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ABBREVIATIONS AND ACRONYMS

CEMP	-	Contractors Site Specific Environmental Management Plan
DRBFC	-	Directorate of Roads, Bridges and Flood Control
EA	-	Executing Agency
EARF	-	Environmental Assessment and Review Framework
EHS	-	Environmental Health and Safety Guidelines
EIS	-	Environmental Impact Statement
ELL	-	Environmental Licensing Law (Decree No. 5/11)
EMP	-	Environmental Management Plan
ESO	-	Environment and Safety Officer (Contractor)
EO	-	Environmental Officer (PMU)
GRM	-	Grievance Redress Mechanism
GRC	-	Grievance Redress Committee
GoTL	-	Government of Timor Leste
IA	-	Implementing Agency
IES	-	International Environmental Specialist
IIC	-	Included in Contract
IOL	-	Inventory of Losses
ISS	-	International Social Safeguards Specialist
JMP	-	Joint Monitoring Program
MAFF	-	Ministry of Agriculture, Fisheries and Forestry
MOF	-	Ministry of Finance
MPWTC	-	Ministry of Public Works, Transportation and Communications
NDPCEI	-	National Directorate for Pollution Control and Environmental Impact
NEC	-	National Environmental Consultant
NES	-	National Environmental Specialist
NGO	-	Non-Governmental Organization
NRUP	-	National Roads Upgrading Program
PSC	-	Project Supervision Consultants
PMU	-	Project Management Unit
REA	-	Rapid Environmental Assessment
ROW	-	Right of Way
RP	-	Resettlement Plan
SEASEE	-	Southeast Asia Association of Seismology and Earthquake Engineering
SPS	-	Safeguard Policy Statement
SEMP	-	Site Specific Environmental Management Plan
SEIS	-	Simplified Environmental Impact Statement
TOR	-	Terms of Reference
UNCBD	-	United Nations Convention on Biological Diversity
UNCCD	-	United Nations Convention on Combating Desertification
UNFCCC	-	United Nations Framework Convention on Climate Change
UNTAET	-	United Nations Transitional Administration for East Timor
WHO	-	World Health Organization

EXECUTIVE SUMMARY

This Simplified Environmental Impact Statement (SEIS) has been prepared as part of the Project Implementation and Support Consultants for the Construction of Suai - Beaco Highway Road Project, Section 1: Suai-Fatukai/Mola Section (Sta.3+920-Sta.34+275). This SEIS is part of the continuing process of compliance with the Government of Timor-Leste's (GOTL) environmental regulations and guidelines. This SEIS with the integrated with Site Environmental Management Plan (SEMP) shall likewise serve as the basis for securing environmental permit for the National Directorate for Pollution Control and Environmental Impact (NDPCEI).

The project is Ministry of Public Works, Transport and Communication of the Democratic Republic of Timor-Leste (MPWTC) and the project proponent is China Overseas Engineering Group Co., Ltd. in joint venture with China Railway First Group Co., Ltd. of the People's Republic of China hereinafter called the "COVEC-CRFG JV" and is supported by the Project Supervision Consultants (PSC) the Katahira Engineering International in joint venture with Renardet S.A. as consultant.

The proposed Suai-Beaco Highway Road project is one of the South Coast Highway Improvement project of the Republic of Timor Leste. It is a south east connector across the mountainous spine/ridge and coast of Timor Leste. A highway from Suai to Beaco with a total distance of 155.679 kms, will connect the three Tasi Mane (Male Sea) clusters. It is classified as expressway. The project, section 1 : Suai-Fatukai/Mola is located at villages Suai Vila, Labarai, Holba, Beco Zumalai, in Covalima District. This first section of the highway road in this contract has a total length of 30.355 kms. This section starts in Suai at Sta. 3 + 920.000 and ends in Zumalai at Sta. 34 + 275.000. The project will definitely enhance the traffic safety and promote the economic development for the surrounding areas and enhance agriculture in the southern coast of Timor Leste.

This Simplified Environmental Impact Statement (SEIS) covers the facilities for Concrete Batching Plants, Asphalt Mixing Plants, Crushing, Washing and Casting Yards for the Construction of Suai - Beaco Highway Road Project, Section 1: Suai-Fatukai/Mola Section (Sta.3+920-Sta.34+275), under the Southern Coast Infrastructure Development Projects. The materials from common and rock excavation work in the project area are expected to be suitable as borrow material. The main quarry will supply crushed aggregate. Excess unsuitable materials and existing pavement shall be disposed at designated approved locations suitable for disposal approved by Project Management Unit (PMU).

COVEC-CRFG as the selected will execute construction and operation of facilities and the plant. COVEC-CRFG will also be responsible for day to day management of the facilities and plant, including implementation of requisites a feguards measures . Within MPWTC the key agency for monitoring will be the PMU established to manage and implement projects financed wholly or partially by GOTL's development partners. The established PMU is supported by the Project Supervision Consultants (PSC) the Katahira Engineering International in joint venture with Renardet S.A. as the Consultant Engineer and Engr. Michael Ho of COVEC-CRFG as an expatriate counterpart for documentation in this process that carried out the study and prepared SEIS and SEMP and provide the environmental management and implement of environmental monitoring at the working level.

The Facilities such as, Concrete Batching Plants, Asphalt Mixing Plants, Sand Washing, Crushing Plants and Casting Yards, are allocated in sub-villages in Branch 1 – Ogues; Branch 2 Meop Labarai; Branch 3 – Holba; Branch 4 - Hol Bome all in Covalima District, which locations were approved by the District Authorities. Each Batching Plant, Sand Washing and Casting Yard will be constructed and operated by

following international best practices and quality standards for production and health and safety includes: (i) extraction and washing of sand from the river; (ii) mixing cement aggregate sand water in the batching plant to make concrete; and; (iii) extraction of gravel based materials.

Laws, regulations, and standards for environmental assessment and management of GOTL will govern the assessment and implementation of the Project. The Basic Law of Environment (April 2012) covers all relevant aspects of environmental protection and the Decree Law 5/11 on environmental licensing covers environmental assessment requirements. In addition to GOTL's requirements the project must comply with safe eguard Policy Statement 2009 (SPS).

The National Directorate for Pollution Control and Environmental Impact (NDCPEI) is the government agency to issue the environmental permit. To prepare the EMP document, steps in environmental impact assessment procedure should be followed, which means that the project proponent must first submit the Project Document (PD) and application form to the environmental authority. Based on the PD and application form, DNE would then perform a screening process to determine the category of the project.

Results from categorization from the NDCPEI would determine the next step in the process, which is to write the full scale Environmental Impact Statement (EIS) for category A projects, Simplified Environmental Impact Statement (SEIS) for category B projects, or to issue permit and recommendations for category C projects.

A Project Document that was prepared and submitted to NDCPEI in order to screen and categorize the project to provide a legal basis for project owner to develop either the EIS or SEIS that contains an Environmental Management Plan (EMP). Based on this PD, the NDE recommended this project to develop SEIS because the overall project evaluation fall under the **Category B** projects, because the potential adverse environmental impacts are site-specific and mitigation measures can be designed readily.

Public consultations were undertaken during the preparation of this SEIS. The stakeholder consultation process disseminated in formation to all key stakeholders including the general public and the authorities through meetings and door-to-door surveys a long the project corridor. Information was provided on the scale and scope of the Project works and the expected impacts and the proposed mitigation measures through meetings and surveys. The process also gathered in formation on relevant concerns of the local community so as to address these in the project implementation stages. Project documentation will be disclosed in a place and language accessible to stakeholders.

The Grievance Redress Mechanism (GRM) for the Section 1: Suai-Fatukai/Mola Section (Sta.3+920-Sta.34+275) to resolve if any issues associated with this project, will be as reference to use for the main Suai - Beaco Highway Road Project. The GRM will receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievance about the environmental and social performance of the Project. Resolution of these issues and concerns will be undertaken expeditiously and according to the procedures of the GRM. The complaints/issues registry maintained at the site project office and by the contractor will be subject to monitoring. The GRM will aim to provide an accessible, time-bound and transparent mechanism for the affected persons to voice and resolve social and environmental concerns linked to the Project.

Mitigation measures, environmental monitoring, and capacity development are required to minimize the environmental impacts in the design, construction, operational and rehabilitation phases. The

main pre-construction issues relate to (i) identifying and suitable land with sufficient supplies of rock based material, (ii) establishing acceptable agreements with land owners for land use, (iii) planning and developing a sustainable design of the excavation, mechanical structures and control of operational impacts. Construction, commissioning and operational impacts including noise and dust, spoil and waste disposal, water quality impacts, health and safety, traffic interruption, re-provisioning of utilities and sand construction. Rehabilitation phase will require use of equipment and impacts that will be similar to construction and commissioning, however the outcome will be beneficial; giving final environmentally acceptable safe contours to the use of driver bed and other batching and sand washing and casting areas.

To ensure these impacts are mitigated to the greatest extent feasible, COVEC-CRFG have designed and will implement the site-specific environmental management plan (SEMP) for the site based on detailed design and integrate it into operational requirements for the Project site to the satisfaction of the PMU. The site-specific EMP (SEMP) proposes in detail how COVEC-CRFG will implement and operate the works. The SEMP will include COVEC-CRFG's proposed actions to cover: (i) noise and dust control; (ii) waste management and spoil disposal; (iii) vegetation removal and replanting (iii) utilities, irrigation and telecommunications re-provisioning; (iv) Temporary drainage; (v) construction materials management; (vi) runoff control and excavation protection; (viii) temporary traffic management; and (ix) worker and public safety and (x) rehabilitation. The primary role for SEMP implementation and monitoring belongs to the PMU with the support from the PSC. Additional support for monitoring is provided by the stakeholders who have been engaged early on. The NDPCEI is primarily responsible for enforcing the GOTL's environmental regulations.

The operation of the Batching Plant, Sand Washing and Casting will have no insurmountable negative longterm effects on the surrounding environment overall and will facilitate the accrual of benefits from road improvement. The improvement of the project road will allow faster, more efficient travel and improved traffic flow. The smoother asphalt pavement and improved road side gutter sand drainage can be expected to reduce noise and the accumulation of road side dust and therefore air pollution from noise and disturbed dust should also be reduced.

No particular difficulties were encountered by COVEC-CRFG in compiling the SEIS. The Project construction and operation is restricted to areas within the land permitted for Batching Plant, Sand Washing and Casting Yard by the local community. The impacts from construction and operation will be manageable and no insurmountable impacts are predicted, provided that the SEMP is implemented thoroughly. MPWTC (assisted by PMU) will ensure that the SEMP provisions are implemented and monitored to their full extent. In the event that any design details change the locations or scope of the proposed Project works the environmental assessment and EMP shall be reviewed and revised accordingly. The findings of the SEIS are that the environmental impacts from the installation of the quarry, crusher, concrete batching plant and asphalt batching plant to support the rehabilitation of the project: The Suai-Fatucaai/Mola Section 1, will be manageable if the mitigation measures established in the SEMP are implemented thoroughly. The SEIS also set out the requirements for monitoring

1. INTRODUCTION

1.1. THE PROJECT

The proposed Suai-Beaco Highway Road project is one of the South Coast Highway Improvement project of the Democratic Republic of Timor-Leste. The proposed highway road is split into four sections, namely: Section 1: Suai-Fatukai/Mola. Section 2: Fatukai/Mola-Betano. Section 3: Betano-Clacuc. Section 4: Clacuc-Beaco. This section 1: Suai-Fatukai/Mola project is under Ministry of Public Works, Transport, and Communication of the Democratic Republic of Timor-Leste (MPWTC). MPWTC as agency implementation funds totally this project.

1.2. THE PROJECT PROPONENT

The proponent of the project is China Overseas Engineering Group Co., Ltd. in joint venture with China Railway First Group Co., Ltd. of the People's Republic of China here in after called the "COVEC-CRFG JV" signed the contract known to be the Construction of Suai - Beaco Highway Road Project, Section 1: Suai-Fatukai/Mola Section (Sta.3+920-Sta.34+275), and is supported by the Project Supervision Consultants (PSC) the Katahira Engineering International in joint venture with Renardet S.A. and Mike Ho with team as consultant Environmental Impact Assessment (EIA) that carried out the study and prepared SEIS and SEMP and provide the environmental management and implement of environmental monitoring at the working level.

This project proponent is committed to implement all the requirements of this Simplified Environmental Impact Statement (SEIS) and the Site Specific Environmental Management Plan (SEMP) and the COVEC-CRFG company environmental policy as stated in the tender proposal and Contract.

Table 1. PROJECT PROPONENT DETAIL

Name of Company:	China Overseas Engineering Group Co., Ltd. in joint venture with China Railway First Group Co., Ltd. (COVEC-CRFG)
Address:	Floor 2, Sea view Apartment & Office Building, Av. de Portugal, Dili, Timor-Leste
Telephone:	+670 331 0997
Name:	Mr. Alex Lin Mingming, General Manager, COVEC-CRFG JV Lda. Timor Leste

This Simplified Environmental Impact Statement (SEIS) covers the Batching Plants, Sand Washing and Casting Yards for the project. These facilities will be used and operated by following international best practices and quality standards for environmental health and safety to provide: (i) extraction and washing of sand from the river; (ii) mixing cement, aggregates and water in the batching plant to make concrete; and; (iii) extraction of gravel based materials for the Suai-Fatukai/Mola section, this project.

This Simplified Environmental Impact Statement (SEIS) has been prepared by the appointed contractor, COVEC-CRFG in response to the requirements for environmental assessment and environmental management identified in the Decree Law 05/2011 Environmental Licensing Law (ELL) in the Contract. The SEIS and the accompanying SEMP are the primary environmental documents for the implementation the Project that is supported by other environmental requirements identified in the Contract and Environmental License for Project.

2. LAW, REGULATIONS POLICY FRAMEWORK

The Constitution, laws, regulations, and standards for environmental assessment and management of GOTL will govern the implementation of the project. The Constitution of Timor-Leste has clearly established the importance of protecting the environment. The Constitution of Timor-Leste establishes a healthy environment as a constitutional right. The Constitution stipulates that:

- 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.
- The State shall recognize the need to preserve and rationalize natural resources.
- The State should promote actions aimed at protecting the environment and safeguarding the sustainable development of the economy.

As of 05 July 2012 the Environmental Basic Decree Law came into force (Decree- Law no. 26/2012). This sets the framework for other environmental legislation such as the Decree 05/2011 Environmental Licensing Law (ELL) and pending laws and regulations including the draft biodiversity law.

Environmental Licensing Law (ELL) implements a system of environmental impact assessment (EIA) and licensing in Timor-Leste. Under the ELL, proponents of projects or activities that may impact the environment are required to undertake a process of environmental assessment (EA), which includes preparing an 'environmental impact statement' (EIS) or 'simplified environmental impact statement' (SEIS), depending on the level of likely impact of the project (respectively Category A and Category B), together with an environmental management plan (EMP), according to the procedure established through the ELL, and submitting this information to National Directorate for Pollution Control and Environmental Impact (NDPCEI). If the Minister determines to approve the project or activity, based on the recommendations of NDPCEI, the proponent is granted an environmental license by NDPCEI to conduct the project or activity.

Moreover, the NDPCEI has classified the project as Category "B" in accordance to the ELL because this project may cause environment impact but not significant. These types of activities deemed to have potential adverse environmental impacts that are site-specific, few if any of them are irreversible and mitigation measures can be designed readily. Also, there are no apparent potential institutional constraints or barriers that could adversely affect project success. The appropriate level of environmental assessment for environment category "B" proposals is an SEIS and an EMP that must be prepared in the prescribed format and be submitted to the NDPCEI for approval.

Article 18 of the ELL requires that the application for environmental license be made to the NDPCEI. The proponent (in this case COVEC-CRFG) of a project classified as Category "B" initiates the procedure for SEIS and environmental license application with the submission of a Development Proposal Application Form to the NDPCEI. The information to be included with the application is: (i) name of the applicant, and their identifying information and contact details; (ii) location and scale of the project; (iii) plans and technical drawings of the project; (iv) technical study on the feasibility of the project; (v) opinions or other documents on the project issued by other entities; (vi) the EMP; and, (vii) the application for an environmental license.

Public consultation is mandatory for Category "B" development projects under the ELL. The proponent must, in the event that the NDPCEI requires it, conduct public consultation, to discuss issues on the project with relevant stakeholders. The proponent must also implement the EMP in

accordance with the provisions of relevant legislation.

Under the ELL, NDPCEI has 30 days to respond to receipt of the application for an environmental license for Category "B" project. NDPCEI may suspend the review process if additional information is required and has 10 days to review the additional information or reject the application. The NDPCEI will also establish the conditions and restrictions deemed necessary to protect the environment as part of the environmental license. In addition to the legal requirements NDPCEI also issues guidelines from time to time and refers to best international practice. Contractor will implement this SEIS by reference to NDPCEI guidelines and the Environmental, Health, and Safety General Guidelines.

Timor-Leste has not enacted laws or implemented regulations for working conditions, health and safety. UNTAET Regulation 2002/05, the Labor Code for Timor-Leste, is broadly relevant but it does not regulate health and safety. This Labor Code creates a National Labor Board with the mandate to provide independent advice on occupational safety and health matters as well as programs on vocational training and skills development, grant exemptions, set minimum wages and other related functions. However, the National Labor Board has not yet been established. The Occupational Health and Safety Law was drafted in 2004, but has not yet been enacted. Therefore during construction, the project will conform to the Environmental, Health, and Safety General Guidelines.

GOTL is a party to several international conventions that are relevant to environmental management. GOTL has signed and ratified three international conventions on preserving the natural environment: the United Nations Convention to Combat Desertification (UNCCD; August 2003), the UN Framework Convention on Climate Change (UNFCCC; Oct. 2006) and the UN Convention on Biodiversity (UNCBD; Oct. 2006). In late 2007, Timor-Leste signed the Kyoto Protocol to the UNFCCC, expressing its commitment to reduce global climate change. None of these conventions have any direct or specific relevance for this SEIS as the project does not encounter any areas of environmental sensitivity covered by the conventions.

In addition to Environmental Licensing regulation, other laws and regulations are also relevant to the mining and rock crushing activities. These laws and regulations as well as their objectives are listed in the following table.

Relevant Laws and Regulations

Agency Relevant Laws

State Secretary of the Environment Decree Law No.5/2011

Decree Law No. 26/2012 on Environmental Base Law

(Draft) Law on Biodiversity (March 2012)

(Draft) Law on Protected Area (May 2013)

UNTAET Law No. 19/2000 on Protected Area

State Secretary of Forestry and Protection of the Nature (Draft) Law on Protected Area (May 2013)

UNTAET Law No. 19/2000 on Protected Area

SEPOPE UNTAET Regulation No. 05/2002 on Labor Code for Timor Leste

Ministry of Petroleum and Mineral Resources Draft Mining Code (August 2013)

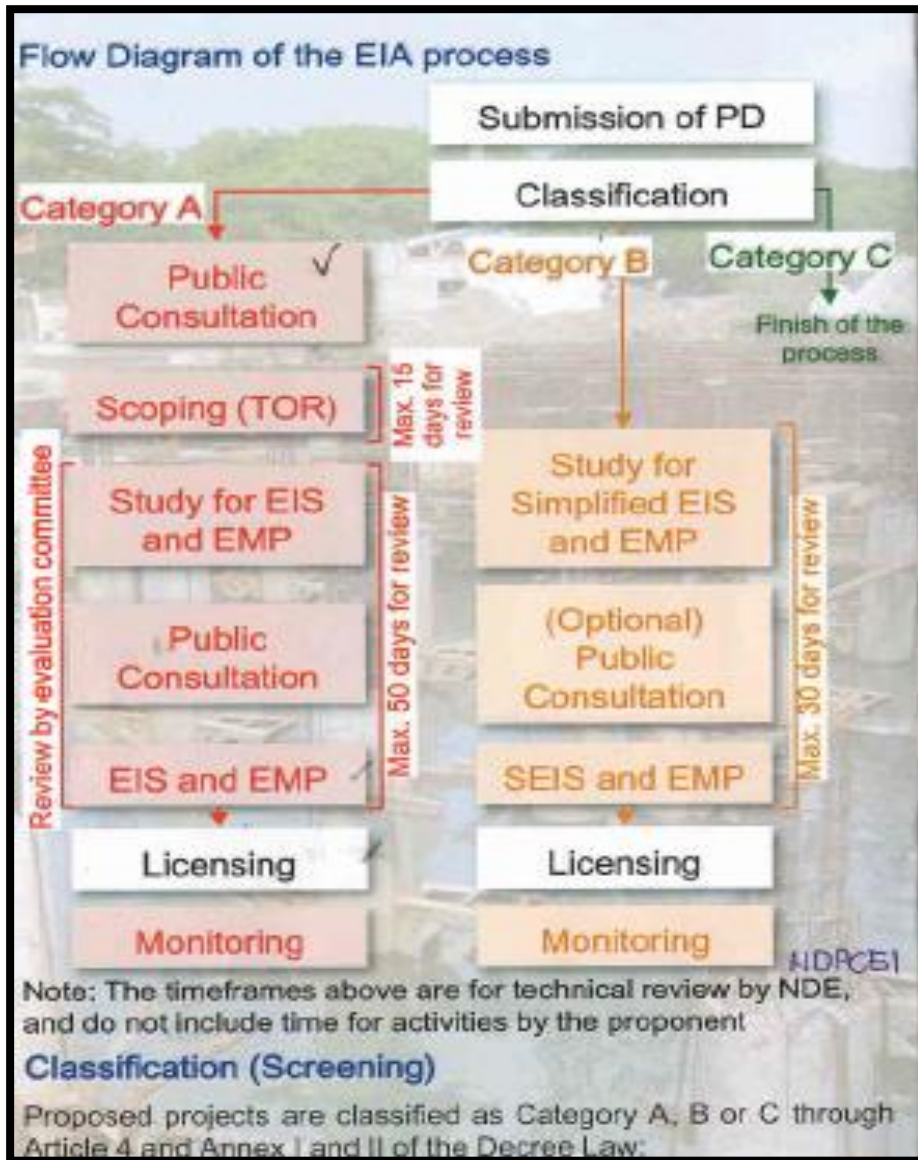
International Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Protocol)

Before an environmental license is duly implemented classification, review and monitoring of the environmental impacts is obtained. These steps include screening, scoping, preparation of an EIS/Simplified EIS and monitoring of the implementation of Environmental Management Plans (EMPs)

contained in the EIS/SEIS.

The process for issuance of environmental permit according to Decree-Law No 5/2011 is shown in the figure below.

Figure 1: Environmental Licensing Process



For projects that do not require preparation of an EIA/IEE (Category C projects), the Environmental Authority would recommend that the projects implement certain measures to protect the environment and maintain an environmental management plan.

The Decree Law No.5/2011 categorizes projects according to the potential impacts to the environment. There are three categories of projects:

Category A - to include projects that potentially cause significant environmental impacts. These projects are subject to Environmental Impact Assessment (EIA) developed based on Impact Analysis and Environmental Management Plan (EMP) in accordance with the Decree Law No. 5/2011.

Category B - to include projects that potentially cause environmental impacts and are subject to the

procedure of Initial Environmental Examination (IEE) developed based on the EMP in accordance with the Decree Law No. 5/2011.

Category C - to include projects where environmental impacts are negligible or nonexistent and not subject to any procedure for Environmental Assessment in accordance with Decree Law No.5/2011.

Annexes I & II of Decree Law No.5/2011 spelled out in more detail the type and scale of projects within mining, oil, energy, general industry, transport, civil, water, sanitation, agriculture, tourism and defense sectors that belong to Category A and B projects. It also makes stipulations that those developments that happen within environmentally, socially and geographically sensitive areas should fall under Category A project.

With support from NDPCEI, the Decree Law No.5/2011 has recently been going through review for the purpose of clarification and ascertain the meaning and intent of relevant provisions that require inclusion, and those provisions that require clarification/amendment, to arrive at a common understanding of all issues that must be addressed in these laws and in the implementing regulations.

Table 2. Recommendation to Existing Guidelines for the Implementation of Decree Law No. 5/2011

Articles of Several Terms in the EIS Laws	Recommendation
Draft-3 Ministerial Diploma (Ministry of Commerce, Industry and Environment/MCIE) and Guidelines on Regulation on the Detailed Requirements for Screening, Scoping and the Terms of Reference, EIS, and EMP for Environmental Assessment	Clarification on general provisions, screening of projects, objectives and contents of: (1) EIS; (2) Simplified EIS; and (3) Environmental Management Plan (EMP)
Draft-3 Ministerial Diploma (MCIE) and Guidelines on Procedures and Requirements during the Environmental Assessment Process	Clearer definition on project affected people and vulnerable groups, notice of classification of proposed projects, public consultation on the proposed ToR, during the study phase and public consultation on the submitted EIS and EMP, record keeping and public access to documents.
Draft-3 Ministerial Diploma (MCIE) and Guidelines on Regulations on Impacts and Benefit Agreements (IBA)	Scope of the IBA, traditional land use and customs role in IBA, negotiation process, conditions in any IBA and complaints and grievance mechanisms.
Draft-3 Ministerial Diploma (MCIE) and Guidelines on Regulations on the Status and Rules of Procedures for the Evaluation Committee for Managing the EIA Procedure for Category A Project.	Composition of the Evaluation Committee, working principles (including quorum, decision making, technical: Analysis, etc.), and expertise from entities.

In addition to recommendations to existing guidelines, the team also makes recommendation on the use of several terms in the Decree Law No.5/2011 for the purpose of clarification and to reflect international best practice on aspects covered in EIS laws (Table 3).

