CHT QUARRY (MOTA ULUN)

ENVIRONMENTAL IMPACT STATEMENT

(DRAFT)

13 Mar 2019

CONTENTS

ABBREVATIONS / ACRONYMS

CHEC:	China Harbour Engineering Company
CHT:	China Harbour Timor Lda
CLO:	Community Liaison Officer
EIA:	Environmental Impact Assessment
EIS:	Environmental Impact Statement
EMP:	Environmental Management Plan
ERP:	Emergency Response Team
GoTL:	Government of East-Timor
ha:	hectares
HSE:	Health, Safety and Environment
IUCN:	International Union for the Conservation of Nature
MPa:	Mega Pascals
PPE:	Personal Protective Equipment
The Project:	The Proposed CHT Quarry at Mota Ulun

1.0 Executive Summary

1.1 The construction of the Tibar Bay Port, with a 630 m long quay wall and a container terminal measuring about 27 ha, requires about 1,030,000 m3 of rocks and gravel for making concrete and for ground improvement work, i.e. to strengthen the ground to lessen the effects of earthquakes, so as to protect the structures on it.

1.2 2 hills at Mota Ulun are identified as meeting the rock-related requirements of quality and quantity, and the other requirements of favourable terrain (i.e. ease of transportation), and minimal disruption to the local community, i.e. no eviction, no resettlement, dispossession of land or assets, no destruction of dwellings or other structures, and no economic deprivation. There are already quarry-related enterprises operating in the Mota Ulun area.

1.3 The quarry is not in or near wetlands or nature reserves. There are also no religious, historical, cultural, archeological, or sacred sites, or protected or endangered species, or unique vegetation, in or near the quarry area of operation.

1.4 The CHT quarry has no unusual environment impacts. There is no tunneling, or open-cast, i.e. deep pit, type of mining. There is no requirement for chemical treatment, i.e. no creation of hazardous sludge. It is a relatively simple quarry to construct and operate.

1.5 The activities for preparing the EIS include public consultations, community profile surveys, studies relating to the biodiversity, and environmental impacts analysis and planning of mitigation measures.

1.6 The EIS is complemented by the Environmental Management Plan (EMP); aiming to avoid, minimize and control environment related concerns. It comprehensively documents the probable causes of concern, and the mitigation methods to counter air, land and water pollution, with the aim of continual improvement. Environmental impacts are low because the quarry is more than 1.5 km from the nearest dwellings.

1.7 Mota Ulun is a small village with about 457 people in about 162 families, living in scattered dwellings, usually of the timber, zinc and thatched roof types. Water obtained from the few wells are salty, for the village is near the sea, and not near rivers or streams.

1.8 There are no plantations or live-stock industry. There are only 2 small one-person type wooden fishing boats. Families grow crops and keep a few animals for home consumption. Commercial activity is very low, with 3 family-owned and operated small provision shops.

1.9 The only and small number of employment opportunities are at the low intensity bulk fuel station, and the few small-scale companies operating quarrying and stone works, i.e. making gravel and casting concrete parts.

1.10 The CHT quarry, by employing 50 local workers out of the 162 families in Mota Ulun, and by providing wages without deductions for necessities, supports local commercial activities, e.g. food, housing and recreational, resulting in economic gain for the whole local community without damage to the social fabric, usually caused by an undesirable influx of workers from other regions.

1.11 Mota Ulun has a primary school. the Church of Capela da Sagrada Familia, and at the rear of the Church, the convent Irmas Franciscanas de Nosa Senhra das Victorias. There is no Clinic. There are no social or recreational facilities, other than 2 tables for billiards.

1.12 The CHT Community Liaison Officer (CLO) frequently meets local residents; explaining the rationale for the quarry, the associated economic and social benefits, and the precautions taken to lessen environmental impacts to the community. A Grievance Management Scheme is in-place.

1.13 Communications with the Mota Ulun residents signal the welcoming of the quarry. Needs include employment opportunities, skills and vocational upgrading, purchase of local produce and products, and the provision of well water, for the existing wells have a salty taste due to proximity to the sea. The CHT CLO has the responsibility of ensuring that the requests are met.

1.14 Regarding decommissioning, it is probably that the quarry will operate for many years to come. There is great potential in the surroundings for further excavation of rock. Due to the Tibar Bay Port, and supporting commerce, the signs are positive for industrial and commercial growth in the Tibar, Ulmera and Mota Ulun areas, and the country as a whole, and rocks / gravel are required for construction of buildings and transport structures to support this growth.

1.15 If the quarry is to be decommissioned, then the first step is for the Village Chief and the Land Authority to decide on the future use of the land. Then it will be clearer as to what to remain behind, what to remove, and what to restore. In essence, clearing out means that stockpiles are sold-off, all machinery are removed, and the fate of structures depend on the Authorities. Usually the roads and utility supplies remain, for these are essential for future access for inspections and use of the land. Bare ground is returfed, with material from the topsoil stockpile. The land can be rezoned for housing, for roads and utilities are now available, and the high ground has an excellent view of the sea. The visual impact is enhanced, for the hill tops remain untouched, and there are “rice terrace” type of features on the hill sides, with footpaths all the way to the top.

1.16 In conclusion, the setting-up and operating of the quarry are not expected to encounter difficulties because general sentiment welcomes the quarry in support for constructing the Tibar Bay Port. It is in an industrial area, no endangered or protected flora and fauna is harmed, there are no cultural or sacred elements in the site, access is good, no persons live on or off the quarry land, employment prospects for the local Mota Ulun residents are excellent, and there are many opportunities for sharing in economic growth and social improvements.

1.17 Work by CHT, i.e. employing about 1,000 persons for constructing the Tibar Bay Port, and the supporting activities of the quarry and the jetty, bring economic growth to the regions of Tibar, Ulmera (where the 400-person Camp is sited) and Mota Ulun. This growth acts as a stimulant for other industrial and commercial enterprises, for people, machinery and transportation factors are now in place. The country has peace; now progress and prosperity follows.

2.0 Details of the Project Proponent

Institution : China Harbour Timor Lda**.**

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3.0 Details of the EIS Consultants

3.1 The names of the persons preparing the EIS and the EMP are stated at Table 3-1.

Table 3-1. Names of Persons Preparing the EIS / EMP

SN	Area	Name / Academic and Professional Qualifications / Experience
1	EIS Document Preparation	Koh Chee Thong, Aircraft Maintenance Engineer (Qantas Airways), Dip in Electronics (Sydney Technical College), Dip in Law (University of London). CHEC HSE Adviser. Prepared and implemented more than 5 Construction Environmental Management Plans (in which EMP are components) for CHEC projects in Angola, Qatar, Gabon, Ghana and Guinea. Also prepared and implemented HSE Management Plans for Seagate sites in Singapore, Malaysia, China and India.
2	Biodiversity	Kate Barker, BSc Hons Marine and Freshwater Biology, University of Wales. Marine life researcher in various country, e.g. Mexico, Thailand and Timor-Leste. Diving instructor.
3	Biodiversity	Kayla Noble, BSc Hons Zoology. Developed and implemented programs in improved farming techniques (US Peace Corp in Timor-Leste) and caring for animals (including preparation of diets and feeding) at VHS Wildlife Rehabilitation Center, Asheboro, North Carolina (USA). Diving Instructor.
4	Dust Management	Li ShunQuan, BSc, South China Agricultural University. Director of an Analysis Laboratory. More than 10 years of experience in field monitoring of water and air samples for water and power plants.
5	Noise Management	Koh Chee Thong, ex-HSE Officer for Seagate factories in Singapore, Malaysia, India and China, and a Sony factory in Singapore. Prepared and implemented Noise Control / Monitoring procedures for these factories.

6	Vibration Management	Hu SiJie, BEng, Ocean University of China. CHEC Quarry Engineer, for supply of rocks for revetment for Fujian Ningde Nuclear Power Marine Engineering Project (China)
7	Quarry Management	Pedro Nelson dos Santos Moreira, a geotechnical engineer, has extensive experience in quarry works. He is employed by CHEC, with the previous project at a CHEC quarry in Tema, Ghana, supplying about 3 million m3 of rocks for the construction of a breakwater approximately 3.5 km long.

4.0 Project Description

4.1 Project Identification

4.1.1 The quarry is at Mota Ulun, about 25 km west of Dili, as illustrated at Figure 4-1. The Project includes the design, construction and operation of the following infrastructure:

4.1.1 Internal haul roads.

4.1.2 Camp quarters.

4.1.3 A rock / gravel processing area.

4.1.4 A rock / gravel storage area.

Figure 4-1. Locations of the Quarry, Tibar Bay and Dili

4.2 Project Category

4.2.1 The Environmental Authority for this Project is the National Authority on Petroleum and Minerals (ANPM). The Project has obtained "Category A" classification based on the rules of Decree Law 5/2011, Environmental Licensing. For ease of confirmation, it is stated that the said classification document from ANPM does not mention any particular item to be followed in preparing the Terms of Reference (TOR), an Environmental Impact Statement (EIS) and an Environmental Management Plan (EMP), before an Environmental License can be issued.

4.2.2 As at the date of this Draft EIS, the TOR is yet to be approved, and therefore supplementary requirements, if any, are not known. Once available, the requirements will be acted upon for inclusion in the final EIS and EMP documents.

4.3 Brief Description of Nature, Size and Location of the Project

4.3.1 Bollore leads the Concessionaire provided by the GoTL, for a public private partnership to undertake the design, construction, financing and operations of Tibar Bay Port, 10 km west of Dili, for a 30-year timeframe. China Harbour Timor Lda (CHT), a subsidiary of China Harbour Engineering Company (CHEC), is the main contractor for Design and Construction.

4.3.2 The quarry is to provide rocks for construction purposes, e.g. for making concrete structures, and for ground improvement to strengthen against earthquakes. About 1,030,000 m3 of rocks is required, over a 3-year timeframe, starting from Apr 2019. The estimated volumes of material to be extracted each year in 2019, 2020 and 2021 are 300,000, 700,000 and 30,000 m3 respectively. The peak monthly production is about 60,000 m3 per month for the 12 months of 2020.

4.3.3 The majority of the rocks will be used for strengthening the quay and the grounds of Tibar Bay Port, in the form of “loose” stone columns in the ground. This is an engineering design to enable the structures on top of the ground to survive an earthquake. In the event of an earthquake, the Port must be able to remain operational, so that supplies, materials and machinery can be brought into the country for humanitarian reasons, and for rebuilding work.

4.3.4 The stone processing yard, and the hills where blasting takes place, are about 1 km and 1.5 km respectively from the main road. The nearest local residences, located at the east of the main entrance, is about 1.5 m away from the stone processing yard; i.e. the wells in the village are at least 1.5 m away from the quarry. Water from the main well used by the villagers at Mota Ulun has been tested to provide baseline information. Attachment A has details of the test report.

4.3.5 The site location and layout plan is at Figure 4-2. A detailed layout of the site is at Figure 4-3.

Figure 4-2. Location and Site Plan of CHT Quarry at Mota Ulun

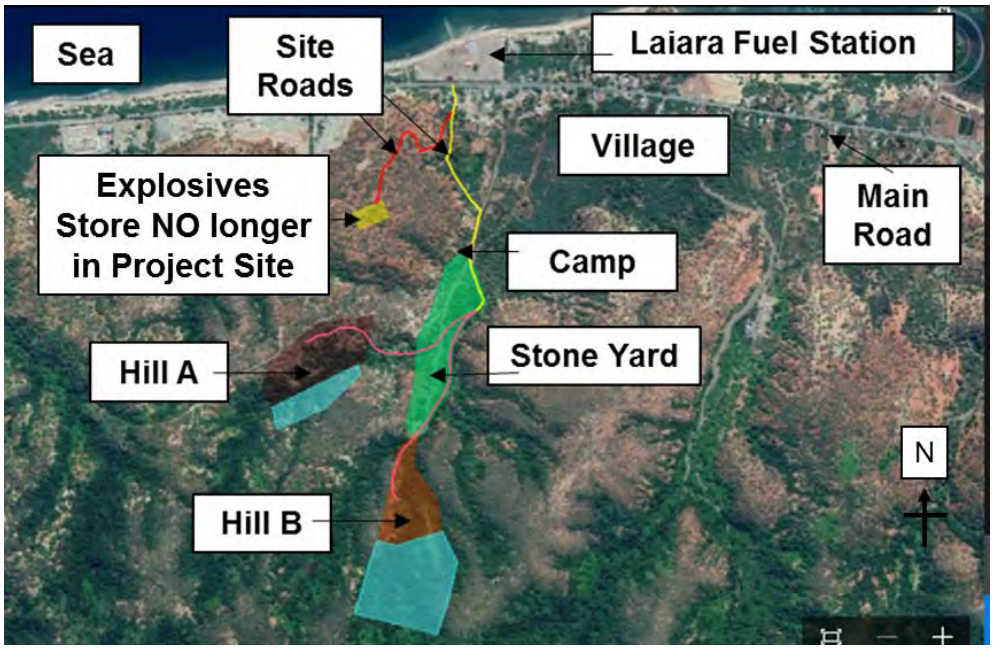


Figure 4-3. Layout Plan of CHT Quarry at Mota Ulun

4.3.6 Table 4-1 shows the sizes of the various places of the quarry. The alternative areas, that ideally should be within or around the proposed area, for project material needs purposes, in case where the proposed areas do not provide sufficient construction materials for support requirements, are also next to the hills that are earmarked for excavation, as shown at Figure 4-3 (highlighted in blue) at above.

Table 4-1. Sizes of Activity Areas

SN	Activity	Size
1	Excavation Area	Hill A: 4 ha Hill B: 3.99 ha Hill C: (Spare) 6.76 ha Hill D: (Spare) 2.1 ha
2	Processing Area	5.84 ha
3	Storage Area	1.275 ha
4	Housing Area	0.5 h

4.3.7 The conventional method for obtaining rocks is used, i.e. using controlled explosions for breaking up a rock wall, and followed by transporting rocks to a crushing machine for processing into the required smaller sizes. The rock / gravel processing and storage area is about 70,000 m2. The rock crushing machine has a capacity of about 300 tons per hour. The main steps for producing rocks and gravel are as follows:

4.3.7.1 Surface earthworks and preparation.

4.3.7.2 Drilling and blasting.

4.3.7.3 Transporting rocks from blasting area to the crusher plant.

4.3.7.4 Loading onto the crusher plant.

4.3.7.5 Crushing, screening and classification.

4.3.7.6 Stockpiling.

4.3.7.7 Hauling to end user sites.

4.3.8 Initial work starts with making the internal haul roads of the dirt type. Initially, there is 1 road, measuring about 1,000 m in length. As work progresses, the haul roads are extended to reach further work places.

4.3.9 The required number of equipment and machinery is listed at Table 4-2. Electricity supply is from public mains. There is no plan to install a generator.

Table 4-2. Type and Quantity of Machinery

Heavy Machine	Initial setup (first 4 months)	Production
Excavator	4	4
Bulldozer	2	1
Front Loader	2	2
Dump Truck	5	21
Water Tanker	1	2
Fuel Tanker	1	1
Rock Crusher	1	1

4.3.10 Attachment B has safety-related information about handling explosives, e.g. covering transport, storage and use. There is a separate application to the relevant authorities for an explosives permit, and for a mining permit.

4.3.11 A workforce of 85 persons is planned. A single-storey camp quarter for 35 persons is constructed. The majority of workers, with the intention to hire as many as practicable, is from the local Mota Ulun community.

4.3.12 The capital cost of setting-up the quarry is about US $ 3 million. Operating cost is not included.

4.4 Justification and Necessity of the Project

4.4.1 Discussions on justification and necessity of the Project start on the premise that the engineering design of the Tibar Bay Port is finalised, and that rocks are required for constructing revetments for shore protection against sea waves, and for ground improvement to strengthen against earthquakes. Therefore, scenarios of "no quarry project", or a reduced quarry size, are not practical, for the type and amount of rocks are already defined.

4.4.2 The rocks should not be imported, for imports cause significant revenue and other economic loss to the country due to the required large quantity that is readily available locally. Also, local quarries provide opportunities for improving the extractive type of industries by building-up the components of people, machinery and logistics needed for quarry operations. This scenario is readily feasible because of the large amounts of minerals in the mountains of Timor-Leste.

4.4.3 The selection of the location for a quarry usually considers the following factors:

4.4.3.1 Quantity and Quality of Material. The hardness of the rocks must be at least 80 MPa (mega Pascals), to meet the design criteria of 60 years for the quay structure. The site should have at least 1,030,000 m3 of rocks.

4.4.3.2 Accessibility. Favourable terrain, for ease of access and transportation, and proximity to the delivery site is desired. Routes to/from the site to final delivery place should be available, and if not, then easily constructed, e.g. no crossing of wide or deep valleys and rivers, for delivery of machinery and the numerous movements of dump trucks for supplying rocks and gravel.

4.4.3.3 Workforce. It is preferred that workers are readily available from the neighbourhood; savings on housing and transport, and eliminating the influx of workers problem.

4.4.3.4 Nature and Social Conservation. The site should not be in or near a wetland or nature reserve, or having protected or endangered species or unique vegetation. Activities should not impact places with religious, historical, cultural, archaeological, heritage, or sacred elements.

4.4.3.5 Existing Usage. There should be compatibility with existing or planned usage. It is a positive point if similar types of industries are already operating in the locality, and the quarry is not in conflict with other types of activities.

4.4.3.6 Community. Harmony with the local community is essential. Evictions, resettlements, dispossession of land and assets, destruction of dwellings and other structures, and economic deprivation, are examples of disharmony that might or might not be beneficial. It is preferable that due to the quarry activities, persons should not be evicted, disposed of land and other assets, or deprived of livelihood and other economic gain.

4.4.4 From Jan to Jul 2018, with assistance from the Institution of Petroleum and Geology (under the Ministry of Petroleum and Ministry of Mineral Resources), 17 places within 50 km of Tibar Bay were prospected for the desired type of rocks. Attachment C shows the locations searched for the right type of rocks. After considerations, the quarry at Mota Ulun is selected, for it has excellent scores for all the factors stated at paragraph 4.4.3.

4.5 Approval of the EIS by the Proposer

4.5.1 Mr. Wang Wei, CHEC Country Head for Timor-Leste, has indicated his approval of the CHT Quarry (Mota Ulun) EIS, as shown as Attachment D.

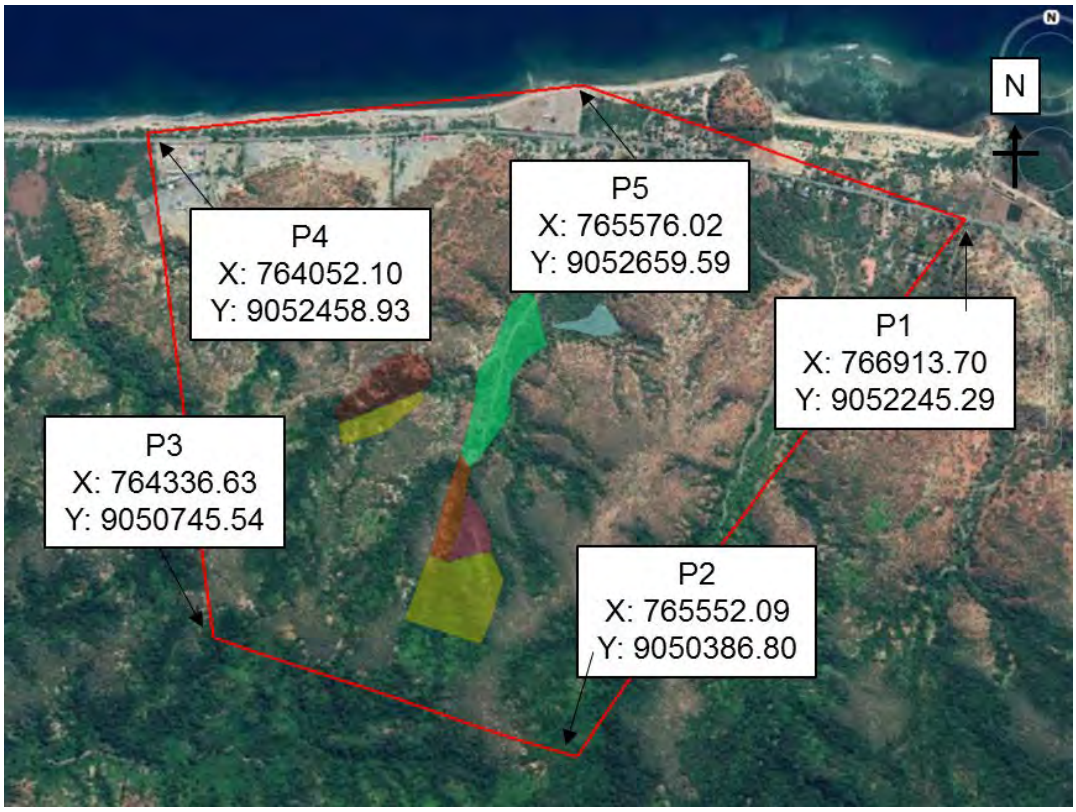
4.6 Structure of the EIS

4.6.1 The purpose of this EIS is to identify and assess the environmental and social risks of the proposed CHT Quarry at Mota Ulun. It has various chapters covering locations, boundaries, affected areas, legislation, environmental, community, social and cultural matters, and related impacts and mitigation measures.

General Location

4.6.2 The EIS study area in which impacts and evaluations take place, is shown at Figure 4-4A, with corner coordinates included. Other parts of the Study Area cover the entities on the sides of the Dili-Liquica trunk road from the quarry to Tibar Bay, for quarry trucks use this stretch of road. These parts are shown at Figures 4-4B and 4-4C.

Figure 4-4A. EIS Study Area (Part 1)



4.6.3 Entities in the study area, with some highlighted in Figure 4-4B, include:

4.6.3.1 Industrial enterprises, e.g. small-scale quarries with gravel processing and concrete component activities, and the Laiara bulk fuel station with a jetty.

4.6.3.2 Village type dwellings scattered along both sides of the Dili-Liquica trunk road.

4.6.3.3 Educational, religious and recreational facilities. There is a primary school, i.e. the Ensino Basico Filial Caitehu. There is a Church; the Church of Capela da Sagrada Familia. At the rear of the Church is a convent; Irmas Franciscanas de Nosa Senhra das Victorias. There are 2 places, each with one table for billiards.

4.6.3.4 Commercial businesses, i.e. 3 small grocery shops, and 2 motorcycle repair shops. There are 2 one-person type fishing boats at the beach behind the primary school.

4.6.3.5 The nearest Clinics are at Ulmera and at Liquica.

4.6.4 From the quarry to Tibar Bay, quarry dump trucks travel along the good condition Dili-Liquica trunk road. This approximately 11 km stretch of road is included in the study area (illustrated at Figures 4-4B and 4-4C), as part of transboundary effects, and traffic safety surveys are conducted.

