and community life concerns that are associated with new road construction, this road improvement project is 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. Road construction 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.

g. Temporary Employment

The community along the alignment of sub-project will have opportunities for temporary employment during construction. .Albeit, this opportunity is temporary in nature, this will be beneficial for Dili and Liquica Districts. But efforts will have to be made so that this positive benefit can be enhanced. Labour force maybe available but may not have the skills necessary for construction, thus, programs need to be emplaced to train these people. Also, the residents of the sub-project area should have priority in employment.

On the other hand, temporary employment opportunities offered by the sub-project may divert part of the labour force from agriculture. This could be a concern in Liquica where unemployment rate is very low (0.3%).

h. HIV/AIDS and General Health and Safety

Among the possible adverse socio-cultural impacts of the project are increased alcohol consumption and risk of exposure to STIs and HIV have been identified.

The risk of spread of STIs and HIV associated with the project is a function of a number of factors including (i) existing knowledge about the risk; (ii) the length of time large and relatively mobile populations will be located in the subproject areas; (iii) engagement in high-risk behaviors (such as increased alcohol consumption and multiple partners etc); and, (iv) improved access and mobility especially that associated with cross-border travel. The knowledge surrounding routes of transmission and prevention of STIs and HIV in the beneficiary population is low.

i. Trafficking

The project is further prone to human trafficking and children exploitation. During project construction there will be opportunities to target those most vulnerable to trafficking with benefits such as job opportunities with construction work. In addition, women and children are vulnerable to being trafficked from rural areas or from camps for internally displaced persons to Dili with lures of employment and then forced into commercial sexual exploitation. Mitigating theses risks include: i) Assessment of the how project activities could affect migration patterns and provide opportunities for traffickers to become active in the area; ii) The incorporation of awareness messages into Project components already addressing community impact issues, and codes of conduct for construction workers that raise concerns about service/sex workers and child prostitution can also be a means to address some trafficking issues; and iii) Awareness messages for service/sex workers and construction workers can be combined with antitrafficking and safe migration messages

j. Cultural Heritage

There is as yet no official listing of historical and archaeological sites in Timor-Leste, although the government has plans to undertake a survey. The known historically significant site along the route is the Tasi Tolu Peace Park and no significant impacts associated with this sub-project are anticipated on this historical site.

k. Traffic Safety

The public will be exposed to traffic hazard during the rehabilitation of the roads. For one, the sub-project vehicles mostly trucks will temporarily increase the volume of road traffic. This impact will be significant when the rehabilitation work is being done in populated areas. School children going to and from school will be among those exposed to this hazard. Commuters will also be affected,

since the work will be done on an existing road, existing traffic will be affected. Delays and diversion of traffic to alternate routes may occur during the rehabilitation work. The areas along the project corridor where this impact can be significant is section of the road that passes through the densely built-up parts of Dili and Liquica. A03-01 in Dili passes through a mixture of commercial and residential areas and there is relatively higher volume of pedestrian.

I. Occupational Hazards Due to Wildlife

Presence of saltwater crocodile in the coastal zone of Timor-Leste poses possible threats to the construction workers. The UN Integrated Mission for Timor-Leste has issued a report on crocodile sightings and attacks around Timor-Leste. The locations of the sightings and reported attack are shown in the following map. Workers have to be reminded and should be given safety guidelines on how to minimize exposure to this hazard.

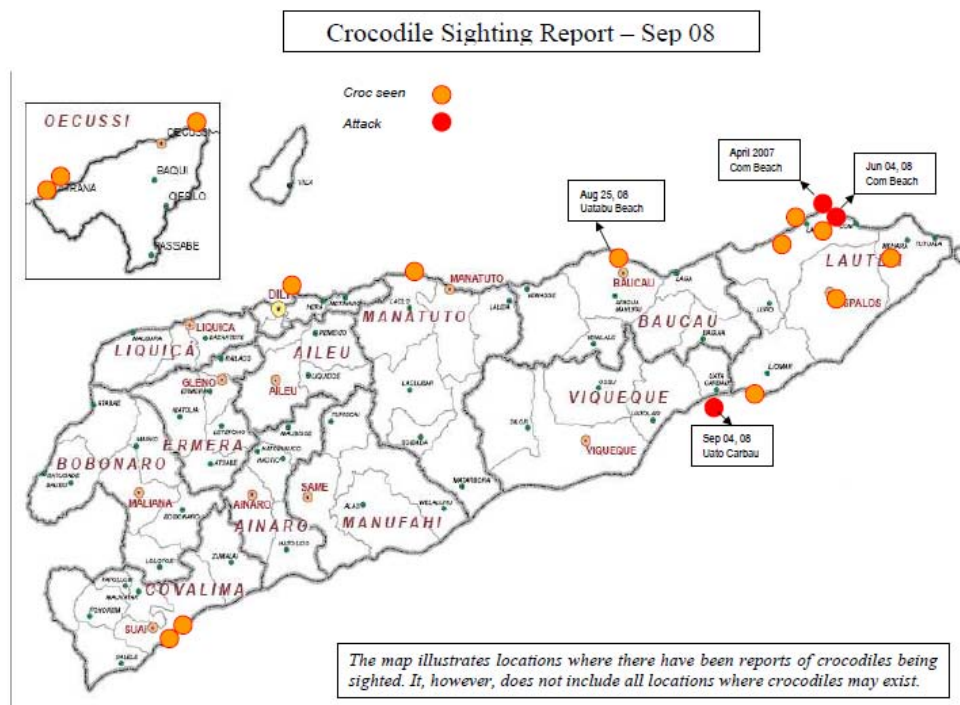


Figure 15 Location of sightings of salt water crocodile in Timor-Leste (after UNIMTL, 2008)

m. Post Construction Impacts

The absence of post-construction environmental management can result to negative impacts such as discarded construction materials and wastes bare borrow sites, untended stockpiles of construction materials and spoils etc. These can give rise to unsafe driving conditions, safety threats to pedestrians and impaired aesthetics among others.

4.1.3 Impacts Due to Operations

The most significant impact of the sub-project is public safety. The planned widening of the carriageway to 6 meters is expected to increase road safety. On the other hand, there is also a possibility that once the road is improved, vehicles will travel much faster and if local drivers ignore the traffic safety rules, it can have serious implication on traffic safety. Also, communities traversed by the sub-project road will also be exposed to traffic hazards, but considering the low volume of vehicles, the impact is rated low.

No significant impact is expected from routine maintenance. Routine maintenance for small roads such as A03-01 and A03-02 will entail activities such as grading, grass cutting, drain clearing, pothole patching and shoulder repairs, which are performed at regular intervals. Periodic maintenance activities are typically scheduled over periods of several years and include resurfacing and bridge 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.

4.2 Mitigating Measure

4.2.1 Impacts due to Project Location

a. Possible Impacts on Ecologically Sensitive Areas

The forests and mangrove within the project corridor need to be protected from incursions and collection of wildlife by construction workers. The Contractor should prohibit workers from collecting wildlife (plants and animals) and firewood from the forest and mangroves. But since this is allowed by GoTL regulations as part of traditional practices, workers should follow the existing GoTL guidelines for harvesting and use of wild resources. This prohibition should be part of the induction of the construction workers.

To protect the coastal and marine habitats within the sub-project corridor, including protection of water bodies from pollution due to sub-project activities, restrictions are imposed as part of the protection of water bodies from pollution (see Section 4.2.4, c.)

b. Impacts due to Design

Anticipated impacts due to design are not directly associated with the design of the road since the sub-project will be implemented within the existing ROW. The two possible sources of impacts, off-site impacts at that are quarry site development and operation, siting of asphalt mix plants and waste disposal sites, should the Contractor opt not to use existing quarries or asphalt mix suppliers.

It will be necessary to conduct a separate survey during the detail design stage to locate suitable quarry and disposal sites. It may be necessary for the construction contractor to do fairly extensive site preparation (for example, construction of retaining walls and drainage facilities). These requirements will have to be presented by the contractor. To select and manage quarries appropriately the long-term impacts of quarrying and gravel extraction should be assessed and mitigated. The contractor may select the quarry site and will need to secure PMU approval of the site. In addition, the Contractor should secure environmental permit from GoTL and comply with ADB environment and safeguards policies prior to quarrying.

The quarry management plans should address:

- the areas to be quarried and the removal sequence;
- the channel and bank stability in the area to be quarried;
- methods which will be used to protect the channel banks, avoid causing discontinuities in the bed, and minimize erosion impacts upstream and sediment loading problems downstream of the quarry site

It is worthwhile noting that rivers along the alignment are experiencing very high rates of sedimentation causing river beds to aggrade and channels to migrate away from the existing channels. Thus, with proper planning, river bed quarrying is not expected to cause significant adverse impacts.

4.2.2 Mitigation of Impacts During Construction

a. Impacts on Air Quality – Dust

Fugitive dust can be a significant concern particularly in sections where houses are located along the road. To protect the residents, the Contractors shall observe and apply the listed dust suppression methods when working in sections Km6+858 to Km8+700, Km14+000, Km18+200 to

Km19+500; Km28+000 to Km28+700; Km31+000 to Km31+600; Km32+200 to end of the sub-project:

- Spray water on exposed surfaces during dry periods
- Wet quarry loads or road fill loads being carried in open trucks
- Construction materials and spoils shall be covered when being transported.
- Siting of stockpiles area and asphalt mix plant away from residential area.
- Borrow sites and bare areas shall be rehabilitated as soon as possible
- In case of unpaved roads near settlements, speed limit shall be imposed on haulers and other vehicles of Contractors.

b. Impacts on Community Noise

Noise mitigation should be implemented in the following sections of the road: Km6+858 to Km8+700, Km14+000, Km18+200 to Km19+500; Km28+000 to Km28+700; Km31+000 to Km31+600; Km32+200 to end of the sub-project Noise associated with construction can be mitigated in a number of ways. The following table presents the measures to mitigate construction noise as well protect workers from occupational hazards of noise. .