Table 3: Proposed Amendments to the Use of Several Terms in the EIS Laws

Article	Proposed Amendments
Article 1 (k)	Definition of “environmental impacts”
Article 1 (w)	Addition of “women” and “affected people” to the definition of “public”
Article 1 (y)	Use of term “Environmental Assessment”
Article 4 (1)	Use of term “Environmental Impact Assessment” and “Simplified Environmental Impact Statement”
Article 4 (3)	Replacement of the article to reflect international best practice on aspects covered in EIS definition
Articles 18, 21, 22, 25,	The use of the term “proponent”, “Simplified EIS”, etc.
Article 19	The deadline for the technical analysis of the Simplified EIS and EMP and Others
Article 33 (1)	Addition of the obligation to keep record on monitoring
Article 38 (1)	Clarification on record and information access to show that the register should also include EIA, EIS and EMP for any project
New Chapter XII	Insertion of a new chapter to cover procedures applicable for proposed projects that may have significant cross border environmental impacts
Article 42	Addition of a “catch all” phrase to account for the emergence of other issues that may require regulations

Institutional Aspects: There are several institutional aspects related to the implementation of Decree Law No. 5/2011 on Environmental Licensing that are relevant to the proposed development. The first one is institutions responsible for general environmental protection (marine, coastal and terrestrial). The second one is institution responsible to regulate and monitor downstream petroleum industry including large scale fuel storage. The third one is institutions responsible for the protection of public health and safety. These institutions are identified in the following table.

Table 4: Government Responsibility and Relevant Institutions

No	Responsibility	Relevant Institutes
1	Environment and Nature Protection (Terrestrial)	State Secretary of the Environment State Secretary of Forestry and Natural Protection
2	Marine and Coastal Environment	State Secretary for Fisheries and Aquaculture
3	License of mining activity in Timor Leste	Ministry of Petroleum and Natural Resources
4	Public Health and Safety	Ministry of Health National Directorate for Civil Protection
5	Worker Health and Safety	State Secretary for Professional Training (SEPFOPÉ - Portuguese Acronym)

3. DESCRIPTION OF THE PROJECT

3.1 LOCALITY, DISTRICTS AND VILLAGES

This first section of the highway road in this contract has a total length of 30.355 kms. This section starts in Suai at Sta. 3 + 920.000 and ends in Zumalai at Sta. 34 + 275.000. The proposed facilities will be located at villages Suai Vila, Labarai, Holba, Beco Zumalai, in Covalima District. No direct adverse impacts are projected on the other districts since the activities involved in the project will be restricted within the jurisdictions of Covalima District.

Figure 2: Covalima District General Information


Country	 East Timor
Capital	Suai
Subdistricts	Fatululic, Fatumean, Fohorem, Zumalai, Maucatar, Suai, Tilomar
Area	
• Total	1,203 km ² (464 sq mi)
Area rank	7th
Population (2015)	
• Total	64,550
• Rank	9th
• Density	54/km ² (140/sq mi)
• Density rank	9th
Households	
• Total	11,820 (as of 2004)
• Rank	8th
Time zone	UTC+9
ISO 3166 code	TL-CO

Table 5. District and Villages that May be Affected

District:	Covalima
Sub-district/Suco:	Suai&Zumalai
Aldeia(Sub-village):	Talioan to Fatucaí

The sand and gravel extraction quarry pits will take place near a bend in the river. There are no village settlements in the area proximity on the road away from the river. Nearest residential houses along the existing road are not less than 500 meters from proposed facilities. The mobile stone crusher, concrete batching plants and sand washers will be erected within the same compound of each branch camp.

3.2 NEED FOR THE PROJECT

The proposed Suai-Beaco Highway Road project is one of the South Coast Highway Improvement project of the Republic of Timor Leste. It is a south east connector across the mountainous spine/ridge and coast of Timor Leste. A highway from Suai to Beaco with a total distance of 155.679 kms, will connect the three Tasi Mane (Male Sea) clusters. It is classified as expressway. The highway is projected for speeds up to 100 km/h in flat areas and 60 km/h in mountain areas, and will reduce total travel time from Suai to Beaco to less than 2 hours. The project, section 1 : Suai-Fatukai/Mola is located at villages Suai Vila, Labarai, Holba, Beco Zumalai, in Covalima District. This first section of the highway road in this contract has a total length of 30.355 kms. This section starts in Suai at Sta. 3 + 920.000 and ends in Zumalai at Sta. 34 + 275.000. The project will definitely enhance the traffic safety and promote the economic development for the surrounding areas and enhance agriculture in the southern coast of Timor Leste especially Suai will become a center for providing services, logistics, fabrications and human resource for the petroleum industry in the future.

3.3 STRUCTURE OF THE SEIS REPORT

This SEIS report has been presented in the following format. The report is organized into following Sections.

- Section 1: Introduction
- Section 2 Policy, Legal, and Administrative Framework
- Section 3 Description of the Project
- Section 4 Description of the Environment (Baseline Data)
- Section 5 Anticipated Environmental Impacts & Mitigation Measures
- Section 6 Information Disclosure, Consultation, and Participation
- Section 7 Grievance Redress Mechanism
- Section 8 Environmental Management Plan
- Section 9 Conclusion and Recommendation

3.4. LOCATION OF PROJECT

The Main Highway Road Project

The proposed project is located within the District of Covalima. There is no direct adverse impacts projected on the other districts since the activities involved in the project will be restricted within the Covalima between the sub-Villages from Talioan of Suai to Fatucaí/Mola in Zumalai as shown on the layout stretch of the project limits in figure 1 to 00. The Construction of Section 1: Suai-Fatukai/Mola

Section (Sta.3+920-Sta.34+275) This will start from Tali Oan, Suai to Fatucaí/Mola, Zumalai in Covalima District, the section of the highway road in this contract having a total length of 30.355km.

The Project Facilities and Borrow Pits

COVEC-CRFG is proposing to quarry six (6) borrow pits locations for embankment/fill use and two (2) river pits for quarrying granular and fine aggregates. After joint confirmation together with Lease Contract with the land owners and the local chiefs, it has been established to locate the following:

- 1) **For Raiketan River in Branch 2** in the sub-village of HOLBA, village of LABARRAI in the sub-district of SUAI will quarry for aggregates with approximately 29 hectares in area with the GPS coordinates of 9°16'25.38"S, 125°18'25.54"E. Within the vicinity of the camp will setup Stone crusher, screening and washing plant, asphalt mixing plant, concrete batching plant and casting yard having an estimated output quantity of aggregates of 75,000 Tons/year and fine aggregates of 4,800 Tons/year. The estimated area for occupancy of the entire facilities and camp including offices and accommodation for all employees of Branch 2 is 6.5 hectares under the lease contract with the private land owners. The distance from nearby residents in the area is approximately 1 km.
- 2) **For Mola River in Branch 4** in the sub-village of Zulotas, village of Zulo, sub-district of Zumalai will quarry for aggregates with approximately 13 hectares in area with GPS coordinates of 9°10'22.35"S, 125°26'51.74"E. Within the vicinity of the camp will setup stone crushers, screening and washing plants, concrete batching plant and casting yard having an estimated output quantity of coarse aggregates of 40,000 Tons/year and fine aggregates of 5,600 Tons/year. The estimated area for occupancy of the entire facilities and camp including offices and accommodation for all employees of Branch 4 is 15 hectares, under the lease contract with the private land owners. The distance from nearby residents in the area is approximately 2 km.

With the both whole river-way occupation for stone crusher plants and sand washer plants that will be built together. Other lesser capacity concrete batching plants with stockpile are also located in other respective locations of branches 1 and 3 camps. The locations of the proposed facilities are not less than 1 km away from the nearest settlements area.

- 3) **Borrow Pit 1** in branch 1 located in sub- village of Foho, village of Ogues, sub-district of Suai will quarry for embankment/fill with an approximate area of 54,000 sq. m. is the proposed location with GPS coordinates of Latitude 074 6710 and Longitude 897 1677.

The facilities in Branch 1 will setup a lower capacity Concrete Batching Plant (0.75 m³ per batch) and Stockpile area. The estimated area for occupancy of the facilities including base camp for offices and accommodation of all employees under the lease contract with the private land owners of Branch 1 is 14,680 sq. m. The distance from nearby residents in the area is approximately 1 km.

- 4) **Borrow Pit 2** in branch 2 located in sub- village of Holba, village of Labarrai, sub-district of Suai will quarry for embankment/fill with approximately 3 Hectares in area is the proposed location with GPS coordinates of Latitude 075 3604 and Longitude 897 4720.
- 5) **Borrow Pit 3** in branch 2 located in sub- village of Holba, village of Labarrai, sub-district of Suai will quarry for embankment/fill with approximately 4 Hectares in area is the proposed location with GPS coordinates of Latitude 075 4677 and Longitude 897 5184.

- 6) **Borrow Pit 4** in branch 3 located in sub-villages of Haimanu and Aidantuik, village of Beco, sub-district of Suai will quarry for embankment/fill with approximately 3 Hectares in area is the proposed location with GPS coordinates of Latitude 075 4677 and Longitude 897 5184.

The facilities in Branch 3 will also setup a lower capacity Concrete Batching Plant and Stockpile area. The estimated area for occupancy of the facilities including base camp for offices and accommodation of all employees under the lease contract with the private land owners of Branch 3 is 16,600 sq.m. The distance from nearby residents in the area is approximately 1 km.

- 7) **Borrow Pit 5** in branch 4 located in sub- village of Zoac, village of Beco, sub-district of Suai will quarry for embankment/fill with approximately 2.43 Hectares in area is the proposed location with GPS coordinates of Latitude 076 2696 and Longitude 898 0142.
- 8) **Borrow Pit 6** in branch 4 located in sub-village of Galitas, village of Tashilin, sub-district of Zumalai will quarry for embankment/fill with approximately 2.5 Hectares in area is the proposed location with GPS coordinates of Latitude 076 7347 and Longitude 898 3714.

A map of the project location of the manufacturing area is presented in Figures 1 and 2. The project will include:

- Batching Plants, identified at corresponding locations will be the source of raw materials such as sand, gravel and boulder;
- Sand Washing, this facility will segregate and crush boulders into required sizes such as 1½ inch, 1 inch, ¾inch, 3/8 inch as well as sand;
- Casting Yard, this plant will be the mixing facility of selected crushed aggregates with sand filler and bitumen. The finished product when laid to the road is called the asphalt concrete pavement.

The sand washing, batching plants will be erected within the compound of each sub-branches camp while casting yards for girders will be in two separate locations, in Holba and Zulo.

FIGURE 3. The Project Section

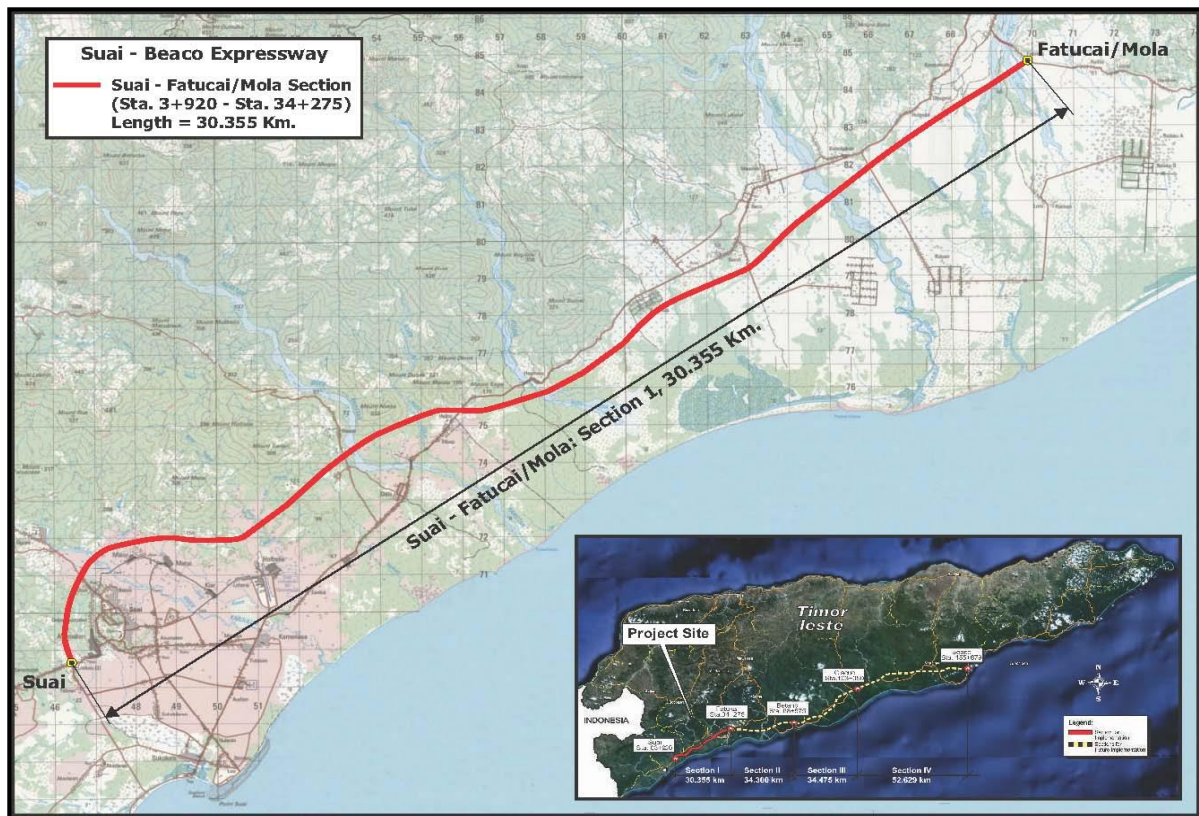


Figure 4: General Layout of Facilities Locations



FIGURE 5. Raiketan River Pit Layout, Facilities and Borrow Pit 2&3 (Branch 2)

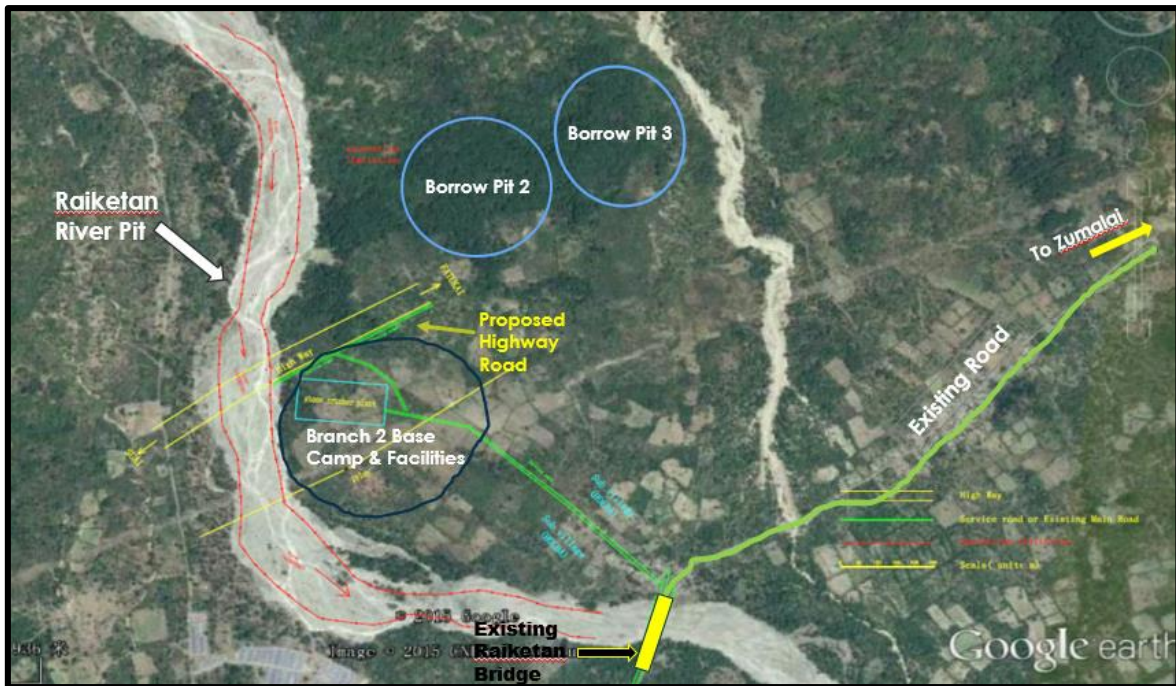


Figure 6: Layout of River Pit in Mola River and Facilities (Branch 4)

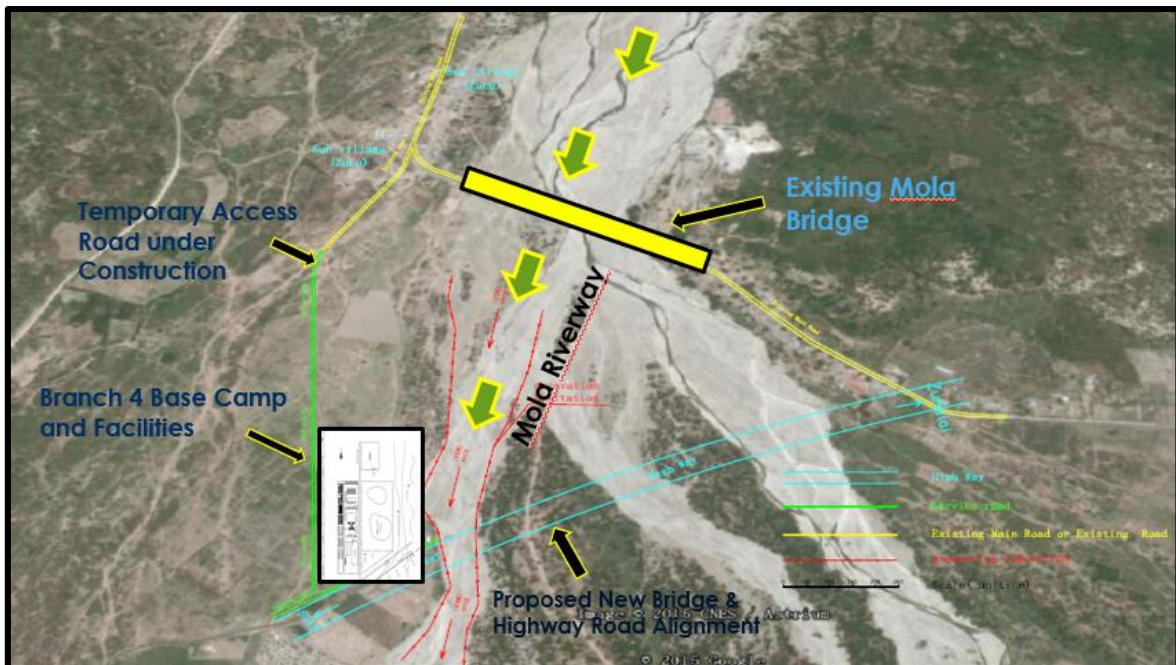


Figure 7: Layout Map of Borrow Pit 1 (Branch 1)

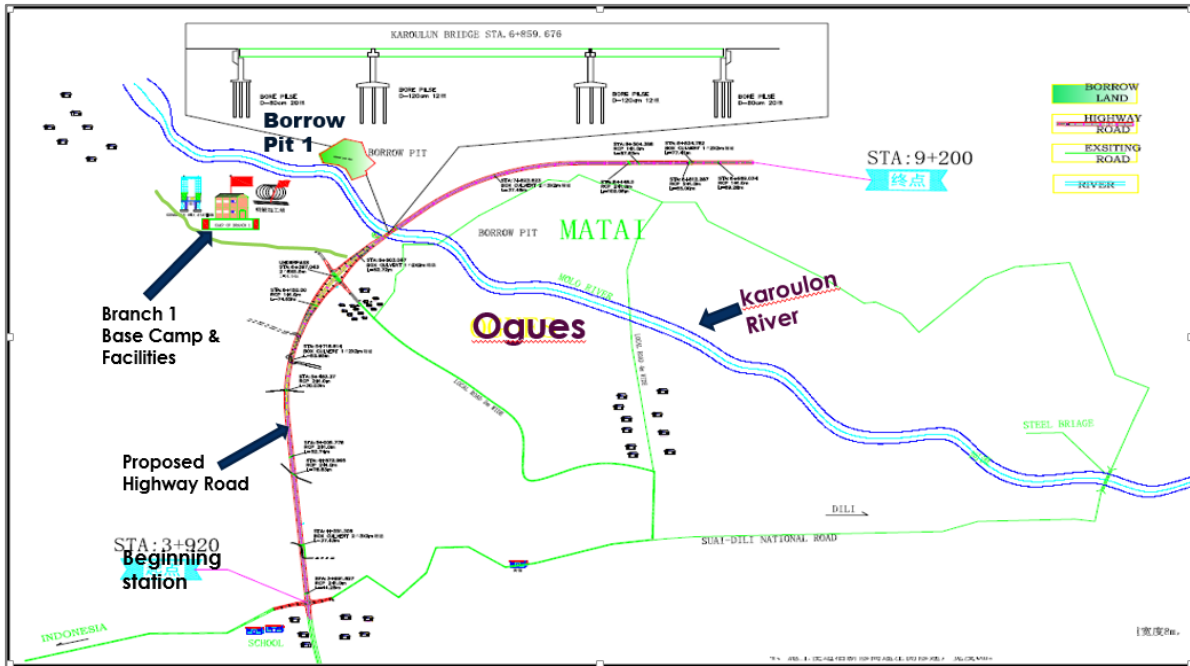


Figure 8: Layout Map of Borrow Pit 4a & b of Branch 3

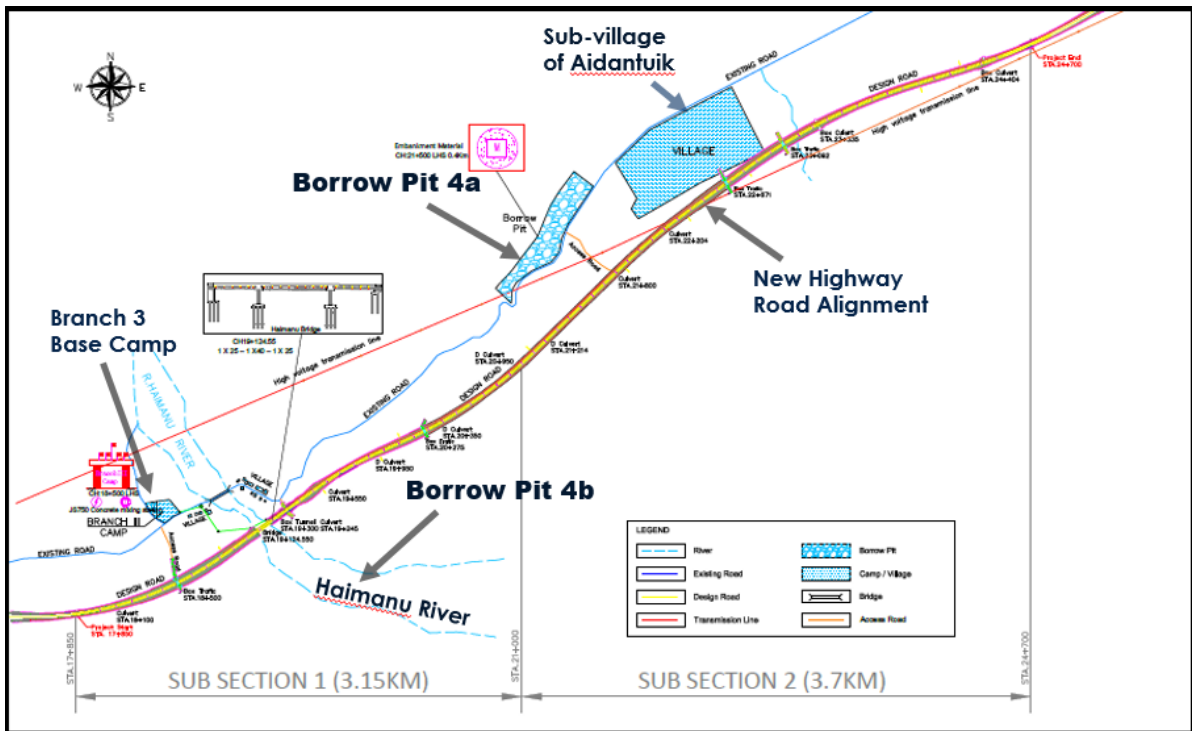


Figure 9: Layout Map of Borrow Pit 5 & 6 (Branch 4)

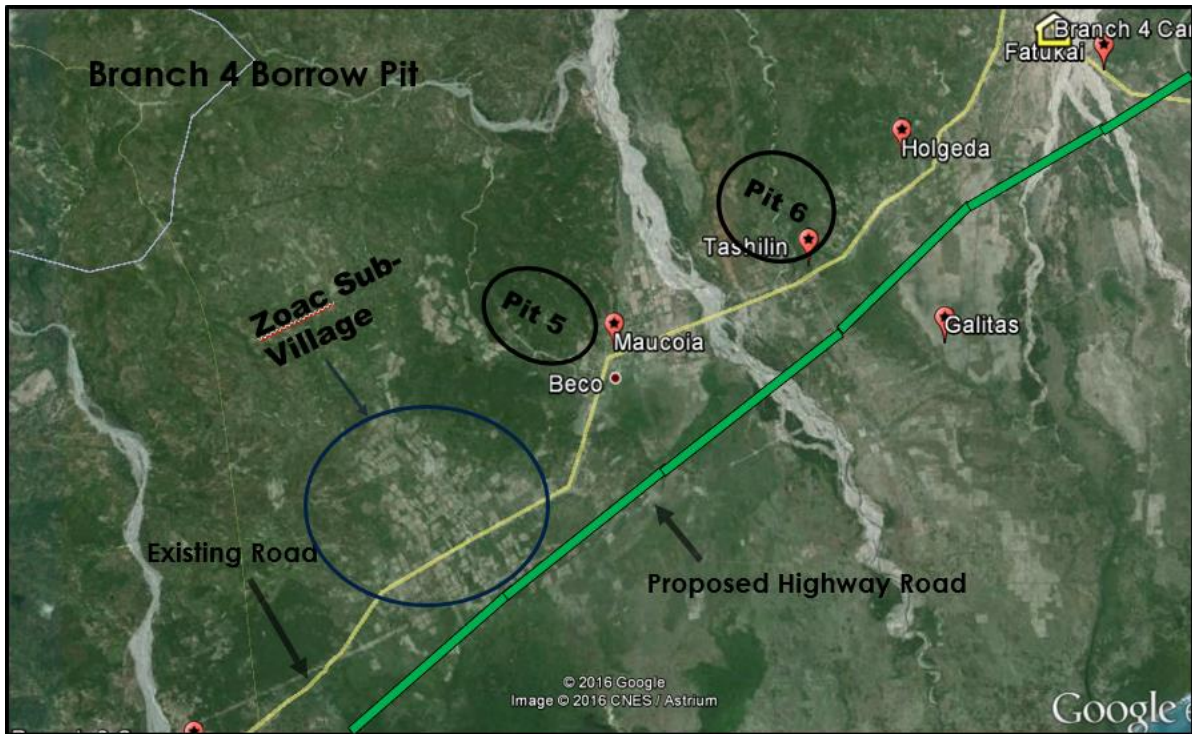


Figure 10. CONSTRUCTION SCHEDULES

Bill No.	Description	Rel. Wt. %	2016												2017												2018						%		
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun		Jul	
1	General	7.809	3.443	0.883	0.853	0.024	0.016	0.018	0.024	0.032	0.036	0.036	0.034	0.030	0.028	0.022	0.020	0.020	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	0.016	2.265		
2	Drainage	2.812				0.086	0.233	0.312	0.356	0.334	0.305	0.151	0.097	0.095	0.104	0.100	0.104	0.134	0.064	0.072	0.046	0.059	0.049	0.029	0.026	0.026	0.026	0.024	0.008						
3	Earthworks	27.176		0.086	0.527	0.754	0.771	1.129	1.953	1.964	1.973	1.997	2.100	2.141	2.154	2.088	2.028	1.537	1.381	0.999	0.956	0.557	0.081												
4	Pavement Widening and Shoulders	-																																	
5	Granular Pavement	12.073																0.141	0.819	1.609	1.475	2.271	3.434	2.274	0.051										
6	Asphalt Pavement	13.461																							1.602	2.016	2.238	1.484	1.821	2.135	1.740	0.426			
7	Structures	29.919				0.231	0.408	0.773	0.971	1.366	1.725	1.697	1.619	1.626	1.429	1.280	1.355	2.974	2.714	2.904	1.944	2.096	1.014	0.490	0.897	0.184	0.070	0.062	0.057	0.035					
8	Reinstatement and Minor Works	6.732																						0.014	0.117	0.197	0.197	0.703	0.717	0.804	0.929	1.094	1.126	0.791	0.042
9	Daywork	0.017																0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001		
	TOTAL	100.00																																	

Note: The 1st Time Extension of 6 months is incorporated for approval by Employer.