Figure 4-4B. Entities in the Study Area (Part 2)
(refer to Figure 4-4C for entities further east until Tibar Bay)

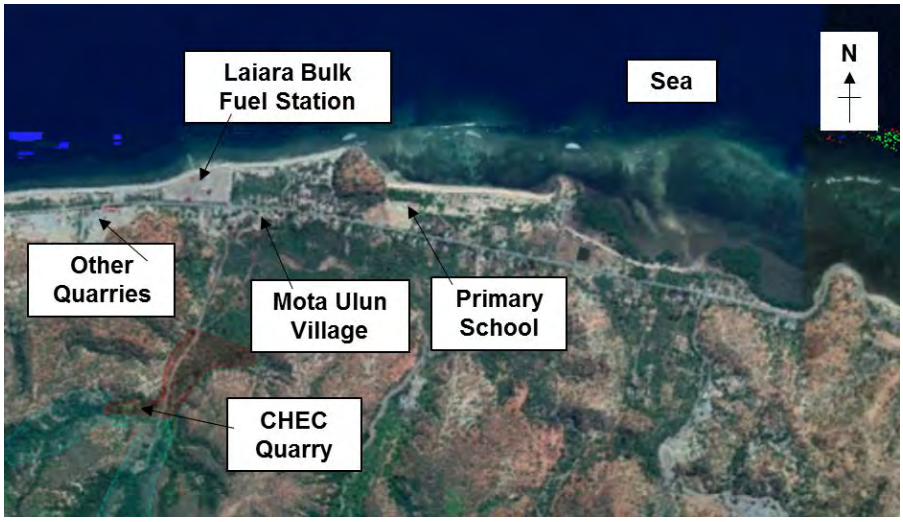


Figure 4-4C. Entities in the Study Area (Part 3)

Areas Affected by the Project

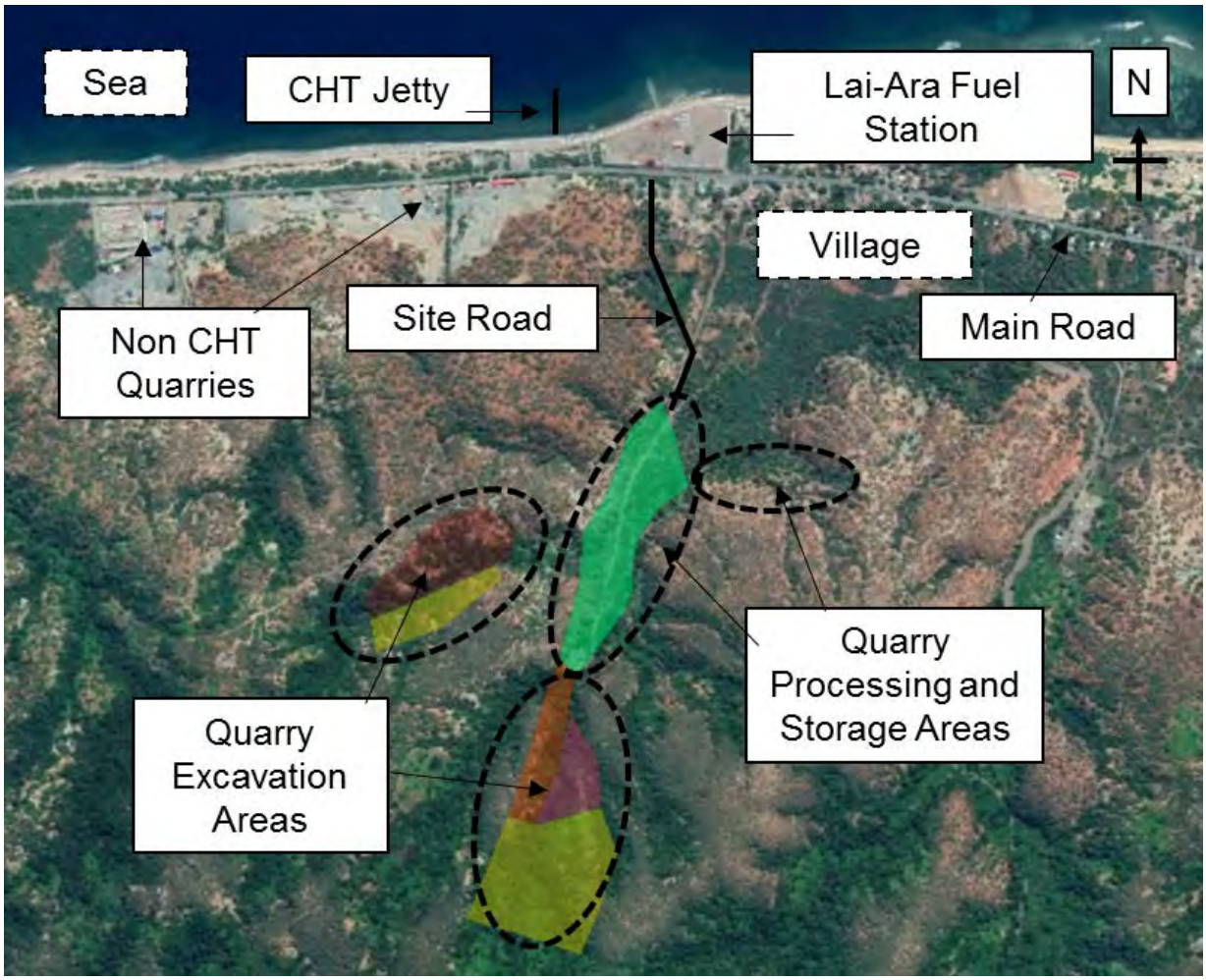
4.6.5 The quarry site is on government owned land. There are no persons living on or off the land, no squatters, and no dwellings. Therefore, the matters of forced eviction, resettlement and economic displacement does not arise. The nearest buildings are at least 1.5 km away. The road to the quarry does not pass through the village. The main places affected by the Project, as shown at Figure 4-5, include:

4.6.5.1 Industrial. There are 3 small-scale gravel construction companies sited immediately at the west of the quarry entrance at the main road, and the Laiara Bulk Fuel Station across the road.

4.6.5.2 Domestic (Households). A few persons from the cluster of village-type homes at the east of the quarry entrance at the main road, go to the foot of the hills to cut firewood. Domestic animals, especially goats forage at the lower slopes of the hills.

4.6.5.3 Main Road. Traffic is expected to increase on the road between Dili and Liquica. A jetty is proposed at a site about 60 m to the immediate west of the Laiara Bulk Fuel Station to ease the traffic load on the said road. A separate application is made to the relevant authority for a separate Environmental License for this proposed jetty.

Figure 4-5. Areas Affected by the Project



4.6.6 Trucks deliver rocks and gravel from the quarry to Tibar Bay, and return for further loading and subsequent unloading. The road used is the Dili-Liquica truck road. The main impact on the entities on both sides of the 11 km stretch of road (illustrated at Figures 4-4B and 4-4C) is therefore due to heavy vehicle traffic.

Project Specific Location, Boundary

and Visual Proposal of the Project Site

4.6.7 The boundaries of the Project, and the specific locations of the various parts, with corner coordinates are shown in Figure 4-6, and Table 4-3.

Figure 4-6. Boundaries of the Project
(Refer to Table 4-3 for the Coordinates)

Table 4-3. Coordinates of the Boundaries of the Project

DESCRIPTION	POINT	COORDINATE	
		LATITIDE	LONGITUDE
Hill A	A1	8°34'18.13"S	125°24'29.36"E
	A2	8°34'16.68"S	125°24'27.88"E
	A3	8°34'16.29"S	125°24'26.54"E
	A4	8°34'17.06"S	125°24'24.06"E
	A5	8°34'18.01"S	125°24'22.85"E
	A6	8°34'20.43"S	125°24'20.81"E
	A7	8°34'22.85"S	125°24'18.14"E
	A8	8°34'24.74"S	125°24'18.74"E
	A9	8°34'20.18"S	125°24'28.75"E
Hill B	B1	8°34'38.86"S	125°24'32.99"E
	B2	8°34'38.13"S	125°24'35.79"E
	B3	8°34'35.11"S	125°24'35.71"E
	B4	8°34'31.61"S	125°24'33.46"E
	B5	8°34'27.83"S	125°24'34.16"E
	B6	8°34'29.57"S	125°24'31.85"E
	B7	8°34'38.86"S	125°24'29.10"E
	B8	8°34'39.27"S	125°24'31.00"E
CONTINGENCY QUARRY 1	E1	8°34'27.00"S	125°24'19.22"E
	E2	8°34'25.28"S	125°24'23.95"E
	E3	8°34'21.75"S	125°24'28.27"E
	A8	8°34'24.74"S	125°24'18.74"E
	A9	8°34'20.18"S	125°24'28.75"E
CONTINGENCY QUARRY 2	F1	8°34'45.69"S	125°24'26.28"E
	F2	8°34'48.02"S	125°24'34.50"E
	F3	8°34'41.04"S	125°24'37.10"E
	B1	8°34'38.86"S	125°24'32.99"E
	B2	8°34'38.13"S	125°24'35.79"E
	B7	8°34'38.86"S	125°24'29.10"E
	B8	8°34'39.27"S	125°24'31.00"E
EQUIPMENT INSTALLATION	C1	8°34'8.76"S	125°24'39.96"E
	C2	8°34'10.40"S	125°24'37.97"E
	C3	8°34'26.00"S	125°24'35.88"E
	C4	8°34'14.41"S	125°24'41.79"E
SPARE AREA	D1	8°34'14.39"S	125°24'44.27"E
	D2	8°34'16.47"S	125°24'50.69"E
	D3	8°34'14.48"S	125°24'51.73"E
	D4	8°34'12.24"S	125°24'50.14"E
	D5	8°34'14.14"S	125°24'48.23"E
	D6	8°34'14.26"S	125°24'44.63"E
	D7	8°34'13.55"S	125°24'44.10"E

4.6.8 The quarry hills, about 200m in height, are located about 1.5 km from the main Dili-Liquica road. Persons using this road are not able to have clear views of the lower parts of the hills because of obstructions caused by trees and other higher land features at the sides of the road, as shown at Figures 4-7A and 4-7B. The top of each hill will not be cut. At the end of rock extraction work, a "stepped pyramid (i.e. similar to rice terraces)" structure remains, with a trekking path winding-up to the original height of the hill. Such a feature has potential to be an amazing sight.

Figures 4-7A and 4-7B. Views of the Quarry Hills from the Main Road

Project or Development Related with the Construction and Project Operation

4.6.9 The construction and operation of the Project involve making haul roads, constructing housing quarters, setting-up a rock crusher, blowing up rock surfaces, gathering and crushing rocks, storing rocks / gravel, and transporting the material to Tibar Bay using trucks via the main road, or by a jetty sited at the immediate west of the Laiara Bulk Fuel Station. There is a separate application to the relevant authorities for a permit for this jetty. The environmental and social impacts of the work are discussed in this EIS.

4.6.10 The Project is entirely in uninhabited land without use for crop growing or raising of animals. Except for 2 electrical masts, there are no other structures. The location is not a destination for tourists, whether local or foreign. The hills are not used for recreational purposes. At the end of excavation of the hills, a stepped pyramid-type structure is left behind, and the original heights of the hills are retained. The haul roads winding-up to the top are left in place. These roads are revegetated. It can be said that at mine closure, the amenity of the location is enhanced with potential for trekking up to the hill tops for scenic views of the sea. Attachment K has fuller details on closure plans.

5.0 Policy, Legal, and Institutional Framework

5.1 The Constitution of the Democratic Republic of Timor-Leste has Articles relating to the environment, natural resources and culture, with examples as follows:

5.1.1 Section 61 (Environment) directs that the State should promote actions aimed at protecting the environment and safeguarding the sustainable development of the economy.

5.1.2 Section 139 (Natural Resources) states that the exploitation of the natural resources shall preserve the ecological balance and prevent destruction of ecosystems.

5.1.3 Section 41.5, though relating to freedom of the press and mass media, mentions the protection and dissemination of culture and traditional values. Section 59 (Education and Culture), recognises and guarantees that every citizen has the right to education and culture.

5.2 Other key environmental legislation associated with the quarry include:

5.2.1 Decree Law 26/2012, Environmental Basic Law; Sets out the framework for environmental policy and the guiding principles for the conservation and protection of the environment and for the preservation and sustainable use of natural resources in order to promote the quality of life of the citizens.

5.2.2 Decree Law 5/2011, Environmental Licensing Law; Creates a system of environmental licensing for public and private projects likely to produce environmental and social impacts on the environment. The system of licensing is a system based on assessing the size of the potential environmental impact of projects taking into account their nature, size, technical characteristics and location. Article 3 states the environmental licensing procedure.

5.2.3 Ministerial Directive 44/2017; Regulation on Impacts and Benefits; Covering the process for agreement between the project Proponent and the local community regarding the advantages and disadvantages of the project.

5.2.4 Ministerial Directive 45/2017; Regulation on the management of and the rules for the Committee assessing Category A projects.

5.2.5 Ministerial Directive 46/2017; Defining the details for Project Documents (PD), TOR, EIS and EMP documents, as stated in Annexes 1, 3, 4 and 5 respectively.

5.2.6 Ministerial Directive 47/2017; Regulation on public consultation procedures and requirements during an environmental assessment process.

5.2.7 Decree Law 64/2016, Licensing of Mining Activities; Sets the licensing procedures for different types of mining licenses, for mining activities relating to construction materials, certain process materials and ornamental stones. Article 40 requires the submission of monthly reports covering HSE concerns and other matters.

5.3 The EIS and EMP documents are prepared to meet the intent and requirements of the stated environmental legislation, and other legislation that cover the quarry. The “List of Compliance with Legislation Requirements” is at Attachment E. Attachment E1 has a list of other standards and guidelines that the Quarry HSE Manager has to take steps to meet.

6.0 Description of the Environment

6.1 The environment is that of a hilly area, bordering the sea with a narrow beach. It has a sparse rural community without any significant scale of agricultural, livestock, industrial, commercial or social activities. The construction and operations of the nearby Tibar Bay Port, and the associated industries supporting it, e.g. the quarry, the fuel stations, and the freight forwarding business, will bring progress and prosperity to the area, that is presently in need of development. Other descriptions of the environment, including the importance and relationships of ecological, economic, social and cultural factors are as follows.

6A Physical Components

6A.1 The physical components cover climate (including any implication of climate change), topography and geology, air, surface water, coastal water, and marine water.

6A.1 Climate

6A.1.1 The region has a typical tropical climate, with monsoon rains during the wet weather season usually from December to May. Seasonal variation in temperature is minimal, from low to mid 30 deg C. Night-time temperatures are in the mid 20 deg C. Humidity is high; greater than 90%.

6A.1.2 Rain does not affect quarry operations, because most of the excavation work is done above ground level, and there is no tunneling work. Extreme weather conditions are not expected.

6A.1.3 The operations of the quarry is not expected to have a significant impact on climate change, of which a further discussion is at Chapter 7.

6A.2 Topography and Geology

6A.2.1 Timor-Leste is in the Indonesia archipelago, an earthquake zone. Figures 6A-1 and 6A-2 show the general terrain where the quarry is located. It is in a hilly region, with hills about 200 m high at the most. . To the north, is the sea about 1,500 m away from the quarry hills. The beach is less than 8 m wide at high tide. . Bordering the beach is a good condition bitumen road with one lane each for traffic going in both directions.

6A.2.2 From the road to the land side, there is usually about less than 200 m of flat land before the rise of the hills. Figures 6A-1and 6A-2 shows the top views of Hills A and B respectively. Attachment F has photographs showing other features of the terrain.

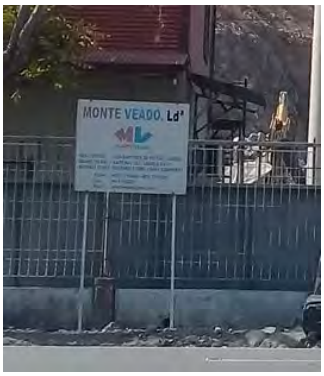
Figure 6A-1 Top View of Hill A

Figure 6A-2 Top View of Hill B

6A.3 Air

6A.3.1 The location has no commercial rearing of livestock, or cultivation of crops, i.e. no air pollution due to animal waste or spraying of insecticides. Traffic along the main road is light. The existing 3 quarries and concrete part manufacturers (with name plates at Figure 6A-3), at the immediate west of the turn-off from the main road to the CHT Project site, are the main contributors to dust pollution.

Figure 6A-3. Existing Neighbouring Quarries



6A.3.2 Quarry operations produce dust. The Institute of Air Quality Management (IAQM), based in London (UK), has a document titled, "Guidance on the Assessment of Mineral Dust Impacts for Planning, dated May 2016 (v1.1). In this document, Figure 1: Site Assessment Flow Chart, at page 11, states that if residential properties and other sensitive uses are not within 1 km of site activity, then "Good Practice Measures" are required.

6A.3.3 Even though residences and industrial properties are more than 1.5 km away from the quarry, CHT is conducting a dust assessment study consisting of the following components:

6A.3.3.1 Establish baseline conditions of the existing dust climate around the site of the proposed operations.

6A.3.3.2 Identify site activities that could lead to dust emission without mitigation.

6A.3.3.3 Identify site parameters which may increase potential impacts from dust.

6A.3.3.4 Recommend mitigation measures, including modification of site design.

6A.3.3.5 Make proposals to monitor and report dust emissions to ensure compliance with appropriate environmental standards and to enable an effective response to complaints.

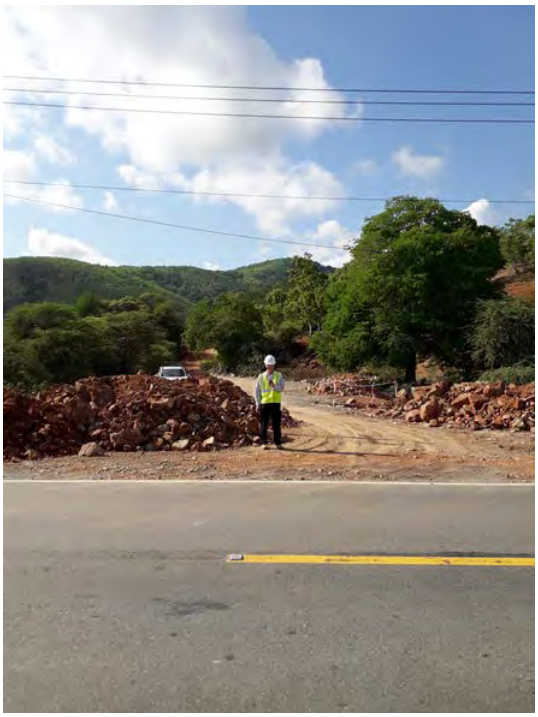
6A.3.4 Baseline dust monitoring includes samplings for “total dust”, PM10 and PM2.5. The Dust Management Plan and the Environmental Dust Baseline Sampling Report, are at Attachments M and M1 respectively.

6A.3.5 Concurrent with the dust monitoring, noise monitoring will also be conducted. Table 6A-1 shows the readings taken during an initial baseline noise sampling conducted on 9 Jan 2019, at the turn-off from the main road to the quarry road. The instrument used was a 3M made, model SD-200, and serial number SD20017508. It was held at a height of 1.5 m, and facing the main road, and 2 m away from it. Figure 6A-4 shows the location (represented by the person taking the sampling).

Table 6A-1. Noise Readings

SN	Vehicle	Reading (dBA)
1	Ambient	62
2	Motorcycles / Sedans	72 to 78
3	Trucks	83

Figure 6A-4. Location of Noise Sampling



6A.3.6 Sound level is measured in dBA (i.e. a range within the human ear). For every doubling of distance, the sound decreases by 6 dBA. Table 6A-2 illustrates the sound produced by various activities. Table 6A-3 shows the sound level decreasing when a person is further away from noise produced by a working jack hammer. The conclusion is that noise produced by quarry activities does not affect the nearest dwellings for these are more than 1.5 km away. The generally accepted noise exposure level is not more than 85 dBA over an 8-hour time period.

Table 6A-2. Noise Level Chart
(from website: https://www.noisehelp.com/noise-level-chart.html)

dBA	Example	Home & Yard Appliances	Workshop & Construction
0	healthy hearing threshold		
10	a pin dropping		
20	rustling leaves		
30	whisper		
40	babbling brook	computer	
50	light traffic	refrigerator	
60	conversational speech	air conditioner	
70	shower	dishwasher	
75	toilet flushing	vacuum cleaner	
80	alarm clock	garbage disposal	
85	passing diesel truck	snow blower	
90	squeeze toy	lawn mower	arc welder
95	inside subway car	food processor	belt sander
100	motorcycle (riding)		handheld drill
105	sporting event		table saw
110	rock band		jackhammer
115	emergency vehicle siren		riveter
120	thunderclap		oxygen torch
125	balloon popping		
130	peak stadium crowd noise		
135	air raid siren		
140	jet engine at takeoff		
145	firecracker		
150	fighter jet launch		
155	cap gun		

Table 6A-3. Sound Level at Different Distances from Source

SN	Distance from Noise Source (m)	Sound Level (dBA)	Sound Produced by
1	1	110	Jack hammer / rock band
2	2	104	
3	4	98	
4	8	92	
5	16	86	Equivalent to a passing diesel truck
6	32	80	Equivalent to an alarm clock
7	64	74	
8	128	68	
9	256	62	
10	512	56	
11	1,024	50	Equivalent to light traffic / refrigerator
12	2,048	44	
13	4,096	38	
14	8,192	32	Equivalent to a whisper

6A.3.7 Even though the noise level risk for the villagers more than 1 km away from the quarry is negligible, noise monitoring will still be carried out during the first week of blasting work, and monthly thereafter, to “make assurance doubly sure”. The Quarry Noise Management Plan is at Attachment N.

6A.4 Surface, Coastal and Marine Water

6A.4.1 There are no rivers in or bordering the Project site, a location that is at least 1.5 km away from the sea. There is no need for chemicals to process the finished rocks / gravel; i.e. no waste sludge. A recycled water tank is used for watering of the stones in the rock crushing machine. CHT does not rear animals or grow crops. Sanitary waste water is channel in closed pipes into closed tanks. The contents are removed by a collector licensed by the authorities. Therefore, quarry operations have no impact on surface, coastal, and marine water.

6A.4.2 The few small surface streams in the area are dried-up during the dry season Pictures of these streams, mainly at road crossings are taken for baseline evidence of condition, shape and size. Details are at Attachment G. During quarry operations, the streams, whether dried-up or otherwise, are checked each day to ensure that “all is well”.

6A.4.3 During ground investigations for the locations and types of rocks, boreholes were dug to within 20 m above ground level without any sign of ground water. The results show that the water table is below the foot of the hills, as shown at Figures 6A-5 and 6A-6. During quarry operations, excavation for rocks stops at 20 m and 100 m above ground level respectively for Hills A and B, i.e. there will be no interference with ground water. However, the water in the wells of the village will still be tested at least once every 6 months. The results of a well water test conducted on Aug 2018, is at Attachment A.