Table 9 Mitigating measures for construction noise in populated areas.

Means of Reducing Noise	Specific examples
Substitute process or equipment with one with lower noise levels	Use of new equipment, well maintained equipment, e.g. new power generators; use of vibratory or hydraulic pile driver
Eliminate or minimize noise at source	Install mufflers; retrofit old equipment; operate equipment according to manufacturer's specifications; damp noisy or vibrating parts, equipment; maintain equipment properly
Increase distance between source and receptor	Doubling distance from source reduces noise by as much as 6dB, depending on site condition, e.g. soft or hard ground
Timing of Activities	Construction /operations of heavy equipment should be limited to daylight hours.
Isolate or enclose process or operator	Use noise enclosures, noise barriers; minimize leaks in barriers; use of equipment with operator enclosures / cab; Noise enclosures should have density of 10kg/m ²
Change work practices	Limit time of use of noisy equipment; rotate use among workers; provide breaks from noisy work place; turn off equipment when not in use; For public protection, avoid operating at night.
Promote occupational health and safety in work places	OHS briefing regularly; provide PPEs;

Equipment that will be deployed to the project shall be inspected to ensure that these are fitted with noise mufflers and properly maintained. The contractor shall indicate in the Construction Plan the current maintenance record of the construction equipment.

c. Impacts on Geology - Erosion and Sedimentation

Erosion problems are mainly connected to the effects of water and weak geological stability. To reduce erosion the objective is to minimize the amount of materials and sediment lost from the site. The proper application of mitigation measures will ensure that impacts are minor and temporary. Measures to achieve these objectives in each project are:

- 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.

- Re-vegetate slopes after construction activity is completed by applying bioengineering solutions where appropriate.
- Rehabilitation of landslide sites and areas with obvious erosion problems as shown above to prevent further damage and repair existing ones.

d. Impacts on Water Quality

To protect water resources within the project area the following measures shall be implemented:

- Contractor shall observe proper management of fuel, lubricants and liquid waste. There shall be no disposal of wastewater in water bodies. Fuel and oil depot shall be provided with impervious flooring, oil water separator sump as per Guideline No 7 (draft?). Liquid waste shall be collected on site and disposed in the GoTL approved liquid waste disposal facility in Tibar (near the Dili-Liquica boundary).
- Construction camps should be provided with sanitation facilities and septic tanks;
- Spoils from slope trimming shall not be pushed into the slopes. Spoils shall be hauled to a stockpile yard or final disposal site.

In addition to the above, the following restrictions shall be observed to prevent pollution of water bodies during the rehabilitation works. These are also intended to protect the beaches which are among the tourism resources of Timor-Leste. The restrictions on the rivers are also aimed at minimizing the risks of the project from avulsion (river channel migration).

Table 10 Restrictions for the protection of water bodies

Stations / Chainage	Water Bodies Susceptible to Impacts	Restrictions / Mitigations
a. Km09+000 to Km23+000 b. Km25+000 to Km27+400 c. Km29+400 to Km30+000	Coastal water, where road on the mudflat, around headlands, over beach and near shoreline.	There shall be no disposal of construction wastes, no stockpiling of construction materials, fuel storage or construction camp between the road and the shoreline
c. Km28+600	Moraeloa River	No stockpiling, fuel storage, construction camp within 50 meter of the active river channel and migrating channels.
e. Km32+200	Fanaloa River	
f. Km34+000	Gularloa River	

e. Impacts due to disposal of solid wastes

All construction wastes, including domestic waste from construct camp shall be collected and disposed of in an approved waste disposal site such as the Tibar waste disposal site. The contractor shall orient workers regarding proper waste management during the induction of workers.

f. Impacts on Socio Cultural and Economic

To maximize the community's benefits the following measures are recommended.

- As part of the continuing community consultation and public disclosure, advise the local community of project plans in advance of construction, and involve them in planning, as necessary.
- Avoid or minimize disturbances near living areas when possible.
- Control run-off and manage sediments near garden and plantation areas.
- Give priority for the hiring of people from the host communities and provide training to those without skills on road construction
- Include women and other community groups in project activities, particularly environmental monitoring. Conduct orientation and training on the EMP so the local community can become effective partners in EMP implementation and monitoring.

g. Temporary Employment Benefit

The opportunity of temporary employment with the sub-project is one of the benefits being anticipated by the host communities. This has consistently been expressed during the various public consultations conducted. For the purpose of this sub-project, the priority communities shall be the sucos traversed by the sub-project. Screening and hiring of local workers from the host sucos shall be done through the District administrators and suco chiefs. Hiring from other sucos shall be done if skills required are not present in the host community.

h. HIV/AIDS and General Health and Safety

General Health and Safety Awareness for construction workers will include:

- Introduction to health and safety issues 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
- Access to construction camps will be controlled and access restrictions for non-construction personnel will be applied.
- Housecleaning and waste management requirements
- Use of Personal Protection Equipment (PPE)
- Sanctions for violation of rules and regulations

i. Trafficking

- Ensuring inclusion of clauses requiring compliance with the labor code and no use of trafficked or child labor;
- Ensuring most marginalized (and at risk from trafficking) are part of Project construction workforce;
- Providing direct employment opportunities during project construction; Implementation of CEC including providing range of vocational skills

j. Cultural Heritage

The term cultural heritage refers to sites, structures and remains of archaeological, historical, religious, cultural and aesthetic value. Its identification and examination by specialists is helpful in understanding the significance of a site, according to its aesthetic, historic, scientific and social value. The construction of roads may endanger this heritage, but it may also lead to the discovery of new sites.

The possibility for the project to affect such cultural sites will be unlikely, since the Project will be road rehabilitation within the existing alignment. However, in the case that a cultural heritage site will be identified during the construction, the following steps will be taken to minimize adverse impacts and avoid conflicts with local communities:

1. Upon the discovery of a ceremonial site or burial ground, the Contractor will cease work and notify the PMU or implementation support consulting engineer and try to avoid any impacts on the sites;
2. If this seems difficult, the Contractor, together with PMU or implementation support consulting engineer, will discuss and negotiate a suitable arrangements with the communities; the objective should be to minimize the impacts, and preferably move the ceremonial site/burial ground to a nearby location; The relevant Provincial and/or National authorities will be notified prior to starting the works.
3. If no agreement can be reached, the relevant Provincial and/or National authorities on these issues should be consulted, and the ADB be notified. A joint team of the Authorities, PMU or implementation support consulting engineer, and the Contractor will discuss with the communities to solve the issues. Only after a

satisfactory agreement has been formally reached the Contractor will be allowed to continue the construction at the concerned site.

k. Traffic Safety

Road accidents have a substantial impact on the community environment and may be reduced or increased as a result of road improvement projects. Measures and design alternatives, which may be considered for dealing with other environmental impacts, could also affect road safety.

The PMU will ensure that all safety related aspects of the operations, as integrated into the project design, will be carried out. Suggested measures to ensure maximum safety of construction personnel and local residents are (primary category, monitored daily):

- Ensure that all occupational health and safety requirements are in place on construction sites in work camps.
- Install lights and cautionary signs in hazardous areas.
- Establish footpaths and pull-off bays along roads; through villages; and near markets, schools, and other community facilities.
- Include safety instructions for the construction activities in the contract documents
- Ensure sufficient visibility along the road section according to standard specifications

l. Occupational Hazards Due to Wildlife

Laborers shall be given an orientation on how to avoid and minimize this hazard. Survey of construction camp shall be done to determine presence of salt water crocodile.

m. Post construction Impacts Mitigation

- Clear roadsides of piles of construction materials, construction wastes, equipment, etc.
- Contain all stores waste and dispose in approved sites;
- During site cleanup, remediate oil stained soils
- Dispose all inorganic solid waste in an approved disposal area. This includes paper used in bitumen spraying.
- Remove all disabled machinery from the project area.
- Compost all green or organic wastes or use as animal food
- Rehabilitate borrow sites, stockpiles area.

4.2.3 Contingency Preparedness

A contingency plan should be prepared and implemented by the Contractor as part of the site management. The environment, health and safety officer should be designated and shall be in charge of the implementation of contingency plan. . The contingency plan should cover: Personnel Emergency; Facility / construction site contingency; and Natural disasters. Personnel emergency includes accidents and injuries involving the construction workers. The personnel contingency plan shall include the designation on site of an emergency first responder, provision on each of the construction sites of a first aid station and medical evacuation plan.

Facilities / construction site contingency includes fire, structural failures, explosions, major environmental accidents such as massive spills of hazardous materials, etc. The contingency plan for facilities emergency should include prevention measures, orientation and awareness of workers, emergency response plan, contact details of emergency responders e.g. police, fire station, search and rescue, medical evacuation, program for emergency drills.

Preparedness for natural disasters is another part of the contingency plan. Flooding is one of the major natural disasters that can occur in certain sections of A03-01 and a plan should be crafted and implemented to protect lives, properties and equipment during flooding events.

4.2.4 Mitigation of Impacts During Operations and Maintenance

a. Public Safety

Along sections of roads where there is pedestrian traffic within and between settlements, or between settlements and gardens, footpaths and let down points for public transport vehicles and other roads, road safety features will be included as an essential requirement in the design for road upgrading projects.

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

- Measures to slow traffic; e.g. install speed bump at selected places (e.g. settlements, schools, markets, etc)
- Off-road let down stops for public transport.
- Dust suppression sealing.
- Improvements in road signage and pavement markings.
- Attention to road accident blind spots.

b. Rehabilitation and Maintenance Practices

Routine maintenance refers to activities such as grading, grass cutting, drain clearing, pothole patching and shoulder repairs, which are performed at regular intervals. Periodic maintenance activities are typically scheduled over periods of several years and include resurfacing and bridge 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.