3.5 MACHINERY AND EQUIPMENT LAYOUT

The preliminary design and layout for the mobile washer and concrete batching plant for the project is presented in the figures – Layout Plan of Sand Washing, Concrete Batching Plant and Casting Yard. The requisite equipment will be installed by: (i) securing the proposed location of the plants and constructing the perimeter fence (ii) staking out the foundations required for each individual plant item; (iii) clearing of shrubs and trees avoiding cutting down of large trees; (iv) implementing the appropriate environmental, health and safety procedures, appropriate traffic management and

control and other measures that may be necessary.

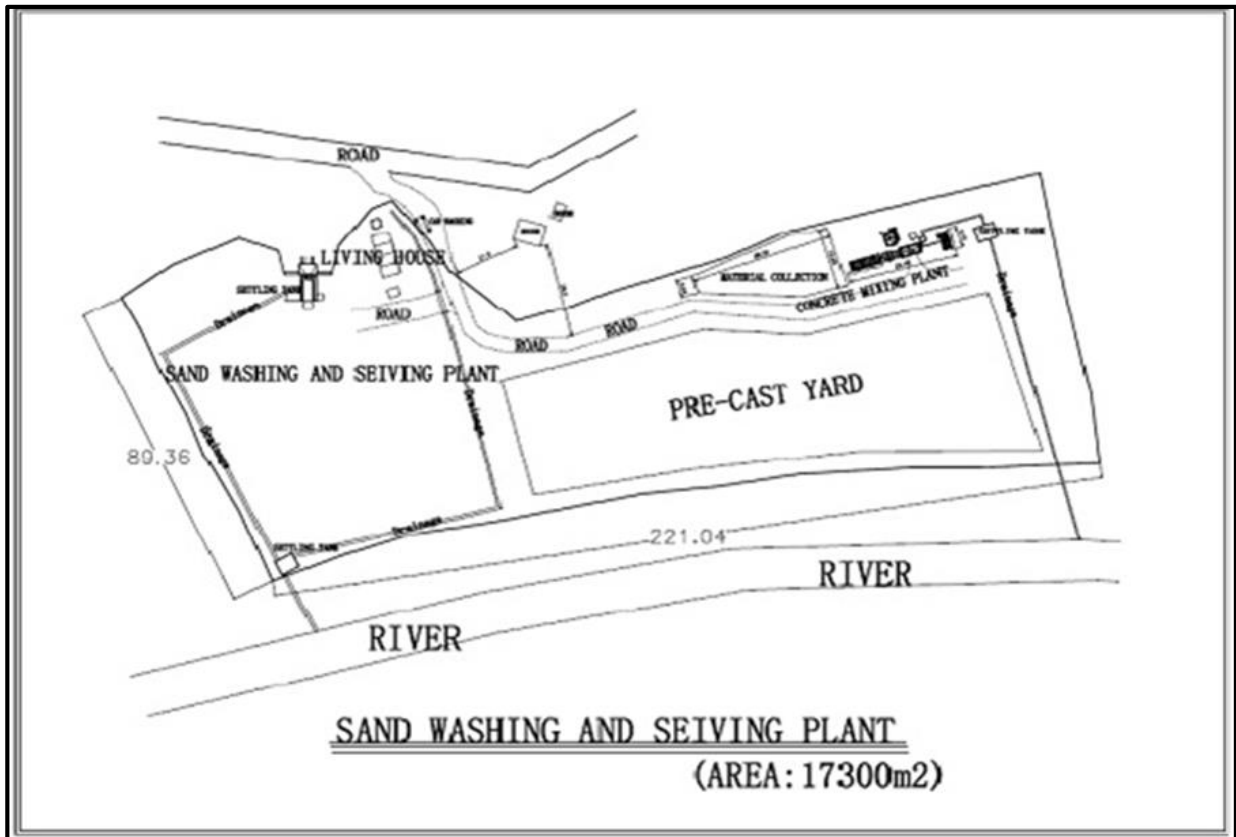
The said facilities are located adjacent to each branch camp safe distance to the nearest public. The nearest structure to the Project machinery is the residences on the opposite side of the road. The project's office accommodation is in an unused house next to the site.

The proposed works will not involve any relocation and resettlement since there are no adjacent directly affected houses within the project areas. There is no removal of trees required although clearing and grubbing is required all across the site. Commissioning of the stonecrusher and asphalt mixing plant will require minimal construction limited mainly to foundation works for the mobile stone crusher and asphalt mixing plant. Works to provide temporary drainage will not be required to avoid inundation or flooding or increased precipitation due to climate changes. The plants to be erected do not affect inundation.

Figure 11. Photos of Borrow Pits and Aggregates Processors



Figure 12. Layout Plan for Plants and Fabrication Yards Facilities



3.6 EARTHWORKS AND SOURCES OF MATERIALS.

The materials from common and rock excavation work in the project area are expected to be suitable as borrow soil. The quarry pits to supply crushed aggregates in locations were identified. Additional materials will be excavated from the river gravel borrow area. Unsuitable materials and material from the removal existing pavement shall be disposed at designated approved locations suitable for disposal approved by PMU.

Suitability of Riverbed Gravels. Generally, the local riverbed gravels are suitable as road construction materials. Riverbed gravels in the several rivers are composed of schist, slate and basalt. Laboratory tests carry out to prove the suitability of materials. Based on tests these materials should contain enough strength as aggregates for asphalt concrete and suitable as mixture to any aggregates and sand. Laboratory tests confirm applicability for concrete. Sands from the river are also observed as applicable for structural concrete use. The quarry pits in Covalima District are also subject to separate application for environmental licensing in parallel with this SEIS. The quarry areas will be combined with crushers and asphalt mixing plants.

Table 6. Estimated Quantity of Coarse Materials Needed

Structures and Works (Suai-Fatucaí/Mola)	Quantity
Removal of Existing Pavement	
Required Bulk Excavation	1,420,261 m ³
Rock Excavation	100 m ³
Required Bulk Fill	5,048,247 m ³
Bituminous concrete wearing course	24,507 m ³
Binder Course	34,601 m ³

Base Course	49,205 m ³
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3.7 RECRUITMENT OF MANPOWER

Mobilization of manpower needed for construction activity will include provisions and recruitment of manpower by the contractor to include engineers, technicians and surveyors, heavy equipment operators and assistants, mechanics, general labourers and security. As far as practicable, manpower will be sourced using local people, especially for semi-skilled and unskilled work according to the contractor requirements.

3.8 MOBILIZATION OF HEAVY EQUIPMENT

Heavy equipment will be mobilized early in the construction phase. Heavy equipment requirements will include wheel loaders, motor graders, excavators, dump trucks, water trucks, vibration rollers, concrete batching plant, asphalt cutters, transit mixer for concrete, asphalt hot mix plant, asphalt finisher, road rollers and tire rollers.

3.9 DEVELOPMENT AND OPERATION OF BASECAMP

The development and operation of the quarry, washing and batching plants will take place before construction starts. The camp will include contractor's office equipment store and maintenance yard, material stockpiles, warehouse, workshop and staff accommodation etc. Location of the basecamps has already been defined prior to the start of construction.

4. DESCRIPTION OF EXISTING ENVIRONMENT

4.1 ENVIRONMENT SURROUNDING THE BORROW PITS

1. Borrow Pit 1

In branch 1, located in sub-village of Foho, village of Ogues, sub-district of Suai is a remote place. There is no other close village and sub-district affected other than Ogues and Suai, respectively in the proposed pit surroundings. The closest nearby residential areas are the sub-village of Matai of about 1.5 km east, and the sub-village of Ranok of about 2 km south from the location. The facilities in Branch 1 will setup a lower capacity Concrete Batching Plant (0.75 m³ per batch) and Stockpile area. The estimated area for occupancy of the facilities including base camp for offices and accommodation of all employees under the lease contract with the private land owners of Branch 1 is 14,680 sq. m. The distance from nearby residents in the area is approximately 1 km. There is no other close village and sub-district affected other than Ogues and Suai, respectively in the proposed pit surroundings. The closest nearby residential areas are the sub-village of Matai of about 1.5 km east, and the sub-village of Ranok of about 2 km south from the location.

2. Borrow Pit 2 and 3

In branch 2, both mountain areas are located in the sub-village of Holba, village of Labarrai, sub-district of Suai, which is also considered as very remote place considering the closest nearby residents and sub-villagers of Holba is about 2 km in the south east. There is no other close village for the next 3 to 5 km in radius and sub-district affected except for Zumalai in the next 15 km north east according to the research.

3. Borrow Pit 4

In branch 3, located in sub-villages of Aidantuik and Haimanu, village of Beco, sub-district of Suai is one part of a continuous mountain land identified as borrow pit 4a in Aidantuik will quarry for embankment/fill is the proposed location with GPS coordinates of Latitude 075 4677 and Longitude 897 5184. Another part in the river of Hamanu identified to be borrow pit 4b with GPS coordinates Latitude 075 8558 and Longitude 897 5637 will quarry for sandstone and sand to mix with borrow pit 4a.

The closest part of the said land is the villagers of Beco. There is no other close village and sub-district affected for the next 2 km referring to the collected survey and the google map in the proposed pit surroundings. The facilities in Branch 3 will also setup a lower capacity Concrete Batching Plant and Stockpile area. The estimated area for occupancy of the facilities including base camp for offices and accommodation of all employees under the lease contract with the private land owners of Branch 3 is 16,600 sq.m. The distance from nearby residents in the area is approximately 1 km.

4. Borrow Pit 5

In branch 4, located in sub-village of Zoac, village of Beco, sub-district of Suai a hilly land which area is located at least 200 m away from villagers. It can be accessed from the existing Suai to Zumalai road. The closest part of the said land is the sub-villagers of Zoac. There is no other close village and sub-district affected for the next 3 km referring to the collected survey and the google map in the proposed pit surroundings.

5. Borrow Pit 6

In branch 4, located in sub-village of Galitas, village of Tashilin, sub-district of Zumalai is a huge hilly land but not of a high elevation. The closest part of the said land is the sub-villagers of Galitas of about 2 km away. The next neighboring sub-village is Holgueda at about 4 km away to the east. There is no other close village and sub-district except for the places mentioned above that are affected referring to the physical inspection, collected survey and google map data in the proposed pit surroundings.

4.2 PHYSICAL ENVIRONMENT

4.2.1 AIR QUALITY

Air quality in Timor Leste is generally good and air pollution is not thought to be a major concern. Air quality problem is usually a localized issue in the urban areas due to heavy vehicle traffic or in urban/rural areas because of construction activities that generate fugitive dust. Recently, however, air pollution from vehicle combustion starting to be of concern in the capital Dili due to the increasing number of cars, trucks and other vehicles. Moreover, the movement of vehicular in unrepaired road is generally also contributing to the air quality degradation.

Air quality is commonly measured in terms of the concentrations of NO₂, SO₂, and Particulate Matter (PM₁₀, PM_{2.5}). The following table contains WHO ambient air quality guidelines, which can be used in Timor Leste in absence of the local standard and guideline.

Table 7: WHO Ambient Air Quality Guidelines

Parameter	Average Period	Guideline Value ($\mu\text{g}/\text{m}^3$)
Sulfur dioxide (SO ₂)	24-hour	20
	10 minute	500
Nitrogen dioxide (NO ₂)	1-year	40
	1-hour	200
PM ₁₀	1-year	20
	24-hour	50
PM _{2.5}	1-year	10
	24-hour	25
Ozone	8-hour daily maximum	100

Source: International Finance Corporation (IFC). <http://www.ifc.org/>

4.2.2 AIR POLLUTION

According to the WB's assessment (2009) outdoor air pollution in Timor Leste is currently a minor problem. The ambient air quality surrounding of area project is unknown at the moment due to lack of air quality measurement. But, most of project area is undeveloped area. Some part is residential and food crop. Air quality appears to be generally acceptable with the exception of dust. The condition of the River doesn't cause dust to arise when excavation of rocks, transport materials and loading trucks pass over unsealed sections. Nonetheless the Contractor will still take some measures to control.

- Seal the work ground and keep it clean;
- Water trunk spray water frequently keep the ground wet;
- Setting tire washing near the entrance of road;
- Checking the excavator regularly to ensure the function of machine is normal;
- Covering the topsoil after it be removed.

Other Particular Views: Outdoor air pollution is a mix of chemicals, particulate matter, and biological materials that react with each other to form tiny hazardous particles. It contributes to breathing problems, chronic diseases, increased hospitalization, and premature mortality.

The concentration of particulate matter (PM) is a key air quality indicator since it is the most common air pollutant that affects short term and long term health. Two sizes of particulate matter are used to analyze air quality; fine particles with a diameter of less than 2.5 μm or PM_{2.5} and coarse particles with a diameter of less than 10 μm or PM₁₀. PM_{2.5} particles are more concerning because their small size allows them to travel deeper into the cardiopulmonary system.

The World Health Organization's air quality guidelines recommend that the annual mean concentrations of PM_{2.5} should not exceed 10 $\mu\text{g}/\text{m}^3$ and 20 $\mu\text{g}/\text{m}^3$ for PM₁₀.

Risk: Cities and rural areas worldwide are affected by air pollution. When planning a trip, consider health status, age, destination, length of trip and season to mitigate the effects of air pollution.

Symptoms: Short term symptoms resulting from exposure to air pollution include itchy eyes, nose and throat, wheezing, coughing, shortness of breath, chest pain, headaches, nausea, and upper respiratory

infections (bronchitis and pneumonia). It also exacerbates asthma and emphysema. Long term effects include lung cancer, cardiovascular disease, chronic respiratory illness, and developing allergies. Air pollution is also associated with heart attacks and strokes.

Prevention

- Comply with air pollution advisories - ask around and observe what locals are doing and avoid strenuous activities.
- Travellers with asthma or chronic obstructive pulmonary disease (COPD) should carry an inhaler, antibiotic, or oral steroid - consult your doctor to see what is best for you.
- Older travellers with pre-existing conditions should get a physical exam that includes a stress and lung capacity test prior to departure.
- Newborns and young children should minimize exposure as much as possible or consider not travelling to areas with poor air quality.
- Ask your medical practitioner if a face mask is advisable for you.

4.2.3 NOISE

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

TABLE 8. IFC Noise Guidelines (IFC, 2007)

Receptor	One Hour L _{Aeq} dBA)	
	Day time 07:00 – 22:00	Night time 22:00 – 07:00
Residential; Institutional; Educational	55	45
Industrial; Commercial	70	70

Most of project area is undeveloped area. Some part is residential and food crop. The primary source of noise is vehicular traffic.

Noise from excavator is concern in the areas around the project when excavating and breaking down of rocks, The noise produced by vibration of excavator might increase gradually as the road project progresses, but the Contractor has the management plan of Quarry, working time, quantities and working method will be strictly observed. The management of working time in daylight hours will be strictly observed.

4.2.4 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. 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.

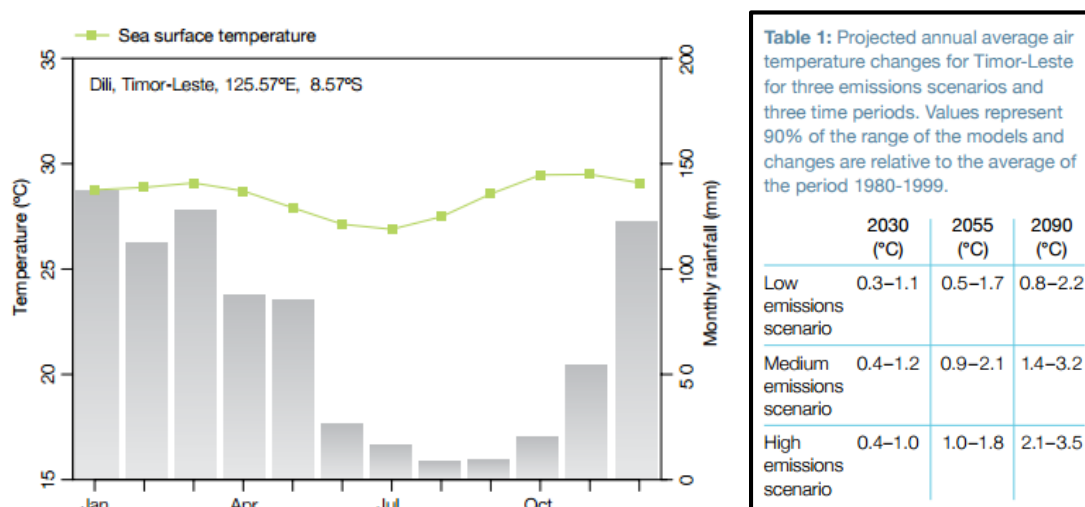
Topography has a strong influence on rainfall quantity, with marginal to low rainfall observed along the northern coast of Timor-Leste (< 1,000 mm/year), low to moderate rainfall in the country's center and on higher elevations (1,500-2,000 mm/year), and relatively high rainfall (2500mm or more /year) on the highest mountains and plains mainly in the west of Timor-Leste (Dewi Kirono, 2010). In south coast, the average annual rainfall is 1,074-1,494 mm/year 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.

Timor-Leste's climate is affected by the West Pacific Monsoon, which is driven by large differences in temperature between the land and the ocean. It moves north to mainland Asia during the Southern Hemisphere winter and south to Australia in the Southern Hemisphere summer. Its seasonal arrival usually brings a switch from very dry to very wet conditions. The normal south-easterly trade winds in Dili are replaced by westerly winds from the monsoon onset until the end of the monsoon season. Year to year variations in Timor-Leste's climate are due to the El Niño–Southern Oscillation and the Indian Ocean Dipole. The El Niño–Southern Oscillation is a natural climate pattern that occurs across the tropical Pacific Ocean and affects weather around the world. There are two extreme phases of the El Niño–Southern Oscillation: El Niño and La Niña. There is also a neutral phase. El Niño events generally bring drier conditions to Dili, and often lead to a late onset and early finish to the wet season. During La Niña events, dry season rainfall tends to be above normal, and the wet season often starts earlier and finishes later. The Indian Ocean Dipole is a climate pattern that affects weather around the Indian Ocean basin. During a positive phase of the Indian Ocean Dipole dry season rainfall in Dili is lower than normal.

4.2.5 CLIMATE CHANGE

Climate change predictions indicate an increase in temperature of around 1,5-3,7⁰ C by 2100 and an increase in rainfall of around 0-10% over the next 50 years. Changes in precipitation are less clear, in particular because of uncertainty over future changes in the Australian monsoon and El Nino, and their effect on regional precipitation. In general, climate change show increased rainfall intensity in the wet season, but more prolonged dry season. An increase in El Nino activity or length of the dry season may cause more frequent droughts in the north of Timor Leste (UNDP, 2008). Because of that, season be considered in the planning of this project particularly for areas susceptible to flooding and landslides.

Figure 13. Seasonal Nature and Temperature



The southern part of Covalima area is tropical rainy season with prolonged rain period that lasts between December and May next year. Long term data from 1957 to 1974 available for Covalima indicate that in the northern Covalima, December through May are the rainy months while the rest of the year are typically dry but still have rainy days because of high elevation in Mountain areas

Table 9.1 Rainfall Data in Covalima 1957-1974

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1957	34	119	15	0	0	0	0	0	0	0	0	115	282
1958	34	119	15	0	0	0	0	0	0	0	0	155	322
1959	140	70	18	23	50	11	10	0	10	0	0	48	381
1960	166	81	199	124	69	0	50	0	0	3	13	158	863
1961	390	129	82	55	10	0	0	0	0	17	11	58	753
1962	123	139	69	68	9	86	5	11	0	3	39	90	640
1963	119	80	239	132	12	0	0	0	0	0	0	8	589
1964	26	21	186	88	87	18	0	2	51	55	60	10	602
1965	130	76	99	8	10	11	0	0	0	0	0	23	357
1966	44	113	93	29	30	36	0	0	0	8	21	44	418
1967	121	59	49	37	5	0	0	0	0	0	0	14	286
1968	63	36	76	20	79	67	54	0	0	0	0	23	418
1969	77	129	32	0	0	78	10	0	0	0	4	146	476
1970	27	81	23	94	74	76	0	0	10	51	60	85	580
1971	74	76	45	29	115	6	22	2	13	50	48	104	583
1972	46	25	90	106	36	0	0	2	0	0	4	102	411
1973	314	675	134	205	73	13	38	0	29	5	103	112	1698
1974	159	102	48	17	19	9	26	1	2	5	115	154	656
MEAN	116	118	84	58	41	56	13	1	6	11	27	80	610
MIN	26	21	15	0	0	0	0	0	0	0	0	8	282
MAX	390	675	239	205	115	613	54	11	51	55	115	158	1698

Source: Ministry of Infrastructure, National Directorate of Meteorology and Geophysics.

In terms of temperature and relative humidity, more recent data available between January 2008 and February 2009 suggested temperature range from the average monthly minimum of 22.9°C to the average monthly maximum of 32.60°C. Relative humidity is approximately 73%, making the weather humid but still generally pleasant. Table 3.2 presents the temperature and relative humidity characteristics of Covalima.

Table 9.2. Temperature and Relative Humidity in Covalima

TEMPERATURE (°C)		RELATIVE HUMIDITY (%)	
Annual Average	27.3	Annual Average	73.5
Highest Monthly Average	32.6	Highest Monthly Average	89.1
Lowest Monthly Average	www	Lc west Mont if y Average	52.4

4.2.6 TOPOGRAPHY

The General topography in the district is mountains and low lands. The highest mountain in Cova Lima District is Mount Taroman with 1,765 m in height. There are rivers that flows across the proposed road alignment throughout the year. It is identified as follows: Karoulun, Nabuk, Raiketan, Zolai, Haimanu, Lumea, Bunetel and Mola rivers. Both Raiketan and Mola are the prospected rivers that the project proposes for river quarrying for crushing and washing stones and sand.

4.2.7 GEOLOGY

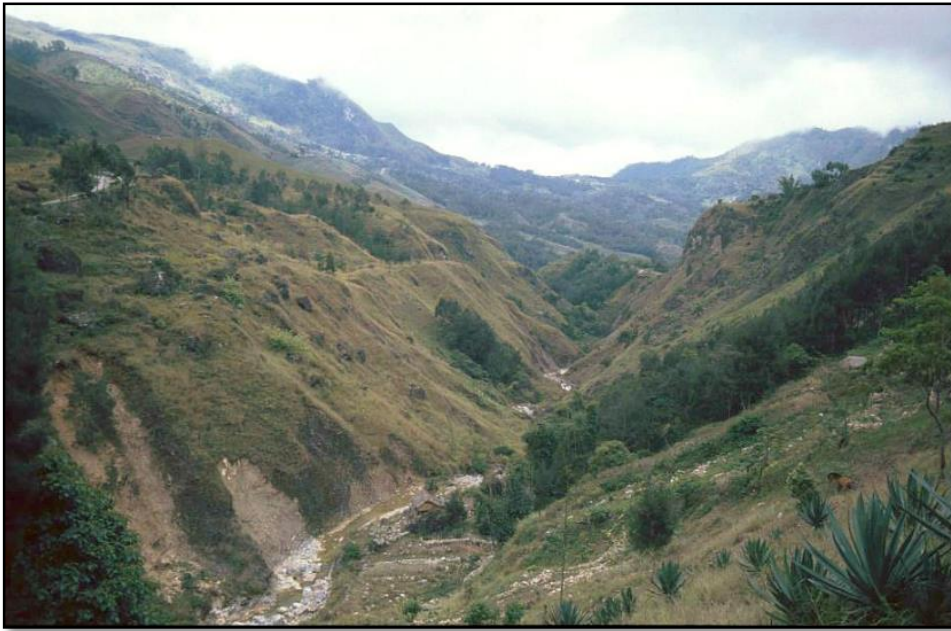
Timor-Leste is unique among the major islands of the Sunda archipelago in that it is not of volcanic origin. Timor-Leste is a continental fragment. The proposed project site in Bandara Hun is composed largely alluvial graveland there are other sedimentary deposits nearby. There is a thin soil course covering the stone surface.