Figure 6A-5. Hill A Boreholes (north-south cross-section)

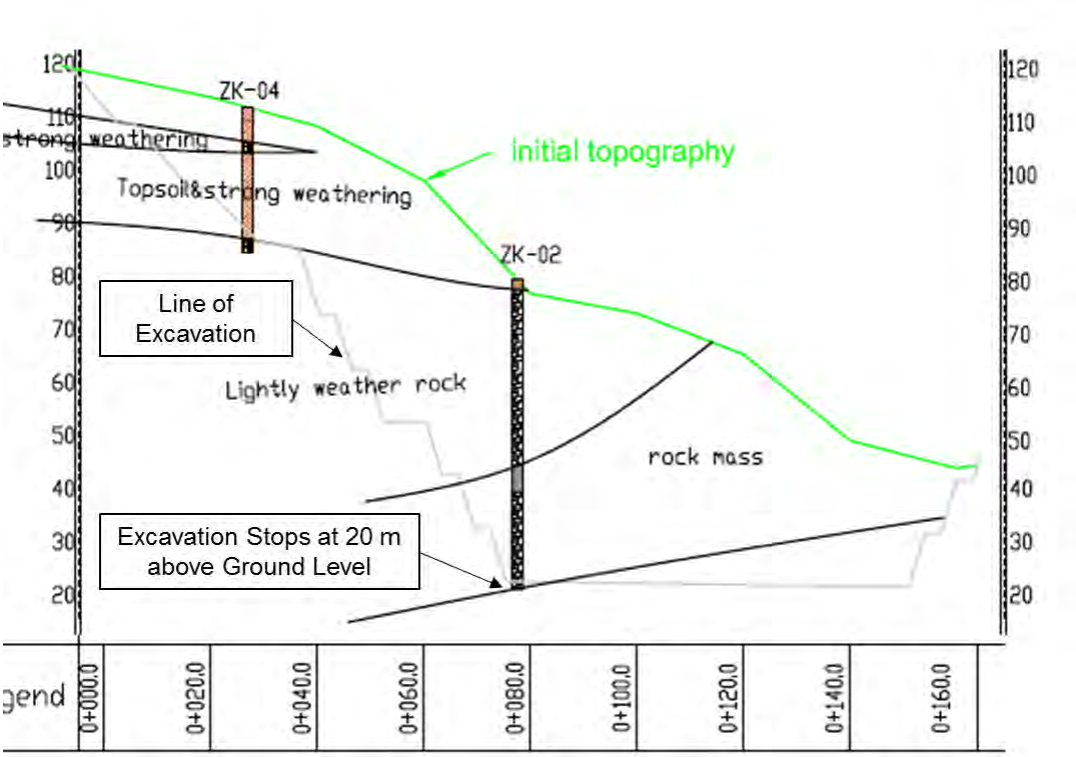
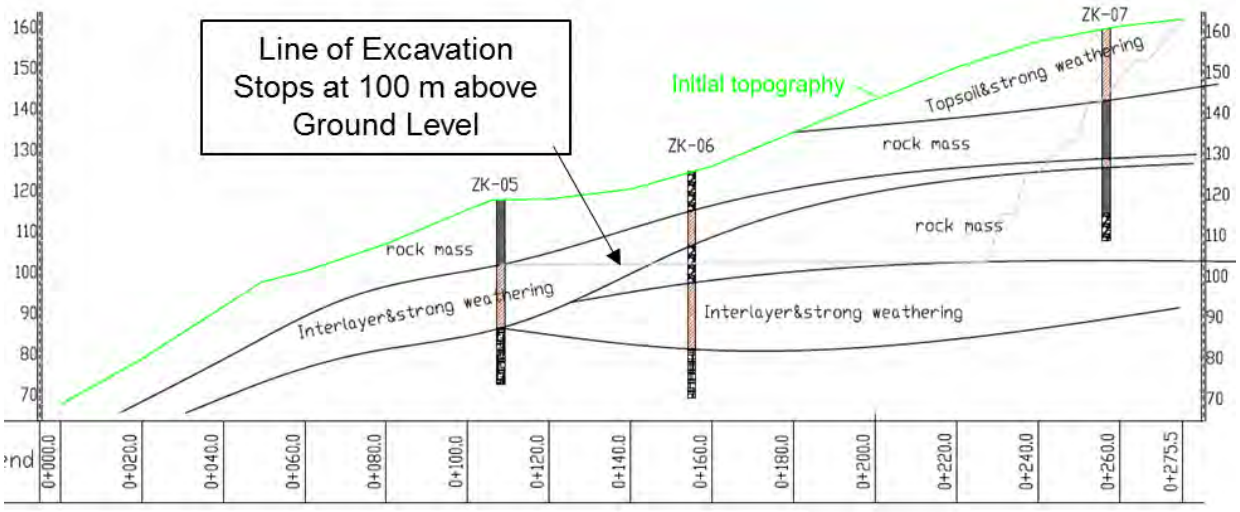


Figure 6A-6. Hill B Boreholes (north-south cross-section)



6B Ecological Components

6B.1 Ecological components cover marshland, mangroves, corals, fishing, protected areas and national parks, flora and fauna, forests and coastal resources.

6B.1 Marshland, Mangroves, Corals, Fishing and Coastal Resources

6B.1.1 There are no water bodies (e.g. ponds) or water courses (e.g. rivers, streams, springs and drains) in the Project area. Attachment G shows the locations of the few small streams that are dried-up during the dry season. Attachment G1 contains the report on "Survey of Water Course East of Laydown Area".

6B.1.2 The Project site is at least 1.5 km away from the sea. Therefore, there is no impact at all on marshlands, mangroves, corals, fishing or coastal resources.

6B.2 Protected Areas and National Parks

6B.2.1 The Project site is not in a wetland or conservation area, e.g. nature reserve, wildlife sanctuary, protected landscape, or near such places. The location is not classified as a protected place with reference to Annex 1 of Decree Law No 5/2016 National System of Protected Areas. The nearest protected area is located at Mount Fatumasin, about 20 km south of the proposed quarry.

6B.3 Forest, and Flora and Fauna

6B.3.1 A biodiversity survey (including flora and fauna) of the Project site was conducted from 2 to 8 Jan 2019. The full report is at Attachment L. Essentially, the survey found, quote, from the Abstract:

"The Timor imperial pigeon (*Ducula cineracea*) is listed **endangered** whilst the White bellied bushchat *Saxicola gutturalis* is **Near Threatened**. There is little information on the vegetation, but the

cedar and sandalwood trees are IUCN **vulnerable** but from our research we know they are rare in Timor-Leste. The Burmese redwood is listed as **endangered".**

6B.3.2 Following this report, the next steps are that of engaging competent persons, e.g. a zoologist and a biologist, to conduct initial training for CHT quarry management and supervisory staff on the following topics:

6B.3.2.1 Field identification of critical trees.

6B.3.2.2 Identification of endangered and near threatened species.

6B.3.2.3 Care for wounded / trapped creatures.

6B.3.2.4 "Catch and Release" techniques, should any creature be accidently trapped or caught.

6B.3.3 After training, the Project site is re-surveyed to identify and mark out trees that are to be protected and their preservation method. In addition, equipment that are required for the safe handling of wild creatures will be obtained and persons are taught on the use of such equipment.

6B.3.4 Other measures for the protection of the environment and the eco system, for nature thrives in a green environment, include:

6B.3.4.1 Open only roads that are necessary, i.e. justify the ground to be cleared.

6B.3.4.2 Do not drop a large tree, if the tree does not need to be dropped, i.e. consider ways of keeping trees, especially at quarry support areas.

6B.3.4.3 When clearing land, do in a manner to allow creatures to escape, e.g. start the clearing from open areas, and do not clear simultaneously from both sides.

6B.3.4.4 Plant local trees and vegetation at deforested areas, e.g. caused by ground clearance.

6B.3.4.5 Implement “no hunting, no trapping, no keeping, no collection of eggs, no bush meat, no keeping of pets” rules.

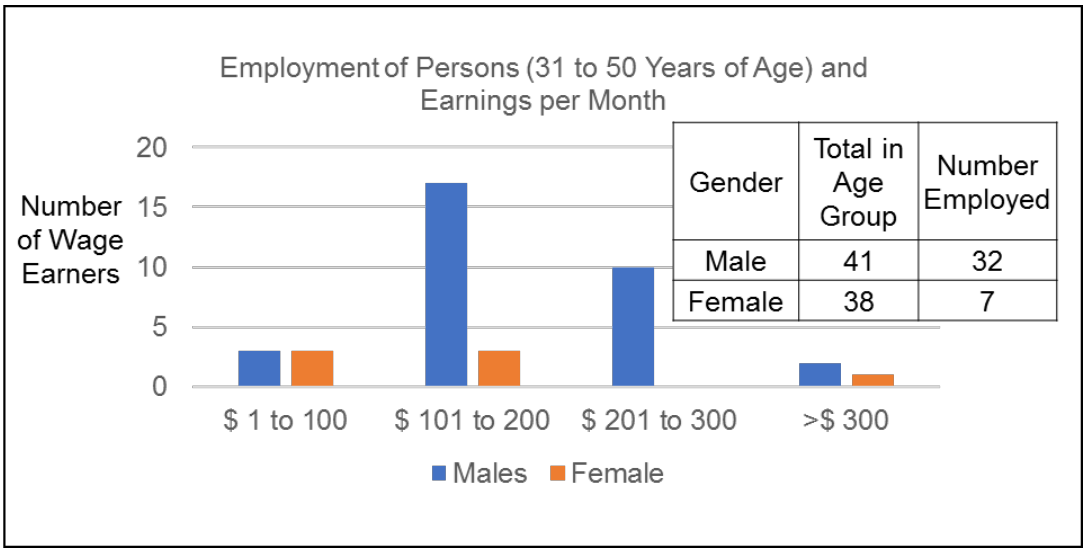
6C Economic Components

6C.1 The economic components cover the employment sector, infrastructure facilities, land use, forest use and other natural resources, fishing, agriculture, tourism, and other industries. A Community Profile Survey was conducted in Dec 2018, and the results are used to fill-in the various parts of the economic components. A total of 68 household were interviewed, and the said survey report is at Attachment H.

6C.1 Employment Sector

6C.1.1 In the prime working age group of 31 to 50 years, 32 out of 41 men are earning a living. However, only 7 women out of 38 are working, as illustrated at Figure 6C-1. Over all age groups, 82 persons are employed, with the types of work classified in the groups of “unskilled”, “semi-skill” and “academic skills”; shown at Table 6C-1. From this figure, it is deduced that earnings are less than $300 per month, because the large majority of workers are not in the highly desired “academic skills” and therefore better paying group. A significant number of persons, especially the older women, go to the nearby hills to collect wood, followed by preparation and bundling at home, and placed by the road side to sell to passing motorists, as shown at Figure 6C-2.

Figure 6C-1. Employment of Persons (31 to 50 years age group)



Gender	Total in Age Group	Number Employed
Male	41	32
Female	38	7

Table 6C-1. Type of Occupation (all age groups)

SN	Unskilled	Qty
1	Construction Worker	15
2	Wood Seller	11
3	Security Guard	8
4	Driver	8
5	Cement worker	3
6	Vegetable seller	3
7	Fruit Seller	1
8	Marine worker	1
9	Waitress	1
10	Pensioner	1
11	Total	52

SN	Skilled	Qty
1	Mobile Machine Operator	7
2	Mechanic	3
3	Construction Supervisor	2
4	Soldier	2
5	Shopkeeper	2
6	Farmer	2
7	Retail Sales	1
8	Cook	1
9	Fisherman	1
10	Total	21

SN	Academic Skills	Qty
1	Teacher	6
2	Engineer	2
3	Bank Employee	1
4	Total	9

Figure 6C-2. Bundles of Wood for Sale at the Roadside

6C.2 Infrastructure Facilities

6C.2.1 The Dili-Liquica road varies in condition. However, the stretch passing through Mota Ulun, and from the Project site to Tibar Bay, is a good condition bitumen road, with one-lane traffic either way (illustrated at Figure 6C-3). There are run-offs with gravel at the sides of the road. There are no breakdown lanes or street lights.

Figure 6C-3. Illustration of Road Condition

6C.2.2 All homes are connected to the government provided mains electrical supply. Domestic water is generally obtained from wells. This water has a high salt content that is not desirable. Some families, especially those living near the coast, i.e. north of the main road, have their water delivered by tankers.

6C.2.3 All persons interviewed said that they own the homes that they live in. Whether made of bricks, wood, zinc or leaves (i.e. usually palm and coconut leaves), there is adequate shelter. There are 12 homes with dirt-type floors, with the rest of the 56 with concrete floors, as shown at Figure 6C-4. An example of a dwelling with zinc walls and roof is at

Figure 6C-5. There are opportunities for CHT to assist in improving the type of dwellings.

Figure 6C-4. Types of Roof, Wall and Floor

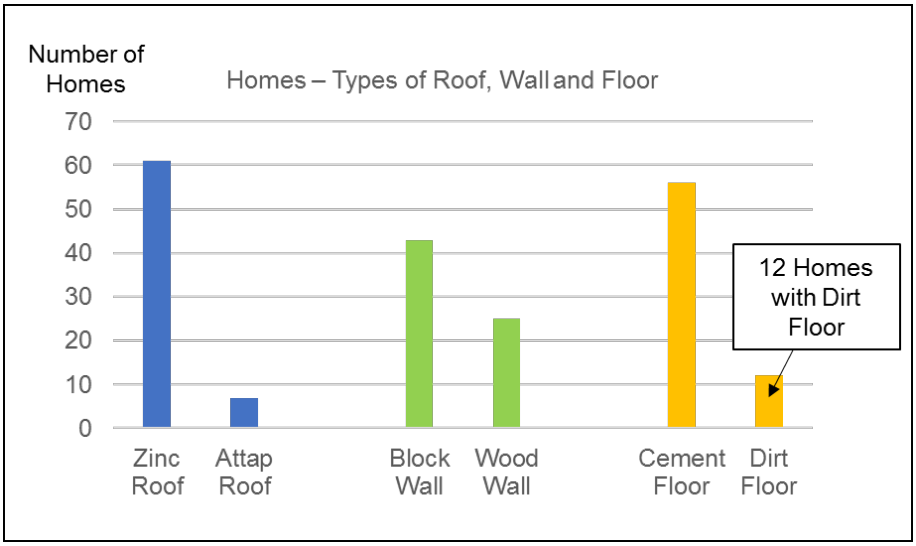


Figure 6C-5. Building with Zinc Walls and Roof

6C.2.4 60 households have water flush toilets. The remaining 8 households use pit latrines.

6C.3 Land and Forest Use and Other Natural Resources, Agriculture and Fishing

6C.3.1 The existing industries are 3 small scale quarries with stone and concrete works (described at paragraph 6A.3.1), and Laiara Bulk Fuel Station (entrance shown at Figure 6C-6) with a jetty that is suitable for pipelines, but not usable by trucks, i.e. not designed as such.

Figure 6C-6. Entrance of Laiara Bulk Fuel Station

6C.3.2 As is usual for a small rural village, there is no designated communal waste dump. Waste is disposed in the bush, or through burning. There is no land use that is affected by the proposed quarry. It is in a non-productive area and the village type settlements are at least 1.5 km away. The route from the main road to the quarry does not pass near any village dwelling, or any other type of structures.

6C.3.3 Domestic water for community daily needs will not be interrupted because CHT dig water wells inside the project area to be used only as domestic water for the project. Water from these wells are tested on a regular basis for suitability for domestic use. The water from the wells in the quarry is expected to have less salinity, for these are

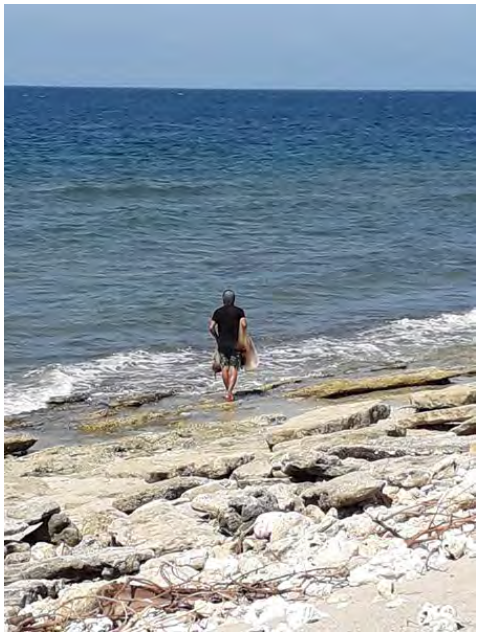
located further away from the sea, and on higher ground. The water will be supplied to the local community for domestic use, as part of corporate social responsibility, and care for the community. The requirements of "Services for Water and Sanitation" will be followed, e.g. suitable locations, testing, storage containers, non-exposure to contamination, etc.

6C.3.4 The concerns relating to flow of rain water, especially during the rainy season are mitigated by the following actions; land clearance permit, designated and purpose-built storage places for materials, checks on water courses before and after ground works, daily inspections by the Quarry HSE Officer, and also after heavy rain. The CHT Community Liaison Officer visits the nearby homes to enquire about welfare, and this includes concerns about matters relating to water, e.g. availability, quality and flooding.

6C.3.5 There are only small home-holdings of cultivation of land for growing crops for personal consumption. There is no livestock industry; only dwellings keeping a few animals, e.g. chickens, pigs, and goats, for home consumption. There are 2 fishing boats of the single-person wood type stored behind the primary school (Figures 6C-7A and B). Occasionally, there is a person at the beach using a spear for catching fish, or using hands to gather shell fish, or casting a hand-drawn net (Figure 6C-8).

Figure 6C-7A and B (2 Fishing Boats Stored Behind the Primary School)

Figure 6C-8. Person with a Casting Net (at beach east of Laiara)



6C.3.6 The community is resourceful with the keeping of chickens, pigs, and goats for home consumption. The distributions of households with animals are shown in Figures 6C-9 and 6C-10. Only one family has ducks. There is no animal husbandry (i.e. the care, cultivation, and breeding of crops and animals for commercial purposes).

Figure 6C-9. Distribution of Chickens and Pigs

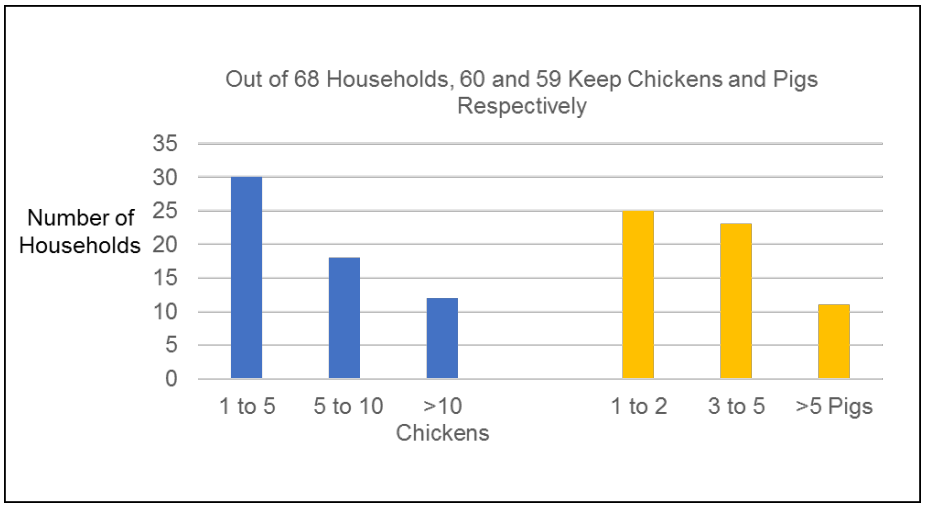
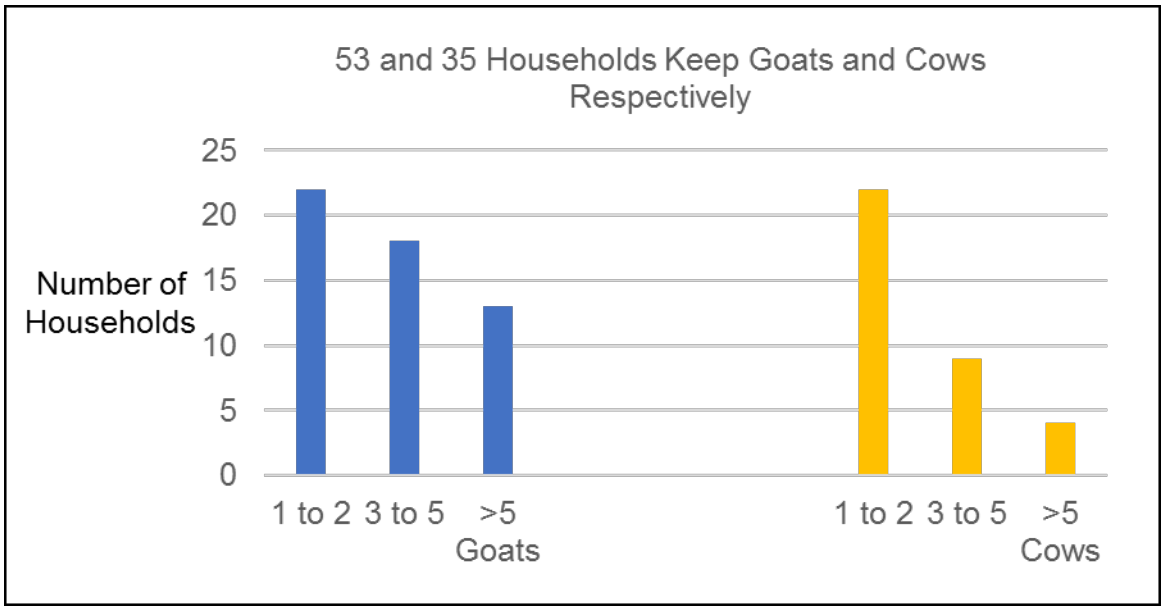
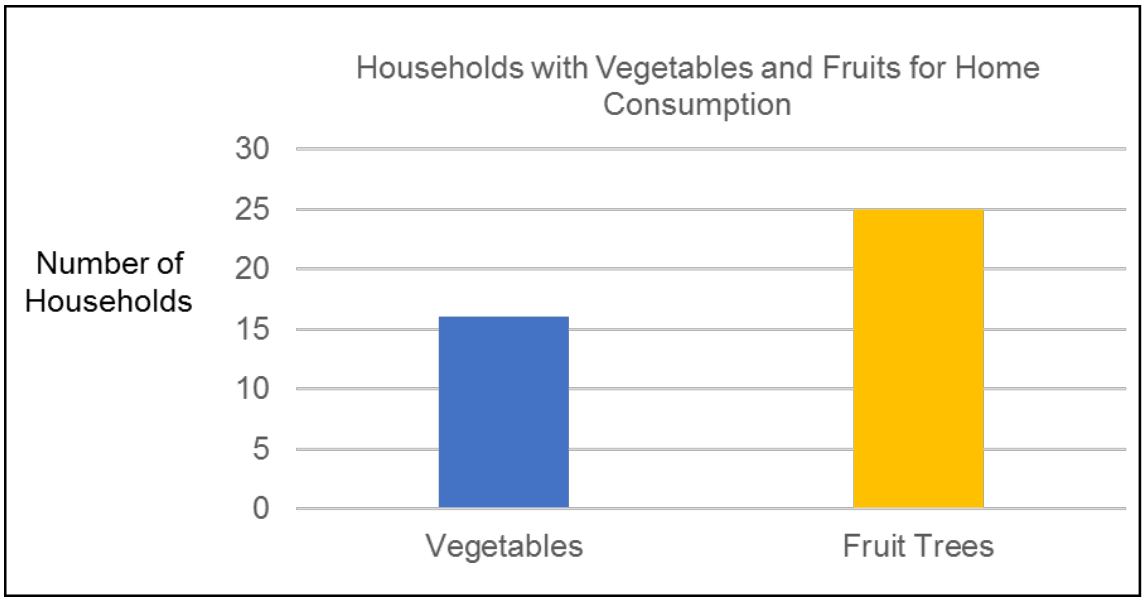


Figure 6C-10. Distribution of Goats and Cows



6C.3.7 Only 16 families grow vegetables for domestic consumption. 25 families have fruit trees, usually of the coconut type, as illustrated at Figure 6C-11. There is no cultivation for commercial purposes.