Adequate regular maintenance is also good for the environment. Timely maintenance action helps in reducing environmental impacts like erosion flooding, road accidents and traffic noise. This Subproject aims at rehabilitating roads to maintainable standards, which is environmentally beneficial during operations provided routine maintenance are timely and properly implemented.

c. Noise Control

Noise originating from roads cannot be considered a major concern, as traffic volumes are generally low. However, at certain locations it is unavoidable that residents living very near the road will be affected by the nuisance of traffic noise.

5. PUBLIC CONSULTATIONS AND INFORMATION DISCLOSURE

5.1 Past Public Consultations

Public consultation is a continuing process for the duration of the sub-project implementation. This is to ensure transparency and to ensure that public concerns that might arise in the course of the rehabilitation works for A03-01 are adequately addressed

The first public consultations done during the early part of the project is the consultation held at the ADB-World Bank Conference Room on April 30, 2009. Over 40 participants from various departments of the Government of Timor-Leste, international and national NGO members, officers from international development agencies and some District Administrators attended the workshop. The participants were actively involved in discussions related to poverty reduction, the Project's goals and environmental issues.

In addition the following government agencies have been consulted:

- i. Ministry of Economy and Development, Directorate of Environmental Services (DoE), to obtain information on the Institutional Laws and Guidelines applied in road rehabilitation and improvement projects;
- ii. Ministry of Agriculture, Fisheries and Forestry (MAFF), Division of Forestry, Directorate for Protected Areas and National Parks, to obtain information on environmental Protected Areas and other sensitive environmental resources, including ALGIS, the government's GIS data center;
- iii. Ministry of Transport, Communication and Public Works, Division of Road, Bridges and Flood Control, to discuss the capabilities of that agency to manage the environmental requirements of the Project.
- iv. Ministry of Finances (MoF), Assets and Property Advisor
- v. UNDP Poverty Reduction and Environment Unit, Sustainable Land Management (SLM) Project and Climate Change Unit

As opportunity arose, local stakeholders were consulted and informed before and during the field visits to proposed Project roads. They stated that road deteriorations are mainly caused by poor drainage maintenance and too few culverts and bridges and expressed their interest to be further consulted during the design and implementation. From the government sector, officers from the Ministry of Economy and Development, Directorate of Environmental Services (DoE) on central and district level and the Ministry of Agriculture, Fisheries and Forestry (MAFF), Division of Forestry, Directorate for Protected Areas and National Parks should be included in this process. During the TA phase, data sharing was also initiated with these agencies and ALGIS, the government's central GIS data processing center.

5.2 Public Consultations for Updated IEE

During the course of the preparation of this IEE, informal consultation with people residing within the subproject alignment was carried out. The meeting was attended by 17 residents of a community in Maubara, the international environmental specialist and the national environmental specialist.

The key elements in the public opinion are:

- i. There is a general sense of disappointment due to poor state of road.
- ii. Public is in favor of repair, restoration and bituminous overlay of the project road.
- iii. Fugitive dust originating from the poorly maintained road pavement is an issue of concern.
- iv. Rash and negligence driving habit of public transport vehicle operated by private owners is an issue of concern.

- v. Employment generated by the contract would be welcomed by certain weaker section of the society.
- vi. Almost everyone would like to conserve environment, therefore avenue plantation within the right of way (ROW) and forestation in the project impact area is welcomed.
- vii. An action to check landslides and sedimentation in the rivers and streams would be appreciated.

Government and institutions are major stakeholders within the PIA, therefore a series of meetings and discussions were conducted by the international specialist (in association with the national specialist) with various ministries and national directorates across the government establishment. Some discussion and meetings were also organised with the NGOs based in Timor Leste.

Focus of discussion with each of the institutions is structured around the overlapping issues in their jurisdiction and the proposed repair, restoration and bituminous overlay of the project road. The broader issues covering the discussion are presented in Table 20.

Table 11 Focus of Discussions with Institutional Stakeholders

S.No.	Institutions	Area of Discussion
1	National Directorate of Environmental Services; Ministry of Economy and Development	(i) Statutory guidance; (ii) Legislations and acts; (iii) Requirements for acceptance of environmental documents/Environmental Clearance; (iv) Monitoring process
2	Directorate of Forestry; Ministry of Agriculture, Fisheries and Forestry (MAFF)	(i) Avenue Plantation in ROW and (ii) Forestation in the PIA; (iii) Plantation in River Catchments; (iv) Requirements for conducting forestation/plantation
3	Department of Biodiversity; Ministry of Agriculture, Fisheries and Forestry (MAFF),	(i) Protected Area; (ii) Wildlife Conservation; and (iii) Requirements of 'No Objection' for the Project
4	Directorate of Livestock; Ministry of Agriculture, Fisheries and Forestry (MAFF)	(i) Issues of Cattle Crossings; (ii) Road Traffic and Livestock Conflicts; (iii) Requirements
5	Agriculture Land and Geographic Information System; Ministry of Agriculture, Fisheries and Forestry (MAFF)	(i) Agricultural Land use; (ii) Agro-climatology data and its recording procedure
6	Water Quality Testing Laboratory; Ministry of Infrastructure	(i) Visit to the laboratory; (ii) Assessment of the available testing facility; (iii) General Overview of surface water quality and ground water quality
7	Directorate of Meteorology	Meteorological data its recording procedure and visit to the observatory

In this process of institutional consultation two NGO's were also contacted and a discussion was organized with one of the most prominent NGO in environment sector the 'Haburas Foundation'.

Subsequent public consultations were also undertaken in June 2011. This included a new visit to the office of the Haburas Foundation for a meeting with its Executive Director Mr. Demetrio Carvalho. Mr. Carvalho updated the environmental consultant on the status of biodiversity conservation in Timor-Leste. He also provided information on the historical values of the Peace Park and the Maubara Lake.

An attempt to organize a formal consultation in the District of Liquica on 29 June 2011 was made. The consultation was coordinated with the District Administrator's office. Perhaps another attempt will be made in the near future.

In addition to the formal consultation, an informal interview was carried out. The public consultation was conducted on 23 May 2011 in the Comoro Suco sub district of Dom Aleixo, Dili District. The respondents are people who live along the roadside including those from São Miguel School and the suco chief. The survey was directed towards securing village level information on waste management, natural hazards, water supply and presence of cultural sites in the area.

It was gathered from the respondents that there is no solid waste management plan in their community. Domestic waste water in Dili is discharged into septic tanks and then discharged into the ditches since there is no sewerage system in Dili. But there are households who avail of services of the sewerage services of Rural Water and Sanitation which pumps the septic tanks for disposal in the wastewater treatment facility in Tibar.

The hazards recognized in their community are flooding, erosion and landslides.

It was also gathered from the respondents that they are not aware of any cultural sites in their community.

The respondents have signified their support for the project and are looking forward to the temporary employment opportunities that will be offered by the sub-project.

5.3 Public Disclosure

As part of the public disclosure process, ADB, during project implementation, will post on its website the Final IEE and the Environmental Monitoring Reports submitted by implementing / Executing Agencies upon receipt. This is to allow the affected people, the other stakeholders, and the general public to provide meaningful inputs into the project design and implementation

6. GRIEVANCE REDRESS MECHANISM

Some of the sections of the Dili-Tibar-Liquica road traverse populated areas. While an EMP has been prepared, it is possible that there could be instances of inadequate implementation of the the EMP. Such situations might result to disturbance and nuisance to the people residing along the road or people using the road during the rehabilitation works. To provide the affected people a direct access to the project authorities to lodge their complaints and have their grievances redressed within the appropriate time, the project shall set up a grievance redress mechanism that will be implemented throughout the rehabilitation period.

A complaint registry shall be set up in the field office of the contractor and people shall be informed of its presence. The registry shall accept complaints on environmental safeguards issues during the rehabilitation works. The complaints received shall be listed in the registry with the name of the complainant and the date of receipt. The Environment Specialist of the PISC shall review the nature of the complaint and ascertain that it is environment related. The PISC shall then direct the Contractor for the necessary action. In case no satisfactory action has been taken by the Contractor, the complainant can report to the PMU. For this purpose, the PMU shall assign a complaint desk in its office to receive such complaints. The PMU shall coordinate with the PISC to address the complaint.

The complaints received and the corresponding actions taken will form part of the environmental monitoring report submitted to ADB.

7. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

7.1 Environmental Impact Mitigation and Monitoring

7.1.1 Environmental Mitigation

The environmental management plan presents the mitigation measures, the monitoring plan, and institutional arrangements for implementation of the rehabilitation of road sections A03-01 to A03-02. The particular sections of the EMP shall be appended to the Tender Documents for the Contractor's compliance.

Most of the mitigation measures are fairly standard methods of minimizing disturbance, minimizing threats to the safety to population and enhancing the socio-economic benefits during construction to communities along the sub-project road alignment.

Monitoring of the mitigation measures will entail site inspections, interview of roadside residents as well as checking of reports, plans, records and other aspects. During the construction, the dust and noise must not cause nuisance or disturbance to the communities along the road sections being worked on. Exceedance as observed by the PISC environmental specialist or complained by affected people shall be addressed immediately. The PISC environment specialist shall inform the PISC Construction Supervisor of the exceedance who in turn shall be responsible for instructing the Contractor to take corrective action.

Incidents of exceedance and corresponding corrective measures taken shall be reported by the Contractor and shall be included in the regular reporting to MoI and ADB.

In addition, ADB can conduct environmental safeguard review missions at any time, even during pre-construction and construction. On those missions ADB monitors the progress towards implementing the EMP.

7.1.2 Environmental Monitoring

The environmental monitoring for the pre-construction and construction stages of the project is presented in the following sections with the detailed monitoring plan in Table 13.