Landslides are not a significant environmental risk in the project area, however erosion, resulting from interactions between water flow and soil may be a problem at this site. No blasting will be needed but excavation and crushing can cause significant vibrations. Safety for plant workers and local people who live around the project are shall be observed. Care will be taken when excavating and protective measures after excavation.

4.2.8 HYDROLOGY

The existing waterway across the site from the road side is a gutter. There is no water during dry season, water flows only at wet season.

FIGURE 14. Mountain area in Cova Lima



4.3 BIOLOGICAL ENVIRONMENT BASELINE CONDITIONS

4.3.1 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*.

The land of project is in the jurisdiction of the local district administration and there is no economic crops on the area. There is grass with occasional trees and shrubs with some cacti scattered between rocky outcrops across the site.

There are four Batching Plants locations by the contractor:

- i. Branch 1, Suai Vila (sta. 6+500 L/S)
- ii. Branch 2, Labarai (sta. 14+500 R/S)
- iii. Branch 3, Holba (sta. 19+000 L/S)
- iv. Branch 4, Beaco (sta. 33+000L/S)

Sand Washing are also located in private lands currently looked after by local leaders. The land has been idle and has not been utilized by the local government or the local people. This being the case, no land or water rights will be affected by the Project.

The cutting of trees out of the excavation area shall be prohibited. When there is conflict

between trees and its work area, it must be informed to the local authorities and proper measures should be taken.

4.4 SOCIO-ECONOMIC ENVIRONMENT BASELINE CONDITIONS

4.4.1 POPULATION

Covalima is located in the western part of Timor leste and borders Indonesia to the west. It had a population of 59,455 inhabitants (sensus 2010) and an area of 1,226 km². The capital of Covalima is Suai, which lies approximately 135 km south-west of Dili

4.4.2 LIVELIHOODS

Most of the population relies on agriculture with limited alternative sources of income which resulted in rising numbers of poor people in rural areas. High population growth (about 3% annually) rapid urbanization and a small formal sector have resulted in slow rates of job creation in urban areas and have contributed to poverty rates rising.

4.4.3 POVERTY

Damage to infrastructure and the dislocation of the population during the independence struggle made Timor Leste's poverty problem worse. Local studies indicate that about a higher proportion of the rural population are poor, compared to the urban areas. About 75% of the poor live in rural areas and 25% live in urban areas.

4.4.4 HEALTH AND SANITATION



There are 13 health posts and six community health centers in Covalima District. The nearest hospital is located in Dili. Two-thirds of the population of the project area has access to basic sanitation (pit latrine, septic tank, flush toilet)

Plan International works with communities to improve access to safe drinking water and basic sanitation and to raise awareness of the importance of hand washing and waste management. By working side by side with communities to build sustainable, community-managed water and sanitation services, Plan International engages Timorese communities to incorporate good hygiene practices, including hand washing, sanitary toilet use and environmental cleanliness into their everyday lives. Improved sanitation facilities are one of the key methods for reducing stunting and improving the health of children and their families.

From 2011 onwards, thirty two village water supply systems benefitting 1,695 households (or approximately 9,400 villagers) have been built or rehabilitated. Thirty two water facility management groups have been formed to manage the construction, operation and maintenance of community water supply and sanitation infrastructure. This will ensure communities will have long-term access to clean drinking water.

Plan International is also constructing toilets in schools and launching Hygiene Clubs that teach students the importance of washing their hands and preventing diseases.

4.4.5 WATER SUPPLY

An assessment of Climate Change Impacts on Groundwater Resources in Timor Leste led by Geosciences Australia is aimed at assisting Timor Leste's government to better understand and manage their groundwater resources. From the current known information most aquifers in Timor-Leste are recharged by rainfall during the wet season. There is a concern that without a regular recharge, the stored groundwater capacity will decrease. Timor's population increase has caused a higher demand for groundwater which is currently been met by regulated pumping bores which are tapped into deep aquifers, plus the sprouting of unregulated spear point bores in the shallow aquifers. Both groundwater recharge and the aquifers morphology need to be better understood in order to ensure supply and so groundwater can be managed for the future. Current weather patterns are expected to change and this could cause longer periods of drought or more intense rainfall, which in turn, would affect the availability and quality of groundwater. Salt water intrusions pose a threat on the low-lying aquifers as sea level rises. Australia's CSIRO has undertaken a series hydro-geophysical investigations employing ground TEM to assist in the characterization of three aquifers near Dili, Timor Leste's capital. Interpreting ground water chemistry and dating; jointly with EM data has enhanced the understanding of the aquifers architecture, groundwater quality and helped identify potential risks of seawater intrusions.

Covalima has access to drinking water from improved sources making use of deep wells, river and spring water in the area. Other sources in particular, water is drawn from river through a perforated pipes encased in wire screens holding infill filter media consists of gravel and cobbles. This is transmitted with the aid of gravitation force to households in the entire villages affected within Covalima District.

Securing Timor Leste's water supplies. A survey of Timor Leste's water supplies kicks off a project aimed at helping to protect this life-giving resource against the threat of climate change.

The joint Charles Darwin University (CDU) and Geoscience Australia project is collaborating with researchers from the National University of Timor Lorosa'e. It will provide input to the Timor Leste government's UN-brokered National Adaptation Programme of Action (NAPA) on Climate Change UN-brokered National Adaptation Programme of Action (NAPA) on Climate Change.

With the assistance of CSIRO scientists, Geoscience Australia geologists are mapping the type and location of the country's underground aquifers.

A team of researchers from CDU has visited more than 30 local villages to find out how people use the water and how access can be improved.

In Dili there is a sedimentary aquifer that provides a large supply of good quality water, and the city's residents benefit from water delivery infrastructure. But in the Covalima, outside of Dili, collecting water is a daily struggle.

Some villagers are forced to move their families from their highland homes closer to the water source during Timor Leste's long dry season that sees vital springs dry up for months at a time.

The CDU researchers spent two months meeting people who draw water from three different aquifer

types – sedimentary, fractured rock and limestone – to gauge how water was treated differently and its impact on the survival and economy of the village.

It is heard some amazing stories like people who had to walk 10 km through the mountains twice a day to fill a small bucket up with water according to some survey of researchers. With Timor Leste's population of 1.7 million people growing rapidly, the government of Timor Leste is under pressure to make sure there is enough water to go around.

The researchers estimated that 44 per cent of the country's population live in areas where the water source is low in quality and quantity, making these people particularly vulnerable to changes to the water source arising from climate change.

Temperatures in Timor Leste are expected to rise by between 0.4°C and 1°C by 2030, cyclones and rainfall will become less frequent but more extreme and the sea level is expected to rise by 6 cm to 15 cm, according to climate change predictions from the *Pacific Climate Change Science Program*.

This means Timor Leste will experience intense rainfall events similar to the 2010–11 wet season when heavy rainfall ran through the country's streams, creeks and rivers out to the ocean, but without replenishing the underground aquifers.

These rains destroyed most of the country's food crops of rice, maize and cassava. There are also fears of the potential impact on the country's growing coffee industry, which relies on cooler temperatures and plentiful water to survive.

Priority actions include monitoring groundwater resources to better understand water availability, irrigation maintenance, diversifying agriculture and reducing waste and overuse of existing water supplies.

The research project was funded by the Australian Government under the Pacific Adaptation Strategy Assistance Program, through the International Climate Change Adaptation Initiative. *Source: Charles Darwin University*

4.4.6 WILDLIFE AND FORESTS

The natural environment of Timor Leste is highly subjected to human exploitation and resource use (Ref). Within this context, the forests of the country are mostly non-pristine in nature. Pristine forests are found only in the eastern part of the country or high on top of the mountain where human influence is hindered by difficult access.

Firewood collection, shifting cultivation and land clearing for residential purposes are several types of resource consumption that put tremendous pressure on the forest and wildlife. Within the changed landscape, however, natural habitats still flourished although land fauna in Timor Leste have been poorly studied until recently. Bird fauna, on the other hand, have been better studied and identification of main habitats as well as areas of importance has recently been made.

Where the project is located (within south region of Timor Leste), main bird habitats found are woodland. No wetland has been identified within or near the facility location, therefore it is not included in the discussion. The following table presents information on these main habitats and the associated bird species.

Table 10. Main Habitats and Bird Species on Areas near Project Locations

Main Habitat	Common Types of Vegetation	Bird Species
Woodland and savannas	<i>Eucalyptus alba</i> , palm, acacia, <i>Eucalyptus urophylla</i> on the hills, and other species of trees common to areas that have been historically affected by swidden agriculture.	<i>Saxicola gutturalis</i> (White-bellied Chat), <i>Padda fuscata</i> (Timor Sparrow). Seasonal birds included <i>Trichoglossus iris</i> (Iris Lorikeet) and <i>Trichoglossus euteles</i> (Olive-headed Lorikeet). Especially in lowland savannas, <i>Mirafra javanica</i> (Australian Bushlark) and <i>Philemon buceroides</i> (Helmeted Friarbird) are common.

In addition to the above general description of main habitats, Important Bird Areas (IBAs) have been identified for Timor Leste. IBA are sites of international biodiversity significance which support globally threatened birds, restricted-range birds, biome-restricted birds or globally important populations of congregatory birds (e.g. waterbirds). No IBA is nearby this project.

4.4.7 HISTORIC, ARCHAEOLOGICAL AND SACRED SITE

An official listing of historical and archaeological sites in Timor-Leste is yet to be published. Actual site investigation has confirmed, there are no old structures, historic buildings or significant monument near or along the project site. The project site is not a historic, archaeological or sacred site.

However, when Cultural Heritage is encountered during excavation at site, work shall be stopped immediately and report to local authority for protection of Cultural Heritage. Works cannot get restarted until such authorities approves back the operation.

4.4.8 PROTECTED AREA AND NATIONAL PARK

Proper identification and effective management of protected areas that cover a wide range of natural habitats for birds well as other fauna are keys to the protection of wildlife in Timor Leste. As previously noted, one of the most important impacts from mining development is loss of important habitats due to the nature of mining activities that remove vegetation, soil and even underlying rock layers from certain areas. It is therefore imperative for the government to regulate mining activities with recent studies have discovered new species of bats, frogs, geckos and skinks (source: As Aves de Timor Leste). Officially, there are 15 protected wildlife areas in Timor Leste based on UNTAET Regulation No. 19/2000. A draft on PA law has been developed by the State Secretary of Forestry and Protection of the Natural Environment with support from Conservation International in Timor Leste.

Table 11. Protected Areas in TL (Based on UNTAET Regulation No.19/2000)

No	Protected Area	Description	District
1	Jaco Island	Total land area of the island with surrounding rocks, reefs and other surface and subsurface features	Lautem
2	Tutuala Beach	Cover the beach as well as the adjacent forest	Lautem
3	Lore Reserve	Forest and Iralalaru Lake	Lautem
4	Cristo Rei Beach	Cover the Cristo Rei recreational park and adjacent mountain range all the way to the back of Area Branca Beach.	Dili
5	Summit of Tatamailau Mountain	All elevations above 2,000 m and the surrounding forests	Covalima

6	Summit of Saburai Mountain	All elevations above 2,000 m and the surrounding forests	
7	Summit of Talobu Mountain	All elevations above 2,000 m and the surrounding forests	
8	Summit of Mount Diatuto	Including surrounding forests	
9	Summit of Mount Fatumasin	Including surrounding forests	
10	Mount Mundo Perdido	Including surrounding forests	Viqueque
11	Summit of Mount Matebian	All elevations above 2,000 m and the surrounding forests	Baucau and Viqueque
12	Mount Cablaque	Including surrounding forests	

The facility is not located within any of the above Protected Areas (PA).

4.5 ALTERNATIVES

Alternative locations for the batching and sand washing areas have been considered including the “do nothing scenario”, alternative layouts, and alternative sources. Hard rock sources in this area are limited and considering strategic, access, environmental, social, economic and financial factors, there are no practical alternatives to the proposed project location.

The “do nothing scenario” alternative is not practical as it would necessitate hauling materials from the nearest suppliers in Dili or Ainaro and these sources cannot be guaranteed and will not necessarily provide material in sufficient quantity at the correct time. The demerits of the “do nothing scenario” are: (i) supply time and transportation cost will increase and road construction may be delayed (ii) repeated quality checks, necessary to comply with contractual obligation, will slow supply process.

5. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This assessment is based on the detailed drawings produced by the COVEC-CRFG. Determining the scale of impact depends on (i) spatial scale of the impact (local site and immediate environs); (ii) time horizon of the impact (short, medium, or long term); (iii) magnitude of the change in the environmental component brought about by the project activities (small, moderate, large); (iv) importance to local human populations; (v) compliance with international, national, provincial, or district environmental protection laws, standards, and regulations; and (vi) compliance with guidelines, policies, and regulations of Timor-Leste. Where potential major negative impacts are identified, mitigation measures are developed to reduce them to acceptable levels. The impacts considered are mainly direct impacts caused by the project manufacturing activities that occur at the same time and place and can be created during both project manufacturing facility construction, commissioning and operation. Indirect impacts that are reasonably foreseeable and occur later in time or farther removed in distance are not likely in the case of the manufacturing facilities under consideration.

Short-term impacts, like the noise and fumes associated with heavy equipment occur without long-lasting effects. There are no long-term impacts that could affect regional land use or development patterns. The project is limited to small-scale manufacturing activities to support road rehabilitation works. There is little scope for long-term environmental impacts arising from such works.

Impacts created during construction and operation of manufacturing activities are dependent on a number of factors including:

- The temporary use of land and its rehabilitation after operations are complete;
- Best practices being employed during pre-construction and operational activities;

- Coordination and cooperation with local authorities in terms of impact management;
- Strict enforcement of environmental clauses and conditions included in project bid documents, the contract and technical specifications; and
- Adherence to the SEMP contained in this SEIS prepared by the contractor and submitted to NDPCEI.

TABLE 12. Summary of Project Activities and Mitigation Measures

PROJECT ACTIVITIES GIVING RISE TO IMPACTS	MITIGATION MEASURES TO CONTROL ENVIRONMENTAL IMPACT FROM:
PRE-CONSTRUCTION	
Use of public and private land.	Identifying suitable land with sufficient supplies of rock based material & testing rock quality
	Establishing acceptable agreements with land owners for land use and tree felling.
	Planning and developing a sustainable design of the Project excavation, mechanical structures and control of operational impacts
Surveying and demarcation of manufacturing area boundary.	Loss of vegetation during demarcation
Site clearance, digging, excavations	Discovery of cultural historical property
	Removal of trees
Mobilization of contractor	Social disruption
	Health and safety risks and management
	Spread of communicable diseases
CONSTRUCTION AND COMMISIONING	
Clearing, cut & fill activities for manufacturing working areas, stockpile and tagging areas lead to loss of land	Soil erosion & sediment contamination of rivers & turbidity.
Operation of construction equipment	Emission and dust from plant and materials
Works adjacent to water bodies or drainage channels	Erosion & physical changes to drainage channels
Spoil overburden discarded un-useable rock base material	Impacts to habitats & water courses
Run-off, discharges, generation of liquid wastes	Impacts on water quality
General activities solid & liquid waste arising	Uncontrolled unmanaged waste disposal
Use of hazardous materials	Spillage, leakage, accidents
Accidental damage to existing services	Interference with existing infra-structure; water supply, power, telecommunications
Presence of construction Workers	Disruption, or antagonism, communicable diseases & community health
Site office, water use &	Stress on existing resources and

electricity supplies	infrastructure
OPERATIONS	
Sourcing of materials (quarry aggregates)	Extraction gravel, altering contours and runoff patterns & erosion; quarries & borrow pits
Operation of construction equipment	Emissions & dust from plant & materials Negative
Operation of rishers, conveyors, batching & asphalt mixing equipment	Emissions & dust from plant & materials Negative
Spoil overburden discarded un-useable rock base material	Impacts to habitats & water courses
Run-off, discharges, generation of liquid wastes	Impacts on water quality
General activities - solid & liquid waste arising	Uncontrolled unmanaged waste disposal
Use of hazardous Materials	Spillage, leakage, accidents
Activities outside manufacturing areas encroaches habitats	Workers poach animals, eggs feathers gather fuel wood & impact habitats.
Accidental impacts historical / cultural sites	Impacts on PCR or cultural property sites
Noisy construction plant and equipment	Impacts community & workers
Vehicle parking and traffic safety issues	Traffic disruption & safety affected
General work activities	Worker health and safety risks
Operation of vehicles creating emissions	Emissions increase locally
Routine and ongoing Maintenance	Blocked drains; gravel repair materials
Run-off from manufacturing area	Loss of soils and water quality in rivers and near shore areas

5.1 PRE-CONSTRUCTION IMPACTS

Planning for materials extraction and identification legitimate sources of materials for all the branches teams in the project must also take place in the pre-construction phase. Pre-construction impacts are limited to identification of suitable land and permission to use it; site clearance, digging and excavations; vegetation removal during surveying and demarcation of manufacturing area. The project has to comply with the requirements of the Employer and best practice in relation to material sourcing. Materials have to be fit for purpose determined through laboratory tests as applicable.

The National Directorate for Pollution Control and Environmental Impact (NDCPEI) to issue the permit. To prepare the EMP document, steps in environmental impact assessment procedure should be followed, which means that the project proponent must first submit the Project Document (PD) and application form to the environmental authority. Based on the PD and application form, DNE would then perform a screening process to determine the category of the project.

Results from categorization from the NDCPEI would determine the next step in the process, which is

to write the full scale Environmental Impact Statement (EIS) for category A projects, Simplified Environmental Impact Statement (SEIS) for category B projects, or to issue permit and recommendations for category C projects.

A Project Document that was prepared and submitted to NDCPEI in order to screen and categorize the project to provide a legal basis for project owner to develop either the EIS or SEIS that contains an Environmental Management Plan (EMP). Based on this PD, the NDE recommended this project to develop SEIS because the overall project evaluation fall under the **Category B** projects.

5.1.1 OPERATIONAL IMPACTS ON PHYSICAL ENVIRONMENT

Table 13. Summary of Impact Arise From Related Activities

No	Potential	Nature of Impacts	Scope of Impacts	Impact Indicator
Mining Activities				
1	Loss of flora and fauna.	Negative, direct, long term impacts related to top soil removal during excavation of rocks.	Localized to the areas cleared. Since the location of mining activities is not part of sensitive habitat or ecologically important areas, impacts are predicted not be significant.	Areas of vegetation cleared, type and extent of vegetation cleared.
2	Erosion	Negative, direct, could be long term impacts related to the mining activities that leave open areas in the mining sites. Erosion is especially a high risk during the rainy season (impacts are likely to happen during rainy season from December through May).	Localized at the mining area, large scale erosion might impact the lower facility area. Depending on the scale of erosion, impact can be significant.	Broken soil area, eroded open pits, evidence of earth movement especially during the rainy season.
3	Sedimentation	Negative, direct, could be long term impacts related to the movement of soil settled by the rain, therefore will become a problem especially during the rainy season.	Sediment can be carried by runoff affecting the coastal and near water area. The scope of the sedimentation will depend on the scope of eroded soil from mining operation.	Turbidity of waters.
4	Air quality	Negative, direct, could be long term related to the movement of earth during excavation activities. Most likely become a problem during dry season from April to November.	Localized around the mining area, however, fugitive dust can be blown by the wind into the national road affecting passersby.	Particulate matter in the air, complaints from workers related to upper respiratory tract infection.
5	Noise and vibration	Negative, direct, short term, related to operation of equipment.	Localized to workers in the facility. Since the closest community lives 6 km away, no noise and vibration impacts are expected to affect local communities.	Level of noise and vibration.

6	Preservation of cultural or archaeological resources	Negative, direct, could be long term related to excavation works for rock mining activities.	Localized to the area being excavated. Archaeological excavation in nearby areas have found remains of past communities	Usually indicated by findings of certain archaeological artefacts such as animal pen, walls and housewares in the excavated areas.
7	Occupational safety	Negative, direct, could be long term to workers' health. Related to the day to day mining activities.	Localized to workers as well as visitors in the facility.	Whether a facility is considered to be running a safe operation or not is usually indicated by the number of work related accidents in a certain period of time.
Crushing Activities				
1	Air quality from particulate matter	Negative impacts related to the handling of raw rocks and crushing of rocks. Most likely become a problem during dry season from June to November.	Localized around the mining area, however, fugitive dust can be blown by the wind into the national road affecting passersby.	Particulate matter in the air
2	Sedimentation	Negative impacts similar to the above impact, related to the movement of earth that is settled by the rain, therefore will become a problem especially during the rainy season.	Sediment can be carried by runoff affecting the coastal and nearby water area. The scope of sedimentation will depend on the scope of eroded soil from mining operation.	Turbidity of waters
3	Surface and ground water quality	Negative impacts related to the use of lubricants for heavy equipment and diesel fuel for power generation. Also related to storage of the fuel and	Spilled oil and fuel could leach into the ground water or being washed away by runoff. Since the area has fissured aquifer type	Evidence of spilled oil on the ground
4	Loss of Flora and fauna	Negative impacts related to changes in land use to industrial (rock crushing) site.	Localized to the facility area. Since location of facility does not fall into sensitive habitat	Loss of vegetation
5	Noise and vibration	Negative impacts related to equipment operation.	Localized to workers in the facility.	Complaint of loud noise and vibration from workers
6	Occupational safety	Negative impacts related to the operation of heavy equipment,		

5.1.1.1 Impacts on Air Quality from Operation of Construction Plant and Vehicles Generating Emissions.

Gaseous emissions. The operation of the manufacturing areas will create air pollution such as hydrocarbons, carbon monoxide, nitrous compounds, sulphur dioxide and particulate matter. Emissions from diesel powered mechanical equipment, as indicated by concentration of oxides of nitrogen, will be the main air pollution sources during operation. However these emissions are located several hundred meters from the villages and emissions will be well dispersed enough to not have a noticeable effect on ambient air quality. The other sources of emissions near the manufacturing area are from domestic fuel burning. Sensitive receivers are set far enough back from the manufacturing area to allow adequate dispersion that there will be no significant impacts at the sensitive receivers.

Particulate emissions. Particulate contamination such as dust and fumes will also be air pollution sources during operation, however, toxic residues from the manufacturing area to allow adequate dispersion that there will be no significant impacts at the sensitive receivers are unlikely to

accumulate or create significant impacts. In the event that dust does become problem the manufacturing areas will be sprayed with water and installations of shrouds or dust control jackets will be undertaken for the hoppers of the plant machinery.

The conclusion in respect to air quality is that the project road is likely to continue to operate at well under its design capacity and no significant air quality impacts warranting mitigating actions are anticipated during operation and maintenance phase.

Air quality of the project area is good due to lack of industry and very low numbers of vehicles. During the construction phase the operation of the plant and machinery will have a minor and temporary impact on local air quality through emission of exhaust from construction vehicles and aggregate crushing plant; as well as through dust generation from vehicles transporting materials and from exposed stock-piles of construction materials.

Earthworks and rock crushing activities will be the main sources of dust. The works will generally have sufficient buffer distance such that no significant impact is expected from the operations on residential sensitive receivers in terms of noise, vibration, and dust. Also works will not take place at night except in special circumstances justifiable to the PMU.

Overall, the improvement of the road will result in reduction of dust emissions as a result of proper compaction and treatment of the road surface. There are a number of good engineering practices that can be employed in the manufacturing areas to ensure that any air quality impacts generated during operations of the plant are mitigated. These include:

Manufacturing equipment being maintained to a good standard. The equipment will be checked at regular intervals to ensure they are maintained in working order and the checks will be recorded by the contractor as part of environmental monitoring;

- Prohibition of the use of equipment and machinery that causes excessive pollution (i.e. visible smoke) at the project site;
- Material stockpiles being located in sheltered areas and to be covered with tarpaulins or other such suitable covering to prevent material becoming airborne and runoff of fine particles;
- Ensuring that all vehicles transporting potentially dust-producing material are not overloaded, are provided with adequate tail-boards and side-boards, and are adequately covered with a tarpaulin (covering the entire load and secured at the front, sides and tail of the vehicle) during transportation. This is especially important as there are a number of Sucos along the road;
- Sprinkling of water on the road, where work is in progress within 100m of the Sucos along the road and any roads being used for haulage of materials, during the dry season shall take place several times a day; and
- Periodic qualitative air quality monitoring.

5.1.1.2 Works in or Adjacent to Rivers and Streams

The River has water flows all year round and during the works it will be necessary to carry out excavation of gravel and boulders in the river. If the wet season cannot be avoided, there could be the need to temporarily constrict water flows and dry out sections of river depending on their size and water volumes carried. These activities can result in a risk of channel shifts and erosion, particularly of river banks that would lose their vegetation cover, most particularly during floods.