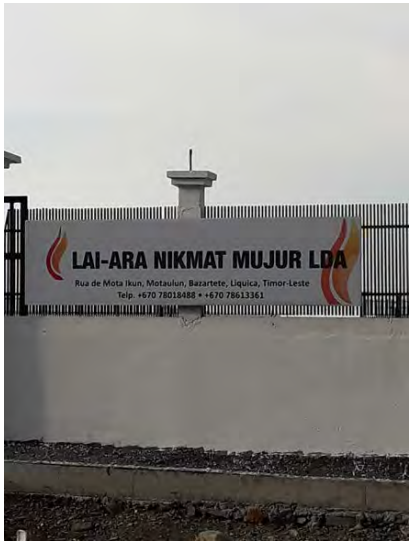
Figure 6C-11. Families with Vegetables and Fruits



6C.4 Tourism and Other Industries

6C.4.1 There is no tourism industry. The few occasional persons at the beachside are from the local community. There are 3 companies operating quarries and concrete works, of which pictures of name plates are shown at Figure 6A-3, at paragraph 6A.3.1. Opposite the road from the Project site is Laiara Bulk Fuel Station (sign board at Figure 6C-12). The arrival of the CHT quarry does not upset the existing industrial arrangement, or change the operating environment.

Figure 6C-12. Sign Board of Laiara Bulk Fuel Station



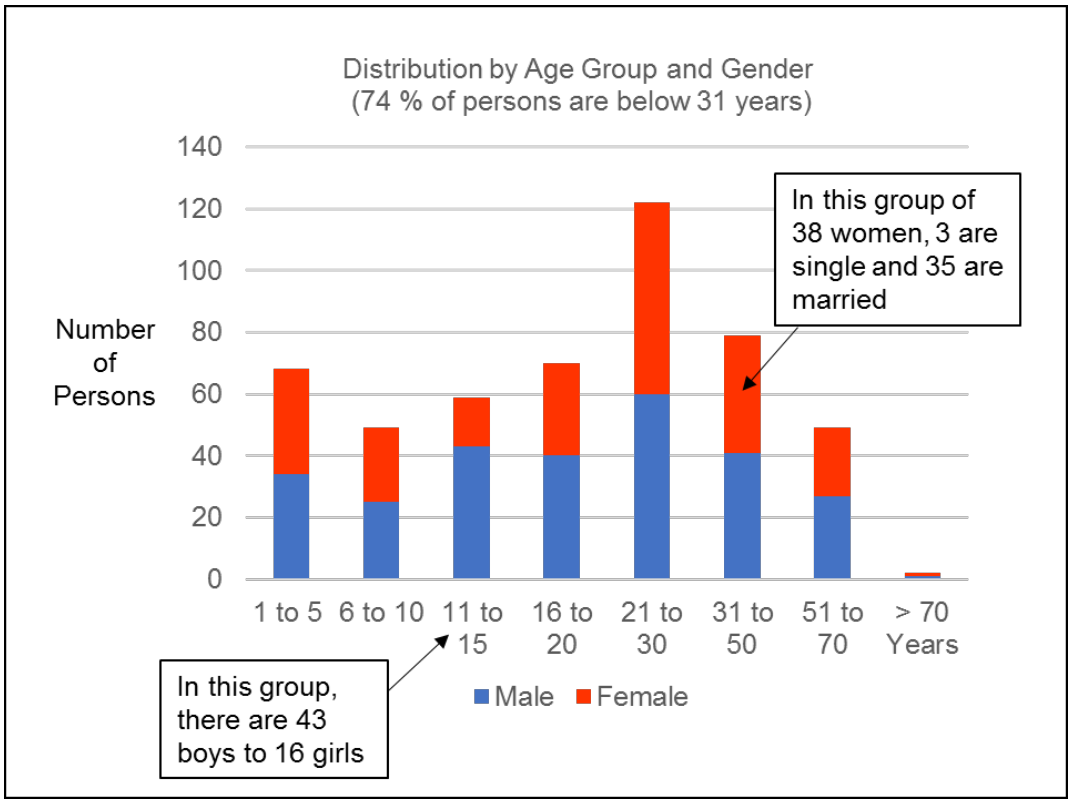
6D Social Components

6D.1 Social components cover population and communities (including number of locals, composition, employment and unemployment), community health profiles, institutions, schools and health facilities, community structure, family structure, land ownership, including informal property or customs on land or any rights to land, and any types of common and individual rights over natural resources.

6D.1 Population, Composition and Family Structure

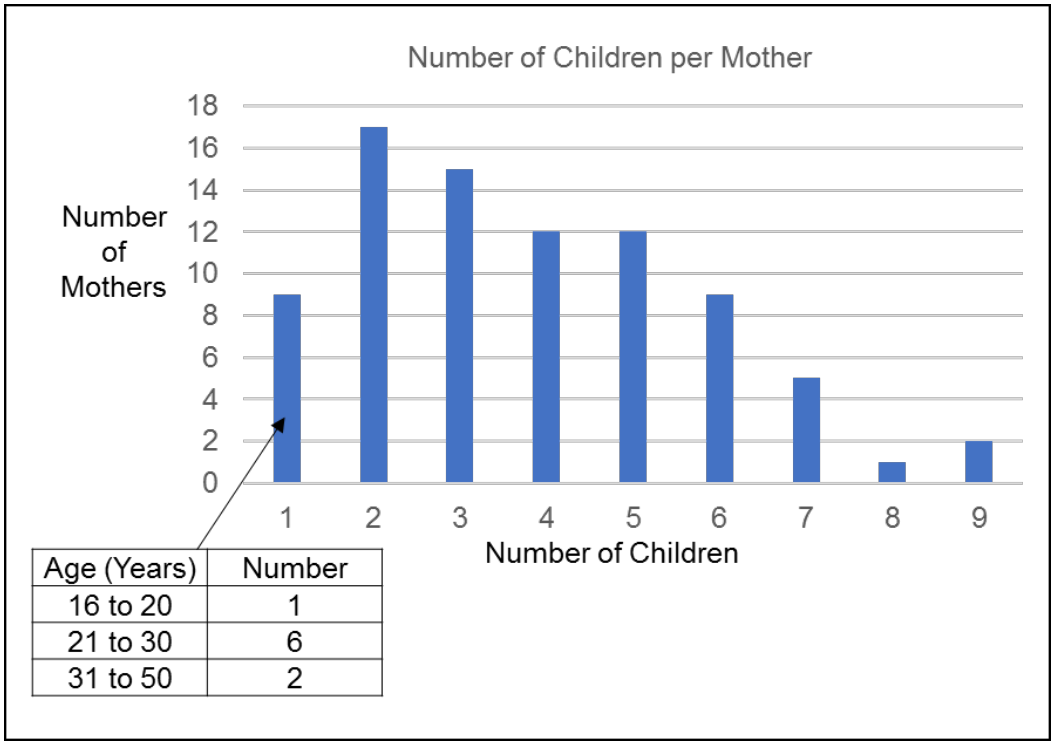
6D.1.1 There are 498 persons, all Timorese, from the interviewed 68 households. The 271 males and 227 females make-up a population distribution of 54 to 46 % in favour of males. This ratio is close to 50-50, except for an anomaly at the 11-15 age group, where the boys outnumber the girls by 43 to 16, i.e. nearly 70 %, as shown at 6D-1. The population is young, for 74 % are below 31 years. There are only 2 persons, one from either sex, aged above 70 years.

Figure 6D-1. Distribution by Age Group and Gender



6D.1.2 Women have little difficulty getting married. In the 31 to 50 year age-group, only 3 women are single, as shown at Figure 6D-1 at above. The birth-rate is excellent. Family size is large. The great majority of mothers have more than 2 children. Of the 9 mothers with only one child each, 7 are still below 31 years, as shown at Figure 6D-2.

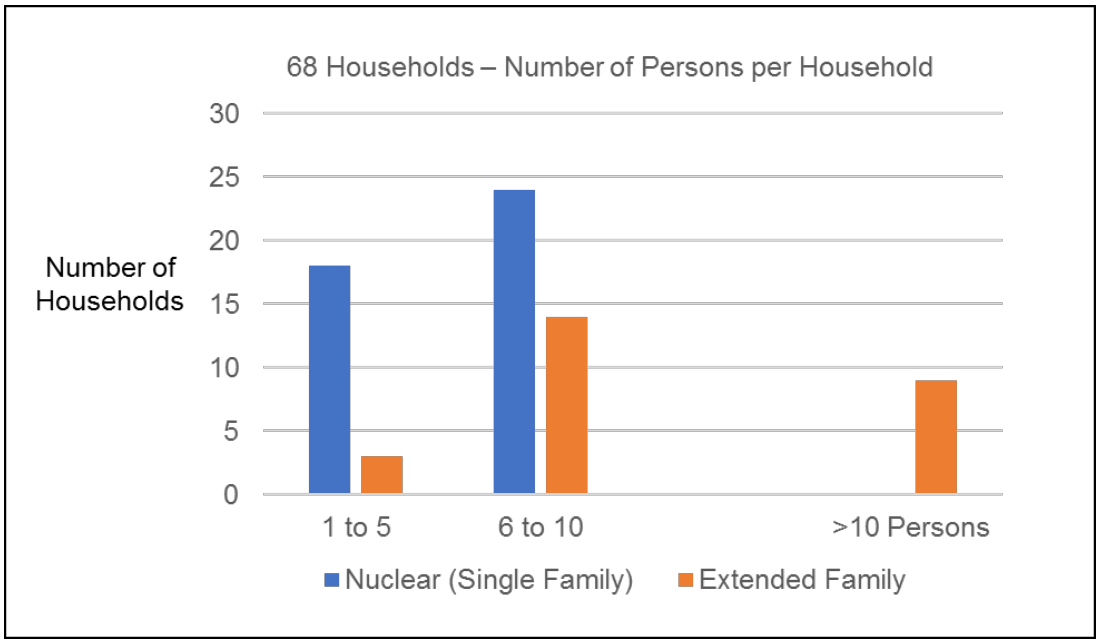
Figure 6D-2. Number of Children per Mother



Age (Years)	Number
16 to 20	1
21 to 30	6
31 to 50	2

6D.1.3 21 families are comfortably housed, with up to 5 persons per home. However, as shown at Figure 6D-3, there are 9 extended families, with each having more than 10 persons.

Figure 6D-3. Number of Persons per Household



6D.2 Employment and Unemployment

6D.2.1 Paragraph 6C.1.1 describes in detail the employment situation in Mota Ulun. The present state of economic activity is low. CHT intends to employ about 50 persons from the local population, with various skill levels ranging from general workers to machine operators to foremen. The proposed jetty will also employ another 22 persons. This combination gives a great uplift to the economic situation of the local community of about 500 persons, i.e. by employing close to half of the working-age persons.

6D.2.2 The Project does not deprive any person of an economic activity. The only exception is that of the few elderly womenfolk collecting wood for preparation for sale as fire wood to supplement home income. These affected persons can easily, conveniently and safely go to other hill sides to continue gathering wood. The employment of local persons, probably from the families preparing wood, will more than compensate for the need to go to other hill sides to continue such an activity that

earns very low income, and results in deforestation, for there is no replanting (not economical), and the trees and branches do not grow fast enough to replenish those cut-down.

6D.3 Institutions and Schools

6D.3.1 There is a primary school, i.e. the Ensino Basico Filial Caitehu. The school has a large bare-field football pitch, and a volleyball court that is in a state that needs repair, i.e. the concrete has broken-up, making the court too dangerous to play on. There is a Church; the Church of Capela da Sagrada Familia. At the rear of the Church is a convent; Irmas Franciscanas de Nosa Senhra das Victorias. The nearest Clinics are at Ulmera and at Liquica. Pictures of the school, church and convent are at Figures 6D-4 to 6D-6 respectively.

Figure 6D-4. Primary School; the Ensino Basico Filial Caitehu

Figure 6D-5. the Church of Capela da Sagrada Familia

Figure 6D-6. Convent; Irmas Franciscanas de Nosa Senhra das Victorias

6D.4 Customs and Rights to Land and Other Natural Resources

6D.4.1 It is customary for villagers to claim usage of land surrounding their homes, and the places where domestic animals are kept at night. The villagers also assert rights to the paths to these structures, and to the main road as “easements”, i.e. right of way. There are no streams or wells or water bodies in the Project site that is more than 1.5 km away from the nearest dwelling. Therefore, claims on land and other rights, e.g. the drawing of water, do not exist.

6D.4.2 Some villagers, especially elder women, go to the hill slopes to gather and cut tree branches for preparation as fire wood for sale. This activity is not stopped for the neighbouring hills are just as easily, conveniently and safely accessible for gathering wood.

6D.4.3 There are domestic goats at the lower parts of the Project hills facing north. These animals will naturally, easily, and harmlessly move away to many other nearby places with similar vegetation to continue foraging for food. A picture of the goats is at Figure 6D-7.

Figure 6D-7. Goats in the Project Site

6E Cultural Components

6E.1 Cultural Related Sites

6E.1.1 Cultural components include heritage items and places, archaeological sites, historical sites, sacred places, and unique landscape. The Project site does not have any cultural component (whether physical or non-physical elements), or is near such components.

6E.2 Unique Landscape

6E.2.1 The landscape is not unique. There are no distinctive characteristics, e.g. waterfalls, springs, rivers, ponds, rock formations, and exceptional cultivations. Therefore, there is no need to retain any feature of the quarry hills.

7.0 Climate Change

7.1 Historical weather trends do not have the slightest impact on Project operations. Conversely, the Project will not have implications on, or affect weather developments.

7.2 The operations of the quarry is not expected to have a significant impact on climate change, whether during construction, operation or dismantling due to the following reasons:

7.2.1 The stone crusher runs on electricity and not diesel fuel, i.e. no hydrocarbon emission.

7.2.2 With the availability of the jetty, i.e. with sea transport of material, truck movements, and consequently exhaust emissions are greatly reduced.

7.2.3 Use of barges to transport rocks / gravel to Tibar Bay results in much lower usage of diesel fuel, for marine transport is environmentally friendlier than land-based truck transport.

7.2.4 The route for trucks from the quarry to Tibar Bay is about 12 km. This short distance means that exhaust emission is lesser than longer routes.

7.2.5 The 21 trucks of the quarry, the 2-year duration of operations (only 2 months of work in the third year), and the short travel distances, all add up to insignificant contribution to the total greenhouse gas emitted by the country as a whole.

7.3 Even though the method of operation reduces the amount of vehicular emissions, additional improvement measures include:

7.3.1 Monthly maintenance of equipment and machinery. The Equipment Department maintains a Maintenance Log, keeping track of upkeep periods for each item of equipment.

7.3.2 An engine running rough must be bought to the workshop for checks and maintenance. This is verified by the driver using a Pre-Start Vehicle Checklist.

7.3.3 Vehicles with dark smoke are not allowed to leave the quarry. Security staff at the gate has this responsibility.

7.3.4 No overloading. An engine operating pass the optimum setting produces “dirtier” smoke. The time-keepers, in charge of loads leaving one site and arriving at another site, check that there is no overloading, for overloading also results in “cargo” lost by the company.

7.3.5 Drivers are taught environment-friendly driving techniques, e.g. no sudden acceleration, not to increase speed only to suddenly stop or slow-down, not to leave engine idling for longer than necessary, not to rev the engine in neutral gear, and to use the correct gear for the travelling speed.

8.0 Alternatives

8.1 For ease of reference, the information in this Chapter on "Alternatives" is extracted from paragraph 4.4 (Justification and Necessity of the Project), for discussions on justification and necessity must include the topic of alternatives, and vice-versa.

8.2 Considerations on alternatives start on the premise that the engineering design of the Tibar Bay Port is finalised, and that rocks are required for constructing revetments for shore protection against sea waves, and for ground improvement to strengthen against earthquakes. Therefore, scenarios of "no quarry project", or a reduced quarry size, are not practical, for the type and amount of rocks are already defined.

8.3 The rocks should not be imported, for imports cause significant revenue and other economic loss to the country due to the required large quantity that is readily available locally. Also, local quarries provide opportunities for improving the extractive type of industries by building-up the components of people, machinery and logistics needed for quarry operations. This scenario is readily feasible because of the large amounts of minerals in the mountains of Timor-Leste.

8.4 The selection of the location for a quarry usually considers the following factors:

8.4.1 Quantity and Quality of Material. The hardness of the rocks must be at least 80 MPa (mega Pascals), to meet the design criteria of 60 years for the quay structure. The site should have at least 1,030,000 m3 of rocks.

8.4.2 Accessibility. Favourable terrain, for ease of access and transportation, and closeness to delivery site is desired. Routes to/from the site to final delivery place should be available, and if not, then easily constructed, e.g. no crossing of wide or deep valleys and rivers, for delivery of machinery and the numerous movements of dump trucks for delivering rocks and gravel

8.4.3 Workforce. It is preferred that workers are readily available from the neighbourhood; savings on housing and transport, and eliminating the influx of workers problem.

8.4.4 Nature and Social Conservation. The site should not be in or near a wetland or nature reserve, or having protected or endangered species or unique vegetation. Activities should not impact places with religious, historical, cultural, archaeological, heritage, or sacred elements.

8.4.5 Existing Usage. There should be compatibility with existing or planned usage. It is a positive point if similar types of industries are already operating in the locality, and the quarry is not in conflict with other types of activities.

8.4.6 Community. Harmony with the local community is essential. Evictions, resettlements, dispossession of land and assets, destruction of dwellings and other structures, and economic deprivation, are examples of disharmony that might or might not be beneficial. It is preferable that due to the quarry activities, persons should not be evicted, disposed of land and other assets, or deprived of livelihood and other economic gain.

8.5 From Jan to Jul 2018, with assistance from the Institution of Petroleum and Geology (under the Ministry of Petroleum and Ministry of Mineral Resources), 17 places within 50 km of Tibar Bay were prospected for the desired type of rocks. Attachment C shows the locations searched for the right type of rocks. After considerations, the quarry at Mota Ulun is selected, for it has excellent scores for all the factors stated at paragraph 8.4.

8.6 The technology used for the finished product of rocks and gravel is that of:

8.6.1 Using explosives to break up a rock wall. The rocks are too hard for an excavator to break. Using a drilling machine creates tunnels, an option that will not be used, because it takes more time, creates more dust and longer periods of noise, and has many more safety considerations, e.g. flooding and collapse, than the use of explosives.

8.6.2 The rocks are then transported to a crusher, in the vicinity of the quarry (with resulting savings and reduction of environmental impacts), for further breaking down to the required sizes. It is not feasible to use manual labour to transport or to crush the rocks. Only machines, e.g. front loaders, excavators and crushers can do these tasks efficiently.

9.0 Evaluation of Impacts and Mitigation Measures

9.1 This Chapter focuses on environment-related impacts. Social and economic evaluations are discussed at Chapters 10 and 11 respectively.

9.2 This Chapter identifies the impacts, for each phase of the Project, i.e. drawing, pre-construction, construction, operation, and decommissioning. It covers description, impact generator, direct and indirect impacts, impact cumulation, short, medium and long term, temporary and permanent, negatives and positives, importance, climate change, approach and methodology, scope and evaluation, residuals, mitigation measures and implementation, and reports and responsibilities.

9.3 The receptors, i.e. parties affected by the Project include the neighbourhood and residents, the road users, and the country in general when it involves the destruction of flora and fauna.

9.4 Evaluation of impacts generally starts by identifying the type, the generating activity, and the stages during which controls are required. These are stated at Table 9-1. The serial numbers (SN) of each impact is kept consistent through all Tables in this Chapter for ease of reference.

Table 9-1. Identification of Impacts

SN	Impact	Generator	Drawing	Pre-Construction	Construction	Operation	Decommissioning
1	Dust	Use of machinery and explosives	Yes	Yes	Yes	Yes	Yes
2	Noise	Use of machinery and explosives	Yes	Yes	Yes	Yes	Yes
3	Vibration	Use of explosives	Yes	No	No	Yes	No
4	Polluted Water	General Waste	No	Yes	Yes	Yes	Yes
5	Silt	Land Clearance	Yes	Yes	Yes	Yes	Yes
6	Traffic Congestion and Accident	Truck Movements	Yes	Yes	Yes	Yes	Yes
7	Destruction of flora and fauna	Land clearance and machinery movement	Yes	Yes	Yes	Yes	Yes
8	Visual Amenity	Alteration of landscape	Yes	Yes	Yes	Yes	Yes

9.5 The effects of the impacts are evaluated, and details are shown at Table 9-2.

Table 9-2. Evaluation of Impacts

SN	Impact	Importance	Direct / Indirect	Cumulation	Temporary / Permanent	Negative / Positive
1	Dust	High	Direct	Yes	Permanent	Negative
2	Noise	High	Direct	No	Permanent	Negative
3	Vibration	High	Direct	No	Temporary	Negative
4	Polluted Water	High	Direct	Yes	Permanent	Negative
5	Silt	High	Direct	Yes	Permanent	Negative
6	Traffic Congestion and Accident	High	Direct	No	Temporary	Negative
7	Destruction of flora and fauna	High	Direct	Yes	Permanent	Negative
8	Visual Amenity	High	Direct	Yes	Permanent	Positive

9.6 The required studies, followed by evaluation and mitigation of impacts are summarised at Table 9-3.

Table 9-3. Evaluation of Impacts and Mitigation

SN	Impact	Study	Evaluation	Mitigation	Residual Impact (if all goes well)
1	Dust	Dust Assessment Study	WHO Standard, or equivalent	1. Design and location. 2. Buffers. 3. Equipment and Vehicles.	Yes
2	Noise	Noise Monitoring Survey	WHO Standard, or equivalent	1. Design and location. 2. Buffers. 3. Equipment and Vehicles.	Yes
3	Vibration	Vibration Calculations	WHO Standard, or equivalent	Design and location	Yes
4	Polluted Water	Water Courses and Pollutant Survey	No foreign objects	Storage, collection and disposal	No
5	Silt	Water Courses, Pollutant, and Green Boundary Survey	No foreign objects	1. Design and location. 2. Buffers. 3. Equipment and Vehicles.	No
6	Traffic Congestion and Accident	Road Traffic Survey	Unsafe driving	1. Design and location. 2. Training.	No
7	Destruction of flora and fauna	Flora and Fauna Survey	1. Classification of species against the International Union for the Conservation of Nature (IUCN) Red List. 2. Unnecessary destruction.	1. Design and location. 2. Training.	No
8	Visual Amenity	Green Boundary Survey	Unnecessary destruction	Design and location.	No

9.7 The Quarry HSE Officer is responsible for preparing the Quarry HSE Monthly Report. Details of environment-related portions of this report are shown at Table 9.4.