Pre – Construction

- Ocular baseline survey
- Review of Contractor's guidelines / IEC for Workers, for protection of sensitive ecological systems, health and safety, waste management
- Review of Construction Plan, particularly for sites of stockpile, staging area, construction camp; environmental provisions for construction camp
- Site inspection of quarry site and asphalt mix plant if Contractor will operate its own; inspection of government permits to operate the facilities (including environmental permit

Construction Stage - Regular Monitoring

Visual monitoring using the monitoring checklist prepared by MoI in the 2009 IEE (**Attachment 4**) shall be implemented as part of regular monitoring. In addition to the road works, quarry sites, asphalt hot mix plant, spoils stockpile area, waste disposal area shall also be subject to visual inspection by the PMU, PISC and DoE. The monitoring shall be conducted as follows:

- Air quality – Dust and Noise

Site inspection shall be done at least once a week by the PISC environment specialist using the checklist (Attachment 4). In addition, interview of residents living along the road should be interviewed for any complaints regarding noise and dust nuisance due to the project.

- Water Quality

Water bodies subject to monitoring are Lake Tasi Tolu,, coastal waters and the perennial streams along the alignment. The coastal waters to be monitored are those which are 100 m or less from

the road section that is being worked on. Monitoring shall include inspection of water for sign of siltation, location of stockpiles and other activities near water bodies.

- Social- Cultural Impacts

The socio-cultural impacts monitoring shall cover impacts on community benefits, temporary employment benefits, HIV/AIDS and general health and safety, trafficking, public safety, heritage and cultural impacts.

Details of the monitoring plan are presented in **Table 13**.

Table 12 Environmental Mitigation Plan

Potential Environmental Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
Pre-Construction			
Encroachment into the forest and mangroves by workers to collect firewood and wildlife	Specific prohibitions on collection of wildlife and firewood in the forest and mangrove should be imposed on the construction workers	Implementation by Contractor; Prohibition to be included in IEC for Workers and shall be disseminated during induction of workers	PISC to monitor the content of Contractor's IEC
Impacts on coastal habitats e.g. fishponds, mangroves, reef flats	No stockpiling of waste and construction materials, no construction camp and fuel depot between the road and shoreline in the following road sections Km09+000 to Km23+000 Km25+000 to Km27+400 Km29+400 to Km30+000	For implementation by the Contractor. Contractor to indicate in Construction plan location of stockpiles, construction camp, fuel depot etc.	PISC to check construction plan and verify location of the mentioned facilities during implementation.
Off-site impacts due to quarrying, operations of asphalt mixing plant and disposal sites	Preferred that Contractors source materials from existing licenses suppliers and government approved facilities, if not: .Contractor will have to select sites, conduct surveys, submit sites for approval by PMU; secure environmental permits and comply with ADB safeguards policies	For implementation by the Contractor.	PISC to check Construction Plan, PMU's approval and compliance with government requirements for opening up new quarry, disposal sites and asphalt mixing plant.
Construction Stage			
Nuisance due to fugitive dust in populated areas	Contractors shall observe and apply the listed dust suppression methods when working in sections Km6+858 to Km8+700, Km14+000, Km18+200 to Km19+500; Km28+000 to Km28+700; Km31+000 to Km31+600; Km32+200 to end of the sub-project: <ul style="list-style-type: none"> ▪ Spray water on exposed surfaces during dry periods ▪ Wet quarry loads or road fill loads being carried in open trucks 	Implementation by the Contractor	Ocular inspection of PISC of work sites and interview of roadside residents as part of environmental monitoring; Review of Complaints registry

Potential Environmental Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	<ul style="list-style-type: none"> ▪ Construction materials and spoils shall be covered when being transported. ▪ Siting of stockpiles area and asphalt mix plant away from residential area. ▪ Borrow sites and bare areas shall be rehabilitated as soon as possible ▪ In case of unpaved roads near settlements, speed limit shall be imposed on haulers and other vehicles of Contractors. 		
Increased Noise due to operations of construction equipment	<p>Mitigations have to be implemented in the following sections of the road: Km6+858 to Km8+700, Km14+000, Km18+200 to Km19+500; Km28+000 to Km28+700; Km31+000 to Km31+600; Km32+200 to end of the sub-project</p> <p>Mitigation measures include</p> <ul style="list-style-type: none"> • Use of newer more quiet equipment • Installation of mufflers in equipment and regular maintenance of equipment; • Time the operation of noisy equipment only during daylight hours; • Enclose noise sources or place noise source (e.g. air compressor) far from the houses; • Protect workers from high noise by rotating the use of equipment among workers and use of PPE 	Implementation by Contractor;	Monitoring by PISC through site inspection of the road sections identified to have human communities; Interview of road side residents; Review of the Complaints Registry
Impacts on Geologic processes – increased rates of erosion & sedimentation	<p>Areas susceptible are the following road sections where slope trimming will be carried out” Km11+660; Km12+240; Km 12+400; Km15+800; Km17+052.95; Km17+263.87</p> <ul style="list-style-type: none"> ▪ Reduce the time surfaces remain bare. ▪ Keep vegetation clearing to a minimum. ▪ Avoid disturbance on steep slopes. 	For implementation by the Contractor	Review of Construction Plan by PISC and ocular inspection of work sites

Potential Environmental Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	<ul style="list-style-type: none"> ▪ Construct necessary temporary/permanent control structures. ▪ Re-vegetate slopes after construction activity is completed by applying bioengineering solutions where appropriate. ▪ Rehabilitation of landslide sites and areas with obvious erosion problems as shown above to prevent further damage and repair existing ones; ▪ Complete work during dry season 		
Impacts on surface water bodies – pollution due to construction associated activities-	<p>No disposal of construction wastes, no stockpiling of construction materials, fuel storage or construction camp between the road and the shoreline in the following sections:</p> <ul style="list-style-type: none"> • Km09+000 to Km23+000 • Km25+000 to Km27+400 • Km29+400 to Km30+000 <p>No stockpiling, fuel storage, construction camp within 50 meter of the active river channel and migrating channels.</p> <ul style="list-style-type: none"> • Km28+600 – Moraeloa River • Km32+200 Fanaloa River • Km34+000 – Gularloa River 	Implementation by Contractor	Review by PISC of construction plan submitted by Contractor by PISC
Impacts due to disposal of solid wastes	Contractor shall implement a solid waste management plan. Wastes shall be disposed of in the Tibar waste disposal facility.	For implementation by Contractor. Contractor to submit waste management plan as part of the Construction Plan	PISC to review waste management plan
Impacts on Socio-cultural and economics	<p>To maximize the community's benefits the following measures are recommended.</p> <ul style="list-style-type: none"> ▪ As part of the continuing community consultation and public disclosure, advise the local community of project plans in 	For implementation by Contractor	PISC to conduct visual monitoring of work sites and conduct interviews of road side residents; Contractor to include in regular

Potential Environmental Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	<p>advance of construction, and involve them in planning, as necessary.</p> <ul style="list-style-type: none"> ▪ Avoid or minimize disturbances near living areas when possible. ▪ Control run-off and manage sediments near garden and plantation areas. ▪ Give priority for the hiring of people from the host communities and provide training to those without skills on road construction ▪ Include women and other community groups in project activities, particularly environmental monitoring. Conduct orientation and training on the EMP so the local community can become effective partners in EMP implementation and monitoring <p>Damage caused by Contractor on private properties, community facilities shall be immediately repaired and compensated by the Contractor if needed.</p>		reporting to PISC/PMU the distribution of workers according to domicile.
Temporary employment opportunities for members of host communities	For the purpose of this sub-project, the priority communities shall be the sucos traversed by the sub-project. Screening and hiring of local workers from the host sucos shall be done through the District administrators and suco chiefs. Hiring from other sucos shall be done if skills required are not present in the host community.	For Implementation by Contractor;	Monitoring of hired workers, by PISC. Contractor to submit as part of regular reporting, the distribution of workers by place of domicile
HIV/AIDS Risks and Health and Safety in General	<ul style="list-style-type: none"> ▪ Introduction to health and safety issues 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 	IEC for workers to be prepared and implemented by Contractor.. Written notices shall be posted and verbal reminders during induction of workers.	PISC to review IEC materials for workers submitted by Contractor.

Potential Environmental Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	<p>information on methods of transmission and protection measures</p> <ul style="list-style-type: none"> ▪ Prohibition of drugs ▪ Prohibition of alcohol on construction sites ▪ Access to construction camps will be controlled and access restrictions for non-construction personnel will be applied. ▪ Housecleaning and waste management requirements ▪ Use of Personal Protection Equipment (PPE) and processes for obtaining relevant PPE ▪ Sanctions for violation of rules and regulations 		
Trafficking	<p>Ensuring inclusion of clauses requiring compliance with the labor code and no use of trafficked or child labor;</p> <p>Ensuring most marginalized (and at risk from trafficking) are part of Project construction workforce;</p> <p>Providing direct employment opportunities during project construction; Implementation of CEC including providing range of vocational skills</p>	For implementation by Contractor.	Contractor to include in regular reporting any skills training and recruitment of workers conducted. Also, report the distribution of workers according to domicile. Report to be reviewed by PISC.
Impacts on Cultural Heritage	<p>Procedures to be followed in case of discovery of artifacts are:</p> <ul style="list-style-type: none"> (i) Cease operations and inform PISC (ii) Contractor and PMU negotiate with community (iii) If no agreement, PMU consults Provincial or National authorities, notify ADB. Joint team of authorities to negotiate with community; Work resumes only if there is satisfactory agreement 	For implementation by Contractor; Contractor shall instruct Foremen / supervisors of this protocol; Contractor to report to PISC discovery / encounter of artifacts / cultural & heritage sites.	PISC to review report
Traffic Safety	The PMU will ensure that all safety related aspects of the operations, as integrated into the project	Implementation by Contractor	PISC to review construction plan and conduct ocular

Potential Environmental Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	<p>design, will be carried out. Suggested measures to ensure maximum safety of construction personnel and local residents are:</p> <ul style="list-style-type: none"> ▪ Ensure that all occupational health and safety requirements are in place on construction sites in work camps. ▪ Install lights and cautionary signs in hazardous areas. ▪ Establish footpaths and pull-off bays along roads; through villages; and near markets, schools, and other community facilities. ▪ Include safety instructions for the construction activities in the contract documents ▪ Ensure sufficient visibility along the road section according to standard specifications 		inspections of
Occupational Hazards due to Wildlife	Laborers shall be given an orientation on how to avoid and minimize this hazard. Survey of construction camp shall be done to determine presence of salt water crocodile.	Implementation by Contractor; Orientation of workers to be done during induction;	To be included in IEC for workers; PISC to review IEC for workers
Post construction Impacts Mitigation	<ul style="list-style-type: none"> ▪ Clear roadsides of piles of construction materials, construction wastes, equipment, etc. ▪ Contain all stores waste and dispose in approved sites; ▪ During site cleanup, remediate oil stained soils ▪ Dispose all inorganic solid waste in an approved disposal area. This includes paper used in bitumen spraying. ▪ Remove all disabled machinery from the project area. 	To be implemented by Contractor as each road section is completed.	PISC to conduct ocular inspection of site.