Stockpiled materials, if located within the floodplain, may be eroded and dispersed and patterns of water movements during 'normal' and flood flows affected. Movements of machinery and other activities can be expected to impact riverside fauna and flora, however because the rivers in the area are highly disturbed ecosystems, regularly subjected to flooding and channel shifts, impacts on these are likely to be minimal. Potential impacts on the structure of river habitats, including their channels, banks and floodplains will be mitigated by:

- Material stock-piles will not be located within riverbeds or the islands in the center of rivers. Similarly, they will not be located within the current area of floodplain of river in areas subject to regular flooding (i.e. once per year or more). All land used for stockpiles will be rehabilitated to its original or better condition upon completion of the works;
- Scour protection will be used as temporary measures, as needed, to ensure temporary structures do not damage river configuration;
- Movements of vehicles and machinery in river beds within the riverine habitats will be minimized at all times to reduce disturbance;
- No vehicles or machinery shall be washed in the river;
- In the event that the contractor causes damage to the river bank or other structural parts of a river, the contractor is solely responsible for repairing the damage and/or paying compensation to the riparian owners;
- Embankments and in-stream/river activities will be monitored for signs of erosion during construction;
- Re-vegetation with local fast growing species, or other plants will be carried out incrementally and as quickly as possible after work within any river habitat has been completed after consultation with the land owners and Suco chiefs; and
- Spoils, rubbish or any other surplus material will not be disposed-off within any river system including riverbed, banks or floodplain areas. Suitable disposal sites will be designated in consultation with land owners and Suco chiefs and approved by PMU.

5.1.1.3 River Training and Sourcing of Materials

Sources of material (gravel, aggregate etc.) and borrow pit sites for the project will be agreed upon prior to commencement of works. The Contractor will be required to identify sources and prepare a sustainable extraction plan (materials management plan) as part of the SEMP, for all sources of material and spoil that will be used in road works. The aggregate extraction plan will be submitted to PMU, which will approve and monitor implementation of the extraction plan.

To mitigate the impacts from extraction sites, in addition to the preparation of the site specific extraction plan by the contractor, the bid and contract documents have specifically required contractors to: (i) Balance cut and fill requirements to minimize impacts from extraction of aggregates; (ii) Prioritize use of existing quarry sites with suitable materials and update the list of quarries and borrow pits monthly and report to MPWTC and minimize impacts on other local resources; (iii) Procure materials only from borrow sites acceptable to PMU or licensed and authorized by NDPCEI; (iv) If the contractors shall operate the river quarry site, required environmental licenses and permits shall be secured prior to operation of quarry/borrow areas; and (v) borrow/quarry sites shall not be located in productive land or forested areas. To mitigate the impacts from extraction mitigation measures identified in the SEMP include:

- Stockpile topsoil for later use and fence and re-contour borrow pits after use
- Properly removed topsoil, overburden, and low-quality materials and stockpile near the

site to be covered and preserved for rehabilitation.

- Use quarries with highest ratio between extractive capacity (both in terms of quality) and loss of natural state.
- Use quarry sites lying close to the alignment not on slopes, with a high level of accessibility and with a low hill gradient;
- Reinstatement damaged access roads, agricultural land and other properties upon completion of construction works at each section, if damaged due to transport of quarry/borrow materials, other construction materials or any other project-related activities;
- Provide adequate drainage to avoid accumulation of stagnant water during quarry/borrow site operation;
- Avoid use of quarry sites located on river beds. If it is not possible to locate quarries out of river beds, use only quarry sites lying on large rivers as approved by PMU;
- Avoid quarry sites lying on small rivers and streams.
- Choose alluvial terraces or alluvial deposits which lie on the river beds but not covered by water in normal hydrological conditions;
- Cut berms and terraces during and after extraction in quarries in the mountainous or hilly areas to stabilize slopes, wherever slopes are important, and implement a drainage system and vegetation cover for rehabilitation;
- Dewater and fence quarries and borrow pits as appropriate, upon completion of extraction activities to minimize health and safety risks;
- Do not open additional extraction sites and/or borrow pits without the restoration of those areas no longer in use;
- Ensure borrow pits are left in a tidy state with stable side slopes and proper drainage in order to avoid creation of water bodies favourable for mosquito breeding;
- Refill borrow pits as required by NDPCEI using surplus inert material and excavated unsuitable soils;
- Mark refilled borrow pits and cover with topsoil and plant shrubs and trees to rehabilitate as required by PMU & NDPCEI. Prevent accidental access and avoid drowning when pits become water-filled by implementing measures such as fencing, providing flotation devices such as a buoy tied to a rope, etc; and
- Conduct the excavation and restoration of sites and borrow areas, as well as their immediate surroundings in an environmentally sound manner to the satisfaction of the PMU. Sign-off to this effect by PMU will be required before final acceptance and payment under the terms of the contract.

5.1.1.4 General Activities – Solid and Liquid Waste Management

Uncontrolled waste disposal operations can cause significant impacts. Mitigation measures will seek to reduce; recycle and reuse waste as far as practicable. The PMU will be responsible to monitor the contractor's progress of implementing the provision of the waste management section of the EMP and all mitigation measures. The waste management section of the SEMP will also include consideration of all matters related to solid and liquid waste disposal including the following: (i) expected types of waste and quantities of waste arising; (ii) waste reduction, reuse and recycling methods to be employed; (iii) agreed reuse and recycling options and locations for disposal / endorsement from NDPCEI and local groups; (iv) methods for treatment and disposal of all solid and liquid wastes; (v) methods of transportation to minimize interference with normal traffic; and (vi) establishment of regular disposal schedule.

The mitigation measures in the EMP will include but not necessarily be limited to the measures listed below. The contractors shall ensure implementation of these measures.

- Areas for disposal to be agreed with local authorities and Suco leaders and checked and recorded and monitored by the PMU (but all waste oil will be taken to disposal site);
- No burning of waste associated with the project or the supporting activities. Burning of waste will not be allowed anywhere on the Project;
- Segregation of wastes shall be observed. Cleared foliage, shrubs and grasses may be given to local farmers for fodder and fuel. Organics (biodegradables) shall be collected and disposed-off on-site by composting (burning waste not be allowed anywhere within the project site footprint or in the camps);
- Recyclables shall be recovered and sold to recyclers;
- Residual general wastes shall be disposed of in disposal sites approved by local authorities and PMU;
- Construction/workers' camps shall be provided with garbage bins;
- Disposal of solid wastes into flood ways, wetland, rivers, other watercourses, farmland, forest, mangrove and associated salt flats, beaches, places of worship or other culturally sensitive areas or areas where a livelihood is derived such as canals, agricultural fields and public areas shall be strictly prohibited;
- There will be no site-specific landfills established by the contractors. All solid waste will be collected and removed from the work camps and disposed in local authority designated waste disposal sites; and
- Waste disposal areas approved by local authorities shall be rehabilitated, monitored, catalogued, and marked.

5.1.1.5 Use of Hazardous Materials and Waste Disposal

Use of hazardous substances such as oils and lubricants can cause significant impacts if uncontrolled or if waste is not disposed correctly. Oils and lubricants discharged to mangroves can kill the roots and destroy the mangrove. Mitigation measures will seek to control access to and the use of hazardous substances such as oils and lubricants and control waste disposal. The PMU will be responsible to monitor the contractor's progress of implementing the hazardous materials and waste section of the SEMP to avoid or minimize impacts from use of hazardous substances such as oils and lubricants.

The hazardous materials and waste management section of the SEMP will include consideration of all matters related to hazardous waste disposal including the following: (i) expected types and volumes of hazardous materials and waste; (ii) methods for treatment and disposal of all hazardous wastes; (iii) approvals and environmental licenses required; (iv) methods of transportation to minimize interference with normal traffic; and (v) establishment of regular disposal schedule as agreed or as condition of granting of environmental license. The mitigation measures identified in the EMP include:

- Ensure that safe storage of fuel, other hazardous substances and bulk materials are agreed by PMU and have necessary approval/permit from NDPCEI and local authorities.
- Hydrocarbon, toxic material and explosives (if required) will be stored in adequately protected sites consistent with national and local regulations to prevent soil and water contamination.
- Equipment/vehicle maintenance and re-fuelling areas will be confined to areas in construction sites designed to contain spilled lubricants and fuels. Such areas shall be

provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency;

- Fuel and other hazardous substances shall be stored in areas provided with roof, impervious flooring and bund/containment wall to protect these from the elements and to readily contain spilled fuel/lubricant;
- Segregate hazardous wastes (oily wastes, used batteries, fuel drums) and ensure that storage, transport and disposal shall not cause pollution and shall be undertaken consistent with national and local regulations;
- Ensure all storage containers are in good condition with proper labeling in English and Tetun;
- Regularly check containers for leakage and undertake necessary repair or replacement;
- Store hazardous materials above flood level;
- Discharge of oil contaminated water shall be prohibited and separated oil shall be disposed of at Tibar disposal site;
- Used oil and other residual toxic and hazardous materials shall not be poured on the ground;
- Used oil and other residual toxic and hazardous materials shall be disposed of in an authorized facility off-site;
- Adequate precautions will be taken to prevent oil/lubricant/ hydrocarbon contamination from mobile equipment of river channel beds;
- Washing of project vehicles in rivers and streams is strictly prohibited;
- Ensure availability of spill clean-up materials (e.g., absorbent pads, etc.) specifically designed for petroleum products and other hazardous substances where such materials are being stored;
- Spillage, if any, will be immediately cleared with utmost caution using absorptive clean up materials to leave no traces;
- Spillage waste will be disposed at disposal sites approved by NDPCEI which is Tibar disposal site;
- All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all the applicable statutory requirements;
- The contractors shall identify named personnel in their EMP in-charge of storage sites for hazardous materials and ensure they are properly trained to control access to these areas and entry will be allowed only under authorization.

5.1.2 OPERATIONAL IMPACTS ON THE BIOLOGICAL ENVIRONMENT

5.1.2.1 Encroachment into Precious Ecology, Disturbance of Marine and Terrestrial Habitats, Effects on Flora and Fauna (Plants and Animals)

Impacts on habitat and flora, very minor impacts on terrestrial habitats and flora of the project area are expected as a result of the Batching Plant and Sand Washing area construction and operation. There will be limited and minor, if any, impacts on habitat, flora or fauna. Manufacturing activities will impact only a small area of vegetation within the site.

Plant species present within the impact area are either introduced species or ubiquitous native species, which are highly tolerant of disturbances. There is no vegetation adjacent to the manufacturing area that has any conservation significance nor is it representative of the original

vegetative cover. There are some individual trees, including banana, mango and teak that will require removal. They are non-endemic, common and have no special characteristics to merit protection.

Therefore, in light of the nature of the project and the types of works envisaged, there will be no significant loss of valuable flora or habitat. Rehabilitation activities will take place entirely within the existing ROW or within areas already subjected to clearing in the past.

Impacts on fauna. In terms of impacts on fauna, there is the potential for construction workers to poach edible animals and birds of the locality in spite of prohibitions and poaching. The contractor will be responsible for providing enough food and adequate information to workers regarding the protection of fauna and imposing sanctions on workers trapping, killing or wounding birds or other wildlife. Protected species are listed in the annex.

The PMU will supervise and monitor to check that the contractors carry forward the mitigation measures and environmental enhancements identified in the SEMP as well as routine matters such as avoiding unnecessary removing of trees and compensatory and enhancement planting.

Invasive species shall not be introduced. During replanting/re-vegetation works, new alien plant species (i.e., species not currently established in the region of the project) shall not be used unless carried out with the existing regulatory framework for such introduction. All replanting and compensatory tree planting will be planned in full agreement with the local forest authority. Measures to be included in the project to ensure protection of flora and fauna within the project area include:

- Contractor's site office, work yard, rock crushers, material storage, borrow pits, and quarries will all be located as approved by PMU in consultation with local authorities and will not be permitted in any ecologically important sites or areas valuable for conservation;
- Vegetation clearance during construction activities, especially of trees along the roadside, will be avoided or minimized;
- Under no circumstances is the contractor or any of his sub-contractors or employees permitted to enter nearby forests or the mangrove communities to fell or remove mangroves wood;
- Vegetative cover cleared from the roadside during rehabilitation activities will be stockpiled and kept for bioengineering and mulching in the re-vegetation works. Contractors will be responsible for re-vegetation in cleared areas;
- The contractor will be responsible for providing adequate knowledge to construction workers in relation to existing laws and regulations regarding illegal logging. Contract documents and technical specifications will include clauses expressly prohibiting the felling of trees, not marked as requiring to be cleared by the project, by construction workers for the term of the project;
- The contractor will be responsible for providing adequate knowledge to construction workers in respect of fauna. Contract documents and technical specifications will include clauses expressly prohibiting the poaching of fauna by construction workers and making the contractor responsible for imposing sanctions on any workers who are caught trapping, killing, poaching, being in possession of or having poached fauna;
- The PMU will supervise and monitor a ban on use of forest and mangrove timber and workers shall be prohibited from cutting trees and mangrove for firewood or collecting wood from mangrove areas; and

- Construction workers will be informed about general environmental protection and the need to avoid un-necessary felling of trees unless justified on engineering grounds and marked for cutting as approved by PMU.

The cutting of trees out of the excavation area shall be prohibited. When there is conflict between trees and its work area, it must be informed to the local authorities and proper measures should be taken.

5.1.2.2 Accidental Encroachment Into Historical/Cultural Sites

Consultations with Suco chiefs as well as resource owners indicated there are no cultural sites within the manufacturing area. And no PCR or sites in the locations proposed for materials extraction.

In the event of accidental discovery of PCR work shall cease immediately and the relevant authorities shall be informed. Activities shall not re-commence until the authorities have signed-off that the site/resources have been dealt with appropriately and that work may continue.

5.1.3 OPERATION IMPACTS ON SOCIAL ENVIRONMENT

5.1.3.1 Operation of Construction Plant and Equipment Creating Noise

Construction noise is generally intermittent, attenuates quickly with distance, and depends on the type of operation, location and function of equipment. During operation of the plant machinery for extraction of materials, there will be temporary adverse impacts due to the noise of the construction equipment, especially heavy machinery. The most sensitive receptors along the project road include the Suco residential areas although noisy activities will be carried out several hundred meters from the nearest Suco and churches, health clinics and schools are much further away. Nevertheless cooperation between the contractor and the residents is essential and it is the responsibility of the contractor to arrange meetings between these parties and arrange such matters as work schedules (hours of equipment operation etc.), and explain that locations of material storage areas, and the locations of rock crushers and asphalt plant are >500m from settlements in the Sucos.

Aggregate processing is one of the noisiest activities required in construction processes, however, this will be undertaken at a designated site located at least 500m away from the nearest sensitive receivers.

Noise impacts may be short lived, although can be very intrusive if not controlled properly. Noise measurement shall be undertaken in response to noise complaints using hand held noise meter at the same sites sampled for TSP and shall follow the methodology specified by the manufacturer. Noise shall be measured in dB(A) over 24 hours covering the different periods (i.e., 6h to 18h, 18h to 22h and 2h to 6h). Measurement will also be taken to establish if the criterion of Leq55dB(A)1-hour is exceeded at the measurement points. If it is exceeded by the existing noise a criterion of background +3dB(A) will be applied in the impact monitoring. Works are not expected to be carried out at night but if this is unavoidable for unexpected reasons separate measurements will also be taken before construction commences to establish if the criterion of Leq45dB(A)1-hour is exceeded and the monitoring assessment criteria will be established accordingly. Measures to be included in the project to mitigate the effects of noise include:

- Baseline data on noise levels shall be collected before commencement of civil works by PMU;

- The contract documents require that all vehicle exhaust systems and noise generating equipment be acoustically insulated and maintained in good working order and that regular equipment maintenance will be undertaken to minimize noise emissions;
- The contractor will prepare a schedule of operations that will be approved by PMU. The schedule will establish the days, including identifying days on which there should be no work, and hours of work for each construction activity and identify the types of equipment to be used;
- Workers will be provided with ear defenders as may be required; and
- Any complaints regarding noise will be dealt with by the contractor in the first instance through the communications plan and if unresolved they shall be referred through the grievance redress mechanism.

5.1.3.2 Presence of Vehicles and Equipment Creating Impacts on Access and Traffic Safety

The project will cause temporary negative impacts through presence of vehicles and equipment. Inconvenience, minor disruptions to traffic on the road as well as on local access to and from the villages near the manufacturing area during the construction period. Mitigation of impacts on access and traffic will include:

- The contractor will prepare and submit to PMU, a traffic management plan detailing diversions and management measures;
- Signs and other appropriate safety features will be used to indicate construction works are being undertaken;
- Contract clause specifying that care must be taken during the construction period to ensure that disruptions to access and traffic are minimized and that access to villages along the project road is maintained at all times;
- Provincial Works and village officials will be consulted in the event that access to a village has to be disrupted for any time and temporary access arrangements made;
- Construction vehicles will use local access roads, or negotiate access with land owners, rather than drive across vegetation or agricultural land, to obtain access to material extraction sites. Where local roads are used, they will be reinstated to their original condition after the completion of work;
- The road will be kept free of debris, spoil, and any other material at all times;
- Disposal sites and haul routes will be identified and coordinated with local officials;
- Provision of adequate protection to the general public in the vicinity of the work site, including advance notice of commencement of works, installing safety barriers if required by villagers, and signage or marking of the work areas; and
- Provision of safe access across the work site to people whose villages and access are temporarily affected during road re-sheeting activities.

5.1.3.3 General Activities, Handling of Equipment and Plant, Construction Vehicles Impact Workers' Health and Safety

The project's construction phase can cause a range of health and safety impacts. The SPS requires that health and safety impacts on workers and the community are identified and mitigation measures proposed. Air pollution and noise, which is also relevant to health and safety aspect, have already been discussed. Traffic safety issues have been discussed above. The risk of spread of communicable disease is dealt with in the next section.

Worker occupational health and safety is generally governed by the new Labor Code of Timor-Leste

and the UNTAET National Labor Code (1 May 2002). As of 2009 the then current National Labor Code has been in a reform process. The International Labor Organization (ILO) has supported the drafting the new Labor Code to include the fundamental principles of rights at work. It is expected that the Labor Code will have been approved by the Council of Ministers and Parliament before implementation of the project. The contractor's EMP will address worker health and safety and will establish routine safety measures of EHS Guidelines, Labor Code of Timor-Leste and by good engineering practice.

Observing general health and safety requirements, including provision of safety and protective gear and equipment to workers, will reduce the risk of accidents at the work sites. The construction camp will be equipped with a health post, which will include first-aid and basic medical supplies. To reduce the risk of incidents at the camp, access to construction camps by other than those authorized will be prohibited. Mitigation measures for reducing and avoiding impacts on worker health and safety include:

- At least one month before construction commences the contractors will demonstrate to the PMU they are properly resourced and a qualified/experienced environment and safety officer (ESO) will be identified by the contractors in the bid;
- Establishment of safety measures as required by law and by good engineering practice and provision of first aid facilities at work sites, in vehicles and establishment of an first aid/health post at the camp;
- The contractor will conduct training (assisted by PMU) for all workers on safety and environmental hygiene at no cost to the employees. The contractor will instruct workers in health and safety matters as required by law and by good engineering practice and provide first aid facilities;
- Instruction and induction of all workers shall be carried out for all operatives before they start work in health and safety matters, including road safety;
- The contractor will instruct and induct all workers in health and safety matters (induction course) including construction camp rules and site agents will follow up with toolbox talks on a weekly basis. Workforce training for all workers starting on site will include safety and environmental hygiene;
- Workers shall be provided with appropriate personnel protection equipment (PPE) such as safety boots, helmets, reflector vest, gloves, protective clothes, dust mask, goggles, and ear protection at no cost to the workers;
- Fencing will be installed on all areas of excavation greater than 1m deep and sides of temporary works;
- Reversing signals (visual and audible) shall be installed on all construction vehicles and plant.
- Provision of potable water supply shall be maintained at all times in all work locations;
- Fencing on all excavation, borrow pits and sides of temporary bridges;
- Scheduling of regular (e.g. weekly tool box talks) to orientate the workers on health and safety issues related to their activities as well as on proper use of PPE;
- Where worker exposure to traffic cannot be completely eliminated, protective barriers and warning signs shall be provided to shield workers from passing vehicles. Another acceptable measure is to install channeling devices (e.g., traffic cones and barrels) to delineate the work zone and trained flag men at each end of the current working zone; and
- Construction camps shall be provided with toilets/sanitation facilities in accordance with

local regulations to prevent any hazard to public health or contamination of land, surface or groundwater. These facilities shall be well maintained and cleaned regularly to encourage use and allow effective operation and emptied regularly so as never to overflow.

5.1.3.4 Presence of Construction Workers Impacts on Community Health and Safety

The works could create various impacts on the health and safety of communities. The presence of construction workers and work camps can induce or increase risk of spread of communicable diseases. Transmission of sexually transmitted infections (STIs) and Human Immune-Deficiency Virus (HIV) is a potential impact of the construction phase posed by construction workers engaging in either commercial sex or sexual relationships with local people. Potential sanitation and impacts from disease will need to be controlled by maintaining hygienic conditions in the worker camps and implementing the social and health awareness programs for the Project.

The excavation of the trenches for side drain construction can threaten public safety, particularly of pedestrians and children. Within 500m of settlements and towns fencing will be installed prior to excavation work commencing on all sides of temporary excavations. The plans will include provisions for site security and guards, trench barriers and covers to other holes and any other safety measures as necessary. The contractor will provide warning signs at the periphery of the site warning the public not to enter. The contractor will restrict the speed of project vehicles and also control traffic by contra-flow and provide flagmen and warning signs at either end of the works where the travelling lanes must be temporarily reduced.

The contractor will provide information boards near the work sites to inform and instruct the public on how to conduct themselves and to be aware of their surroundings if they must approach the works. Information boards will be refreshed as necessary and also show the name and telephone contacts in PMU and contractors offices for complaints about the works. Information boards will also state that the PMU and contractor have an open door policy as regards complaints. The contractors will implement the following safety measures for the public:

- The contractor will appoint an ESO to address health and safety concerns and liaise with the PMU and Sucos within the Project area;
- Barriers (e.g., temporary fence), and signs shall be installed at construction areas to deter pedestrian access to the roadway except at designated crossing points;
- Adequate signage and security will be provided at the site office and works yard and prevention of unauthorized people (including children) entering work areas and camp. Warning signs will be provided at the periphery of the site warning the public not to enter;
- The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and these sites will have a watchman at the entrance to keep public out;
- Speed restrictions shall be imposed on project vehicles and equipment traveling within 50m of Sucos and sensitive receptors (e.g. residential, schools, places of worship, etc.);
- Upon completion of construction works, borrow areas will be backfilled or temporarily fenced, awaiting backfilling;
- Provisions will be made for site security, safety barriers and signs will be erected outside trenches deeper than 1m and covers will be placed over other holes. Other safety measures will be installed as necessary;

- Drivers will be educated on safe driving practices to minimize accidents and to prevent spill of spoil, hazardous substances (fuel and oil) and other construction materials during transport;
- Contractors will ensure that no wastewater is discharged to local rivers, streams, lakes and irrigation channels and any other water bodies;
- Measures to prevent proliferation of mosquitoes shall be implemented (e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside);
- The contractor shall make provision to ensure the construction workforce attends STI and HIV/AIDS prevention workshops provided through an approved service provider. The workshops will be delivered to the contractor's workforce prior to commencement of any civil works; and
- Suco-based community awareness raising about transmission of STIs and HIV, reproductive health and safe sex. The program will be implemented after contractor mobilization when training staff are in post and prior to construction works commencing.

6. SITE SPECIFIC ENVIRONMENTAL MANAGEMENT PLAN (SEMP)

The Contractor will prepare a site specific EMP (SEMP) for the manufacturing area including the SEMP. The content of the SEMP mitigation measures is generally included in the construction mitigation section of the Contract. The SEMP demonstrates the manner (location, responsibilities, schedule/timeframe, budget, etc.) in which the Contractor will implement the mitigation measures specific to this site. The SEMP will be updated as necessary to respond to any unanticipated impacts that may arise as the project is commissioned and operated.

The SEMP will be agreed in advance with MPWTC/PMU in the project preconstruction phase. The requirements will include full implementation of the agreed SEMP. MPWTC shall require the Contractor to engage capable and trained staff and / or site agent to take responsibility as Environmental and Safety Officer (ESO) for the environmental management at the working level.

6.1 QUARRIES, BORROW PIT AREAS AND CONSTRUCTION MATERIALS MANAGEMENT

The Contractor has identified and tested suitable sources of materials and locations for the plant and review the requirements for provision of construction materials. As a first priority topsoil will be stockpiled for later reuse in planting and rehabilitation. Where surplus materials arise from the removal of the existing surfaces these will be used elsewhere on the project or other projects for fill (if suitable) before additional rock, gravel or sand extraction is considered.

The SEMP includes method statements and details of arrangements to be made to facilitate the timely production and supply of construction materials to avoid impacts due to unnecessary stockpiling outside the project site. The Site specific EMP (SEMP) will include as a minimum consideration of the following:

- Required volume of materials, potential sources and estimated quantities available.
- Impacts to identified sources and availability.
- Required endorsements that should be obtained by the Contractor from NDPCEI and local groups for use of legitimate sources.
- Measures to be employed to mitigate nuisances to local residents.

- Methods of transportation to minimize interference with normal traffic.
- Constraints of regular delivery schedule to reduce stockpiling on site.
- Programme for reuse of slope excavated material for reuse
- Programme for delivery of quarry and borrow materials.
- Discussion of the PMU/MPWTC inspection/monitoring role.
- Agreement on publicity/public consultation requirements.

6.2 BLASTING AND VIBRATION.

There is no reason to expect that blasting will be required at all this stage. In the event that blasting is to be considered, even if only in special circumstances, the Contractor shall follow blasting mitigation in the SEMP that will include method statements and consideration of the following matters:

- Use of only controlled blasting methods in line with the rules set down by the local authorities and NDPCEI.
- Limitations to permissible times and intervals between blasting
- Details of the prescribed manner of blasting and precautionary measures to be included.
- Prior notice to all local residents.
- Undertaking prior condition surveys of residences within 500m of the blast sites. All residents within 500m of the blast sites.
- Measures to keep LGUs and public informed of the plans and progress of blasting.
- Measures for temporary evacuation and provisions for alternative accommodation if required.
- Discussion of the PMU/MPWTC inspection/monitoring role.