Table 9-4. Quarry HSE Monthly Reporting

SN	Impact	Items in Quarry HSE Monthly Report	Responsibility (and to propose and implement corrective measures)
1	Dust	1. Storage at approved locations. 2. Buffers retained. 3. Tanker watering report. 4. Monthly maintenance. 5. Security at exit gate reports. 6. Dust monitoring reports.	1. Quarry Engineer. 2. Quarry Engineer. 3. Quarry Engineer. 4. Equipment Manager. 5. Quarry HSE Manager. 6. Quarry HSE Manager.
2	Noise	1. Operations at approved locations. 2. Buffers retained. 3. Monthly maintenance. 4. Noise monitoring reports.	1. Quarry Engineer. 2. Quarry Engineer. 3. Equipment Manager. 4. Quarry HSE Manager.
3	Vibration	1. Operations at approved locations. 2. Blasting Calculations. 3. Vibration monitoring reports.	1. Blasting Engineer. 2. Blasting Engineer. 3. Blasting Engineer
4	Polluted Water	1. Waste Management Report. 2. Inspections of site and water courses. 3. Inspections of nearby village areas.	1. Quarry HSE Manager. 2. Quarry HSE Manager. 3. Quarry HR Manager.
5	Silt	1. Inspections of site and water courses. 2. Maintenance of watercourses. 3. Land Clearance Permit.	1. Quarry HSE Manager. 2. Quarry Engineer. 3. Quarry Engineer.
6	Traffic Congestion and Accident	1. Review of road conditions. 2. Training of drivers. 3. Disciplinary records.	1. Quarry HSE Manager. 2. Quarry HSE Manager. 3. Quarry HR Manager.
7	Destruction of flora and fauna	1. Land Clearance Permit. 2. Buffers retained. 3. Training of quarry staff. 4. Site inspections.	1. Quarry Engineer. 2. Quarry Engineer. 3. Quarry HSE Manager. 4. Quarry HSE Manager.
8	Visual Amenity	1. Land Clearance Permit. 2. Buffers retained. 3. Site inspections.	1. Quarry Engineer. 2. Quarry Engineer. 3. Quarry HSE Manager.

9.8 In summary, the main steps to reduce and to eliminate the environmental impacts due to the project include:

9.8.1 Baseline and monthly monitoring of dust and noise levels.

9.8.2 Identification and retention of green buffers, i.e. trees and other vegetation, at work areas. The buffers act as dust and noise shields, prevent soil erosion and silt flowing into watercourses, and to retain visually pleasing features.

9.8.3 Watering to reduce dust create by the movement of trucks.

9.8.4 Maintenance of machinery, especially trucks, to keep engine noise and exhaust emission pollutants to as low as reasonably practical.

9.8.5 Training for drivers on “Pollution Reduction Techniques for Drivers”.

9.8.6 Use of the proposed jetty to reduce truck movements on the narrow Dili-Liquica road.

9.8.7 In-house Land Clearance Permit, to ensure that there is no excessive destruction of vegetation; for the keeping of buffers, and protection of water courses.

9.8.8 Vibration monitoring each time there is blasting work; usually once a day. The Vibration Management Plan is at Attachment O.

9.8.9 Daily inspections of water courses.

9.8.10 Monthly visits to nearby villages to enquire about the general conditions. During the raining season, there will be weekly visits.

9.8.11 Implementation of a Waste Management System.

9.8.12 Field identification and marking out (e.g. with a protective border) of trees and other vegetation to be retained.

9.8.13 Training for quarry personnel on “Protection of Flora and Fauna”.

9.8.14 Other than the fence around the housing quarter for about 30 persons, the Project has no fence. The positive feature of this arrangement is that wild creatures are allowed to free-range. If a boundary fence is installed, creatures within it cannot thrive, for they cannot moved about within natural ranges, i.e. trapped.

10.0 Social Impact Evaluation

Objectives and Goal

10.1 The main aim of social impact evaluation is that of ensuring that the Project does not degrade the social-cultural conditions, and should preferably improve the general conditions of life, i.e. development. Work starts with public consultations.

10.2 2 formal public consultations were held on 20 April 2018 and 8 Jul 2018. The first consultation included the local authorities of Liquica Municipality, during which the activities of CHT in the Tibar Bay Port, and the quarry site, were presented, and benefits explained, e.g. creating many job opportunities for the local people, and boosting the economy. The Attendance List is at Attachment I.

10.3 In the second consultation, seven respondents were interviewed on their concerns regarding environmental impacts due to the proposed project activity. Most of the correspondents focused on the effects of the activities such as dust, noise and water conditions. However, they expected that the activities can enhance their earnings through job opportunities that are prioritize for the local people. A sample of a questionnaire is at Attachment I.

10.4 The Mota Ulun village near the quarry has about 162 households. CHT Community Liaison Officer (CLO) and the HSE Advisor visited about 12 households, and 2 enterprises, i.e. a small provision shops and a mechanical workshop, explaining the rationale for the quarry, i.e. in support of construction of the Tibar Bay Port. The visits also allow for the passing of information regarding economic benefits, and other improvements for the community, and for feedback, especially on the matter of grievances. Attachment I has photographs of household and small enterprise visits.

10.5 The consultation effort gathered the following opportunities for improvements to the economic and social conditions of the local community:

10.5.1 Employment prospects.

10.5.2 Provision of well water; as domestic water.

10.5.3 Purchase of local produce and products.

10.5.4 Education and vocational training.

10.6 The community also has the following concerns:

10.6.1 Dust from the project operation will impact health, and noise will create nuisance to the nearest community.

10.6.2 Schedule watering to suppress the dust.

10.6.3 Manage waste, such as empty drums, properly so as not to create mosquito breeding which could spread health problems.

10.6.4 Project activity should not damage the irrigation channels draining water to the community's corn fields. File note: Initial investigations did not show any sign of irrigation channels or paddy fields. However, the search for such items continues, and the results will be stated in the final EIS document.

10.6.5 Create a good working condition between project workers and the community, including the local authority, to avoid social conflicts.

10.7 The CHT Community Liaison Officer (CLO) has the responsibility of ensuring that the above-mentioned objectives are met. "Status of Social Performance" is an item in the Quarry Monthly HSE Report to the Employer / Engineer.

10.8 A further Community Profile Survey was conducted in Dec 2018, and the report is at Attachment H.

Description of the Social-Cultural Context

10.9 The social-cultural context includes institutional, historical and political items. The political environment is stable. There are no signs of

political activities, e.g. graffiti, banners, and sign boards indication setup of political parties and trade unions. There are no government-related administrative offices, or historical buildings. There are no sports organisations or sporting clubs at all; therefore, such groups usually with ties to particular factions do not exist. The location is also not a transport or transit hub for people or goods.

10.10 Other than the single primary school, i.e. the Ensino Basico Filial Caitehu, there are no other educational facilities. There is a Church; the Church of Capela da Sagrada Familia. At the rear of the Church is a convent; the Irmas Franciscanas de Nosa Senhra das Victorias. The nearest Clinics are at Ulmera and at Liquica. Pictures of the school, church and convent are at Figures 6D-4 to 6D-6, at paragraph 6D3.1.

10.11 Livelihoods and demographics are described at paragraphs 6C.1 and 6D.1 respectively. The Project will not upset the population structure. The quarry will employ at least 50 local residents, out of a total workforce of about 80 persons. The 50 persons from the local community are required to fill the positions of security guards, housekeepers, drivers, cooks, machinery operators, office staff, timekeepers, administrators, manual workers, flagmen, and mechanics. The remaining 30 expatriate staff, mainly from China, stay within a purpose built housing quarter in the Project site. This arrangement eliminates the “influx of workers” problem.

Influx of Workers

10.12 Quarry operations need workers, resulting in increased loading on housing and transportation. The first measure is that of reducing the influx of workers. This is done by giving first preference to the employment of locals. They are encouraged to look for own housing quarters of their choice, and make own transport arrangements. The advantages of such a “dispersed” arrangement are:

10.12.1 No influx problems because there is no large group of workers, especially young men, from outside the area, and staying in one location.

10.12.2 Employees with own homes and transport benefit from the allowances. Similarly, for employees living with relatives.

An employee staying near the place of work saves the full amount of transport expenses.

10.12.3 Employees gain by pooling resources.

10.12.4 Home owners with rooms to rent out welcome the business.

10.12.5 Local transport providers also share in the prosperity.

10.12.6 By staying in general areas, the local population gains in the increase in commercial activities supporting housing, catering, transport and recreation.

10.12.7 A single failure of housing, catering, transport, or other factors, will not stop quarry production.

10.12.8 Welfare is improved, because workers need not be absent from families for long periods of time, for they go home at the end of each day.

10.12.9 There are savings by not having to pay fees to money-transfer companies to send money to families.

10.13 A booking in/out system is provided for the estimated 35 expatriates living in the on-site quarters. This is to provide knowledge about whereabouts for safety and other reasons.

10.14 The expatriate staff are informed about not straying out of work areas, and not to go wandering about, especially during the hours of darkness. They are also reminded about the “No Hunting, Trapping, Fishing, Gathering, Keeping” Rule. The possession of pets is also not allowed, for certain pets might kill fowl kept by the villagers, or other small wildlife creatures.

10.15 Expatriate staff are informed to be on excellent polite behavior, and to treat all with respect.

Legislation and Regulations

10.16 Chapter 5, “Policy, Legal, and Institutional Framework” comprehensively describes the legislative requirements with bearings on the Project, e.g. regulating the execution of the Project, goods, services and opportunities offered by the Project and the environment for public participation. Attachment E has information on “Compliance with Legislation”.

Analysis of Fundamental Social Issues

10.17 Social issues are centred around family structures, education, and employment. For Mota Ulun, these factors are presented and discussed at Chapter 6D, Social Components.

10.18 The Project will employ as many persons from the local community as practicable, depending on skill level. Persons are employed on merit, and not on connections. No ethnic or religious group is given preference. There is no influx of workers from other regions. The expatriate staff stay in the Project site. The Project is not expected to upset the social balance.

10.19 Project staff are taught the merits of good social behaviour, e.g. covering non-discrimination or degradation based on race, language, religion, gender, earnings, occupation, diet, sexual orientation, gestures, and physical ability. Local customs, clothing and food must be respected.

Strategy to Reach Result of Social Development

10.20 Social development starts with persons in the working-age group having an income. By providing employment, the Project and the associated proposed jetty meets this aim.

10.21 Once income is assured, the next step is that of personal improvement. CHT has a Skills Development Program, with training as the focus, for training helps to sustain local employees, i.e. improving morale and better prospects for promotion, and lowering the turn-over rate. The training needs of local staff is analyzed, with follow-on programs

tailored for designated groups. Generally, training courses range from basic to advanced, with examples as follows in increasing degree of difficulty:

10.21.1 Languages (English and others). The syllabus starts with basic vocabulary covering words used day-to-day and words used in the construction industry.

10.21.2 Elementary mathematics; starting with arithmetic (plus, minus, addition and multiplication), then progressing to geometry, and so on.

10.21.3 Elementary science; covering living and non-living things, life cycles, the human system, etc.

10.21.4 Office computer skills, e.g. use of Microsoft Office.

10.21.5 Engineering (technician) fundamentals.

10.22 Generally, the academic levels of the different types of classes can only be set once volunteers for training come forward, and their abilities are evaluated. A separate Capacity Building procedure will be prepared once there are enough workers to gauge foundation levels, followed by determination of the type, level and frequency of courses, and class size, and the required infrastructure.

10.23 Courses are voluntary, and free-of-charge (including training material, classroom stationery and pens).

Implications in the Analysis of Alternatives

10.24 The importation of rocks for the Tibar Port will cause significant revenue and other economic loss to the country due to the required large quantity that is readily available locally. Also, local quarries provide opportunities for improving the extractive type of industries by building-up the components of people, machinery and logistics needed for quarry operations. This scenario is readily feasible because of the large amounts of minerals in the mountains of Timor-Leste.

10.25 The Project provides employment for the local community, and this greatly improves social development.

Recommendation for Project Design and Implementation Measure

10.26 The Project design is such that the quarry is at least 1.5 km away from the nearest dwellings. This distance is too far away for noise, dust or vibration impacts to affect the local community, or to change the environmental ambience. During operations, there is basic social development due to employment and the upgrading of skills.

10.27 The design of the quarry is such that at the end of excavation work, the hill tops remain untouched, there is a stepped pyramid structure, akin to rice terraces, and with trekking routes all the way from bottom to top. It will be an architectural wonder of the natural type.

10.28 Site closure will be a gradual drawn-down process. Retrenchments will be in batches, spread over several months, so as not to cause a sudden unemployment impact on the local community. By then, work in the operating Tibar Port will be available.

Monitoring Plans

10.29 The process of social evaluation through a consultation and monitoring framework is under the charge of the CHT Community Liaison Officer, who has the responsibility of fostering good relationships with the local community, and activities cover the areas of:

10.29.1 Identification of stakeholders and relationships with the Project, and the impact of the Project on their livelihood and other considerations. A Community Profile Survey (report at Attachment H) was conducted in Dec 2018. This survey will be repeated 6 months after the start of quarry operations, to determine social changes in the community.

10.29.2 Engagement methods, e.g. with village elders/representatives, property owners, and households.

10.29.3 Addressing grievances, e.g. face-to-face contact with regular visits to enquire about well-being, and also as part of sourcing for workers under the local content plan, i.e. explaining the project need for workers, with preference for employing from the local community.

10.29.4 Maintaining the Grievance Register. All grievances, including concerns expressed by affected communities about security arrangements and acts of security personnel, are recorded. The complainant is informed about status of corrective actions and closures.

10.30 A further public consultation was conducted on 18 Jan 2019, to obtain the latest feedback and notifications. The notes of this meeting are at Attachment I1.

11.0 Economic Evaluation

11.1 The Project feasibility study supports a local quarry. The rocks should not be imported, for imports cause significant revenue and other economic loss to the country due to the required large quantity that is readily available locally. Also, local quarries provide opportunities for improving the extractive type of industries by building-up the components of people, machinery and logistics needed for quarry operations. This scenario is readily feasible because of the large amounts of minerals in the mountains of Timor-Leste.

11.2 Occasionally, a few persons from the local community, especially those living near the quarry, enter the place to gather wood. The quarry will not deprive them of this economic benefit, for there are many other locations, e.g. other surrounding hills, that fire wood can be conveniently and safely obtained. In addition, preference will be given to Mota Ulun residents, for employment at the quarry.

11.3 At present, the few employment opportunities are at the low intensity bulk fuel station with a marine jetty (Laiara Construction), and the few small-scale quarry companies operating stone works, i.e. making gravel and casting concrete parts, at the western part of the road after the quarry entrance.

11.4 Economic activity is very low. There is no hardware shop. There is not a single shop selling cooked food. There is hardly any selling of local produce. There are only 3 family-owned and operated small provision shops, selling products related to home and personal use. A picture of one such shop is at Figure 11-1.

Figure 11.1 Provision Shop (with Proprietor Madam Anna Clara do Santos

11.5 No one will be denied of an economic benefit that is existing. The CHT quarry gives an economic uplift, for it is expected that the 50 position| for workers wiol/be all filled by persons from the local community, for such is the lack of employment opportunities at present.

11.6 By staying in dwellings of their choice, the general community benefits by providing housing, catering, transport and other arrangements.

11.7 The quarry is at least 1.5 km away from the nearest dwelling, i.e. too far away to be affected by noise, dust and vibration caused by quarry operations. However, monitoring for these impacts will still be carried out “to make assurance doubly sure”.

11.8 Measures to protect the environment cover many parts of quarry operations. Examples of such requirements include housings and covers for equipment, maintenance of equipment, daily site surveys, HSE and security staff, preparations of HSE surveys and studies,

designated storage areas, clearing-up work, and maintenance of water courses.

11.9 To show an illustration of cost, the total planned expenditure, for environmental monitoring of dust, noise and vibration, is US $191,000 over 2.5 years. Details are in Table 11.1.

Table 11.1. Cost of Monthly Dust, Noise and Vibration Monitoring

SN	Item	One-off Cost of Instrument (US $). Excludes Yearly Calibration	Monthly Personnel Cost (US $)
1	Air (Dust)	10,000	2,000
2	Noise	2,000	2,000
3	Vibration	8,000 (2 sets)	2,000
4	Sub-Total	11,000	6,000 per month, i.e. 180,000 per 30 months
5	Total		191,000 (11,000 plus 180,000)

11.10 Decommissioning can be economically beneficial. The steps to achieve a closure plan favourable to the local community and district in general, and the country as a whole, include the following step by step approach.

11.11 The Land Authority, in consultation with the local authorities, e.g. the Suco (village) Chief, decides on the future use of the land. Options include continue mining, keeping the land “empty”, converting to plantations or livestock rearing, and rezoning to housing usage.

11.12 These decisions should be taken by Jan 2010, for usage by CHT is planned to end in Feb 2021. About a year of lead-time is required for interested operators and developers to plan, take over and obtain the necessary licenses for renewed or new use of the land.

11.13 The start-up cost of a quarry is about a few million US $. Therefore, this lead time is also required by CHT to plan whether to keep people and machinery at the site, to sell lock, stock and barrel, to remobilize

to another location in-country or overseas, or to decommission completely.

11.14 CHT might decide to continue quarry operations, either to support other construction activities in Timor-Leste, or even exporting material for work in other countries. If this is the case, then a Closure Plan is not required for the time being.

11.15 Once the supplying of rocks and gravel for the Tibar Port project is completed, the main and only reason for CHT to operate the quarry is over. CHT might hand-over the quarry to another operator. It is presumed that such a sale would be on an "as is" basis, for this provides signification savings both for the new operator, and for CHT. It follows that decommissioning work by CHT is minimal, with usually a Site Closure and Handing / Taking-over Report. The in-coming operator warrants to the government, and takes responsibility for continued operations.

11.16 CHT has built roads and installed water and electricity supplies, and constructed habitable buildings and supporting infrastructure. CHT has also levelled large tracts of the hilly terrain to a stepped pyramid structure, with flat ground at the base, and with a stockpile of topsoil. There is a now a reservoir holding about 400,000 m3 of fresh rain water.

11.17 The local community, or an external commercial entity, might want to convert the land to vegetable growing, or other similar agricultural and livestock pursuits. The stockpile of topsoil is especially suitable for laying on and preparing the earth for vegetation. The supply of fresh water from the reservoir is also an essential factor, to ensure the viability of the crop growing industry.

11.18 Contrary to other types of mining, granite quarrying does not irreversibly scar the land. The activity might even be a plus factor in developing a previously hilly region. CHT leaves large tracts of flat land about 20 m above ground, and with access roads. Property developers might want to use the land for housing. Houses on this elevated land have scenic views of the sea. The road to Dili is now upgraded to meet the transport requirements of the new Tibar Port. Start-up cost for a developer is greatly reduced, for roads and utilities are already in place, and there is available accommodation for workers building the homes. The ex-quarry is readily transformed to a location with a premiere residential address.

11.19 At closure stage, facilities at the quarry area include 2 unpaved access roads wide enough for 2 way traffic, and with a total length of about 3,400 m, 3 boreholes for well water, a rain water reservoir measuring 200 m by 100 m and with a depth of 20 m, 3 domestic water tanks (2 with 10 m3 capacity, and a third with 50 m3 capacity), an electrical room connected to government supplied electrical mains, street lights from the main road powered by solar cells, and a single-storey unit for 35 residents with a fence.

11.20 A hill by itself, without any outstanding features, has no economic value. In conclusion, contrary to conventional thinking, the closure of a granite quarry can enhance the attractiveness of the location, with further and greater economic returns, in monetary terms. Further details about the Quarry Closure Plan is at Attachment K.

12.0 Summary of the Environmental Management Plan (EMP)

12.1 Some aspects of environmental monitoring are described in Chapter 9, "Evaluation of Impacts and Mitigation Measures", and this are included in the EMP, i.e. a document separate from, and in support of the EIS. The intention of the EMP is to prevent and reduce adverse impacts to the environment by careful consideration of work, monitoring of activities, and the carrying-out of improvement measures. It comprehensively documents the probable causes of concern, and the mitigation methods to counter air, land and water pollution, and social impacts, with the aim of continual improvement. Some mitigation measures are summarized from the EMP into 3 Tables (Tables 12-1 to 12-3), i.e. one for each phase of work as follows:

12.1.1 Pre-Construction. Land clearance for site roads and placing site office and housing quarters.

12.1.2 Construction. Building of structures, and laying of utilities.

12.1.3 Operations. Blasting work, transporting rocks to a crushing machine for processing, and transporting off site.

12.2 In addition to the 3 phases stated at above, another phase is that of mobilization, i.e. activities from the very beginning, e.g. site exploration and prospecting, are not covered, for these are completed before the start of the EIS part of the project. For ease of reference, it is stated that basic worker safety, e.g. wearing of personal protection equipment (PPE), and welfare facilities, e.g. meal centres, drinking water, rest areas, and toilet units, are discussed in the EMP.

Table 12-1. Pre-Construction Impact Assessment and Mitigation Measures

SN	Activity	Impact	Mitigation, including Monitoring and Control
1	Initial entry into site	Objections from local community	CHT Community Liaison Officer (CLO) visits and explains the benefits of the quarry, and to obtain feedback. Grievance resolution process in place.
2	Land clearance (1)	Unnecessary destruction of vegetation	Daily reminders to machine operators not to stray out of work areas. Routes identified before start of work. No creation of new routes without justification.
3	Land clearance (2)	Disposal of waste vegetation	Local community has first right to the cleared trees (e.g. as firewood) and scrubs (e.g. for feeding goats).
4	Land clearance (3)	Soil erosion	Silt fences if run-off water flows into grassland, or to land occupied by villagers.
5	Land clearance (4)	Flooding	Checks before and after work, to determine flow of storm water, i.e. not going into local dwellings. Building of storm drains, if required, to channel water away from dwellings.

Table 12.2. Construction Impact Assessment and Mitigation Measures

SN	Activity	Impact	Mitigation, including Monitoring and Control
1	Creation of concrete slabs	Uncontrolled flow of water	Building of storm drains, if required, to channel water away from dwellings.
2	Trespassers (non-workers and general public)	Injuries	24/7 Security. Warning signs. CLO informs local community about the hazards of the work site. Workers inform family members not to trespass.
3	Trespassers (own workers)	Antagonizing locals	Workers informed not to stray out of work areas, and about the “No Hunting, Trapping, Fishing, Gathering, Keeping” Rule.
4	Expatriate staff	Antagonizing locals	Expatriate staff inform to be on excellent, i.e. polite, behavior, and to treat all with respect.

Table 12.3. Operations Impact Assessment and Mitigation Measures

SN	Activity	Impact	Mitigation, including Monitoring and Control
1	General operations	Locals not sharing in the economic growth	First preference is to employ people from the local Mota Ulun community. Preference to buy local produce and products from local shops. CHT Community Liaison Officer (CLO) visits and explains the benefits of the quarry, and to obtain feedback. Grievance resolution process in place.
2	Influx of workers (1)	Social problems	First preference is to employ people from the local Mota Ulun community. No concentration of a large group people from outside the community.
3	Influx of workers (2)	Increase in housing and transport loading	First preference is to employ people from the local Mota Ulun community. Housing and transport cost factored into wages.
4	Trespassers (non-workers and general public)	Injuries	24/7 Security. Warning signs. CLO informs local community about the hazards of the work site. Workers inform family members not to trespass.
5	Trespassers (own workers)	Antagonizing locals	Workers informed not to stray out of work areas, and about the “No Hunting, Trapping, Fishing, Gathering, Keeping” Rule. Booking in/out for expatriates living in the on-site quarters.
6	Expatriate staff	Antagonizing locals	Expatriate staff informed to be on excellent polite behavior, and to treat all with respect.

7	Movement of trucks (1)	Traffic accidents	Qualified drivers. In-house “Driver Safety” training. Speed timings checked against time leaving site and time reaching destination.
8	Movement of trucks (2)	Road obstructions, and increased loading	Designated immediate stops for drivers to park, i.e. not allowed to stop elsewhere unless in an emergency. Using of jetty at beach across road at entrance, to reduce loading on the main road.
9	Movement of trucks (3)	Dust pollution, and spilled gravel (high hazard to motor cycles)	Using of jetty at beach across road at entrance, i.e. barges for sea transport to Tibar Port.
10	Noise from machinery	Irritation, and impact on sleep	Gravel processing area is more than 1 km away from the village. Monthly maintenance of machinery. No night work.
11	Machine maintenance	Oil pollution	Hazardous substances procedure, e.g. no disposing of oil onto the ground. Proper containers and storage places. Emergency Response Team (ERP) setup, with spill control facilities.
12	Topsoil and overburden stripping	Bare and unprotected ground after extraction of rocks	Topsoil stockpiled for rehabilitating the ground after work has moved on, and at decommissioning.
13	Noise, dust and vibration from blasting work	Degradation of social amenity	The nearest dwellings are at least 1.5 km away. Safe blasting procedure. Calculations on amount of explosives used to ensure no excessive noise and vibration. Millisecond delays for each set of explosions to reduce overall impact. Noise, dust and vibration monitoring.