Potential Environmental Impacts	Proposed Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation
	<ul style="list-style-type: none"> Compost all green or organic wastes or use as animal food Rehabilitate borrow sites, stockpiles area. 		
Operations Stages			
Public Safety	<p>Road safety features will be included as an essential requirement in the design for road upgrading projects.</p> <ul style="list-style-type: none"> Measures to slow traffic; e.g. install speed bump at selected places (e.g. settlements, schools, markets, etc) Off-road let down stops for public transport. Dust suppression sealing. Improvements in road signage and pavement markings. Attention to road accident blind spots 	To be addressed during detailed design	Part of construction cost
Rehabilitation and Maintenance - environmentally beneficial and makes road safe for travel,	Timely maintenance work.		

Table 13 Environmental Monitoring Plan

Work Stage	Mitigation Measure	Monitoring Required	Location	Frequency	Date Required	Completion Date	Responsibility
Pre Construction							
1.	Specific prohibitions on the construction workers particularly against encroachment of ecologically sensitive areas and collection	Review of the guidelines / IEC issued to workers; Assess awareness of laborers regarding	Contractor's field office and construction camp	Once prior to construction; Continuous monitoring of	Prior to construction Part of weekly monitoring		PISC EHSO/PISC

Work Stage	Mitigation Measure	Monitoring Required	Location	Frequency	Date Required	Completion Date	Responsibility
	of wildlife (plants and animals) and firewood.	guidelines / rules		compliance			
2.	Inspection of proposed quarry, borrow, disposal site, asphalt plant site	Ocular inspection; Issuance of government permits	Proposed sites	Once prior to approval of sites by PMU	Prior to start of work		PISC PMU and Contractor
3.	Protection of water bodies from pollution	Ocular inspection of work sites, camp site, quarry site, asphalt mix plant	Site	Once at the start and regular monitoring during operations	After camp, quarry, borrow pits, asphalt plant has been set up		PISC/PMU/ Contractor
4.	Establish baseline environmental condition	Visual inspection using checklist	Part of sample road where settlements are located; Quarry site, borrow pit, asphalt mix plant site,	Once prior to start of works	After selection of sites		PISC/PMU/
Construction Stage							
5.	Dust suppression and management of spoils and bare areas	Visual monitoring of sites and inspection of records of dust suppression activities	Active work sites where there are human communities	At least once a week			PISC/PMU
6.	Management of noise impact	Site inspection and interview of residents for complaints on project related nuisance	Same sites as air quality monitoring sites	At least once a week			PISC/PMU /EHSO

Work Stage	Mitigation Measure	Monitoring Required	Location	Frequency	Date Required	Completion Date	Responsibility
7.	Management of slope stabilization works to minimize erosion	Ocular inspection of work sites and monitoring with the use of a checklist	Slope stabilization work sites	At least weekly	During construction works		EHSO / PISC /PMU
8.	Protection of water bodies from pollution	Ocular inspection of work sites and monitoring with the use of a checklist	All water bodies where work is in progress	At least weekly	During construction works		EHSO / PISC /PMU
9.	Maximize benefits to beneficiary communities	Monitoring of compliance with guidelines, employment of locals, etc.	Work sites / contractor's office	Quarterly	During construction works		PISC / ESHO
10.	General Occupational Health and safety including HIV/AIDS awareness	Monitoring of implementation of awareness program; Laborers' compliance with health and safety guidelines Inspection of upkeep of camp and work area etc.	Contractor's field office, construction camp	At least weekly as part of the ocular inspection	During construction work		PISC / EHSO / PMU
11.	Prevention of trafficking	Review of the Contractor's policy towards hiring of trafficked individuals and other guidelines;	Contractor's field office	Once before start of construction and during construction period	During construction		PISC / EHSO / PMU
12.	Protection of cultural heritage	Assess awareness of workers on the guidelines in case of accidental find	Contractor's field office	At least once i.e. during induction of new laborers	During construction		PISC / EHSO / PMU
13.	Protection of workers from wildlife hazards through	Assess awareness of workers on guidelines	Contractor's	Once after induction of	During		EHSO / PMU /

Work Stage	Mitigation Measure	Monitoring Required	Location	Frequency	Date Required	Completion Date	Responsibility
	awareness	regarding avoidance of wildlife hazard	field office	new workers	construction		PISC
Operations Stage							
14.	Traffic Safety – Road safety features to be included in the rehabilitation	Inclusion of the safety features in the detailed design	PISC's office	Once after completion of detailed design	Prior to approval of the design		Detailed design consultant / PMU

7.1.3 Reporting Arrangement

a. Baseline Monitoring Report

The Baseline Monitoring Report will be submitted to MOI and ADB prior to the commencement of civil work MOI would forward a copy of this report to the National Directorate of Environmental Services.

b. Environmental Monitoring Reports

The quarterly environmental monitoring reports will include the: (i) environmental mitigation measures; (ii) environmental monitoring activities; (iii) details of monitoring data collection; (iv) analysis of monitoring results; (v) recommended mitigation measures; (vi) environmental, health and safety trainings conducted within that timeframe; and (vii) violations of environmental regulatory mechanism. The environmental monitoring reports will be submitted quarterly to the Ministry of Infrastructure and every six month to ADB throughout the construction stage and annually after completion of construction. MOI would forward a copy of this report to the National Directorate of Environmental Services.

c. Environmental Monitoring Report on Completion of the Project

Within one calendar year from the date of completion of the construction activity; the PMU will submit a 'Project Completion Environmental Monitoring Report' to the ADB, summarizing overall environmental impacts on the physical, ecological and socio-economic environment due to the new construction. At this stage, compliance with the recommendations of the EMP will be subject to review missions by the ADB, aside from the safeguard review missions that ADB conducts during the pre-construction to the construction period..

7.1.4 Responsibilities and Authorities for Implementation of Mitigation Measures and Monitoring Requirements

The agencies and organizations with authority and responsibilities for the implementation of mitigation measures and monitoring are summarized in the following table:

Table 14 The agencies and their respective responsibilities in the implementation of the EMP

Organization	Responsibilities
Ministry of Infrastructure (PMU)	<ul style="list-style-type: none"> Implementing agency Overall planning, management and monitoring of the environmental management Ensure that tender documents and civil works contracts include the project EMP (specific conditions) and specify requirement for preparation and implementation of construction EMP Ensure that environmental protection and mitigation measures proposed in the project MEP are incorporated into the detailed design and that the Project is implemented following GoT's environmental regulations and compliant with ADB's environmental and social safeguards policies; Ensure that all environmental protection and mitigation measures are carried in accordance with policies, regulations on environment and other relevant laws. Supervise the monitoring activities Responsible for reporting to the MoED and ADB (semi-annual basis) Based on the results of the EMP monitoring, identify environmental corrective actions and prepare a corrective action plan, as necessary for submission to ADB
Project Implementation Support Consultant (PISC)	<ul style="list-style-type: none"> Assist MoI/PMU in preparing tender documents and ensure that the EMP provisions are included in the tender documents and civil works contracts; Provide international environment specialists to undertake regular project monitoring and reporting based on EMP provisions Assist MoI in monitoring the implementation of mitigation measures and the environmental performance of contractors based on the EMP Incorporate in the environmental monitoring reports the results of environmental monitoring and undertake data analysis Assist MoI/PMU in environmental monitoring and in preparing monitoring reports for submission to ADB on a semi-annual basis

	<ul style="list-style-type: none"> Implement the capacity building/training program on environmental management contained in the IEE/EMP
General Contractor	<p>Main responsibilities include</p> <ul style="list-style-type: none"> construction works and implementation of the construction EMP Designate on site an Environment and Health and Safety Officer who will oversee the implementation of the construction mitigation measures; Ensure proper implementation of the mitigation measures Submit monthly reports to Mol regarding the status of the
Stakeholders-communities along the sub-project alignment and others	<ul style="list-style-type: none"> Monitor and assess the implementation of the mitigation measures and monitoring as proposed in the EMP Participate in public consultation so they can give their opinions regarding the implementation of the EMP; <p>Sucos along the road have been invited into public consultations represented by the suco chief, NGOs like the Lao Hamutuk and Haburas have participated in the earlier consultation. These stakeholders are expected to participate in future consultations during project implementation.</p>
Directorate of Environment/ MoED	GoTL's government agency tasked with the implementation and enforcement of environmental regulations and policies. Responsible for screening and issuing environmental permits to projects as well as monitoring compliance with environmental regulations.
ADB	<ul style="list-style-type: none"> Reviewing the IEE Disclosing reports over ADBs website (Responsibility of ADB Project Leader) Reviewing environmental clearances granted by GoTL Reviewing quarterly reports & taking necessary actions Monitoring EMP implementation and due diligence

The Ministry of Infrastructure (Mol) is the official Executing Agency (EA) for this project and will be responsible for the implementation and compliance with the EMP including the monitoring plan. The Directorate of Roads, Bridges, and Flood Control (DRBFC) will provide counterpart staff to participate in the Project Implementation, particularly the development and implementation of road maintenance program. The PMU will provide day-to-day project management of the Project, and on-the-job training to counterpart Mol staff on implementing road projects and road maintenance program.