6.3 ASPHALT, HOT MIX PLANT, ROCK CRUSHING AND BITUMEN SUPPLY

The rock crushing activities will generate noise and dust and pavement works will generate gas and odor from the asphalt hot-mix plant and noise from the compaction of the pavement. The Contractor shall include a section on Asphalt, hot mix plant, Rock crushing and Bitumen supply in the SEMP that will include method statements and consideration of the following matters:

- Estimation of volumes of rock based material and asphalt required.
- Use of existing cement batching, aggregate and hot mixing plant or proposals for new installations.
- Locations of cement batching and aggregate mixing plant as far as possible from settlements and habitation.
- Locations of cement batching and aggregate mixing plant in agreement with the local town or municipality and to be approved by PMU.
- Licenses for operation of plant and approval from the relevant local authority and NDPCEI.
- Dust suppression equipment to be installed.
- Proposals for storage, handling, use and disposal of residual bitumen in line with the waste disposal section of the CEMP.
- Duration and timing of the proposed operation and cement batching and aggregate mixing plant.
- Discussion of the PMU/MPWTC inspection/monitoring role.

6.4 USE OF GRAVEL AND RIVER PROTECTION

The Project proposes to source raw materials, some of which may require crushing from river pits.

This it is covered generally by the EMP for this project and therefore the operation of the gravel sourcing shall follow the guidelines of NDPCEI Guideline #2 Mechanical Sand and Gravel Extraction from Rivers and Borrow Pits. Therefore the SEMP will have sufficient provisions to ensure control of physical aspects of work to remove gravel from rivers including the following matters:

- Program for work near rivers (for the dry season as far as practicable).
- Avoidance of blocking rivers and streams through improper disposal of rock based materials.
- Covering of open surfaces to reduce runoff and bank erosion.
- Discussion of the PMU/MPWTC inspection/monitoring role.

6.5 WATER CONTAMINATION PREVENTION

Work near rivers and streams have the potential to cause water pollution. In order to prevent water contamination the SEMP will include coverage of the following to be undertaken by the Contractor:

6.5.1 DISPOSAL OF SOLID WASTE AWAY FROM RIVERS.

- Design of storage areas with sufficient lining for lubricants and other construction storage/stockpiles.
- Handling of stockpiled materials to avoid leakage and prevent runoff.
- Location of stockpiling or borrow site sand storage for hazardous substances.
- Responses to complaints, complaints monitoring and investigation of water quality.
- Scheduled work duration in near rivers shall be as short as possible.
- Immediate stabilization of slopes after works are completed.
- Prohibition of washing of machinery and vehicles in surface water

6.6 DUST AND NOISE MINIMIZATION

Earthworks and rock crushing activities will cause dust impacts. All construction works will involve some noisy activities and it is good practice to control dusty materials and noisy activities at source so that nuisances do not occur. The Dust and Noise control section of the SEMP will include method statements and minimize impacts to sensitive receptors (residential areas, schools, hospitals, etc.) due to construction works, sourcing and transport of construction materials, and other project-related activities. In order to prevent dust and noise nuisances the Dust and Noise control to section of the SEMP will include the following:

- Use and availability of water for damping down dust in wet and dry seasons.
- Alternative use of dust barriers / segregation between the works and sensitive receivers.
- Locations and timing of works within 500m of settlements including night works.
- Reporting of complaints to PMU in line with the grievance redress mechanism discussed in section 7.
- Compliance of heavy equipment and machinery with best practice on pollution.
- Ban on smoke belching vehicles and equipment.
- Covering vehicles transporting loose construction materials.
- Speed limits on vehicles unpaved areas near works.
- Methods to reduce the need for large stockpiles and planning of supplies of as per the Construction Materials Management section of the CEMP.
- Location of stockpiles and enclosing or covering when not in use.
- Description of any monitoring proposed by Contractor in addition to the PMU/DSC

monitoring role.

6.7 TREE CUTTING AND REPLANTING

All areas within the Facilities for Batching Plants and Aggregate Processors which areas are affected due to clearance for agriculture. The natural vegetation within the facilities shall then be temporarily cut down or suspended for agricultural activities until completion of project. There are no woodland habitats outside of these areas where facilities in our Branches 1,2,3&4, which is composed of houses and gardens on the urban fringe of Covalima. Most of these temporarily occupied areas have no vulnerable to further loss for fuel, timber and food. Mitigation measures to protect the remaining habitats from exploitation during the project construction should not be necessary as no tree need to be cut for the purposes of establishing the entire facilities in the areas, unless otherwise of some unavoidable circumstances that any particular trees need to be eliminated as an obstruction will be discussed by authorities and will then be cut upon concurrence with re-planting consideration as required by the environmental law of GoTL.

6.8 ENHANCEMENT PLANTING

Environmental enhancements such as on-site planting at used worker camps, or off- site tree planting for long term soil stabilization included in the detailed designs will be identified in the SEMP by the Contractor. The enhancement planting section of the SEMP will include:

- Locations of enhancement planting required in detailed design.
- Provide enhancement planting at construction worker campsites after use.
- Maintenance and monitored for planted specimens as agreed with the PMU
- Discussion of the PMU/MPWTC inspection/monitoring role.

6.9 CONSTRUCTION CAMP, SANITATION AND DISEASES

The operation of the supporting Contractor worker accommodation is at the base camp and is covered by the mail EMP for this project under the environmental license. The measures included in the construction camp section of the EMP include:

- Proposed location of local construction worker accommodation was agreed with local communities and PMU.
- Local workers are being hired and trained
- Accommodation, potable water, clean water for showers, hygienic sanitation facilities/toilets, worker canteen/rest area and first aid facilities are all provided in the main camp and the other 4 branches camp.
- Wastewater effluent from worker facilities and Contractor workshops and equipment washing-yards is captured and treated before discharging.
- Solid and liquid waste is managed in line with waste disposal practices approved by NDPCEI.
- Food is provided from local farm / suppliers.
- There is a ban on hunting and bush meat supplies to discourage poaching gathering green timber.
- Provisions are in place to clean the construction worker camp site after use and dispose of all waste materials to approved disposal sites.
- Provisions are in place to restore land used for accommodation and the area be planted with appropriate trees/shrubs as enhancement.

Sanitation and diseases will mainly be concerns at the construction accommodation area. The contractor will ensure that additional measures to maintain hygienic conditions in the Batching Plant and Sand Washing Plant area and implement the social and health programs for the project are included in the SEMP:

- Measures to prevent proliferation of mosquitoes.
- Temporary and permanent drainage facilities to prevent the accumulation of surface water ponds.
- Implementation of the social and health programs for the project (e.g. HIV- AIDS education as required in line with social programs.

6.10 SAFETY PRECAUTIONS FOR WORKERS AND PUBLIC

Workers and Public Safety section of the SEMP will include method statements to identify safe working practices and interfaces between the works and public to ensure worker and public safety and prevent accidents due to the construction works. Workers and Public Safety section of the SEMP will include:

Statutory requirements for worker occupational health and safety as governed by the labor codes of Timor Leste and National Labor Code as amended for principles of rights at work. It is expected that the new Labor Code will soon be approved by the Council.

- Method statement of how the Contractor work practices will comply with statutory requirements.
- Arrangements to protect public safety.

6.11 TEMPORARY TRAFFIC MANAGEMENT

6.11.1 OBJECTIVE AND STRATEGIES

The Temporary Traffic Management Plan (TMP) outlines the traffic control and traffic management procedure during hauling of materials from and to borrow and river pit sites be enhanced by the Contractor COVEC-CRFG for the smooth implementation of the Suai-Fatucaí/Mola section 1 of the Suai-Beaco Highway Road Project, to manage potential hazards associated with the traffic environment during the project.

The objectives of the Temporary Traffic Management Plan are:

- a) To provide protection to workers and the general public from traffic hazards that may arise as a result of the construction activity.
- b) To manage potential adverse impacts on traffic flows to ensure network performance is maintained at an acceptable level.
- c) To minimize adverse impacts on users of the road reserve and adjacent properties and facilities.

In an effort to meet these objectives the Traffic Management Plan will incorporate the following strategies;

- a) Providing a sufficient traffic lanes to accommodate vehicle volumes. Ensuring delays are minimized.
- b) Ensuring all road users are managed including motorists, pedestrians, cyclists, people with disabilities and people using public transport.
- c) Ensuring work activities are carried out sequentially to minimize adverse impacts.

- d) Provision will be made for works personnel to enter the work area in a safe manner in accordance with safety procedures.
- e) All entry and exit movements to and from traffic streams shall be in accordance with the requirements of safe working practices

Arrangements for vehicles accessing the project area will be formulated to avoid community disturbance and severance and will at least retain a passing lane along all roads used during extraction works up to the highway road construction. The Temporary Traffic Management section of the SEMP will include method statements and to minimize disturbance of vehicular traffic and pedestrians during construction including consideration of the following:

- Lane availability and minimizing interference with traffic flows past the works site.
- Establishment of acceptable working hours, constraints and public safety issues.
- Agreement on time scale and establishment of traffic flow/delay requirements.
- Programming issues including the time of year and available resources.
- Discussion of the PMU/MPWTC inspection/monitoring role.
- Establishment of complaints management system for duration of the works
- Agreement on publicity/public consultation requirements (advance signing etc.)

During quarrying activities, we will organize access site route schemes from quarry to the proposed project highway that will traverse existing road intersection so that vehicles and pedestrians using can move safely. It shall be suitable for the vehicles and pedestrians using them, in suitable positions and sufficient road warning signs and barricades in number and sizes. The term 'vehicles' includes: cars, vans, trucks, heavy equipment such as pay loaders, excavators, lift trucks and site dumpers etc. A temporary traffic control with safety flagmen/coordinators will be deployed to avoid interference in the lives of local villagers. The key message is construction site vehicle incidents can be and should be prevented by the effective management of transport operations throughout the construction process.

- The new highway will be built with a proper drainage system to improve existing condition and ensure free flow of storm drain water. It is necessary to clean the crashed rocks on the road to ensure the road is open to traffic with safety procedure at all times.
- Access road shall be sprayed with water periodically based on road condition, especially road passing by local sub-villages must be kept wet, free from dense dust and good quality of air.
- When access road converges with existing road, warning board and guide board shall be installed to guide vehicles according to the technical specifications in the project contract. When necessary, guide wearing protective vests with reflecting mark, holding warning board in hands and holding whistle in mouth are nominated to command vehicle traffic running.
- During night works, lights shall be installed at crossings to warn incoming vehicles to be cautioned to slow down. Worker's vehicles on site when present shall activate hazard warning lights.

Location of Road Intersections and Access to include hauling activities to and from borrow pits:

This project Section 1, will start from Tali Oan, Suai to Fatucaai/Mola, Zumalai, the first section of the highway road having a total length of 30.355km starts at Sta. 3 + 920 and ends at Sta. 34 + 275.

- Along the highway road alignment this project will cross existing road intersections namely:
 - A. Existing Major National and Regional Road (See Attachments Drawings):

- 1) Sta. 3 + 920.00 Beginning of Project (Suai-Salele National Road)
- 2) Sta. 6 + 400.00 with RC Box Traffic (Suai-Ogues Regional Road)
- 3) Sta. 17 +150.00 with RC Box Traffic (Suai-Beco National Road)
- 4) Sta. 34 + 250.00 End of Project (Zumalai-Oebaba National Road)

B. Existing Minor Local Road all with RC Box Traffic (See Attachment Typical Drawing):

- 1) Sta. 14+000.00 (Suai-Labarra Local Road)
- 2) Sta. 16+240.00 (Labarra-Zulai Local Road)
- 3) Sta. 18+500.00 (Haimanu Local Road)
- 4) Sta. 19+303.00 (Haimanu, Beco Local Road)
- 5) Sta. 20+275.00 (Beco Local Road)
- 6) Sta. 22+671.00 (Beco Local Road)
- 7) Sta. 23+091.00 (Aidantuik, Beco Local Road)
- 8) Sta. 25+352.00 (Zoac, Beco Local Road)
- 9) Sta. 29+398.00 (Galitas, Tazhilin Local Road)

• Access Roads

- 1) Access Road Use for Equipment Hauling Embankment Materials
- 2) Access Road Use for Equipment Hauling Aggregates 1
- 3) Access Road Use for Equipment Hauling Aggregates 2
- 4) Existing Road Use for Equipment Access from Jetty to Sites

Figure 15: Typical Layout of Traffic Management Schemes at Intersections

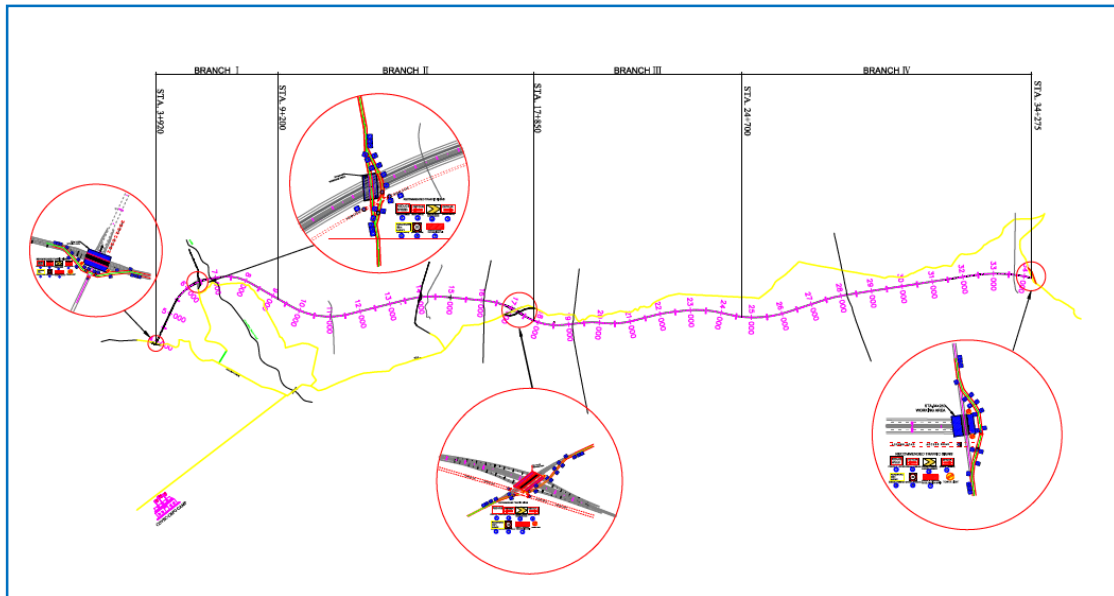
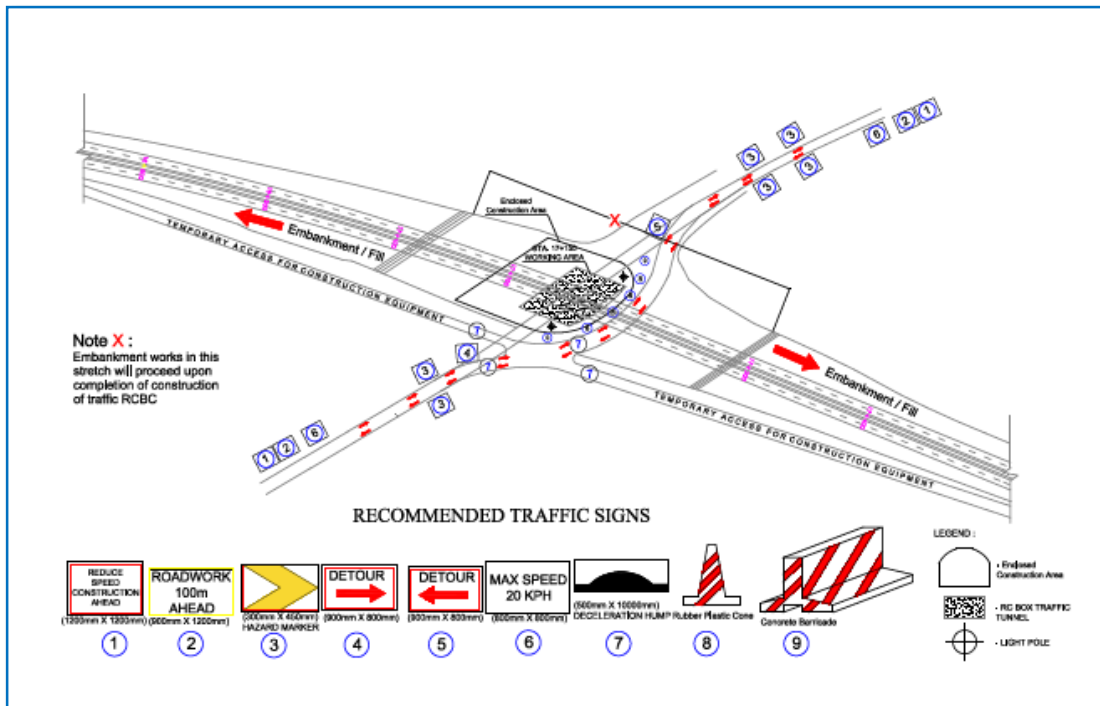
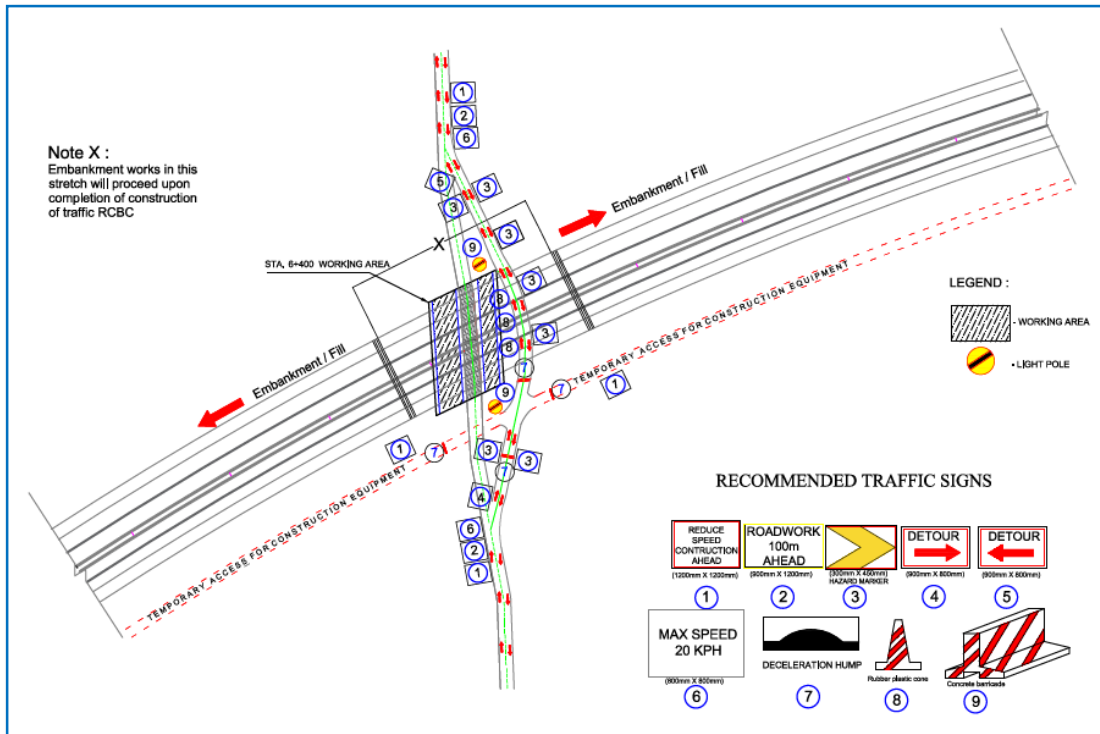


Figure 16: Typical Schematic Details of Traffic Management at Intersections



6.11.2 IMPORTANT STATISTICS ON TRAFFIC

It is so obvious that each year within the construction industry, number of people die as a result of being struck by vehicles on site. In addition, there are hundreds of preventable accidents and injuries. Accidents occur from ground works to finishing works and managers, workers, visitors to sites and members of the public can all be at risk. Inadequate planning and control is the root cause of many construction vehicle accidents.

During construction activities, we will organize a construction site re-routing schemes at corresponding locations during construction of RC Box traffic structures so that vehicles and pedestrians using site routes can move around safely. The routes shall be suitable for the vehicles and pedestrians using them, in suitable positions and sufficient road warning signs and barricades in number and size (See details of plans attachments). The term 'vehicles' includes: cars, vans, trucks, heavy equipment such as pay loaders, excavators, lift trucks and site dumpers etc. The key message is construction site vehicle incidents can be and should be prevented by the effective management of transport operations throughout the construction process.

COVEC-CRFG would like to provide the people of Suai to Fatucaai/Mola (This Section of Construction) with the opportunity to choose the most appropriate form of transport, the infrastructure to enable their safe journey and the services for as much as possible to the nearest convenient trip throughout the construction process.

6.11.3 KEEPING PEDESTRIAN AND VEHICLES APART

Majority of transport accidents result from the inadequate separation of pedestrians and vehicles. This can usually be avoided by careful planning, particularly at the schematic stage, and by controlling vehicle operations during construction work.

The following actions will help keep pedestrians and vehicles apart:

- a) Entrances and exits to and from detour routes around construction of RC Box Traffic - provide separate entry and exit detour ramps for pedestrians and vehicles;
- b) Walkways - provide firm, level, well-drained pedestrian walkways that take a direct route where possible
- c) Crossings - where walkways cross roadways, provide a clearly signed and lit crossing point where drivers and pedestrians can see each other clear
- d) Visibility - make sure drivers driving out onto public roads can see both ways along the footway before they move on to it
- e) Obstructions – do not block walkways so that pedestrians have to step onto the vehicle route; and
- f) Barriers - think about installing a barrier between the roadway and walkway.

6.11.4 MINIMIZING VEHICLE MOVEMENTS

At the beginning and end of the project stretch areas where more numerous movement of pedestrian and vehicular traffic, COVEC-CRFG plan to minimize vehicle movement around a site. For example, landscaping to reduce the quantities of fill or spoil movement.

COVEC-CRFG will take steps to make sure that all workers are fit and competent to operate the vehicles, machines and attachments they use on site, for example:

- a) Checks when recruiting drivers/operators or hiring sub-contractors;
- b) Training drivers and operators;
- c) Managing the activities of visiting drivers.

People who will direct vehicle movements (signallers) are trained and authorized to do so. Accidents can also occur when untrained or inexperienced workers drive construction vehicles without authority. Access to vehicles shall be managed and people alerted to the risk.

- Turning vehicles: The need for vehicles to reverse should be avoided where possible as reversing is a major cause of fatal accidents. One-way systems can reduce the risk, especially in storage areas. A turning circle could be installed so that vehicles can turn without reversing.
- Visibility: If vehicles reverse in areas where pedestrians cannot be excluded the risk is elevated and visibility becomes a vital consideration.
- Signallers or Traffic Flagmen: Who can be appointed to control manoeuvres opposing traffics and who are trained in the task;
- Lighting: So that drivers and pedestrians on shared routes can see each other easily. Lighting may be needed after sunset or in bad weather;
- Clothing: Workers on site will be wearing high-visibility clothing.

6.11.5 WARNING SIGNS AND INSTRUCTIONS

COVEC-CRFG will make sure that all drivers and pedestrians know and understand the routes and traffic rules on site. The use of standard road information and warning signs where appropriate will be considered. Will provide induction/orientation for drivers, workers and visitors and send instructions out to visitors before to proceed their visit. Intersections at the beginning and end points of project hauling stretch with the National and Regional Roads will be widened or constructed using half- width construction so that the road is maintained and open to traffic at all times.

Corresponding Road information and warning signs with drawings as part of the traffic management presentation for review and approval by the Consultant Engineer for implementation to each location. Cones shall be used for delineation unless other treatment is specified in this Traffic Management Plan or on the Traffic Control Diagrams. Cones shall be designed to be stable under reasonably expected wind conditions and air turbulence from passing traffic. The base of the cones will be secured so that they are not dislodged by traffic. Cones will be inspected at intervals necessary to ensure any mis-alignment or displacement is identified and corrected prior to this causing disruption to traffic.

Work hours will be adjusted to fall within the hours when traffic volumes will permit the necessary temporary traffic lane closures in minutes. On-site variations, if required, shall generally only be made following approval by the Local Authorities and recorded in the daily diary. In emergency situations, on-site variations shall be made and recorded in the daily diary, and the Road Authority's Representative notified as soon as practicable. Any variations to drawings will be recorded.

6.11.6 TRAFFIC AND TRANSPORT PLANNING

- 1) During quarrying activities, we will organize access site route schemes from quarry to the proposed project highway that will traverse existing road intersection so that vehicles and pedestrians using can move safely. It shall be suitable for the vehicles and pedestrians using them, in suitable positions and sufficient road warning signs and barricades in number and sizes. The term 'vehicles' includes: cars, vans, trucks, heavy equipment such as pay loaders, excavators, lift trucks and site dumpers etc. A temporary traffic control with safety flagmen/coordinators will be deployed to avoid interference in the lives of local villagers. The key message is construction site vehicle incidents can be and should be prevented by the effective management of transport operations throughout the construction process.

- 2) The new highway will be built with a proper drainage system to improve existing condition and ensure free flow of storm drain water. It is necessary to clean the crashed rocks on the road to ensure the road is open to traffic with safety procedure at all times.
- 3) Access road shall be sprayed with water periodically based on road condition, especially road passing by local sub-villages must be kept wet, free from dense dust and good quality of air.
- 4) When access road converges with existing road, warning board and guide board shall be installed to guide vehicles according to the technical specifications in the project contract. When necessary, guide wearing protective vests with reflecting mark, holding warning board in hands and holding whistle in mouth are nominated to command vehicle traffic running.
- 5) During night works, lights shall be installed at crossings to warn incoming vehicles to be cautioned to slow down. Worker's vehicles on site when present shall activate hazard warning lights.