12.3 The CHT quarry has no unusual environment impacts, i.e. it is a conventional type of quarry operation, using explosives to break-up rock surfaces. There is no tunneling, or open-cast, i.e. pit, type of mining. There is also no requirement for chemical treatment, i.e. no creation of hazardous sludge. The business of quarrying can be grouped into 4 main work areas of:

12.3.1 Land preparation.

12.3.2 Construction of domestic facilities and usage.

12.3.3 Rock breaking and processing.

12.3.4 Rock / gravel transportation.

12.4 These activities have impacts on the environmental elements of air, land and water. A summary of the EMP action items is at Tables 12-4 to 12-7 at below, based on the above-stated groups of activities.

12.5 For full and complete coverage, social impacts are also included. The CHT Community Liaison Officer has the duty of creating and fostering good relations with the local community with the view of improving the economic and social well-being of the residents. More details are in the main EMP document, that has additional coverage of the safety of workers and welfare matters.

Table 12-4. Summary of EMP Action Items (Land Preparation)
(Grubbing, i.e. removing vegetation, and ground levelling)

SN	Activity / Impact	Mitigation, including Monitoring and Control
1	Local community not aware of quarry activities, i.e. creating social disturbances.	CHT CLO frequently meets local residents; explaining the rationale for the quarry, the associated economic and social benefits, and the precautions taken to lessen environmental impacts to the community. Setup of Grievance Management Scheme.
2	Excessive clearance and soil erosion.	Areas to be worked upon clearly marked out and explain to machine operators. Operators reminded to keep to designated access routes and work areas, to prevent unnecessary destruction of grass and other vegetation. Silt nets to prevent excessive run-offs.
3	Waste vegetation.	Local villagers have first choice to the removed vegetation, e.g. as fire wood, feeding animals, building structures, etc.
4	Excess earth	Used for building foundation for facilities.
5	Uneven ground	An excavator taps down the sides of site roads to create levelled and even ground, i.e. easier for walking on, preventing puddles after rain, and aesthetics.
6	Flooding, i.e. uncontrolled flow of rain water.	Review of drainage before and after work. Constructing drainage to keep water away from local dwellings. Site road sloped to prevent water run-off to the main road.
7	Machinery noise	Daily Pre-Start Checklist. Monthly Maintenance. Machines not left idling for long periods if there is no work. No usage of machinery for leisure. No night work. Baseline environmental noise monitoring conducted.

Table 12-5. Summary of EMP Action Items (Construction of Domestic Facilities and Usage)

SN	Activity / Impact	Mitigation, including Monitoring and Control
1	Machinery and general construction noise	Daily Pre-Start Checklist. Monthly Maintenance. Machines not left idling for long periods if there is no work. No usage of machinery for leisure. No night work. Baseline environmental noise monitoring conducted.
2	Merry-making	Silent hour after 10.00 pm. No playing of loud music outdoors.
3	Domestic waste.	Meals at designated meal rooms. No food at the work front. Proper bins at designated locations with concrete floors. Disposal at municipal waste collection location.
4	Excess concrete	Used for building foundation for facilities. Donated to the local villagers.

Table 12-6. Summary of EMP Action Items (Rock Breaking and Processing)

SN	Activity / Impact	Mitigation, including Monitoring and Control
1	Machinery noise	Daily Pre-Start Checklist. Monthly Maintenance. Machines not left idling for long periods if there is no work. No usage of machinery for leisure. Minimise night work, i.e. night work is not routine. Baseline environmental noise monitoring conducted.
2	Maintenance of machinery	Designated workplace. Designated waste oil storage with proper containers and shelter. Removal of waste oil by approved waste collector. Emergency Response Team (ERP) setup, with spill control facilities.
3	Use of explosives	Use of Explosives Procedure. Signs posted warning of the hazard. Closure of roads to the explosion location. Guards placed at road blocks. Warning siren 5 minutes before explosion.
4	Air pollution	Water spray for the rock crusher (gravel processing) machine. Maintenance of machinery. Dust mask for rock crushing Team.
5	Water pollution	Designated recycled water tank for the rock crusher machine.
6	Unusable gravel (unacceptable quality)	Used for building internal roads. Donated to the local villagers.

Table 12-7. Summary of EMP Action Items (Transporting Rocks / Gravel)

SN	Activity / Impact	Mitigation, including Monitoring and Control
1	Dump truck noise	Daily Pre-Start Checklist. Monthly Maintenance. Machines not left idling for long periods if there is no work. No usage of machinery for leisure. Minimise night work, i.e. night work is not routine. Baseline environmental noise monitoring conducted.
2	Traffic accidents, congestion and obstruction	Use of the jetty, i.e. transport by marine barges to Tibar Bay. Speed control, i.e. timings taken when leaving quarry and when arriving at destination, and vice versa. No using of cellphone when driving. No taking of passengers, i.e. unauthorized persons. Designated rest stops. Stopping at other places only in emergencies. Standby vehicle for truck recovery.
3	Spillage of cargo and earth droppings	Speed control, i.e. timings taken when leaving quarry and when arriving at destination, and vice versa. No overloading. Security checks before truck leaves the quarry. Use of Truck Leaving / Entering Control Form, with entries including timings, load level, cleanliness of tyres, etc. Spade in the truck for clearing spillages.
4	Maintenance of dump trucks	Designated workplace. Designated waste oil storage with shelter, concreted ground and spill bunds, and proper containers. Removal of waste oil by licensed waste collector. Emergency Response Team (ERP) setup, with spill control facilities.
5	Air pollution	Daily Pre-Start Checklist. Maintenance of dump trucks.
6	Water pollution	Designated recycled water tank for the washing of dump trucks.

7	Local community not sharing in the economic growth, i.e. at the stage of rock / gravel leaving site	First preference given to hiring of persons from the local community. All are encouraged to buy local produce and products. CHT CLO frequently meets local residents; providing information on the status of operations, and obtaining feedback, on economic and social situations. Management of the Grievance Management Scheme.

12.6 The EMP also covers the identification of training and capacity building. Some of these elements are stated at paragraphs 10.20 to 10.23 of this EIS for easy reference.

13.0 Disclosure of Information and Public Consultation

13.1 For a Project to be successful, a clear understanding of the stakeholders and an engagement strategy is essential for building better relationships with the societies in which a company operates, and also for improving business planning and performance. Conversely, if not managed properly, there will be considerable risks to the Project.

13.2 The stakeholders can generally be categorized into the following 4 main groups:

13.2.1 Partnership. These stakeholders have the highest interest and the greatest influence on the Project. There is usually a contractual relationship with shared accountability with two-way joint learning, decision making and actions. Communications are regular and with designated participants.

13.2.2 Regulatory. Government agencies with regulatory oversight on particular activities, and with authoritative influence. There are ad-hoc site visits.

13.2.3 In-directly Affected Parties. These consist of non-government organizations (NGO) and the media, e.g. newspapers, that has no responsibility for the company's activities, or duty to correct any activity. The NGO and the media, even if not affected by the project, can effectively voice the grievances of locals.

13.2.4 Directly Affected Parties. These are the communities around the worksites, i.e. directly affected by activities.

13.3 As stated at above, the first group is bound by contract. The second group is regulatory. These 2 groups are legally unavoidable. The third group is a pressure group, and might be avoidable. The fourth group, i.e. the local community is crucial, and public consultation is essential towards ensuring harmony, for without peace, there cannot be progress.

13.4 Public consultation has the following guidelines:

13.4.1 Involve the local community early, i.e. as soon as possible. Rumours and subsequent denials or confirmation show a lack of planning.

13.4.2 Be forthright. A development can be detrimental in the short-term, but bring greater rewards in the medium to long-terms. The slightest evidence of a hidden agenda can snowball to disastrous consequences.

13.4.3 Present both the good and the bad.

13.4.4 Accurately take notes. One-sided notes are not worth reading for there are only skewed views, and other opinions are not presented.

13.5 Public consultations are fundamental because:

13.5.1 The buy-in of the local community is essential in building trust.

13.5.2 Involving the public in preparation of the EIS increases understanding and acceptance.

13.5.3 Opportunities are available to raise concerns, some of which might not be obvious to the team from the Proponent.

13.5.4 A sense of “togetherness’ is created.

13.6 There are 2 types of public consultations for a local community, that usually does not have newspapers, or television or radio sets. The first is that of formal town-hall gatherings, with official invitations to community leaders, with an Agenda, with attendance sheets and note taking, and where seats, and refreshments are provided. Questionnaires are prepared, handed out and collected at the end of the meeting. A formal report is prepared by the CHT Community Liaison Officer (CLO) and submitted to the team preparing the EIS and the EMP, for inclusion in these 2 latter documents.

13.7 The second type of public consultations is that of the CHT Community Liaison Officer (CLO) regularly visiting as many households as practicable; to provide information about activities, gather feedback, as part of the Grievance Management process, and also to give a

personal touch. These visits continue throughout the life of the quarry, and for a short period after decommissioning.

13.8 The public consultation process is guided by Ministerial Directive 47/2017; Regulation on public consultation procedures and requirements during an environmental assessment process. The CHT Community Liaison Officer (CLO) has the responsibility of ensuring that engagement methods are prepared, and that public consultations are properly and adequately carried out, covering, e.g.:

13.8.1 Creating a table that identifies directly affected parties and indirectly affected parties.

13.8.2 Details around actual stakeholders identified, e.g. Suco chief, names of community members, government officials and representatives of NGO groups.

13.8.3 Consultations for the TOR, e.g. publicity, access, comments on documents, meetings and records.

13.8.4 Evidence of consultations undertaken, with photographs and notes/minutes of meetings covering key issues raised in each forum.

13.9 As part of the due diligence process in gathering information about the local population profile, a survey is conducted, covering type of dwellings, water supply, domestic animals, household size, make-up of persons in each household, education level, and type of employment. About 6 months after the quarry starts operations, and at yearly intervals, surveys will be conducted to find-out the effects on the community, especially on indicators of growing prosperity, e.g. employment rate, ownership of motorcycles, and better types of dwellings.

13.10 Chapter 10, “Social Impact Evaluation”, has details about public consultations conducted during April and July 2018. In addition, a Community Profile Survey was carried out in Dec 2018 (with the report at Attachment H). A copy of the “no objection letter’ from Mr. Francisco Soares, the Chief of Suco Mota Ulun, is at Attachment J.

13.11 As public consultation is an on-going process, another session was conducted on 18 Jan 2019, and the notes of that meeting are at Attachment I1.

13.12 The list of stakeholders, and consultations done to date are at Attachment I2.

14.0 Difficulties Found

14.1 There are no difficulties encountered for the setting-up and operation of the Project, with reasons stated as follows.

14.2 There are no engineering problems in designing, constructing and operating the quarry. Materials, equipment and machinery are in supply, and are not expected to cause difficulties, e.g. shortages.

14.3 The quarry is in an industrial area, i.e. with existing businesses with rock / gravel processing and making of concrete parts, and a bulk fuel terminal.

14.4 Manpower of the required skill level, other than for Supervisory staff, is easily available from the local community.

14.5 The road to Tibar Bay Port is in good condition, and without heavy traffic. CHT intends to construct a jetty so as not to further load the road, even though traffic is light at the moment.

14.6 Site access is easily achieved from the main road. Roads in the Project site are also relatively easy to build.

14.7 Access to and meeting the Mota Ulun community was easy and consultations were warm and cordial. The public welcomes the quarry, the employment of locals, and the associated benefits of sharing in the economic growth, and social improvements.

14.8 The site is free from encumbrances, i.e. belonging to the government, and there are no squatters, no one is staying on or living of the land, no dwellings or other structures, no forced eviction, no sale of land (forced or otherwise), and no economic deprivation, etc.

14.9 There are also no religious, historical, cultural, archaeological, or sacred sites in or near the quarry, or affected by the work.

14.10 The site is not near wetlands or other types of protected places. There is no protected or endangered species or unique vegetation in or near the quarry, or could harmed by quarry activities.

14.11 General sentiment supports the quarry, for the rocks and gravel are for constructing the Tibar Bay Port; considered as a national project. This is especially important for the rocks laid in the ground enables the Port to survive an earthquake.

14.12 Even when the quarry closes, the land can be considered to have been improved, with increase in development potential, and greater economic value.

15.0 Conclusion and Recommendation

15.1 Significantly large quantities of rocks and gravel, about 1 million m3, are needed for construction of the Tibar Bay Port; considered as a national project.

15.2 After long searches of many areas, the quarry for the required rocks is chosen at Mota Ulun, for the 2 identified hills meet the criteria of quality, quantity, ease of access and transportation, and minimal disruption to the local community, i.e. no eviction, no resettlement, no dispossession of land or assets, no destruction of dwellings or other structures, and no economic deprivation. There are already quarry-related enterprises operating in the Mota Ulun area. The location is also not in or near sacred sites, nature reserves, or where protected or endangered species or unique vegetation, are found.

15.3 The CHT quarry has no unusual environment impacts, i.e. it is a conventional type of quarry operation, using explosives to break-up rock surfaces.

15.4 There is no tunneling, or open-cast, i.e. pit, type of mining. There is also no requirement for chemical treatment, i.e. no creation of hazardous sludge.

15.5 The CHT Community Liaison Officer (CLO) frequently meets local residents; explaining the rationale for the quarry, the associated economic and social benefits, and the precautions taken to lessen environmental impacts to the community. A Grievance Management Scheme is in-place.

15.6 The environmental impacts are avoided, minimized and controlled, i.e. via the Environmental Management Plan; comprehensively documenting the potential causes of concern, and the mitigation measures.

15.7 The qulrry benefits Mowa/Ulun, by providing possibly full employment for the community, without undue harm to the environment, and no harm at all to the social fabric. Local employment means that all gets to share in the prosperity.

15.8 Work by CHT, i.e. employing about 1,000 persons for constructing the Tibar Bay Port, and the supporting activities of the quarry and the jetty, bring economic growth to the regions of Tibar, Ulmera (where the 400-person Camp is sited) and Mota Ulun. This growth acts as a stimulant for other industrial and commercial enterprises, for people, machinery and transportation factors are now in place. The country has peace; now progress and prosperity follows.

15.9 It is recommended that the CHT quarry at Mota Ulun be approved, so that operations for obtaining rocks and gravel can start to finish the first phase of Tibar Port for operations by mid-2020.

16.0 Non-Technical Summary

16.1 About 1,030,000 m3 of rocks and gravel , i.e. a significantly large quantity, are needed for construction of the Tibar Bay Port, with a quay wall length of 630 m, a container terminal measuring about 27 ha, and numerous other port structures and facilities. The rocks and gravel are needed for making concrete and for ground improvement work, i.e. to strengthen the ground to lessen the effects of earthquakes, so as to protect the structures on it.

16.2 After long and hard searches of many areas over 7 months, 2 hills at Mota Ulun were identified as meeting the quarry requirements for rocks of the required criteria of quality, and quantity, and the other requirements of favourable terrain (i.e. ease of access and transportation), and minimal disruption to the local community, i.e. no eviction, no resettlement, no dispossession of land or assets, no destruction of dwellings or other structures, and no economic deprivation. There are already quarry-related enterprises operating in the Mota Ulun area.

16.3 The quarry is not in or near wetlands or nature reserves. The location is also not in or near sites with religious, historical, cultural, archaeological, or sacred elements, or where protected or endangered species, or unique vegetation, are found.

16.4 The CHT quarry has no unusual environment impacts, i.e. it is a conventional type of quarry operation, using explosives to break-up rock surfaces. There is no tunneling, or open-cast, i.e. pit, type of mining. There is no requirement for chemical treatment, i.e. no creation of hazardous sludge. There is also no need for engineering design for site access roads. Bridges or culverts (drainage under roads) need not be built.

16.5 Mota Ulun is a small village with about 457 people in about 162 families, living in scattered dwellings, usually of the timber, zinc and thatched roof types. The homes are connected to the main road by narrow dirt tracks. There is electricity supplied by government installed mains. Water obtained from the few wells are salty, for the village is near the sea.

16.6 There are only small home-holdings of crops for personal consumption. There is no livestock industry, only the occasional dwellings keeping a small number of animals for home consumption. Fishing activity is that of a few persons at the beach using spears for catching fish, or using hands to gather shell fish. There are 2 small fishing boats of the one-person type.

16.7 The only and small number of employment opportunities are at the low intensity bulk fuel station with a marine jetty (Laiara Construction), and the few small-scale companies operating stone works, i.e. making gravel and casting concrete parts.

16.8 Commercial activity is very low, i.e. only 3 family-owned and operated small provision shops, selling products related to home and personal use.

16.9 Each of the 162 families in Mota Ulun generally has a person requiring work. The quarry, by employing 50 local workers, and the resulting supporting commercial activities, e.g. food, housing and recreational, will result in economic gain for the whole local community without damage to the social fabric.

16.10 There is a primary school; the Ensino Basico Filial Caitehu. There is a Church, the Church of Capela da Sagrada Familia. At the rear of the Church is a convent; the Irmas Franciscanas de Nosa Senhra das Victorias. There is no Clinic. There are no social or recreational facilities, other than 2 billiards tables.

16.11 The undesirable effects of an influx of workers are completely avoided by the intention of employing only local residents, with housing and transport cost included in wages. This arrangement has the added advantages of:

16.11.1 Employees with own homes and transport benefit from the allowances. Similarly, for employees living with relatives. An employee staying near the place of work saves the full amount of transport expenses, or gain by pooling transport resources.

16.11.2 Home owners with rooms to rent out welcome the business; similarly for shop owners.

16.11.3 Welfare is improved, because workers need not be absent from families for long periods of time, for they can go home at the end of each day.

16.11.4 A single failure of housing, catering, transport, or other factors, will not stop quarry activities.

16.12 The CHT Community Liaison Officer (CLO) frequently meets local residents; explaining the rationale for the quarry, the associated economic and social benefits, and the precautions taken to lessen environmental impacts to the community. A Grievance Management Scheme is in-place.

16.13 The CHT CLO has the responsibility of ensuring that the great majority of workers are local residents, that there are skills and vocational upgrading for them, that purchase of local produce and products are increasing, and that well water is provided.

16.14 The EIS is complemented by the Environmental Management Plan (EMP); aiming to avoid, minimize and control environment related concerns. It comprehensively documents the probable causes of concern, and the mitigation methods to counter air, land and water pollution, with the aim of continual improvement.

16.15 The impact assessments, and follow-on control and monitoring measures cover 3 broad areas of a quarry enterprise, i.e. Pre-Construction (e.g. land clearance), Construction (e.g. building of structures), and Operations (e.g. breaking rocks and making gravel, and transportation of the finished product).

16.16 The setting-up and operating of the quarry are not expected to encounter difficulties because general sentiment welcomes the quarry in support of constructing the Tibar Bay Port. The quarry is in an industrial area, no endangered or protected flora and fauna is harmed, there are no cultural or sacred elements in the site, access is good, no persons live on or off the quarry land, employment prospects for the local Mota Ulun residents are excellent, and there are many opportunities for sharing in economic growth and social improvements.

16.17 It is probable that the quarry will operate for many years to come, for the hills are full of rocks. Also, as industrial and commercial growth increases in the Tibar, Ulmera and Mota Ulun areas, and the country

as a whole, the demand for rocks also increases, for such a material is essential for constructing modern structures.

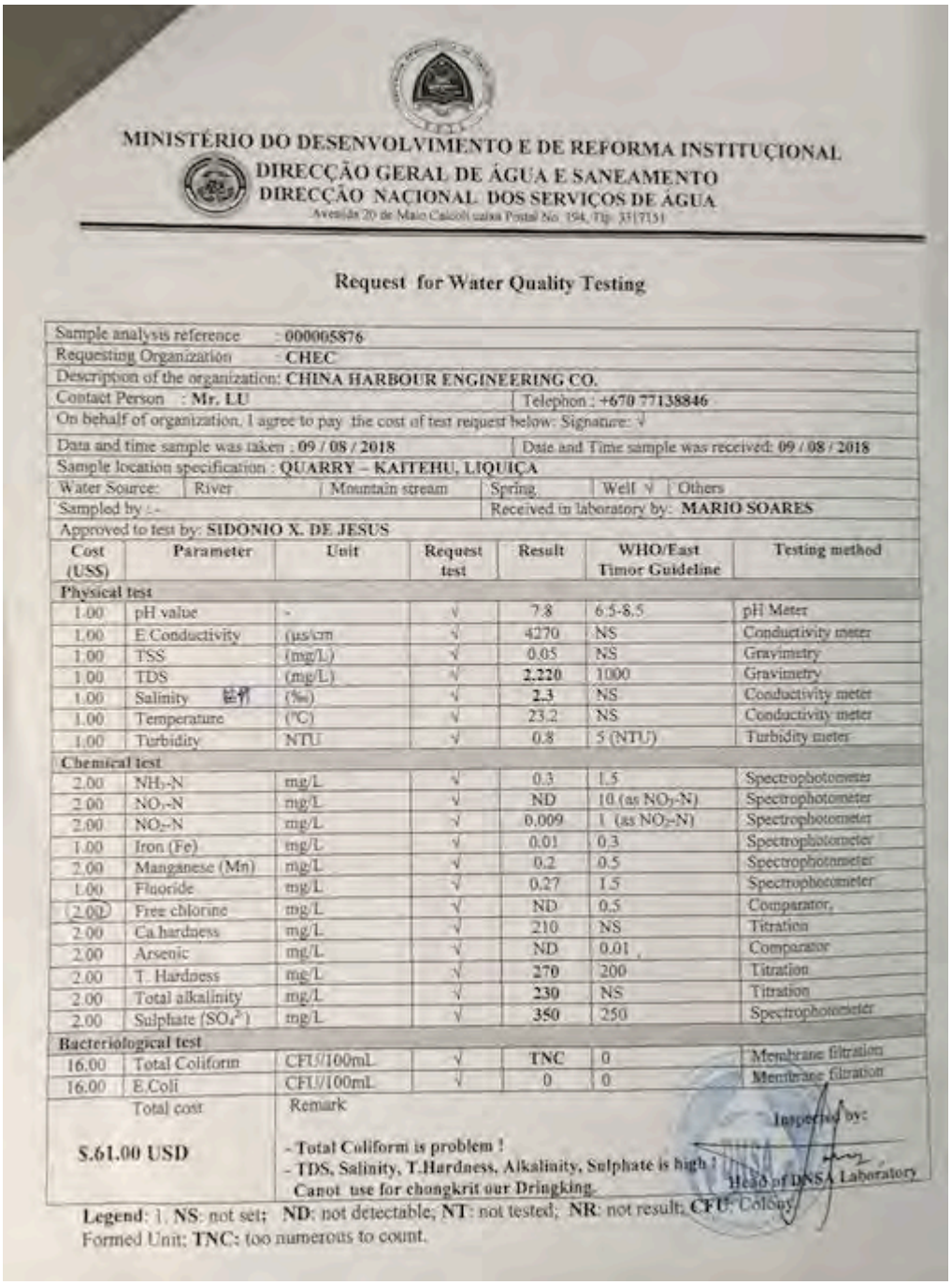
16.18 The quarry, if not continued as is, has potential for conversion to plantations or housing. The land was hilly. It now has large tracts of level ground. Roads, utilities, housing structures, and even a fresh water reservoir is available; all enhancing the value of the land. The ex-quarry on higher ground has scenic views of the sea, and there is a good road to Dili. It can readily be transformed to premiere housing.