Project Implementation Support Consultants (PISC) will be engaged to assist the PMU in subproject appraisal, detailed design, national contractor training, construction supervision, and performance monitoring.

The PMU's capability for social and environmental management will be enhanced with the engagement of national social and environmental specialists. These two national specialists will work closely with the international specialists they will closely liaise with the Engineers cum Environmental Officers (EEOs; Regional Engineer and District Supervisors) of Mol and the Environmental Impact Assessment (EIA) Unit and other relevant officers at the Directorate of Environmental Services (DoE). Construction contractors should also be required to retain environmental specialists to oversee compliance with their respective parts of the EMP and to serve as direct liaison to the international environmental specialist. The requirements to obtain the needed personnel and to comply with the EMP will be made part of the bidding documents.

7.1.5 Environmental Monitoring Data Management and Analysis

The environmental monitoring data will be stored and analyzed using a spreadsheet software like the Excel. This spreadsheet database can later be uploaded into a GIS based database to integrate the spatial and tabular databases for analysis and interpretation.

The basic analysis and interpretation of the monitoring data consists of the following steps:

- i. Assess the contractor's compliance with the environmental management plan;
- ii. Assess the environmental monitoring data by comparing with the environmental baseline and the appropriate standards;
- iii. Determine if there is exceedance or complaints. If there is, review if corrective action has been taken. Determine the need for follow-up testing / monitoring.
- iv. Present the monitoring data to the stakeholders during public consultations.

7.2 Capacity Building

Government of Timor-Leste is in its incipient stage of establishing its environmental regulations, standards and guidelines and at this stage it has legislated the law enforcing environmental permitting. The law sets the requirements and procedures for screening, scoping, conduct of EIA & IEE, review, issuance and monitoring. Having been legislated only in 2011, the DOE has had limited experience in enforcing it. The sub-projects under the RNSDP-TIM 0180 offer opportunities for the DoE gain experience in implementing Decree-Law No 5 provisions. The same holds true to validate and fine tune their environmental screening and permitting procedures and for project owners and developers to gain experience and better appreciation and understanding of the environmental impact assessment processes.

With respect to the implementing agency, the Ministry of Infrastructures, it is in the process of integrating social and environmental safeguards specialists within the organizational set up of the PMU. Since DoE and the PMU has limited environmental impact management capacity, designated staff members will be trained in environmental management and monitoring of this road project. Initially, an orientation on the EMP shall be conducted. The orientation shall be conducted by the PISC's international environmental specialist and shall cover, among others, the following topics:

- a. The basis for environmental management
 - The GoTL environmental regulation
 - ADB Environmental safeguards policies
- b. The EMP
 - Mitigation Measure
 - Monitoring Plan
- c. Collection of monitoring data
- d. Analysis and archiving

On the-job training and 'buddy' missions shall be carried out to train PMU and DoE staff members in environmental management, establish routine environmental monitoring protocols, and undertake periodic environmental monitoring and audit of construction works during implementation.

It is expected that PMU and DoE staff shall gain sufficient experience in monitoring the EMP implementation and assessing compliance.

7.3 Estimated Cost of Environmental Monitoring

The major expense in the implementation of the EMP (including environmental monitoring, public consultation and capability building) is remuneration of the PISC's international and national environmental specialists. The estimated cost for the EMP implementation of the A03-01 and A03-02 of the RNSD Project, Grant No. 0180-TIM is presented in the following table.

Table 15 Estimated cost of implementing the EMP

	Unit	No of Unit	Cost/Unit US\$	Total
a. Remuneration				
International Environment Sp	Manmonth	5	12,000.00	60,000.00
National Environment Sp.	Manmonth	10	3,500.00	35,000.00
b. Travel				
Perdiem International	Manmonth	5	3,600.00	18,000.00
Air Fare International	RT	5	2,000.00	10,000.00
Domestic Travel	Days	40	150.00	6,000.00
Total				129,000.00

8. FINDINGS AND RECOMMENDATIONS

Based on the initial environmental examination and screening of anticipated impacts over physical, ecological, and socio-economic environment; it is concluded that the proposed widening of carriage way, repair, restoration and bituminous overlay for A03-01 and A03-02 falls under Category B as per the categorization criterion of ADB and statutory guidance of Timor-Leste. The proposed activity is unlikely to result in significantly adverse environmental impacts of irreversible nature; most impacts would be of reversible nature, which would remain confined within the finite spatial limits of Project Influence Area (PIA) and would also likely to remain within a temporal limit of well-structured construction stage. Mitigation measures have been incorporated in the environmental management plan and the environmental monitoring plan.

The nature of the proposed activity and low volume of traffic on the project road, now or in the foreseeable future, further support the finding that there will be no significant indirect or induced impacts on the physical and ecological environment. Therefore the IEE for the project road complies with the ADB's environmental safeguard policies. Environmental Monitoring Plan given in the IEE provides sufficient guidance for the PMU to successfully monitor and report the environmental compliance throughout the project implementation period.

Despite the project road's alignment traversing through an ecologically sensitive area, signs of traffic-wildlife conflict are not apparent. Project road is neutral towards the Illegal logging and hunting; which are subject to policing, law and order. By maintaining the road in its existing lane configuration, long term adverse impacts on the forested areas, mangroves, and protected areas are not likely to arise; therefore no additional or special studies are needed at this stage.

Since the proposed strengthening and bituminous overlay do not involve additional land corridor, therefore the project would not involve displacement of people, therefore the project would also not involve process of resettlement and rehabilitation. The socio-economic benefit of the project on the resident population would be substantially beneficial.

The current limitations of doing environmental assessment and associated studies have to be recognized and considered in the planning and conduct of environmental studies. Among the limitation is the fact that environmental legislation is in its early stage of implementation and supporting legislations are yet to be enacted. Hence, preparation of environmental impact assessments during the transition period needs to be done in close consultation with the DoE. The other limitation is the lack of experienced national environmental specialists.

9. CONCLUSIONS

Based on the outcome of the screening process of anticipated environmental impacts conducted in this IEE, it is being concluded that proposed activity of widening, repair and restoration and bituminous overlay of sub-project road 'Dili –Tibar - Liquica (A03-01 and A03-02)' is not likely to cause any significant adverse environmental impact over a long time frame. The IEE confirms that this project should be designated as 'Category B'.

The nature of the planned activity, which is limited only to widening in selected areas, repair, restoration and bituminous overlay on the existing road, drainage repair and improvement, slope stabilization and road safety features coupled with the relatively low traffic volume, currently or in the foreseeable future, supports the conclusion that there will be no significant indirect or induced impacts from the sub-project. Adverse potential impacts are confined within the construction stage, towards which particular attention would be attributed to ensure that contractors comply with the EMP and good engineering practices.

10. LIST OF REFERENCES

- Dewi Kirono, 2010. Climate change in Timor Leste-a brief overview on future climate change projections. Prepared for Department of Climate Change and Energy Efficiency. National Research, Flagships, Climate Adoption, CSIRO
- ESCAP, 2003. Geology and Mineral Resources of Timor Leste, Atlas of Mineral Resources of the ESCAP Region, vol 17. Date accessed 01 April 2011
<http://www.unescap.org/esd/publications/AMRS17.pdf>
- FAO, 2009. National Fishery Sector Overview, Timor-Leste. Date accessed: 28 April 2011
http://www.fao.org/fishery/countrysector/FI-CP_TL/en
- Graham, C. and Powell, B. 2006. Situation analysis report – Timor-Leste, Australian Water Research Facility, International Water Centre. Date accessed, 04 April 2011
http://www.watercentre.org/resources/publications/reports/Costin%20-%20Powell%20-2006-%20Timor%20Leste%20Situation%20Analysis_FIN.pdf
- IFC 2007. Noise Management, Environmental, Health, and Safety (EHS) Guidelines General EHS Guidelines: Environmental. Date accessed 04 April 2011
[http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS_1-7/\\$FILE/1-7+Noise.pdf](http://www.ifc.org/ifcext/enviro.nsf/AttachmentsByTitle/gui_EHSGuidelines2007_GeneralEHS_1-7/$FILE/1-7+Noise.pdf)
- Ministry of Infrastructure 2009. Volume II Part B, Feasibility Study Road Section A03-3/4. Preparing the Road Network Development Project – TA 7100, prepared by Cardno Acil in association with KWK Consulting
- Ministry of Infrastructure 2009. Volume III , Initial Environmental Examination Road Section A03-3/4. Preparing the Road Network Development Project – TA 7100, prepared by Cardno Acil in association with KWK Consulting
- Sahat Lumban Tobing, 1989. Geology of East Timor, A Thesis submitted for Master of Science in Philosophy, University of London. Date accessed 01 April 2011
http://searg.rhul.ac.uk/FTP/tobing/Tobing_Sahat_MPhil.pdf
- Soetardjo, Untung, M. Arnold, E.P. Soetadi, R. Sulaiman, I and Kertapatic E. E. 1985. Series on Seismology, Vol V, Indonesia. Southeast Asian Association of Seismology and Earthquake Engineering (SEASEE)
- Trainor C.R. Santana, F, Pinto, P. Xavier, A.F. Saffor, R. and Grimmet R. 2008 Birds, birding and conservation in Timor-Leste *COUNTRY SPECIAL: TIMOR-LESTE BirdingASIA 9 (2008): 16–45*
- UN Integrated Mission in Timor Leste, 2008. Crocodile threat in Timor Leste, Joint Mission Analysis Center.
http://www.norway.or.id/NR/rdonlyres/DF8B6D1C4FCA4A4AAA43CDDC46A86909/101816/TimorLeste_CrocodileAssessment17Sep08.pdf
- World Bank, 2009. Timor Leste Country Environmental Assessment Sustainable Development Department East Asia and Pacific Region. Date accessed: 01 April 2011
<http://www.laohamutuk.org/econ/SDP/WBEnvironmentTLJuly09.pdf>
- WHO, 2005. WHO air quality guidelines for particulate matter, ozone, nitrogen dioxide, sulfur dioxide. Global Update. Date accessed, 03 April 2011
http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf

ATTACHMENT 1: COMPLETED APPLICATION FORM FOR ENVIRONMENTAL PERMIT

ATTACHMENT 2: RELEVANT ENVIRONMENTAL REGULATION OF GOTL

Legislation for Environmental and Natural Resource Management and Pertinent Institutional Responsibility			
Environmental Policy/ Act/ Legislation	Agency with Primary Responsibility	Responsible Ministry	Status of Legislation
Planning and Zoning			
Zoning and Landuse planning	Directorate of Land and Property (DTP)	Ministry of Justice	No exclusive law exists at the moment; nevertheless it is governed through the "Parliament Act No. 1 of 2003"
Development control	National Directorate of Local Development and Territorial Management	None Ministry of State Administration and Territorial Planning	No specific legislation; although the development may be subject to new legislation which is in draft stage. Division of Environment also has a stake through 'Guideline #1 on Environmental Requirements for Development Proposals'.
Building Control	Directorate for Roads, Bridges and Flood Control	Ministry of Infrastructure	None; however there is a Draft Regulation on Building Control – waiting for approval.
Environmental Impact Assessment	Directorate for Environment	Minister for Economic Development	<i>Decree-Law No 5/2011</i>
Pollution Control	Directorate for Environment	Minister for Economy and Development	Directorate of Environment's Guideline #5 on Prescribed Activities for Pollution Control; Guideline #7 on Storage of Fuel and Oil; and Guideline #8 on Ambient Noise from Stationary Sources. The proposal for preparation of Regulations on Pollution Control has been forwarded to the Council of Ministers.
Forestry and land-clearing			
Trees and Forest	National Directorate of Forests	Minister for Agriculture and Fisheries	National Forestry Programme and Policy Statement (Dec 2000) approved by the Minister for Agriculture in 2001; and UNTAET Reg. 2000/17, but `comprehensive legislation is required.
Biodiversity and protected natural areas			
Endangered species	National Directorate of Forests	Minister for Agriculture and Fisheries	UNTAET Reg. 2000/19, (interim only) permanent legislation required
Protected Wildlife Areas	National Directorate of Forests	Minister for Agriculture and Fisheries	UNTAET Reg. 2000/19, (interim only) permanent legislation required
Coral reefs and mangroves	National Directorate of Forests	Minister for Agriculture and Fisheries	UNTAET Reg. 2000/19, (interim only)

			permanent legislation required
Wetlands	National Directorate of Forests	Minister for Agriculture and Fisheries	UNTAET Reg. 2000/19, (interim only) permanent legislation required
Waste Management			
Solid waste (collection and transport)	Secretary of State of Electricity, Water and Urbanization and Local Government Bodies	Minister of Infrastructure	Not in existence at the moment; however funding proposal for a solid waste collection system has been drafted by Government of Democratic Republic of Timor Leste and adopt by UNDP which include funding for legislative drafting.
Solid Waste Disposal (site selection)	Directorate of Environment	Minister for Economy and Development	No specific legislation; but the Directorate of environment's Guideline #3 on Small Landfill Site Selection (Environmental); and Directorate of Environment's Guideline #4 on Interim Tibar Landfill Operations do exist
Sanitation	Secretary of State of Electricity, Water and Urbanization	Minister of Infrastructure	No specific legislation; but the Policy Document has been approved by the Cabinet and there is a Draft Regulations on Sanitation Control, which is awaiting approval of Parliament.
Hazardous Waste	Directorate of Environment	Minister for Economy and Development	No specific legislation, but Directorate of Environment has draft proposal for approval pertaining to the Regulation of Pollution Control and Hazardous Waste. This proposal is currently with the Council of Ministers. A funding proposal for a solid waste collection system has been drafted by Directorate of Environment, which has been adopted by UNDP. This draft includes funding for legislative support system for handling and management of hazardous waste.
Water			
Water supply	Secretary of State of Electricity, Water and Urbanization	Minister of Infrastructure	Decree Law No. 5/2009 of January 15: Licensing Regulations, Sale and Quality of Drinking Water
Irrigation	Not clearly Defined	Minister of Agriculture and Fisheries	No Specific legislation exists as of now
Pollution Control	Directorate of Environment	Minister of Economy and Development	Directorate of Environment's Guideline #5: Prescribed Activities for Pollution Control; also there is a proposal to approve the Regulation on Pollution Control, which is currently under discussion with Council of Ministers.
Storm-water Drainage and Urban/Municipal	Directorate for Roads, Bridges and Flood Control	Ministry of Infrastructure	No specific legislation is in existence; however there is a draft regulation on sanitation and

Drainage			drainage prepared by the consultants hired by ADB for the water and sanitation unit in June 2001; which has not yet been passed by the Cabinet. This draft regulation may require further review.
Chemicals	Crop Production Unit	Ministry of Agriculture and Fisheries	No specific legislation has been enacted till date; nevertheless a policy document has been approved by the Cabinet. There is a draft regulation on the 'Importation and Use of Agriculture Chemicals in Timor Leste'; which has yet to be approved by the Cabinet.
Fisheries			
Fish and Aquatic-life	Secretary of State for Fisheries	Ministry of Agriculture and Fisheries	UNTAET Reg. 2000/19 provides interim protection. On 30 May 2001, the minister approved the strategy document "Fish for the Future", containing to a proposal to develop Fisheries Management Projects which includes preparation respective legislation.
Mineral Resources			
Sand and Gravel Extraction for Construction and Commercial Uses	Secretary of State for Natural Resources; and Directorate of Environment	Minister for Economy and Development	No specific legislation has been enacted; however Directorate of Environment's 'Guideline #2 on Mechanised Sand and Gravel Extraction from River and Borrow Pits' is the guiding document. UNTAET order on 'Temporary Suspension of the Mechanised Extraction of Gravel, Sand and other Materials from the Comoro River Basin date 2 Sept 2000' is still valid for this river.
Mining	Secretary of State for Natural Resources	Minister for Economy and Development	No specific legislation exists; but the draft is under preparation
Oil and Gas	Secretary of State for Natural Resources	Minister for Economy and Development	No specific legislation exists; but the draft is under preparation
Heritage and Cultural Affairs			
Heritage	Secretary of State for Culture	Ministry of Education	UNTAET Reg. 2000/19, provide interim protection. Permanent legislation required.
Enforcement			
Fines	Sector specific agency recommend imposition of fine through Transitional Administrator	Transitional Administrator of UNTAET determines fine up to a maximum of US 5,000 for individual, or US\$ 500,000 for businesses,	UNTAER Reg. 2000/17 (on logging) UNTAET Reg. 2000/19 on Protected Areas

		corporations and institutions	
Confiscation of prohibited animal or article (animal or coral), tools, equipment or vehicle used in offence.	UN Police and authorized personnel from Local Police are entitled to take action	Deputy Transitional Administrator of UNTAET/Government of Democratic Republic of Timor Leste	UNTAER Reg. 2000/17 (on logging) UNTAET Reg. 2000/19 on Protected Areas
Environmental Awareness			
Public Awareness and Consultation	Undecided as of now; requires clarification. Nevertheless it involves overlapping responsibilities among Directorate of Environment; Ministry of Education and Some other ministries	Ministry of Economy and Development; and Minister for Education	No relevant legislation or guidance exists as of now
Integrate Natural Resource Management			
Catchment Area Management	Directorate of Environment	Minister for Economy and Development	No relevant legislation or guidance exists as of now; however the Directorate of Environment facilities 'Natural Resource Management Working Group' on issues pertaining to catchment area management.

ATTACHMENT 3: RAPID ENVIRONMENTAL ASSESSMENT FORM

Rapid Environmental Assessment (REA) Checklist

Instructions:

- This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- Answer the questions assuming the “without mitigation” case. The purpose is to identify potential impacts. Use the “remarks” section to discuss any anticipated mitigation measures.