6.12 ACCIDENTAL DISCOVERY OF ARCHAEOLOGICAL ASSETS, SITES OR RESOURCES

Timor Leste has an archaeological heritage and therefore the contractor will establish precautionary measures to be included in the SEMP implemented to avoid disturbance of any unexpected finding of archaeologically valuable artifacts.

6.13 SITE CLEARANCE, DIGGING AND EXCAVATIONS

Any site clearance, digging and excavation activities undertaken during pre- construction can un-earth Physical Cultural Resources (PCR) including sites. In the event this occurs, work shall cease immediately and the relevant authorities shall be informed. Activities shall not re-commence until the authorities have signed-off that the site/resources have been dealt with appropriately and that work may continue. The Contractor shall be responsible for complying with the requirements of authorities, and the PMU shall monitor the same. The contractor will include a section on "chance finds" in the Site Specific Environmental Management Plan (SEMP). Mitigation measures for potential impacts on PCR include:

- Site agents will be instructed to keep a watching brief for relics in excavations.
- Should any potential items be located, the PMU will immediately be contacted and work will be temporarily stopped in that area.
- The PMU with the assistance of the PSC will determine if that item is of potential significance and contact MPWTC to pass the information to the relevant department in GOTL (i.e. State Secretary of Art and Culture) who will be invited to inspect the site and work will be stopped to allow time for inspection.
- Until GOTL has responded to this invitation work will not re-commence in this location until agreement has been reached between GOTL and PMU as to any required mitigation measures, which may include structured excavation.
- Removal of trees during site clearance has to be based on the schedule of trees to be cut made by PSC. Plans have to be incorporated in the SEMP for the removal of these trees incorporating owner consultation and compensation per Resettlement Plan (RP).

6.14 MOBILIZATION OF THE CONTRACTOR AND CONSTRUCTION CAMP

The mobilization of the contractor and initial establishment of site office, works yard and work sites will bring about interaction between local people and construction workers. Prior to contractor

mobilization to the site, PMU will work with the contractor to establish the communications protocol between the project and communities as per the project's communications plan. The contractor will identify one member of their staff to be the liaison between the Suco chiefs and elders and contractor, as well as between the contractor and PMU.

The contractor will adopt good management practices to ensure that fuels and chemicals, raw sewage, wastewater effluent, and construction debris/scarified material is disposed of in controlled conditions to reduce the risk of contamination. Measures to minimise disturbance by construction workers and presence of the works site/area include:

- Suco (village) protocols discussed with workers as part of awareness and mobilization training;
- The contractor is to ensure that workers' actions outside work site are controlled and Suco codes and rules of conduct are observed at all times;
- The contractor will identify one member of their staff to be the liaison between the Suco chiefs and elders and contractor, as well as between the contractor and PMU;
- Worker camp location and facilities will be located at least 500m from settlements and agreed with local communities and facilities approved by PMU and managed to minimize impacts;
- Adequate signage and security provided at the site office and works yard and prevention of unauthorized people (especially children) entering the area;
- Hire and train as many local workers as possible by using labor from each Suco as the work proceeds from Suco to Suco;
- Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas;
- Construction camp(s) will be established in areas with adequate drainage in order to prevent water logging at the camp and formation of breeding sites for mosquitoes in order to facilitate flow of the treated effluents;
- Potable water, clean water for showers, hygienic sanitation facilities/toilets with sufficient water supply, worker canteen/rest area and first aid facilities will be provided. Separate toilets shall be provided for male and female workers;
- Portable lavatories (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and use of lavatories encouraged by cleaning lavatories daily and by keeping lavatory facilities clean at all times;
- Wastewater effluent from contractors' workshops and equipment washing- yards will be passed through gravel/sand beds and all oil/grease contaminants will be removed before discharging it into natural streams. used oil and grease residues shall be stored in drums awaiting disposal in line with the agreed waste management section of the EMP;
- Predictable wastewater effluent discharges from construction works shall have the necessary permits from NDPCEI and local authorities before the works commence;
- As much as possible, food shall be provided from farms nearby or imported to the area. Bush meat supplies from protected areas will be banned to discourage poaching. Solid and liquid wastes will be managed in line with the provisions of the waste management section of the EMP;
- Use of guns and hunting equipment by workers will be banned and workers will be dismissed for taking or using green timber or hunting or being in possession of wildlife;
- Entry to the protected, IBAs and/or sensitive areas (beaches, mangrove areas) by

workers will be banned;

- Provision of adequate protection to the general public in the vicinity of the work site, including advance notice of commencement of works, installing safety barriers as required by villagers, and signage or marking of the work areas;
- Provision of safe access across the works site (particularly during construction of drains) to people whose Suco and access are temporarily affected during construction works;
- At all times workers should respect village and land owner's boundaries and recognize and follow village rules and terms of conduct, including those addressing women and elders;
- Avoid damage to productive trees and gardens, water resources and springs;
- As per provisions set out in Poverty and Social Assessment, implement HIV/AIDS/STIs awareness and prevention for the contractor's workers and adjacent communities;
- Land used for campsites shall be restored to the original condition as far as practicable and the area shall be planted with appropriate trees / shrubs as soon as practicable after it is vacated and cleaned; and
- Work and camp sites will be cleaned up to the satisfaction of and local community after use.

7. CONSULTATION AND INFORMATION DISCLOSURE

7.1 INTRODUCTION AND STAKEHOLDER IDENTIFICATION

The objectives of the stakeholder consultation process were to disseminate information on the project and its expected impact, long-term as well as short-term, among primary and secondary stakeholders and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of project design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the Project implementation and to suggest appropriate mitigation measures. The feedback received has been used to address these issues at early stages of project design.

The stakeholders consulted for the project included local affected persons, local village head persons, local authorities, Suco leaders, national authorities, educational institutions, and other groups with an interest in the project corridor where the improvements will be implemented. GOTL departments were also consulted. Individuals representing several hundred persons from numerous family groups in the Sucos along the alignment were informed about the project and invited to comment on their environmental concerns. These stakeholders were considered to be representative of the community living in the area, the road users, the business associated with the road and the locally elected representatives.

The communities near the site indicated they would fully support the project especially it is in connection with the rehabilitation and improvement of the road. The main environmental concerns included noise and dust, erosion control, traffic accidents, protecting water supplies, preventing damage to local electricity cables and other infrastructure and utilities surroundings construction areas. Prompt completion of the works, were also requested by some local stakeholders. Significant operational phase impacts from the plant were identified as noise and dust and minor interference with local traffic. Mitigation measures will be put in place to control these residual impacts to acceptable levels.

Consultations will continue throughout construction and operational phases. Records including reports on environmental and social complaints and grievances will be kept in a simple database in the COVEC-CRFG Project Office and reported to PMU monthly.

Figure 17: Photographs for the Series of Public Consultation



Public Consultation in a meeting with Socos Chiefs and Villagers on Feb 24, 2016



Public Consultation with Villagers on Feb 25, 2016



Public Consultation in a meeting with Socos Chiefs and Villagers on April 02, 2016.



Public Consultation with Villagers and Site Inspection on Dec 17, 2015

7.2 CONSULTATION WITH OTHER AUTHORITIES

Information disclosure will be undertaken as per the requirements of WB's SPS and Public Communications Policy 2011. In disclosing the environmental documents to the public, the MPW through the PMU is responsible for (i) providing the SEIS to NDPCEI for clearance; (ii) ensuring that all environmental assessment documentation, including the environmental due diligence and monitoring reports, are properly and systematically kept as part of the sub-project specific records; (iii) disclosing all environmental documents, and making documents available to public, on request; and (iv) providing information to the public and stakeholders as per the Project's communications plan. Disclosure of relevant environment safeguards documents will be in an appropriate form, manner, and language and at an accessible location to be understandable to the affected people and local stakeholders.

Figure 18: Photographs of Series of Consultation with Other Authorities



Office of Covalima Land Property Director



Meeting with NDPCEI and MPRM Officers in Dili



Meeting with Land Property Officers in Dili



Meeting with NDPCEI Officers in Dili



Pre-Construction Meeting at PMU Mandarin Office



Consultation with National Authorities on June 05



Consultation with National Authorities on Feb 22



Consultation with National Authorities on Feb 22

8. GRIEVANCE REDRESS MECHANISM

8.1 NEED FOR GRIEVANCE REDRESS MECHANISM

MPWTC assisted by PMU will establish a **Grievance Redress Mechanism (GRM)** for this project as a whole to facilitate resolution of complaints by affected people and grievances about the project's environmental performance, in line with the requirement of SPS. The GRM will be facilitated by the PMU and be applicable to all contractors who will be required to maintain a grievance registry to record the actions of PMU or designated officer in liaison with the Suco leaders and committees at the district level.

The public will be made aware of the relevant contact numbers and contact person in PMU and each contractor through media publicity, notice boards at the construction sites, and local authority offices. The public will be made aware that the contractors and the PMU have an open door policy and that the complainant can remain anonymous if requested. The GRM will address affected people's concerns and complaints promptly, using an understandable and transparent process based on traditional methods for resolving conflicts and complaints. The GRM shall provide a framework for resolving complaints at the project level as well as beyond the project (that is, involving relevant government offices such as District and Suco committees, NDPCEI, etc.), using the existing judicial or administrative remedies. The GRM will be detailed in the SEIS and other safeguard reports as required (such as Resettlement Plan).

The GRM to be established to receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievances about the social and environmental performance at the level of the project. The PMU will maintain an open door policy to accept complaints at all levels concerning the environmental performance of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

A project information brochure will include information on the GRM and shall be widely disseminated throughout the project corridor by the safeguards officers in the PMU. Grievances can be filed in writing or by phone with any member of the PMU, construction sites and other key public offices, all of which will accept complaints.

Existing arrangements for redress of grievances for affected persons are through complaints to the village and Suco committees up to the district level and then through the PMU and back to the agency which implements a project. This indirect route will remain in place to preserve the usual administrative remedies. There will be a need to deal with complaints and grievances during construction for this project.

8.2 STEPS AND PROCEDURES FOR THE GRM

First tier of GRM. The contractor, COVEC-CRFG through PSC, is the first tier of GRM which offers the fastest and most accessible mechanism for resolution of grievances. One of the two safeguards officers or designated officer in the COVEC-CRFG shall be the key officers for grievance redress. Resolution of complaints will be done within fifteen working (15) days. The safeguards officers in PMU will provide the support and guidance in grievance redress matters. Investigation of grievances will involve site visits and consultations with relevant parties (e.g., affected persons, contractors, traffic police, etc.). Grievances will be documented and personal details (name, address, date of complaint, etc.) will be included unless anonymity is requested.

A tracking number shall be assigned for each grievance, and it will be recorded including the following elements: (i) initial grievance record (including the description of the grievance), with an acknowledgement of receipt handed back to the complainant when the complaint is registered; (ii) grievance monitoring sheet, describing actions taken (investigation, corrective measures); and (iii) closure sheet, one copy of which will be handed to the complainant after he/she has agreed to the resolution and signed-off. The updated register of grievances and complaints will be available to the public at the PMU office, construction sites and other key public offices along the project corridor (offices of the Suco and districts). Should the grievance remain unresolved it will be escalated to the second tier.

Second Tier of GRM. The COVEC-CRFG will activate the second tier of GRM by referring the unresolved issue (with written documentation) to the PMU who will pass unresolved complaints upward to the **Grievance Redress Committee (GRC)**. The GRC shall be established by MPWTC before commencement of site works. The GRC will consist of the following persons: (i) Project Director; (ii) representative of District and Suco; (iii) representative of the affected person(s); (iv) representative of the local land office; and (v) representative of the National Directorate for Pollution Control and Environmental Impact (NDPCEI) (for environmental related grievances). A hearing will be called with the GRC, if necessary, where the affected person can present his/her concern. The process will facilitate resolution through mediation.

The GRC will meet as necessary when there are grievances that cannot be solved at the first tier and within thirty (30) working days will suggest corrective measures at the level and assign clear responsibilities for implementing its decision and a timeframe that must be adhered to. The functions of the GRC are as follows: (i) resolve problems and provide support to affected persons arising from various environmental issues and including dust, noise, utilities, power and water supply, waste disposal, traffic interference and public safety as well as social issues land acquisition (temporary or permanent); asset acquisition; and eligibility for entitlements, compensation and assistance; (ii) reconfirm grievances of displaced persons, categorize and prioritize them and aim to provide solutions within a month; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

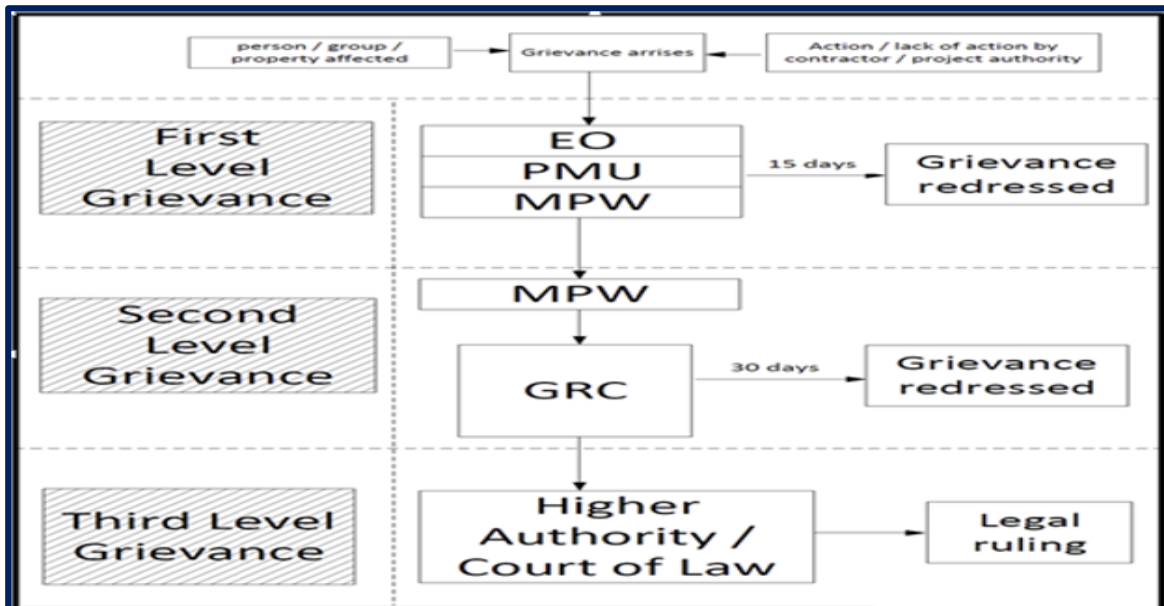
The PMU will be responsible for processing and placing all papers before the GRC, maintaining database of complaints, recording decisions, issuing minutes of the meetings and monitoring to see that formal orders are issued and the decisions carried out. The contractor will have observer status on the committee. If unsatisfied with the decision, the existence of the GRC shall not impede the complainant's access to the GOTL's judicial or administrative remedies.

Third tier of GRM. In the event that a grievance cannot be resolved directly by the contractor or PMU officers (first tier) or GRC (second tier), the affected person can seek alternative redress through the Suco or District committees under the existing arrangements for redress of grievances for affected persons. The PMU or GRC will be kept informed by the district, municipal or national authority.

Monitoring reports shall include information about the GRM including: (i) the cases registered, level of jurisdiction (first, second and third tiers), number of hearings held, decisions made, and the status of pending cases; and (ii) an annex which lists cases in process and already decided upon may be prepared with details such as name, ID with unique case serial number, date of notice/registration of grievance, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e., open, closed, pending) and if it is a repeat of a previous grievance. The grievance redress

mechanism and procedure is depicted in the next Figure 19

Figure 19: Grievance Redress Mechanism



9. SITE SPECIFIC ENVIRONMENTAL MANAGEMENT PLAN

9.1 OVERVIEW OF ENVIRONMENTAL MANAGEMENT PLAN

The Site Specific Environmental Management Plan (SEMP prepared separately) contains a number of components crucial to effective environmental management within the project. These include:

- Organizational responsibilities (for various aspects of SEMP implementation).
- Consultation and information disclosure.
- Plan for mitigation of impacts (during pre-construction, construction and operation).
- Monitoring.

These are explained in detail in the sub-sections below.

Institutional Arrangements and Responsibilities: This sub-section of the SEIS presents the SEMP as a discussion of the environmental management structure and activities that will be undertaken as part of overall implementation for the quarry and manufacturing areas. The roles and responsibilities of various agencies in undertaking these activities are then defined and the institutional strengthening activities that will be required to allow those organizations to fulfil their nominated roles and responsibilities are identified. An environmental monitoring program has been prepared.

9.2 OVERALL MONITORING RESPONSIBILITIES AND ACTIVITIES

The PMU will be responsible for monitoring of the project construction and operation activities; assisted by the PSC environmental specialists on a day to day basis with the direct cooperation with the Contractor. PSC will carry out regular daily and weekly inspections of operational activities and monitor mitigation measures. PMU will carry out spot checks to compliment the activities of PSC. Together this will provide an efficient use of the environmental monitoring resources available to the project.

9.2.1 ROLE OF MINISTRY OF PUBLIC WORKS, TRANSPORT AND COMMUNICATION

As implementing agency (IA) for this project has overall responsibility for preparation, implementation and financing of environmental management and monitoring tasks as they pertain to the project and inter-agency coordination. MPWTC will exercise its functions through the PMU which will be responsible for general project execution, and which will be tasked with day-to-day project management activities, as well as monitoring of the project. Consulting firms were hired in different stages by the GOTDL to provide services for detailed engineering design, construction supervision, and other assignments, as needed.

Project Management Unit. The PMU is already established in MPWTC and has been augmented sometime in the year 2011 to implement the project and manage detailed engineering design and to this stage of construction supervision. The PMU is headed by a full-time Project Manager and supported by a team consisting of staff and consultants engaged under different project arrangements. The PMU will be responsible for the following: (i) assisting the IA in implementing the Project; (ii) carrying out procurement and engaging design and supervision consultants (PSC) and contractor; (iii) as required liaising and coordinating with the DRBFC; and (iv) managing the contractor, and liaising with other stakeholders, on the day to day implementation of Project activities. The PMU, through the PSC, will retain experienced consultants to monitor and report on contractor compliance with the approved CEMP.

Road project implementation has evolved to the point that PMU needs to recruit safeguards staff who can receive training and capacity building under various projects financed by development partners. PMU has established an Environmental and Social Unit (ESU) that is co-financed by the government. ESU staff – national environment specialist (NES) and national social safeguards specialist (NSS) - will receive capacity building and training from two international specialists financed under the project (one environment (IES) and one resettlement and social (ISS)). Wherever possible future projects - irrespective of financing - will provide support to PMU staff rather than national consultants brought on for specific projects. This will provide long term institutional support and develop the PMU. In the implementation of environmental management and monitoring tasks specific technical assistance will be provided by environmental specialists that are part of the PMU. The specialists will assist in all aspects of implementation of environmental assessment and management, internal monitoring and evaluation (M&E), and training of MPWTC and MECM and other relevant government agencies.

PMU will prepare and submit to MPWTC Monthly Progress Reports, these will incorporate the main items raised in contractor's monthly reports and the environmental monitoring reports prepared by PMU environmental specialists and NES, as well as all other items required by MPWTC

Project Supervision Consultant (PSC). The PMU is supported by a PSC (Katahira Engineers International). The PSC will comprise international specialists as required to supplement existing PMU resources and assist PMU to deliver a capacity building program. In respect of safeguards the PSC will include an environment consultant (EC intermittent) full time to monitor contractor's mitigation measures. The inputs of specialist to maximize capacity building efforts across a number of activities required in first phases of implementation of this project as well as for more general awareness raising and training needs.

The environment consultant will assist in capacity building for the contractors who will receive training and capacity support from the EC and NEC to ensure learning and development, as well as smooth and effective implementation of the SEMP.

9.2.2 ROLE OF NATIONAL DIRECTORATE FOR POLLUTION CONTROL AND ENVIRONMENTAL IMPACT

The NDPCEI, the agency responsible for environmental management, was consulted at the onset of the SEIS process and again at the confirmation of the categorization of the project. The SEIS revised 2 was submitted to NDPCEI for second review and evaluation in the pre-issuance of environmental clearance. Consultations with NDPCEI was required during the operation of the project facilities and NDPCEI has the authority to monitor implementation of the SEMP and ensure that environmental management and mitigation of the project is undertaken to an acceptable standard. Periodic inspections will take place with NDPCEI, PMU, PSC and the Contractor.

9.2.3 ROLE OF THE CONTRACTOR

The Contractor will be responsible for responding fully the contract conditions including those covering environmental mitigation, social mobilization and awareness and monitoring. The Contractor will then be responsible for implementing all environmental, health and safety actions included in the SEMP and relevant clauses in the bidding documents and contract during the pre-construction and construction period.

The contractor will prepare the SEMP based on the site-specific construction methodologies they proposed in this SEIS. The SEMP will further develop the EMP contained in this SEIS and will detail measures for all impacts covered in the EMP including but not limited to traffic management, waste management, hazardous material and waste management and health and safety. The PMU will review and approve the SEMP before the commencement of construction.

The contractor will appoint an Environmental and Safety Officer (ESO) who will be responsible for site inspections on a weekly basis to check compliance with the approved SEMP and ensuring implementation of all health and safety requirements, these will be documented and subject to monitoring by PMU and NDPCEI. The responsibilities of the Contractor include:

- Submit the SEIS and SEMP to NDPCEI for approval and obtain the site specific Environmental License.
- Participate in induction on environmental awareness and mitigation measures to be delivered by PMU prior to preparation of the SEMP;
- Participate in induction on environmental awareness and mitigation measures to be delivered by PMU prior to preparation of the SEMP;
- Appointing an ESO , sending letter to PMU confirming that this position have been filled and by whom before construction commences (the bidding documents and contract specify the roles and tasks of the ESO);
- Seeking training and support from PMU on any aspects of environmental management, as required;
- Coordinating with PMU for preparing and submitting the SEMP following detailed design, the ESO will be responsible for ensuring that the Contractor complies with the clauses in the contract and bidding documents in respect of environment, health and safety;
- As required, preparing, and submitting for approval, appropriate plans (tree cutting, aggregate extraction, traffic management etc.);
- Engaging an approved service provider to undertake STIs and HIV/AIDS briefings and awareness raising amongst the contractor's employees and communities, and reporting on the same;

- Coordinating with PMU in respect of community consultation i.e. establishing GRM etc; and
- Undertaking daily and weekly site inspections (by the ESO) recording the findings in a site diary, and participating in monitoring and coordinating with PMU to ensure that environmental management activities are reported in Monthly Progress Reports as required.

9.3 MITIGATION OF IMPACTS

The SEIS has been prepared to identify and assess environmental and social impacts and has also set out a range of measures to avoid and/or mitigate those impacts. The mitigation of impacts during the pre-construction and commissioning (construction) phase will be the responsibility of PMU and the contractor; the mitigation of impacts during the operational construction phase will be the responsibility of the contractor.

The SEMP is prepared by the contractor and submitted to PMU for review for approval prior to commencement of works. (Table 14.1, 14.2 and 15) includes the SEMP for the Project within a matrix of mitigation measures and responsibilities of implementation.

Erosion and Sedimentation in Marine Environment - Sedimentation is related directly to the rain, soil erosion, and activity within the project area that create the soil/material that will be wash away by the rainwater during the rainy seasons. Two main activities contribute directly to the soil erosion and sedimentation

Mining activity to find the raw material (boulder, rock, stone, etc.) can be done by collecting material that is available in the surface and excavate the nearest location in order to dig out the raw material. While collection of available raw material does not create any significant condition that leads to major soil erosion, the collecting raw material from underground through the excavation will create unstable soil condition that leads to erosion during the heavy rainy season.

The maximum erosion rate from project site could be roughly estimated by using the universal soil loss equation that expressed in the following mathematical equation.

$$E = R \times K \times SL \times C \times P$$

First, **R, the rainfall erosivity index**, equals E, the kinetic energy of rainfall, multiplied

by I30 (maximum intensity of rain in 30 minutes expressed in cm per hour). This index corresponds to the potential erosion risk in a given region where sheet erosion appears on a bare plot with a 9% slope.

Soil erodibility, K, depends on the organic matter and texture of the soil, its permeability and profile structure. It varies from 70/100 for the most fragile soil to 1/100 for the most stable soil. It is measured on bare reference plots 22.2 m long on 9% slopes, tilled in the direction of the slope and having received no organic matter for three years.

SL, the topographical factor, depends on both the length and gradient of the slope. It varies from 0.1 to 5 in the most frequent farming contexts in West Africa, and may reach 20 in mountainous areas.

C, the plant cover factor, is a simple relation between erosion on bare soil and erosion observed under a cropping system. The C factor combines plant cover, its production level and the associated

cropping techniques. It varies from 1 on bare soil to 1/1000 under forest, 1/100 under grasslands and cover plants, and 1 to 9/10 under root and tuber crops.

Finally, **P** is a factor that takes account of **specific erosion control practices** such as contour tilling or mounding, or contour ridging. It varies from 1 on bare soil with no erosion control to about 1/10 with tied ridging on a gentle slope

Figure 20: Raw Material Collection in Project Site



Stone Processor in Mola Zumalai



Raw Materials in Mola River, Zumalai



Stone Processor in Labarrai



Raw Materials in Reiketan River, Labarrai

9.4 ENVIRONMENTAL MONITORING AND REPORTING

As previously described, the aquifer in the area has been categorized as localized high which has high permeability and not good storage of the aquifer according to studies conducted by the Australian Geoscience. This phenomenon, verify that fact that the type of rock/storage is highly porous material from carbonate (Kart). Since the type of aquifer is from porous rock, it is possible that the groundwater may contaminate from the hazardous material from the project activity if not proper treatment is taken.