17.0 Attachments

Attachment A: Well Test Report.
Attachment B: Safe Use of Explosives.
Attachment C: Locations Searched for the Right Types of Rocks.
Attachment D: EIS Approval by Proposer.
Attachment E: Legal Compliance
Attachment E1: Other Standards.
Attachment F: Features of the Terrain.
Attachment G: Pictures of Dried-Up Streams.
Attachment G1: Survey of Water Courses East of Laydown Area.
Attachment H: Community Profile Survey Report.
Attachment I: Public Consultations and Household Visits.
Attachment I1: Notes of Public Consultation (18 Jan 2019).
Attachment I2: List of Stakeholders.
Attachment J: “No Objections Letter” from Chief of Suco Mota Ulun.
Attachment K: Quarry Closure Plan.
Attachment L: Biodiversity Survey Report.
Attachment M: Quarry Dust Management Plan.
Attachment M1: Environmental Dust Monitoring Report.
Attachment N: Quarry Noise Management Plan.
Attachment O: Quarry Vibration Management Plan.

Attachment A Well Test Report

Figure 1. Water Test Report for Main Well at Mota Ulun



MINISTÉRIO DO DESENVOLVIMENTO E DE REFORMA INSTITUCIONAL
DIRECÇÃO GERAL DE ÁGUA E SANEAMENTO
DIRECÇÃO NACIONAL DOS SERVIÇOS DE ÁGUA
Avenida 20 de Maio Caicoli caixa Postal No. 194, Tlp: 331715

Request for Water Quality Testing

Sample analysis reference : 000005876
Requesting Organization : CHEC
Description of the organization: CHINA HARBOUR ENGINEERING CO.
Contact Person : Mr. LU | Telephon : +670 77138846
On behalf of organization, I agree to pay the cost of test request below: Signature: √
Data and time sample was taken : 09 / 08 / 2018 | Date and Time sample was received: 09 / 08 / 2018
Sample location specification : QUARRY – KAITEHU, LIQUIÇA
Water Source: River | Mountain stream | Spring | Well √ | Others
Sampled by :- | Received in laboratory by: MARIO SOARES
Approved to test by: SIDONIO X. DE JESUS

Cost (US$)	Parameter	Unit	Request test	Result	WHO/East Timor Guideline	Testing method
Physical test						
1.00	pH value	-	√	7.8	6.5-8.5	pH Meter
1.00	E.Conductivity	(µs/cm	√	4270	NS	Conductivity meter
1.00	TSS	(mg/L)	√	0.05	NS	Gravimetry
1.00	TDS	(mg/L)	√	2.220	1000	Gravimetry
1.00	Salinity	(‰)	√	2.3	NS	Conductivity meter
1.00	Temperature	(°C)	√	23.2	NS	Conductivity meter
1.00	Turbidity	NTU	√	0.8	5 (NTU)	Turbidity meter
Chemical test						
2.00	NH_3-N	mg/L	√	0.3	1.5	Spectrophotometer
2.00	NO_3-N	mg/L	√	ND	10 (as NO_3-N)	Spectrophotometer
2.00	NO_2-N	mg/L	√	0.009	1 (as NO_2-N)	Spectrophotometer
1.00	Iron (Fe)	mg/L	√	0.01	0.3	Spectrophotometer
2.00	Manganese (Mn)	mg/L	√	0.2	0.5	Spectrophotometer
1.00	Fluoride	mg/L	√	0.27	1.5	Spectrophotometer
2.00	Free chlorine	mg/L	√	ND	0.5	Comparator,
2.00	Ca hardness	mg/L	√	210	NS	Titration
2.00	Arsenic	mg/L	√	ND	0.01	Comparator
2.00	T. Hardness	mg/L	√	270	200	Titration
2.00	Total alkalinity	mg/L	√	230	NS	Titration
2.00	Sulphate (SO_4^{2-})	mg/L	√	350	250	Spectrophotometer
Bacteriological test						
16.00	Total Coliform	CFU/100mL	√	TNC	0	Membrane filtration
16.00	E.Coli	CFU/100mL	√	0	0	Membrane filtration

Total cost: 5.61.00 USD

Remark:
- Total Coliform is problem !
- TDS, Salinity, T.Hardness, Alkalinity, Sulphate is high !
Canot use for chongkrit our Dringking

Inspected by:
Head of DNSA Laboratory

Legend: 1. NS: not set; ND: not detectable; NT: not tested; NR: not result; CFU: Colony Formed Unit; TNC: too numerous to count.

Figure 2. Main Well at Mota Ulun

Attachment B Safe Use of Explosives

1. This summary of safe use of explosives is organized in a narrative manner, in the form of responsibilities of the main participants of the Blasting Team.

Organisation

2. The Blasting team has the following main persons; Blasting Engineer, Shot Firer, Blasting Foreman, the Blasting Safety Officer, and the Explosives Truck Driver. Main equipment and facilities are the purpose-built explosives store, the purpose-outfitted explosives truck and assorted wood-type containers for explosives.

The Blasting Engineer

3. Act as the Shot Firer, only for actual triggering of the explosives, if required.

4. Manage the handling and transporting of explosives and accessories from external places to the quarry explosives store.

5. Prepare the list of items to be removed from the explosives store, i.e. the “Stock Out” Permit.

6. Surveys the place for the purpose of blasting work.

7. Select the explosives, detonators, fuses for the purpose.

8. Calculate and prepare the layout of the explosives, and the charging and tamping of shots.

9. Check the connections of lines and circuits.

10. Co-ordinate with the Blasting Safety Officer before giving the warning and all-clear signals.

11. Give warning signals (30 mins and 5 mins) before the blast, and the all-clear signal after the blast.

12. Manage misfires.

13. Return all unused items to the explosives store.

The Blasting Safety Officer

14. The Blasting Safety Officer is assisted by a Blasting Safety Supervisor.

15. Issue certificates of competency to the Blasting Team.

16. Train quarry personnel on “Blasting Safety”.

17. Post the weekly forecast schedule for blasting, and the actual daily timings.

18. Setup the 50 m restricted zone, and the 300 m safety zone.

19. At the 300 m safety zone, organise the road blocks, the guards at the road blocks, and the safety car that travels at the perimeter of the 300 m zone.

20. Check that only authorized persons and equipment are within the 50 m, and the 200 m.

21. Check that the blasting shed is position at a relatively safe place.

22. Co-ordinate with the Blasting Engineer before the blasting and all-clear signals.

The Blasting Foreman

23. Ensure that only persons holding certificates of competency are in his work team.

24. Check that persons in the work team are in fit condition, e.g. not under the influence of alcohol or drugs.

25. Check that unauthorized items are not brought into the workplace. Examples of unauthorized items include cellphones and lighters, and non-certified tools.

26. Organise the work in a safe manner, e.g. explosives, detonators and containers are under proper care, and handled with caution.

27. Lay the explosives and circuitry in the manner prescribed by the Blasting Engineer.

28. Check that scatter protection items, e.g. blasting mats are properly placed.

29. Perform confidence checks before informing the Blasting Engineer that the shot can be safely triggered.

30. Assist the Blasting Engineer in handling misfires.

31. Check inventory, and return all unused items to the explosives store.

32. Manage the explosives store, e.g. ensuring security, proper containers, separation of incompatibles, and keeping inventory control.

The Shot Firer

33. The Shot Firer assists the Blasting Foreman.

34. Prior to firing, the explosives stock register is reconciled against the number of holes loaded to ensure all explosives are accounted for.

35. Perform confidence checks before informing the Blasting Engineer that the shot can be safely triggered.

36. Trigger the blast only after positive confirmation from the Blasting Engineer.

37. Collect all unused items in proper containers and check inventory.

Blasting Crew

38. Work in a safe manner, i.e. no distracting activities or conversations, and not bringing-in unauthorized items into the workplace.

39. Handle all explosives related items, including containers with care and caution.

40. Work in accordance with instructions given by Supervisory staff.

The Explosives Truck Driver

41. Use the vehicle only for transporting explosives. Do not use the vehicle for any other purpose.

42. Maintain the vehicle.

43. When carrying explosives, there must be a Vehicle Assistant, who has a certificate of competency issued by the Blasting Safety Officer.

44. Before driving off, check that all items are in designated containers, and properly placed in the vehicle.

45. No explosives related items are to be placed in the driver's cabin.

46. Take instructions only from the Blasting Engineer, the Blasting Safety Officer, and the Blasting Foreman.

47. No unauthorized stops. The trip is only to/from designated places.

Attachment C Locations Searched for the Right Type of Rocks

Figure 1. Locations Searched for the Right Type of Rocks

Attachment D EIS Approval by Proposer

"Will be attached in the final EIS"

Attachment E Legal Compliance

1. The preparation of the EIS and the EMP is governed by environment-related regulations. In addition, other regulations, standards, and guidelines that affect environmental and social matters, e.g. covering demarcated sensitive areas, protected and endangered species, culturally important sites, and the welfare of communities, are also referenced. Information on "Compliance with Legislation Requirements" are shown at Tables E-1 to E-7.

Table E-1. Legal Compliance (Environment Legislation)

SN	Legislation	Article / Annex	Requirement	Compliance	CHEC Responsible Person
1	26/2012. Environmental Basic Law	Article 13	Conduct a strategic environmental assessment before consenting to any project	EIS and EMP	HSE Manager
2	Decree Law 5/2011, Environmental Licensing Law	Article 3	Describes the environmental licensing procedure	Project Documents, TOR, EIS, EMP and Environmental License	HSE Manager
3	Decree Law 14/2018,Government Structure	Article 33, paragraph 1, sub-paragraph O	Empowers the Minister of Petroleum and Minerals to approve environmental licenses, in the petroleum and mining sector	Environmental License	HSE Manager
4	Directive 44/2017, Regulation on Impact and Benefit		Process for agreement between the Proponent and the local community regarding the project	Impact and Benefits Agreement	Community Liaison Officer
5	Directive 45/2017		Rules for the Committee assessing Category A projects	Project Documents, TOR, EIS, EMP and Environmental License	HSE Manager

6	Directive 46/2017		Details of Project Documents (PD), TOR, EIS and EMP documents, as stated in Annexes 1, 3, 4 and 5 respectively	Project Documents, TOR, EIS, EMP and Environmental License	HSE Manager
7	Directive 47/2017		Public consultation procedures and requirements during an environmental assessment process	EIS and EMP	HSE Manager
8	Resolution 32/2016		Strategy for waste management covering waste collection, destruction, and recovery. A new landfill is to be setup in Tibar; operated by private entities	Quarry Waste Management procedure	Quarry HSE Manager
9	Decree Law 2/2017, Urban Waste Management		Rules on recyclable waste, duties of Municipalities, waste collection, transportation and disposal, and urban waste management contracts	Quarry Waste Management procedure	Quarry HSE Manager

Table E-2. Legal Compliance (Biodiversity and Protected Areas)

SN	Legislation	Article / Annex	Requirement	Compliance	CHT Responsible Person
1	Decree Law 5/2016, National System of Protected Areas		Defines areas classified as national parks, wildlife sanctuaries, natural monuments, protected landscapes and natural reserves. Permitted and non-permitted activities	PD, EIS and EMP	HSE Manager
2	Government Resolution 41/2015, Sandalwood Classified as Iconic Plan		States the protection measures for this species, e.g. the cutting, extraction, and sale of sandalwood is prohibited	PD, EIS and EMP. Quarry HSE Plan.	HSE Manager. Quarry HSE Manager
3	Joint Ministerial Diploma No. 18/MAP/MCIA/ II/2017 of 12 April 2017	Annex 1	List of Protected Species	PD, EIS and EMP. Quarry HSE Plan.	HSE Manager. Quarry HSE Manager

Table E-3. Legal Compliance (Mining)

SN	Legislation	Article / Annex	Requirement	Compliance	CHEC Responsible Person
1	Decree Law 64/2016, Licensing of Mining Activities		Describes the licensing procedures for different types of mining licenses, for construction and other types of materials. Article 40 - monthly HSE reports	PD, EIS and EMP. Quarry HSE Plan.	HSE Manager. Quarry HSE Manager
2	Joint Ministerial Resolution 1/2017		States the importance of rocks for the Tibar Bay Port Project, in that without rocks of a certain quality and quantity, the Project is in jeopardy. The use of explosives permit is to be issued, subject to certain conditions.	Noted	Permits Officer
3	Resolution 36/2016		Government provides exemption to international companies engaged in major public construction projects without Timorese having majority share	Noted	Permits Officer

Table E-4. Legal Compliance (Land)

SN	Legislation	Article / Annex	Requirement	Compliance	CHEC Responsible Person
1	Decree Law 15/2017, Private Investment Law	Article 14	Right to private ownership and use of land	Noted	Permits Officer
2	Decree Law 10/2011, Civil Code		Covers the management, e.g. rights, purchase, lease, and contractual interpretations, of land and immovable property	Noted	Permits Officer
3	Decree Law 6/2017, Basis of Spatial Planning		Provides the mechanism for planning, promotion and development of sectors and regions	Noted	Permits Officer
4	Decree Law 8/2017, Expropriations Law		Expropriation is only admissible in cases of “public interest” in the use of the asset	Noted	Permits Officer

Table E-5. Legal Compliance (Agriculture and Fishing)

SN	Legislation	Article / Annex	Requirement	Compliance	CHEC Responsible Person
1	Decree Law 6/2004, Legal Regime for Regulation and Management of Fisheries and Aquaculture	Article 81. Article 82	Prohibits the introduction into waters of substances likely to harm aquatic life. Authorisation is required, amongst other activities, for any work or installation intended to be carried out in national maritime waters, or in the seafront up until 100 meters from the coastline.	Quarry HSE Plan. Quarry Waste Management procedure	Quarry Manager.

Table E-6. Legal Compliance (Labour Legislation)

SN	Legislation	Article / Annex	Requirement	Compliance	CHEC Responsible Person
1	Decree Law 4/2012, Labour Law	Article 20	Requires an employer, to provide good working conditions, with regard to health, hygiene and safety at work. An employer is also required to provide vocational training opportunities	Quarry HSE Plan	Quarry HSE Manager

Table E-7. Legal Compliance (Other Legislation)

SN	Legislation	Article / Annex	Requirement	Compliance	CHEC Responsible Person
1	Decree Law 33/2008, Hygiene and Public Order	Article 2. Article 5	Applicable to urban areas. Prohibitions; releasing polluted water into ditches, depositing refuse on rights of ways, blocking drains, directing drainage onto rights of ways, and making noises that prejudice communication or disturb the peace	Quarry Waste Management Procedure. Quarry HSE Plan	Quarry HSE Manager
2	Decree Law 9/2016, Sucos Law		Explaining the concept of Sucos. Establishing the authorities of Sucos, and the rules for appointments of members of associated bodies	Noted	Community Liaison Officer
3	Decree Law 7/2009,		Defines community leadership, sets the rules for the action limits	Noted	Community Liaison

	Community Leaderships and their Election		of the community leadership structures, and the organization and implementation of the process for elections		Officer
4	Decree Law 43/2015, Tibar Port Public-Private Partnership		Sets the legal framework for Tibar Port, e.g. granting the legal power to the Government to execute the contract for the financing, design, construction and operation of the Port	Noted	Permits Officer

Attachment E1 Other Standards and Guidelines

1. The Equator Principles is a risk management framework, adopted by financial institutions, for determining, assessing and managing environmental and social risks in project financing. It has the following items:

   Principle 1: Review and Categorisation

   Principle 2: Environmental and Social Assessment

   Principle 3: Applicable Environmental and Social Standards

   Principle 4: Environmental and Social Management System and Equator Principles Action Plan

   Principle 5: Stakeholder Engagement

   Principle 6: Grievance Mechanism

   Principle 7: Independent Review

   Principle 8: Covenants

   Principle 9: Independent Monitoring and Reporting

   Principle 10: Reporting and Transparency

2 The Extractive Industries Transparency Initiative is a global standard for the good governance of oil, gas and mineral resources. It seeks to address the key governance issues in the extractive sectors. The EITI Standard requires information along the extractive industry value chain from the point of extraction, to how the revenue makes its way through the government, to how it contributes to the economy

3. The Global Reporting Initiative(GRI) is an international independent standards organization that helps businesses, governments and other

organizations understand and communicate their impacts on issues such as climate change, human rights and corruption. The 100 series of the GRI Standards includes three universal Standards applicable for every organization preparing a sustainability report. They guide reporters in using the Standards, reporting an organization's relevant contextual information, and reporting how its material topics are managed:

GRI 101: Foundation 2016 (containing Standard Interpretation 1) Effective date: 01 Jul 2018.

GRI 102: General Disclosures 2016 Effective date: 01 Jul 2018.

GRI 103: Management Approach 2016.

4. The International Finance Corporation (IFC), part of the World Bank, has the following Performance Standards (PS):

4.1. IFC PS 1 Assessment and Management of Environmental and Social Risks and Impacts.

4.2. IFC PS 2 Labor and Working Conditions.

4.3. IFC PS 3 Resource Efficiency and Pollution Prevention.

4.4. IFC PS 4 Community Health, Safety, and Security.

4.5. IFC PS 5 Land Acquisition and Involuntary Resettlement.

4.6. IFC PS 6 Biodiversity Conservation and Sustainable Management of Living Natural Resources.

4.7. IFC PS 7 Indigenous Peoples.

4.8. IFC PS 8 Cultural Heritage.

4.9 IFC Environmental Health, Safety (EHS) Guidelines April 2007.

5. The Asian Development Bank (ADB) has environmental safeguards, i.e. referring to environmental, assessments and measures to identify potential environmental impacts and risks of a project and prescribe the environmental management plans to be implemented. These are composed of the following documents:

5.1 Initial Environmental Examination (IEE). Describes the environmental condition of a project, including potential impacts, the formulation of mitigation measures, and the preparation of institutional requirements and environmental monitoring for the project.

5.2 Environmental Assessment Review Framework (EARF). Outlines procedures for the preparation of environmental assessment documents for a project to ensure environmental impacts are appropriately addressed and mitigated.

5.3 Environmental Impact Assessments (EIA). Examines the social and environmental consequences of the project prior to execution and provides information to decision makers and the public about the environmental implications of proposed actions before decisions are made.

5.4 Social and Environmental Compliance Audit Reports. Describe project compliance to social or environmental safeguards requirements based on ADB Safeguards Policy Statement (2009) and includes conclusions and recommendations.

5.5 Environment and Social Management System Frameworks (ESMS). Provide guidelines and frameworks for establishing the environmental and social management system for a project that is consistent with the safeguard policy principles and requirements of ADB.

6. The Internal Standards Organisation (ISO) standard ISO14001 refers to Environmental Management Systems.

7. The OHSAS 18001 is a standard on Occupational Safety and Health. Note: OHSAS refers to Occupational Health and Safety Assessment Series.

Attachment F Features of the Terrain

Figure F-1. Top View of Hill A

Figure F-2. Existing Path Up Hill A

Figure F-3. Rocky Conditions of Top of Hill A

Figure F-4. Illustration of Vegetation at Hill A (Part 1)

Figure F-5. Illustration of Vegetation at Hill A (Part 2)

Figure F-6. View of Hill B

Figure F-7. Slope of Hill B

Figure F-8. Illustration of Vegetation at Hill B

Figure F-9. Internal Haul Road (and landscape at the sides)

Attachment G Pictures of Dried-Up Streams

Figure G-1. Location Map of Pictures of Dried-Up Streams

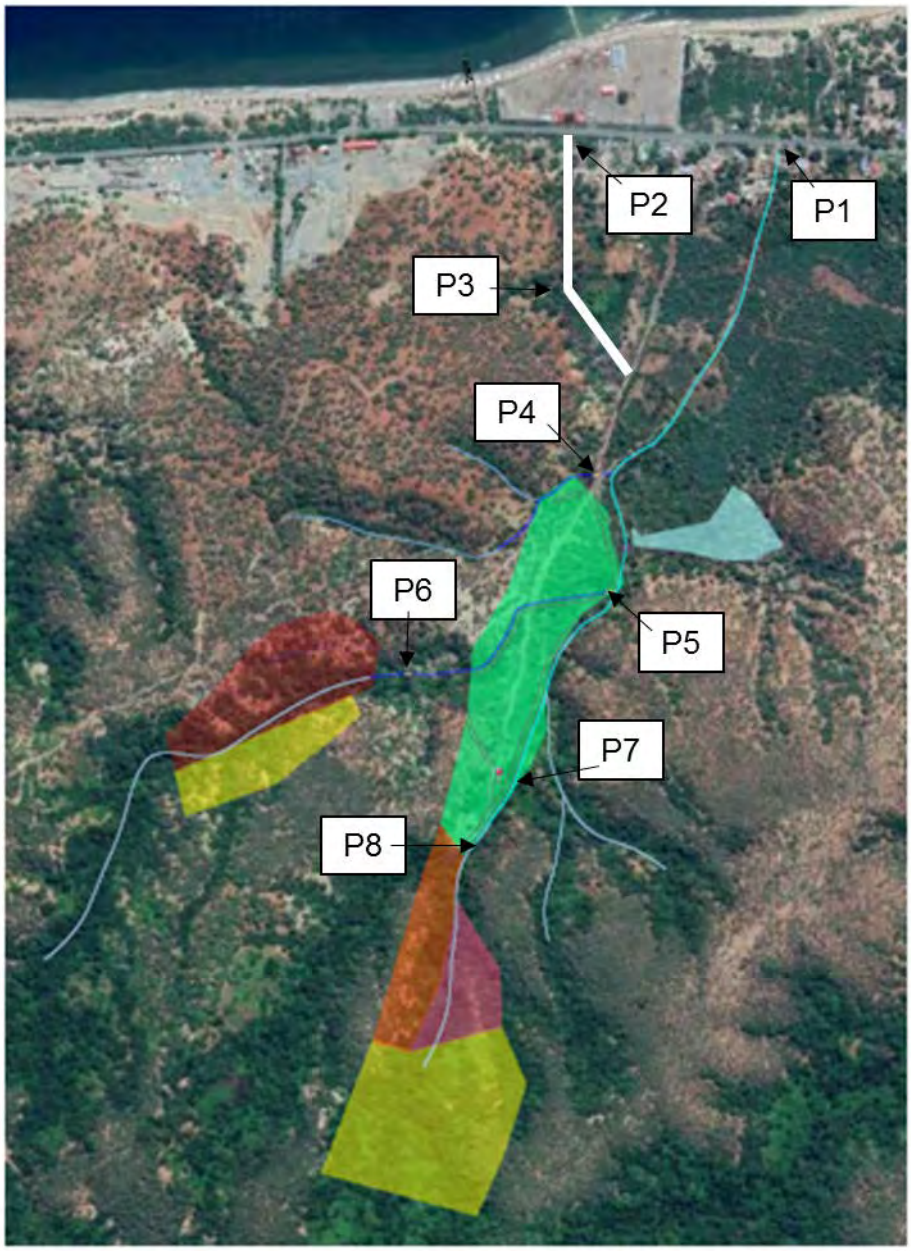


Figure G-2. Picture of Point P1

Figure G-3. Picture of Point P2

Figure G-4. Picture of Point P3

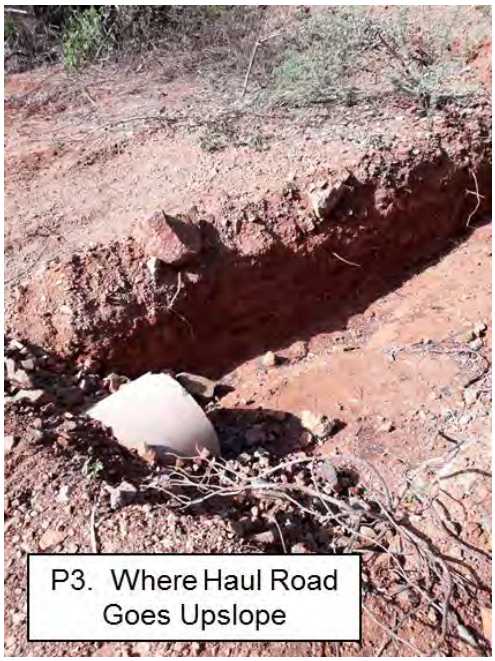


Figure G-5. Picture of Point P4

Figure G-6. Picture of Point P5

Figure G-7. Picture of Point P6

Figure G-8. Picture of Point P7

Figure G-9. Picture of Point P8

Attachment G1 Survey of Water Course East of Laydown Area

Site Survey of Natural Drainage East of Laydown Area Flowing South to the Village and Under the Dili-Liquica Road to the Sea

Date of Survey: Sat 19 Jan 2019.