Country/Project Title: ADB Grant 0180 TIM – A03-01 Dili to Liquica

Sector Division:

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting			
Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
▪ Cultural heritage site		<input checked="" type="checkbox"/>	
▪ Protected Area		<input checked="" type="checkbox"/>	
▪ Wetland		<input checked="" type="checkbox"/>	
▪ Mangrove	<input checked="" type="checkbox"/>		The sub-project road parallels the coast and patches of mangroves are present along the coastline of Liquica
▪ Estuarine	<input checked="" type="checkbox"/>		The existing road passes along an estuarine in Tibar, Liquica
▪ Buffer zone of protected area		<input checked="" type="checkbox"/>	
▪ Special area for protecting biodiversity	<input checked="" type="checkbox"/>		Lake Tasi Tolu has been identified an important bird area
B. Potential Environmental Impacts			
Will the Project cause...			
▪ encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		<input checked="" type="checkbox"/>	
▪ encroachment on precious ecology (e.g. sensitive or protected areas)?		<input checked="" type="checkbox"/>	

SCREENING QUESTIONS	Yes	No	REMARKS
<ul style="list-style-type: none"> alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site? 		<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction? 	<input checked="" type="checkbox"/>		This potential impact will be addressed in the EMP.
<ul style="list-style-type: none"> increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing? 	<input checked="" type="checkbox"/>		Quarry operations and asphalt mixing plant shall be part of the sub-project. This will be addressed in the EMP.
<ul style="list-style-type: none"> noise and vibration due to blasting and other civil works? 	<input checked="" type="checkbox"/>		The road rehabilitation will require use of construction equipment which can generate vibration and noise
<ul style="list-style-type: none"> dislocation or involuntary resettlement of people 		<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress? 		<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> hazardous driving conditions where construction interferes with pre-existing roads? 	<input checked="" type="checkbox"/>		The sub-project is rehabilitation and repair of existing roads hence will affect existing traffic.
<ul style="list-style-type: none"> poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 	<input checked="" type="checkbox"/>		Setting up of temporary construction camps is a necessity since sections of the road are quite distant from settlements.
<ul style="list-style-type: none"> creation of temporary breeding habitats for mosquito vectors of disease? 		<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> dislocation and compulsory resettlement of people living in right-of-way? 		<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life? 		<input checked="" type="checkbox"/>	
<ul style="list-style-type: none"> increased noise and air pollution resulting from traffic volume? 	<input checked="" type="checkbox"/>		The rehabilitation and repair works will add up to traffic due to hauling of construction supplies
<ul style="list-style-type: none"> increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road? 		<input checked="" type="checkbox"/>	

ATTACHMENT 4: ENVIRONMENTAL MONITORING CHECKLIST



Sub-Project Environmental Compliance Inspection and Monitoring Form
Sub-Projetu Meio Ambiente Konaba Comformidade Inspesaun no Formulariu Monitorizasaun

Sector	: <u>Roads/Dalan</u>	Implementing Agency	: _____
Sektor			
Setor		<i>Instansi Pelaksana</i>	
Sub-Project	: _____	<i>Agensia Implementasaun</i>	
Sub-Proyek		Monitoring Agency	: _____
Sub-Projetu		<i>Agensia Monitorizasaun</i>	
Location	: _____	<i>Instansi Pemantau</i>	
Lokasi		Enforcing Agency	: _____
Fatin		<i>Agensia ne'ebe iha poder</i>	
Date	: _____	Contractor(s)	: _____
Tanggal		<i>Kontraktor/Kontrator</i>	
Data			
Reporting Period	: _____		
Periodu relatoriu			
Implementation Phase: Preconstruction / Construction / Operation			
<i>Persiapan / Konstruksi / Operasi/Preparasaun/Construsaun/Operasaun</i>			
Periode Pelaporan			

1. Contractor(s) / Kontraktor/Kontrator

Contractor(s) Environmental Awareness <i>Kepedulian Kontraktor Terhadap Lingkungan</i> <i>Kontrator nia konhesemento kona ba Meio Ambiente?</i>	Yes / No <i>Ya / Tidak</i> <i>Los/La los</i>	Actions Required <i>Tindakan Yang Diperlukan</i> <i>Asaun ne'ebe prezisa</i>	Contractor Response / Comment <i>Tanggapan Kontraktor / Komentar</i> <i>Kontrator nia resposta/Komentar</i>
---	--	--	---

Contractor(s) aware of mitigation requirements?

Kontraktor peduli terhadap syarat-syarat pencegahan
Kontrator hatene konaba prevensaun?

Contractor(s) have a copy of IEE EMP?

Kontraktor mempunyai salinan (copy) dari IEE EMP
Kontrator hetan kopia husi IEE EMP?

2. Mitigation Compliance Inspection / Pemeriksaan Ketaatan Pencegahan/Comformidade Inspesaun konaba prevensaun

Impact / Mitigation Measure <i>Ukuran Dampak /Pencegahan /Impakto/sasukat atu prevene</i>	Mitigations Implemented (Yes, No) <i>Pencegahan Yang Diterapkan</i> <i>Prevensaun ne'ebe implementa tiha ona (Ya, Tidak) (Los/La los)</i>	Mitigations Effective? (1 to 5)* <i>Tingkat Keberhasilan Pencegahan (1-5)*</i> <i>Prevensaun efektifo ka lae (1-5)*</i>	Impact Observed / Location <i>Dampak yang terdeteksi / Lokasi Hetan Impakto/Fatin</i>	Action Required <i>Tindakan Yang Diperlukan</i> <i>Asaun ne'ebe foti</i>	Contractor Response / Comment <i>Tanggapan Kontraktor / Komentar</i> <i>Kontrator nia resposta/Komentariu</i>	Endorsed by: <i>Disetujui oleh</i> <i>Autoriza husi:</i>	
	Implementing Agency <i>Instansi Pelaksana Agensia Implementasau</i>	Monitoring Agency <i>Intansi Pemantau Agensia Monitorizasaun</i>					

Worker Camps sited appropriately?

Kelayakan dari Kamp Pekerja di lapangan ?
Trabalhador nia hela fatin diak ka lae?

Adequate sanitation & waste management at Worker Camps?

Apakah memadai Sanitasi dan manajemen sampah di Kamp pekerja ?
Sanitasaun no manajemento soe foer fatin iha trabalhador nia hela fatin diak ka lae?

Erosion or instability of cut faces, quarries and borrow pits?

Pengikisan atau Ketidak stabilan dr potongan permukaan dan lubang2 galian?
Rai monu ka rai leten la seguru, pedreiras?

Noise controlled
adequately?

Pengendalian
kebisingan memadai?

Kontrola barulho ho
diak?

Traffic safety measures
adequate?

Pengendalian keamanan
lalulintas memadai ?
Seguransa trafiku nian
sasukat ho diak?

Sedimentation and
Pollution of Local water
bodies?

Pencemaran dari
pengairan konstruksi
setempat ?
Sedimentasaun no
poluisaun husi mota?

Changes to hydrology
of local water bodies,
flooding?

Perubahan hidrologi
dari pengairan
konstruksi setempat,
banjir?
Iha mudansa konaba

be'e mota nian, be'e boot?

Mitigation Effectiveness Rating Criteria / Kriteria Tingkat Keberhasilan Pencegahan/Kriteriaan nivel konaba prevensaun nian

Very Good (all required mitigations implemented)

Sangat Baik (semua syarat pencegahan di laksanakan) 100%
Diak liu (todo criteria prevensaun nia lao ho diak) 100%

Good (the majority of required mitigations implemented)

Baik (sebagian besar syarat pencegahan di laksanakan) 75 – 99%
Diak (Kriteriaan prevensaun nian lao ho diak) 75-99%

Fair (some mitigations implemented)

Sedang (beberapa syarat pencegahan di laksanakan) 50 – 74%
Nato'on (Kriteriaan prevensaun balu deit mak lao ho diak) 50-74%

Poor (few mitigations implemented)

Jelek (sebagian kecil syarat pencegahan di laksanakan) 30 – 49%
A'at (Kriteriaan prevensaun oituan deit mak lao ho diak) 30-49%

Very Poor (Very few mitigations implemented)

Sangat Jelek (sedikit atau tidak ada syarat pencegahan di laksanakan) <30%
A'at liu (Oituan ou la iha kiteria prevensaun ne'ebe halao) <30%

3. Ambient Monitoring (if relevant) / Pemantauan Ambient (jika relevan) Monitorizasaun Meio Ambiente (Karik relevante)

Parameter	Date / Location	Measured by	Monitoring Equipment	Result	Standard	% Exceedance	Action Required	Contractor Responses / Comments	Endorsed by:	
									Implementing Agency	Monitoring Agency
Parameter	Tanggal / Lokasi	Diukur Oleh	Dipakai	Hasi	Baku Mutu	% Kelebihan	Tindakan yang Diperlukan	Tanggapan / Komentar	Agency Instansi	Agency Intansi
Parametru	Data/Fatin	husu	Material ne'ebe hodi uza	Rezultado	Estandarte	% Exceder	Asaun ne'ebe foti	Kontrator nia resposta/Komentariu	Pelaksana Agensia Implementasau	Pemantau Agensia Monitorizasaun
Water										
Air										
Be'e										
Air										
Udara										
Aereu										

Soil
Tanah
Rai

Note: N/A (Not or be implemented yet)

4. Summary of Actions Required and Follow-up (if relevant) / Ringkasan Tindakan Yang Diperlukan dan Tindak Lanjut

Action Required <i>Tindakan Yang Diperlukan</i> <i>Asaun ne'ebe foti</i>	Timeframe (e.g. within one week) <i>Periode Waktu (misalnya dalam seminggu)</i> <i>Tempu (ezemplu iha semana ida nia laran)</i>	Responsible Parties <i>Pihak Yang Bertanggung Jawab</i> <i>Dirasaun ne'ebe responsavel</i>	Follow-up (to be completed if actions are taken) <i>Tindak Lanjut (dilengkapi bila telah ada tindakan)</i> <i>Seguimento (Kompletu ho asaun karik iha)</i>
			Effectiveness in %: <i>Keberhasilan: Sedang (beberapa syarat pencegahan di laksanakan)</i> <i>Efektivu iha %:</i>
			Further Action Required?: <i>Perlu Tindakan Lanjutan?:</i> <i>Persiza tan seguimento?</i>
			Prepared by: <i>Dibuat Oleh:</i> <i>Prepara husi:</i>
			Date: <i>Tanggal:</i> <i>Data:</i>

Inspection Completed by: _____ Date: _____
Pemeriksaan Ole/Revista husih: _____ Tanggal/Data: _____
 Signature:
Tanda Tangan
Asnatura

Add Attachments as appropriate (e.g. list of inspection participation, map(s) showing sites, picture)
Tambahan Lampiran Yang Diperlukan (daftar peserta pemeriksaan, peta, gambar)
Aumenta ho lampiran ne'ebe persiza (lista elementus ne'ebe revista, Mapa, Fotografia)