Moreover, soil type is dominated by rocky, which is naturally not fertile for various agriculture practices in one hand and high infiltration rate of rainfall to the groundwater. Environmental monitoring is a very important aspect of environmental management during construction and operation stages of the project to safeguard the environment. In response to the impacts identified during the feasibility study, an environmental monitoring plan has been developed. The contract documents will contain a list of all required mitigation measures, the EMP and a time-frame for the compliance monitoring of these activities. The monitoring will comprise surveillance to check that the contractor is meeting the provisions of the approved CEMP and all other contractual obligations during construction.

The environmental specialists of PMU will supervise the monitoring of implementation of mitigation measures during the construction stage and compliance with the CEMP. The PMU during project implementation will be required to:

- Develop an environmental monitoring protocol for the construction period, and formulate a detailed plan;
- With assistance from the Engineer, conduct regular environmental monitoring, including review of daily and weekly site inspections undertaken by the contractor and items recorded in the ESO's site diary (the main parameters to be monitored are outlined in Table 6); and
- Prepare environmental monitoring reports covering the above and prepare and submit inputs for the Quarterly Progress Reports.

Ground Water Pollution:

Potential for ground water pollution depends on several physical factors including:

- Ground water depth from the surface
- Presence of low permeability deposit
- Nature of the underlying strata that forms the aquifer

Air Quality:

Potential impacts to air quality are related to both mining and rock crushing activities. During mining, the process of removal and piling of top soil with heavy equipment will lead to the broadcast of particulate matter from the top soil to the surrounding area. Air pollution will especially be the problem during dry period because dry top soil can be easily blown by the wind. Moreover, crushing, transfer and piling of rocks will also generate dust and other particulate matter that will pollute the environment.

It is likely that the scope of the air pollution will be limited to the facility, therefore felt especially by workers in the facility. Limited dust emission might impact those workers.

Noise and Vibration:

Several activities could lead to the production of noise and vibration that will in turn affect workers in the project. These activities include operation of heavy equipment and traffic load within the facility and those coming in and out of the facility. Likely level of noise and vibration produced from the facility are between 80 and 100 decibel for noise. The following table shows the range of noise level produced by various heavy duty equipment that will be used in this project.

Table 14.1. Impacts from Mining Activities during Operation and Maintenance Phase

Potential Impacts	Nature of Impacts	Scope of Impacts	Impact Indicator
Loss of flora and fauna.	Negative, direct, long term impacts related to top soil removal during excavation of rocks.	Localized to the areas cleared. Since the location of mining activities is not part of sensitive habitat or ecologically important areas, impacts are predicted not be significant.	Areas of vegetation cleared, type and extent of vegetation cleared.
Erosion	Negative, direct, could be long term impacts related to the mining activities that leave open areas in the mining sites. Erosion is especially a high risk during the rainy season (impacts are likely to happen during rainy season from December through March).	Localized at the mining area, large scale erosion might impact the lower facility area. Depending on the scale of erosion, impact can be significant.	Broken soil area, eroded open pits, evidence of earth movement especially during the rainy season.
Sedimentation	Negative, direct, could be long term impacts related to the movement of soil settled by the rain, therefore will become a problem especially during the rainy season.	Sediment can be carried by runoff affecting the coastal and near water area. The scope of the sedimentation will depend on the scope of eroded soil from mining operation.	Turbidity of waters.
Air quality	Negative, direct, could be long term related to the movement of earth during excavation activities. Most likely become a problem during dry season from April to November.	Localized around the mining area, however, fugitive dust can be blown by the wind into the national road affecting passersby.	Particulate matter in the air, complaints from workers related to upper respiratory tract infection.
Noise and vibration	Negative, direct, short term, related to operation of equipment.	Localized to workers in the facility. Since the closest community lives 0.5km away, no noise and vibration impacts are expected to affect local communities.	Level of noise and vibration.
Preservation of cultural or archaeological resources	Negative, direct, could be long term related to excavation for rock mining activities.	Localized to the area being excavated. Archaeological excavation in nearby areas have found remains of past communities	Usually indicated by findings of certain archaeological artefacts such as housewares in the excavated areas.
Occupational safety	Negative, direct, could be long term to workers' health. Related to the day to day mining activities.	Localized to workers as well as visitors in the facility.	Whether a facility is considered to be running a safe operation or not is usually indicated by the number of work related accidents in a certain period of time.

Table 14.2. Impacts from Rock Crushing Activities during Operation and Maintenance Phase

Potential Impacts		Nature of Impacts	Scope of Impacts	Impact Indicator
Crushing Activities				
	Air quality from particulate matter	Negative impacts related to the handling of raw rocks and crushing of rocks. Most likely become a problem during dry season from April to November.	Localized around the mining area, however, fugitive dust can be blown by the wind into the national road affecting passersby.	Particulate matter in the air
	Sedimentation	Negative impacts similar to the above impact, related to the movement of earth that is settled by the rain, therefore will become a problem especially during the rainy season.	Sediment can be carried by runoff affecting the coastal and nearby water area. The scope of sedimentation will depend on the scope of eroded soil from mining operation.	Turbidity of waters
	Surface and ground water quality	Negative impacts related to the use of lubricants for heavy equipment and diesel fuel for power generation. Also related to storage of the fuel and lubricating oil.	Spilled oil and fuel could leach into the ground water or being washed away by runoff.	Evidence of spilled oil on the ground
	Loss of Flora and fauna	Negative impacts related to changes in land use to industrial (rock crushing) site.	Localized to the facility area. Since location of facility does not fall into sensitive habitat or ecologically important areas.	Loss of vegetation.
	Noise and vibration	Negative impacts related to equipment operation.	Localized to workers in the facility.	Complaint of loud noise and vibration from workers
	Occupational safety	Negative impacts related to the operation of heavy equipment,	Localized to workers as well as visitors in the facility.	Whether a facility is considered to be running a safe operation or not is usually indicated by the number of work related accidents in a certain period of time.

Table 15.1. Environmental Mitigation and Monitoring Plans 1.

IMPACT MITIGATION			IMPACT MONITORING		
Environmental Impact	Mitigation measures	Mitigation Responsibility	Parameter to be monitored	Frequency and means of verification	Monitoring Responsibility
Mining Activities					
Loss of flora and fauna	<p>Tree planting on backfilled pits</p> <p>Tree planting on trenches or other holes on the ground created from the mining activities</p>	Contractor COVEC-CRFG	<p>Species of trees for replanting should be native species suitable for mountain area location.</p> <p>Planting techniques such as planting distance, depth of holes, types of filling and watering needs.</p>	<p>During planting activities and once a year to all the trees planted in the mining location.</p>	<p>Contractor COVEC-CRFG (designated officer) can be coordinated with local forestry officer in Manatuto</p>
Erosion	<p>Development of cut slopes (walls and benches) for erosion control as well as for ease of movement to the upper part of the mined area.</p> <p>Development of drainage trenches to prevent water from scouring top soil and other exposed surface on the hills. Water should be directed to the lower part of the facility where a sedimentation treatment pond is located.</p> <p>Backfilling of pits and holes created by mining activities</p>	Contractor COVEC-CRFG	<p>Monitoring for evidence of the start of erosion in areas with relatively steep slope. This could include rockfall or rock slides, debris avalanches and earth slump, failure of walls and benches and evidence of water scouring in the area. This should be closely monitored and swiftly attended with proper measures.</p>	<p>Day to day monitoring, especially after the onset of rain.</p>	<p>Contractor COVEC-CRFG (designated officer).</p>

Sedimentation	<p>Topsoil removed should be reused as backfilling material.</p> <p>Any unused topsoil should not be piled anywhere in the facility and becomes source of sedimentation during rainy event.</p> <p>Unused topsoil should be compacted (instead of piled) and provided with drainage and vegetation such as grass (turving) or other vegetation to avoid erosion. Location of compaction should be at least 50m away from the water bodies (including intermittent stream in the south of facility).</p>	Contractor COVEC-CRFG	Monitoring for sedimentation in drainage paths in the mining area especially during rainy period.	Day to day monitoring, especially after the onset of rain.	Contractor COVEC-CRFG (designated officer).
Air quality	<p>Operation of well-maintained construction equipment to avoid polluted exhausts.</p> <p>Proper treatment of unused topsoil (see discussion on mitigating sedimentation above)</p> <p>Spraying of water in the working area and unsealed road areas often passed by project vehicles.</p>	Contractor COVEC-CRFG	Monitoring measures should include: Qualitative monitoring within mining areas; Record of dust complaints from workers and communities living near project area.	Day to day monitoring especially during dry period.	Contractor COVEC-CRFG (designated officer).
Noise and vibration	<p>All noise-generating equipment should be insulated and well maintained to ensure that they operate within the noise limits they were designed to operate.</p> <p>Operation of noise generating equipment should only be during the day.</p> <p>Vibration sources at the operation are blasting equipment used to breakdown large rocks. Mitigation measures for vibration should include:</p> <p>Use of newer equipment to reduce vibration</p>	Contractor COVEC-CRFG	Monitoring measures for noise and vibration are: Record of complaint about noise/vibration from workers and communities living near the project.	Day to day monitoring	Contractor COVEC-CRFG (designated officer).

<p>Preservation of cultural and archaeological resources</p>	<p>Should any potential for physical cultural or archaeological resources be identified, the following steps should be followed: All works on the location should cease immediately; An officer should be assigned to keep watch on the archaeological or physical cultural resource; Relevant agency (Secretary of State of Art and Culture) be contacted for further action; All officers on the site should be aware of the potential for the discovery of archaeological artefacts during mining activities;</p>	<p>Contractor COVEC-CRFG</p>	<p>Monitoring should be conducted on a daily basis by workers and any evidence of archaeological artefacts or physical cultural resources should be reported promptly to the supervisor on duty for further action.</p>	<p>Day to day monitoring</p>	<p>Contractor COVEC-CRFG (designated officer).</p>
<p>Occupational health and safety</p>	<p>Mitigation measures for occupational health and safety should include the use of worker's protection apparatus, including: Bright vest for easy identification of workers Ear and eye protection especially where workers are close to excessive noise generating equipment or vehicle Respiratory mask for workers exposed to dust. Limitation of exposure to 8 hr per day for workers exposed to dust. Helmet Foot protection (safety boot), rain coat, etc. as needed First aid kit should be made</p>	<p>Contractor COVEC-CRFG</p>	<p>Monitoring for workers' day to day activity to identify potential ways accidents can happen and anticipate beforehand. Monitoring for accidents that occur and adjust protection gears and work procedures as needed.</p>	<p>Day to day monitoring</p>	<p>Contractor COVEC-CRFG (designated officer).</p>

TABLE 15.2. Environmental Management and Monitoring Plan 2

IMPACT MITIGATION					IMPACT MONITORING		
PROJECT ACTIVITIES	ENVIRONMENTAL IMPACT	MITIGATION MEASURES TO BE INCLUDED IN SEMP	MITIGATION RESPONSIBILITY	MITIGATION COST (US\$)	PARAMETER TO BE MONITORED	FREQUENCY AND MEANS OF VERIFICATION	MONITORING RESPONSIBILITY
PRE-CONSTRUCTION PHASE							
PMU Check on legitimacy of material sources	Project complies with donor bank requirements, best practice and material suppliers are fit for purpose	PSC checks legitimacy of material supplies proposed by Contractor in the CEMP	PSC and Contractor	Project IIC	CEMP prepared and endorsed	Review inspection of CEMP	PMU
Contractor EMP prepared Awareness and orientation of Contractor	All foreseeable impacts captured in CEMP.	The following sections or method statements shall be included in the CEMP based on the EMP and the CEMP shall be prepared by the Contractor in the pre-construction stage for approval by PSC and endorsement by PMU and implementation by the Contractor: Quarries, borrow areas and construction materials management; Blasting and vibration; Asphalt, hot mix plant, rock crushers and bitumen supply; Dust and noise minimization; Tree cutting and replanting; Enhancement planting; Construction camp operations, sanitation and diseases; Safety precautions -	PMU Contractor	Project IIC	Area of vegetation on area of felled trees/vegetation removal	During survey and activities – visual inspection before, during and after.	Contractor; PMU

		workers and public; Temporary traffic management; and Accidental discovery of archaeological assets, sites or resources.					
Surveying and demarcation of site area	Minor loss of vegetation during demarcation	Vegetation clearance during surveying and demarcation activities, especially of trees along the river banks and road-side, will be minimized. Major trees (especially in Suco areas) to be removed will be clearly marked, only marked trees will be removed; In order to minimize loss of trees the trees that are not within the paved area or hard-shoulder but are in the embankment will not be cut unless for justifiable engineering or safety reasons; The contractor will be responsible for providing adequate knowledge to construction workers in relation to existing laws and regulations regarding illegal logging. Contract documents and technical specifications will include clauses expressly prohibiting the felling of trees, not requiring to be cleared by the project, by construction workers for the term of the project; and Construction					

		workers will be informed about general environmental protection and the need to avoid un-necessary felling of trees wherever possible.					
Site clearance, digging, excavations	Accidental discovery of PCR or cultural property sites	Contractor's CEMP to include section on "chance finds" Site agents will be instructed to keep a watching brief for relics in excavations. Should any potential items be located, the PMU will immediately be contacted and work will be temporarily stopped in that area. The Contractor with the assistance of the PMU will determine if that item is of potential significance and contact MPWTC to pass the information to the relevant department in GOTL (i.e. Secretary of State for Art and Culture) who will be invited to inspect the site and work will be stopped to allow time for inspection.	Contractor	IIC	Sites and/or resources discovered and protected	During activities-stop work order issued; site/resources dealt with appropriately	Contractor; Sec. of State for Art and Culture/ PMU
Mobilization of contractor, presence of construction workers, establishment of camp, associations with local people	Social disruption	Suco (village) protocols discussed with workers as part of awareness and mobilization training; At all times workers should respect village and land owner's boundaries and recognize and follow village rules and terms of conduct (especially addressing women	Contractor		Complaints of incidents between workers and villagers; No. of Children entering camp and effectiveness of signs.	During activities checking records for complaints consultation with workers about protocols	PMU/PSC

		and elders), avoiding damage to productive trees and gardens, and access to the resources and springs; The contractor is to ensure that workers actions outside work site are controlled and Suco codes and rules of conduct are observed at all times; The contractor will identify one member of their staff to be the liaison between the Sucochiefs and elders and contractor, as well as between the contractor and PMU; Worker camp location and facilities will be located at least 500m from settlements and agreed with local communities and facilities approved by PMU and managed to minimize impacts; Adequate signage and security provided at the site office and works yard and prevention of unauthorized people (especially children) entering the area; Hire and train as many local workers as possible by using labour from each Suco as the work proceeds along the road from Suco to Suco.					
	Health & safety	Provide adequate housing for all workers at the construction camps and establish clean canteen/eating and cooking areas; Potable water, clean	Contractor	IIC	Camp, yard, streams/rivers	Monthly observation, consultation	PMU/PSC

		<p>water for showers, hygienic sanitation facilities/toilets with sufficient water supply, worker canteen/rest area and first aid facilities will be provided. Separate toilets shall be provided for male and female workers; Portable lavatories (or at least pit latrines in remote areas) shall be installed and open defecation shall be prohibited and use of lavatories encouraged by cleaning lavatories daily and by keeping lavatory facilities clean at all times; Wastewater effluent from contractors workshops and equipment washing-yards will be passed through gravel/sand beds and all oil/grease traps and contaminants will be removed before discharging it into natural streams. Oil and grease residues shall be stored in drums awaiting disposal in line with the agreed waste management section of the SEMP and the Environmental License; Predictable wastewater effluent discharges workshops and equipment washing-yards will be passed through gravel/sand beds and all oil/grease traps and contaminants will be removed</p>					
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		<p>before discharging it into natural streams. Oil and grease residues shall be stored in drums awaiting disposal in line with the agreed waste management section of the SEMP and the Environmental License; Predictable wastewater effluent discharges from construction works shall have the necessary permits from NDPCEI and local authorities before the works commence; As much as possible, food shall be provided from farms nearby or imported to the area. Bush meat supplies from protected areas will be banned to discourage poaching. Solid and liquid wastes will be managed in line with the provisions of the waste arrangement section of the EMP; Use of guns and hunting equipment by workers will be banned and workers taking or using green timber or hunting or in possession of wildlife should be dismissed; Entry to the protected areas, IBAs and/or sensitive areas (beaches and mangrove areas) by workers will be banned; Provision of adequate protection to the general public in the vicinity of the work site, including advance notice of</p>					
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		commencement of works, installing safety barriers if required by villagers, and signage or marking of the work areas; Provision of safe access across the works site to people whose Suco and access are temporarily affected or disconnected during construction works (especially across drainage works in Sucos);					
	Spread of communicable diseases	Construction camp(s) will be established in areas with adequate drainage in order to prevent water logging at the camp and formation of breeding sites for mosquitoes in order to facilitate flow of the treated effluents; Implementation of HIV/AIDS awareness and prevention program – community (villages)	Contractor & Approved service provider	To be Advised (TBA)	STI/HIV/AIDS prevalence Increased awareness about transmission and prevention	Prior to construction - check contractor records, consultation with employees, discussions with NGO	PMU/PSC
CONSTRUCTION AND COMMISSIONING PHASE							
Operation of construction equipment, plant and vehicles generating emissions	Emission of exhaust from vehicles and machinery; Dust from aggregate crushing plant; generated by heavy vehicles transporting materials on roads; Uncovered loads on trucks;	Construction equipment will be maintained to a good standard. The equipment will be checked at regular intervals to ensure they are maintained in working order and the checks will be recorded by the contractor as part of environmental monitoring; Prohibition on the use of equipment and machinery that causes excessive pollution(i.e. visible smoke) at	Contractor	IIC	Air quality, emissions, dust, particulate matter; Use of tarpaulins and loading of vehicles; Stockpiles	Monthly or after complaint - periodic visual inspection; Any particulate matter and smoke managed as per SEMP	PMU/PSC

	Dust from exposed stockpiles	the Project site; Material stockpiles being located in sheltered areas and be covered with tarpaulins or other such suitable covering to prevent dusty material becoming airborne; Ensuring that all vehicles transporting potentially dust-producing material are not overloaded, are provided with adequate tail-boards and side-boards, and are adequately covered with a tarpaulin (covering the entire load and secured at the front, sides and tail of the vehicle) during transportation. This is especially important as there are a number of Suco along the road; Damping down of the road, especially within 100m from the Sucos along the road and any roads being used for haulage of materials, during the dry season shall take place four times per day; and Periodic qualitative air quality monitoring.					
Works in, or adjacent to, river sand streams	Erosion of riverbanks; Effects on river structure including (i) changes to river water flows, including levels and velocity;	Material stock-piles shall not be located within riverbeds or in islands in the center of rivers. Similarly, they shall not be located within the current area off flood plain subject to regular flooding (i.e. once or more). All land will be for temporary use	Contractor	IIC	Temporary structures removed; River training/scour protection; No stockpiling in riverbeds, river islands or flood	Monthly or as required after event; Check designs; Visual observation of culverts, bridge sand in-stream/river	PMU/PSC

	<p>(ii) changes to channel depth, structure & location resulting from excavations; and (iii) changes to river banks; Increased turbidity of river waters due to gravel extraction; Increased siltation at culverts; Construction materials are washed out into rivers and other areas</p>	<p>sand will be rehabilitated to original condition or better condition upon completion of the works to the satisfaction of PMU; Scour protection will be used as temporary measures, as needed, to ensure temporary structures do not damage river configuration; Movements of vehicles and machinery, and hence disturbance, within the river in habitats will be minimized at all times; No washing of vehicles or machinery in the river; In the event that the contractor causes damage to the river bank or other structural parts of a river, the contractor is solely responsible for repairing the damage and/or paying compensation; Embankments and in-stream/river activities will be monitored during construction for signs of erosion; Re-vegetation with local fast-growing species, or other plants in consultation with the land owners and Suco chiefs, will be carried out incrementally and as quickly as possible after work within any river habitat has been completed; and Spoils, rubbish or any material will not be disposed within riverbed, banks</p>			<p>plains; Flooding frequency; Localized erosion</p>	<p>work areas; Consultation with users</p>	
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		or floodplain areas. Suitable disposal sites will be designated in consultation with land owners & Suco chiefs approved by PMU. Contractor will prepare bridge decommissioning plan incorporating all of the above measures.					
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10. DIFFICULTIES ENCOUNTERED

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 Publics Work, Transport, and Communication 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.

11. CONCLUSION AND RECOMMENDATIONS

11.1 FINDINGS AND CONCLUSIONS

The consultants in compiling the SEIS encountered no particular difficulties. Lack of environmental laboratory services is one of the limitations to completing environmental assessment in Timor-Leste. One limitation in conducting environmental studies in Timor-Leste is the absence of baseline ambient environmental data. However the regulatory framework, including that for environmental protection is now in place.

The use of location for the Batching Plant and Sand Washing area offers a robust option for the support of the existing road improvement project. The works are restricted to a small area and the small area of additional land required has been agreed with the local community and authorities. There is no resettlement needed.

The Batching Plant and Sand Washing area does not traverse any protected areas or areas of conservation value, including primary forests, terrestrial reserves, important bird areas or community managed protected areas. The Project will not create any impacts on cultural or heritage sites and neither does it disturb densely populated areas or an area subject to heavy development. The proposed Project will not create conflicts with natural resource allocation. The construction and operational impacts are predictable and manageable and with appropriate mitigation, few residual impacts are likely, however rehabilitation of the quarry and manufacturing area will be required. The activities require environmental permit under the environmental laws of Timor-Leste. The Site specific EMP prepared in tandem with this SEIS is based on the type, extent and duration of the identified environmental impacts.

Implementation of appropriate measures during the construction and operation phases will minimize negative impacts to acceptable levels. To ensure that these mitigation measures are implemented and negative impacts avoided, the measures are included in the contract. Contractors' conformity with contract procedures and specifications and implementation of the approved SEMP during operation will be carefully monitored. The contractor will be required to follow best international operational practices and comply with a series of contractual requirements which will be monitored and supervised by PMU. Environmental monitoring of the project will be undertaken regularly through the three years of its operation to ensure that the measures are being implemented properly. The Project will have insignificant negative impacts that will nevertheless be carefully monitored and adequately mitigated. A benefit of Project is the accessibility to labor requirements for the villages around the site.

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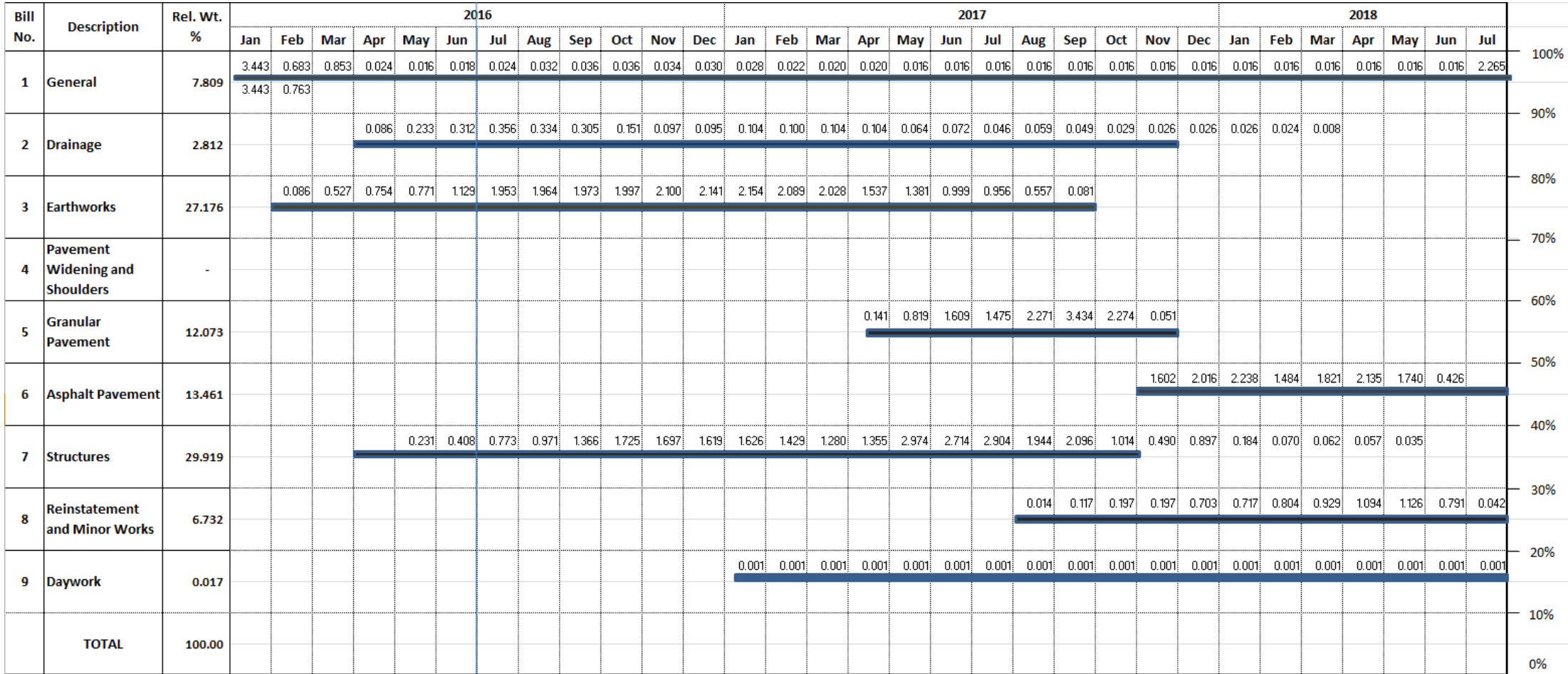
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Figure 21: Construction Schedule



Note: The 1st Time Extension of 6 months is incorporated for approval by Emoloyer.