Surveyed By: Koh Chee Thong (CHEC HSE Adviser), and 2 residents, both sisters, from the house at the location where the culvert goes under the main Dili-Liquica road, i.e. Ms Anabela da Silva and Ms Angelina da Silva.

Summary

1. Other than 2 small ponds with brackish water, the drainage channels are is completely dried-up, even during the wet season. The channels are flat and wide, with some parts about 50 m wide, i.e. the rain water flows over a large area. There are no gullies, except for a location where the flow of water cuts a grove in the ground about 30 cm deep, 1 m wide and 20 m long. There is no crop growing either side of the drainage channels, other than a single small enclosure, measuring about 20 m by 10m, with corn plants in it. There are scattered dwellings of the wood and grass type on the west side of the drainage system, about 250 m from the main road. Domestic goats, chickens and pigs were encountered all along the route.

Location of Survey

2. At the immediate east of the CHT laydown area for the Quarry at Mota Ulun, there is a natural drainage channel flowing north towards the sea. The start point for the survey is the location where the drainage goes into a culvert under the Dili-Liquica road, and then to the sea. The turn back location is where the drainage meets the quarry laydown area. Figure G1-1 shows the layout of the mentioned places.

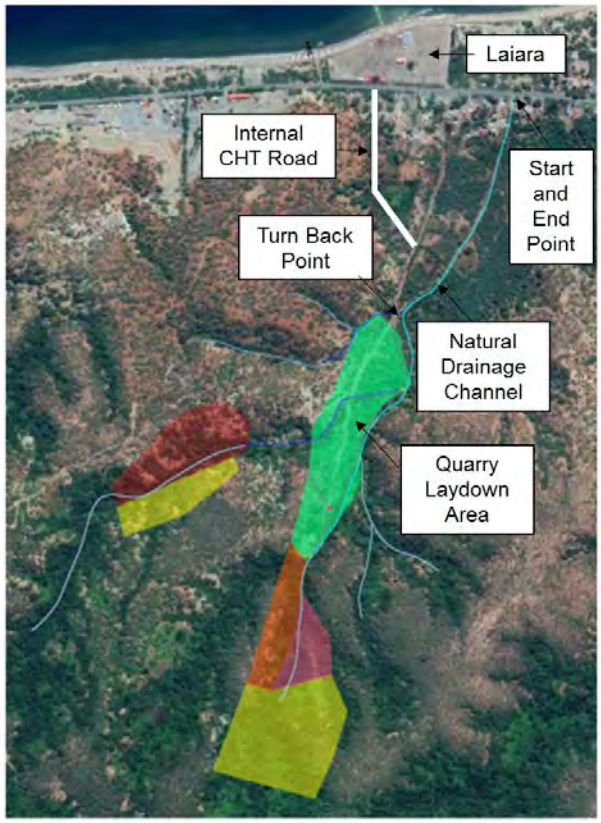
Method

3. After enquiries, it was gathered from the villagers that the water channels are not flooded, that there are no steep slopes or dangerous wild animals, or snakes, and that it is safe to walk on the water channels, or at the sides.

4. The survey method consists of travelling on foot, with the assistance of 2 local persons staying at the house next to the water channel and near the main road. The hike was easy, and 4 children with ages ranging from about 5 to 8 years accompanied the Team, for they are familiar with and are comfortable with the neighbourhood. The Team walked up to the laydown area, and made a turn back, and return by another trail, running approximately parallel to the first route, and on the east side.

5. Photographs were taken at places of interest, and these are shown as figures in Attachment A. The distances stated in the figures are a continuation of distance for the Team, as it starts out from the under-the-road culvert point. The distances are not distances from any other point.

Figure G1-1. Layout Drawing and Route Taken by the Survey Team



Terrain

6. The ground is generally flat, and the slow rise from the main road to the foot of the hills is not noticeable as a person walks on it. Along several parts, the rain channel is general wide, about 50 m. It narrows to about 3 m at certain areas. There is no gully, except for a small section where the rain water flow cuts a grove in the ground measuring about 1 m wide, 30 m long and 30 cm deep. The reason could be because the ground is very firm, for there are stones just about 20 cm deep from the surface. Some parts of the ground are sandy with small stones, and other parts are slightly muddy. The mud is only about 1 cm thick, and easily walked on. At the village area where the culvert under the road was constructed, the ground is full of small stones, carried down by the flow of water.

7. There are only 2 shallow ponds with brackish water, one of which is only 1 m wide and 3 m long. The other pond is about 20 m by 6 m. The water is dirty and muddy, because pigs wallow in it.

Vegetation

8. Vegetation is sparse. There is no thick undergrowth. The ground is usually bare. The trees are not more than 6 m high. Palm trees are prominent; many of which are dead, with only trunks remaining. There is no evidence of oil palm cultivation. The branches on the other types of trees are not thick with leaves.

Fauna

9. There was hardly any sound made by birds. Only one small bird was observed flying. A butterfly was seen, and the children were stopped from trying to beat it with sticks.

10. No wild animals were seen. Domestic goats, pigs and chickens, and animal droppings are encountered all along the path. The animals move away when the Team approaches, indicating that they are not familiar with humans in the area. This is expected, for there is no reason for the villagers or other persons to be in the location. There are several spots where pigs, whether wild or domesticated, have dug up the ground next to trees in search of roots to eat.

Homes, Crops and Husbandry

11. About 250 m from the main road, there are several small buildings of the wood and grass type on the west side of the rain water channel. There are free ranging and domestic chickens, goats and pigs. There are also a few cows. Grass and shrubs are sparse, probably due to foraging by the domestic animals.

12. There is no growing of vegetables, other than a small enclosure measuring about 20 m by 10 m, and with rows of corn plants less than 1 m in height. This enclosure is about 200 m from the main road, and on the west side of the water channel. Further up the path, there were 2 similar enclosures, but they are abandoned, without any crops, and with only weeds and wild vegetation.

Pictorial Observations

13. Observations along the route are shown at below. The distances stated in the figures are a continuation of distance for the Team, as it moves along, i.e. starting from the under-the-road culvert point. The distances are not distances from any other point.

Figure G1-2. Start Point. Inlet of culvert under crossing (of Dili-Liquica road)

Figure G1-3. 150 m. Small pond with brackish water

Figure G1-4. 200 m. Corn growing enclosure (about 20 m by 10 m) on the right

Figure G1-5. 200 m. Dried-up shallow bed of stream

Figure G1-6. 250 m. Pond (about 20 m by 6 m) with brackish water

Figure G1-7. 250 m. Mother pig and a piglet using the pond (Note: a few piglets ran away when the Team approached the pond)

Figure G1-8. 350 m. Enclosure on the left without crops (only weeds and wild growth)

Figure G1-9. 500 m. Dried-up drainage. Typical of terrain

Figure G1-10. 600 m. Continuation of dried-up drainage

Figure G1-11. 800 m. Further continuation of dried-up drainage. Note the wide ground span covered by water when it rains

Figure G1-12. 1,000 m. Enclosure without crop growing. Only weeds and wild vegetation in it

Figure G1-13. 1,150 m. Rain water flow cutting a grove in the bed. (about 1 m wide, 30 m long and 30 cm deep)

Figure G1-14. 1,200 m. Fork in the rain water flow path. Team continued onto the fork on the right

Figure G1-15. 1,250 m. Dried-up bed continues

Figure G1-16. 1,300 m. Turn-back point. CHT rest shed in the far background. Return to main road by the previously encountered fork on the left (now on the right)

Figure G1-17. 1,400 m. Dried-up bed continues

Figure G1-18. 1,500 m. Dried-up bed continues

Figure G1-19. 1,500 m. Earth dug up by pigs

Figure G1-20. 1,600 m. Wide area covered by rain water flow

Figure G1-21. 1,700 m. Depression (1 m wide by 3 m long by 20 cm deep), created by rain water flow

Figure G1-22. 1,800 m. Wide area flooded by rain water

Figure G1-23. 1,850 m. Continuation of wide area flooded by rain water (Note the stones on the ground)

Figure G1-24. 1,900 m. Decayed tree trunk eaten by pigs

Figure G1-25. 1,900 m. Wide area flooded by rain water

Figure G1-26. 2,000 m. Another view of wide area flooded by rain water. Note thin white deposit on surface, and tree cut by villagers (truck stump remaining)

Figure G1-27. 2,200 m. Return to village houses at location where culvert runs under the main road (Note the small stones on the ground carried down by the rain water)

Attachment H Community Profile Survey Report

CHT Quarry and Jetty (Mota Ulun)
Community Profile Survey Report (

Summary

1. The community profile survey from 20 to 26 Dec 2018, covered 68 households with a total of 498 persons, and with a distribution of 271 males and 227 females. The population is young, for 74 % are below 31 years. There are 82 wage earners, with about half earning between US $ 100 to 200 a month. These 82 persons make up 41 % of the 201 persons in the 21 to 50 years age group. CHT by providing employment for another 50 persons increases the employment rate to more than 65 %. A 100 % employment rate is not feasible, for it is not practical for both parents to be working.

2. It is pleasing to observe that for women, the 21 to 30 age group has 3 times more persons attending secondary and university education compared with the 31 to 50 age group.

3. Health-wise, there are improvements, for there are about 70 children in the 1 to 5 age group, compared to the about 50 and 60 children in the 6 to 10 and 11 to 15 age groups respectively.

4. Opportunity-wise, CHT can contribute to the community by:

    4.1 Employing as many locals as practicable, especially the large number of unemployed women.

    4.2 Helping to concrete the floors of 12 homes that have dirt floors.

    4.3 Providing better quality water from the bore holes higher up in the hill slopes. The water from the wells located lower, and nearer to the sea, has an undesired high salt content.

    4.4 Purchasing groceries from the local shops; focusing on locally grown products.

Method

5. The quarry is at Suco Mota Ulun, approximately 23.4 km west of Dili, and in Liquica Municipality, with Barzetete as the sub-district. A community profile survey questionnaire was prepared; of which a sample shown at Figure 1. It has items covering the main groups of type of dwellings, household composition, personal information, employment, education, utilities, and animal husbandry.

6. Madam Anna Clara do Santos has the main grocery shop out of 3 in the village. With her kind heartedness and consent, the wide foyer of her shop was used for interviews as persons arrive to make purchases. Conveniently, next to the shop is a billiards table, where the villagers come for recreation, and subsequently agreeing to be interviewed. Feedback questionnaires about positive and negative opinions about the quarry were handed out, and returned to the store at responders' convenience. A sample of this questionnaire is at Figure 2.

Figure 1A. Community Profile Survey Questionnaire (Left Half)

Mota-Ulun Community Profile Questionnaire					
House/Shop Number:			General Location:		
1	Nuclear	Extended	No Persons	Head of Household:	
2	Land Owner	Electricity	Toilet: F/L/O	House - Roof:	Wall:
3	Chicken:	Pig:	Goat:	Cow:	Duck:
4	Vegetables	Home / Retail		Fruit Trees (Qty)	Home/Retail
5	Person 1	Male / Female	Age:	Edu: IL / L / N / P / S / V / U:	S/M/Sp/D/W/Wr. H/W/S/D/GM/GF/GS /GD/Rel/Ptr
6	Person 2	Male / Female	Age:	Edu: IL / L / N / P / S / V / U:	S/M/Sp/D/W/Wr. H/W/S/D/GM/GF/GS /GD/Rel/Ptr
7	Person 3	Male / Female	Age:	Edu: IL / L / N / P / S / V / U:	S/M/Sp/D/W/Wr. H/W/S/D/GM/GF/GS /GD/Rel/Ptr
8	Person 4	Male / Female	Age:	Edu: IL / L / N / P / S / V / U:	S/M/Sp/D/W/Wr. H/W/S/D/GM/GF/GS /GD/Rel/Ptr
9	Person 5	Male / Female	Age:	Edu: IL / L / N / P / S / V / U:	S/M/Sp/D/W/Wr. H/W/S/D/GM/GF/GS /GD/Rel/Ptr
10	Person 6	Male / Female	Age:	Edu: IL / L / N / P / S / V / U:	S/M/Sp/D/W/Wr. H/W/S/D/GM/GF/GS /GD/Rel/Ptr

Figure 1B. Community Profile Survey Questionnaire (Right Half)

	Date:	Person Collecting Info:	
	Single/Mother/Father	Language:	Religion: C/Pt/Ism/O
Floor:		Water: Mains/Well/Sp	
Dog:	Cat:		
Nationality	Income per month	Livelihood (Main):	Livelihood (Others):
Nationality	Income per month	Livelihood (Main):	Livelihood (Others):
Nationality	Income per month	Livelihood (Main):	Livelihood (Others):
Nationality	Income per month	Livelihood (Main):	Livelihood (Others):
Nationality	Income per month	Livelihood (Main):	Livelihood (Others):
Nationality	Income per month	Livelihood (Main):	Livelihood (Others):

Figure 2. Public Consultation Questionnaire

CHT Quarry/Pedreira no Ponte Kais (Mota Ulun)
CHT Quarry and Jetty (Mota Ulun)
Questionário Konsulta Públika. Public Consultation Questionnaire

Naran no asinatura husi ema/pesoal:
Name and Signature of Person:

Idade / Generu. Age / Gender:
Occupasaun. Occupation:
Hela Fatin. Address:

Numeru telemovel (opsional). Cellphone number (optional):
Residente husi Mota Ulun. Resident of Mota Ulun. Yes / No. Sim / Não:
Data. Date:

Representa an rasik. Representing ownself: Sim / Não. Yes / No:
Representa Organizasaun ruma (Organizasaun nia naran):
Representing an organisation (Name of Organisation):
Nomeasaun iha Organizasaun. Appointment in the organisation:

Saida mak diak kona ba quarry (pedreira)/ ponte kais?
What is good about the quarry / jetty?

(Eskala husi 1 to 10, ho 10 hanesan mais preferidas / gosta liu).
(Scale of 1 to 10, with 10 as most preferred).

SN	Bom/Diak (Preferência). Good (Preference)	Eskala. Scale	Komentárius. Comments
1	Empregu. Employment.		
2	Sosa produtu lokal. Buy local products.		
3	Be'e uza ba domestiku. Water for home use.		
4	Hasae hablidades/skills. Improvement in skills.		
5	Servisu médiku. Medical service.		
6	Krescimentu ekonômiku.		

	Economic growth.		
7	Seluk. Others.		
8	Seluk. Others.		
9	Seluk. Others.		

Saida mak ladiak kona ba Quarry (Pedreira)/ Ponte Kais?
What is bad about the quarry / jetty?

(Eskala husi 1 to 10, ho 10 hanesan la gosta mais / liu).
(Scale of 1 to 10, with 10 as most disliked).

SN	At (la Gosta). Bad (Dislike)	Eskala. Scale	Komentários. Comments
1			
2			
3			
4			
5			

Komentários. Other Comments:

7. A courtesy call on Mr. Francisco Soares, Chief Suco Mota Ulun, was carried out, with the purpose of providing information about the community profile survey. Francisco Soares mentioned that there are about 162 households in the Suco.

8. The survey was conducted by Adelina do Rego Soares (CHT Community Liaison Officer), and Koh Chee Thong (CHT HSE Adviser), over 7 days from 20 to 26 Dec 2018. There were house-to-house visits, with some photographs shown at Figures 3 to 7. The List of Persons Surveyed is at Figure 8.

Figure 3. With Mr. Francisco Soares, Chief of Suco Mota Ulun

Figure 4. With Mdm Anna Clara dos Santos (in the background , in her shop)

Figure 5. With Mdm Marta De Araujo (red T-shirt) and Neighbours, at household compound

Figure 6. With Mr. Manuel dos Reis (wearing a singlet, at his house), and his children and friends

Figure 7. With Mr. Venancio dos Santos (blue T-shirt, with wide red decorations, at his motor shop) and Friends/Customers

Figure 8. List of Persons Surveyed

Form No	Date of Interview	Location of Interview	Name of Interviewer	Name of Person Interviewed
1	20 Dec 2018	Ana Clara Shop	Ade and Koh	Ana Clara do Santos
2	20 Dec 2018	Ana Clara Shop	Ade and Koh	Santiago Dias Gomes
3	20 Dec 2018	Mechanic Shop	Ade and Koh	Venancio do Santos
4	20 Dec 2018	Mechanic Shop	Ade and Koh	Adao Soares Lima
5	21 Dec 2018	Ana Clara Shop	Ade and Koh	Isabel Mesquita
6	21 Dec 2018	Ana Clara Shop	Ade and Koh	Custodio Babo
7	21 Dec 2018	Ana Clara Shop	Ade and Koh	Elizario da Conceicao
8	21 Dec 2018	Ana Clara Shop	Ade and Koh	Leonel Correia
9	21 Dec 2018	Ana Clara Shop	Ade and Koh	Jeronimo Alves
10	21 Dec 2018	Ana Clara Shop	Ade and Koh	Ana Rosa do Santos Gomes
11	22 Dec 2018	Ana Clara Shop	Ade and Koh	Sergio Soares
12	22 Dec 2018	Ana Clara Shop	Ade and Koh	Gabriel Correia
13	22 Dec 2018	Ana Clara Shop	Ade and Koh	Rogino do Santos
14	22 Dec 2018	Ana Clara Shop	Ade and Koh	Romaldo de Jesus Alyes
15	22 Dec 2018	Ana Clara Shop	Ade and Koh	Avelino da Cruz
16	22 Dec 2018	Ana Clara Shop	Ade and Koh	Zacarias Correia
17	22 Dec 2018	Ana Clara Shop	Ade and Koh	Marta da Conceicao

18	22 Dec 2018	Ana Clara Shop	Ade and Koh	Christina Correia
19	22 Dec 2018	Ana Clara Shop	Ade and Koh	Silveiro da Conceicao Castro
20	22 Dec 2018	Ana Clara Shop	Ade and Koh	Marcal Brito
21	22 Dec 2018	Ana Clara Shop	Ade and Koh	Cerilio da Silva
22	22 Dec 2018	Ana Clara Shop	Ade and Koh	Francisco Correia
23	22 Dec 2018	At Operator's house	Koh and Janu	Manuel dos Reis
24	22 Dec 2018	Mechanic Shop	Koh and Janu	Rosalino Dosantos
25	22 Dec 2018	At Operator's house	Koh and Janu	Jermano Augusto
26	22 Dec 2018	Small Shop near CHT	Koh and Janu	Elidio Coreia
27	22 Dec 2018	Other Billard Place	Koh and Janu	Pedro Soares
28	22 Dec 2018	Other Billard Place	Koh and Janu	Florindo da Concincao
29	22 Dec 2018	Other Billard Place	Koh and Janu	Joaqim da Concincao
30	22 Dec 2018	Other Billard Place	Koh and Janu	Carlito Pinto
31	22 Dec 2018	Other Billard Place	Koh and Janu	Mudo Mesquita
32	23 Dec 2018	CHT Quarry	Koh and Janu	Simao da Costa
33	23 Dec 2018	Clothes Shop	Koh and Janu	Zito DeJesus Ribeiro
34	23 Dec 2018	Clothes Shop	Koh and Janu	Albino Soares
35	23 Dec 2018	Clothes Shop	Koh and Janu	Joaquina deJesus
36	23 Dec 2018	Ana Clara Shop	Koh and Janu	Adeino Coreia

37	23 Dec 2018	Veg stall next to Clara	Koh and Janu	Natalino Ribeiro
38	23 Dec 2018	Veg stall next to Clara	Koh and Janu	Imaculada Fatima
39	23 Dec 2018	Church	Koh and Janu	Joanico Coreia
40	23 Dec 2018	Ana Clara Shop	Koh and Janu	Mario Fatima Vaseo Amaral
41	23 Dec 2018	Ana Clara Shop	Koh and Janu	Amelia de Fatima
42	23 Dec 2018	Ana Clara Shop	Koh and Janu	Salvador Coreia
43	23 Dec 2018	Ana Clara Shop	Koh and Janu	Tobias Coreia
44	23 Dec 2018	Ana Clara Shop	Koh and Janu	Elias Coreia Soares
45	23 Dec 2018	Ana Clara Shop	Koh and Janu	Arsenio Bossa Coreia
46	23 Dec 2018	Ana Clara Shop	Koh and Janu	Oscar da Silva
47	23 Dec 2018	Ana Clara Shop	Koh and Janu	Marcelina Coreia
48	24 Dec 2018	Ana Clara Shop	Koh and Nache	Benita Ramos
49	24 Dec 2018	Ana Clara Shop	Koh and Nache	Silvestre Corea
50	24 Dec 2018	Ana Clara Shop	Koh and Nache	Sabina Castro
51	24 Dec 2018	Ana Clara Shop	Koh and Nache	Jeremias da Conceicao
52	24 Dec 2018	Ana Clara Shop	Koh and Nache	Ana Correia Soares
53	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Faustino Brito
54	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Sebastiao Varela
55	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Maria dos Santos Soares
56	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Alexandre Correia

57	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Dircio de Fatima
58	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Marman
59	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Domingos Fatima
60	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Jose Pedro Perreira
61	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Martina Ribeiro
62	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Agida Pereira
63	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Domingas dos Santos
64	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Madalena Destry da Silva
65	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Joaminha de Aranyo
66	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Paulina Correia
67	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Jeronimo G Leite
68	26 Dec 2018	Ana Clara Shop	Koh and Inacio	Fridus Ramos da Silva

Demographics

9. Demographics - statistical data relating to the population and particular groups within it. There are 498 persons from the interviewed 68 households. The 271 males and 227 females make-up a population distribution of 54 to 46 % in favour of males, as illustrated at Figure 9. This ratio is close to 50-50, except for an anomaly at the 11-15 age group, where the boys outnumber the girls by 43 to 16, i.e. nearly 70 %, as shown at Figure 10. The population is young, for 74 % are below 31 years. There are only 2 persons, one from either sex, aged above 70 years.

Figure 9. Total Population by Gender

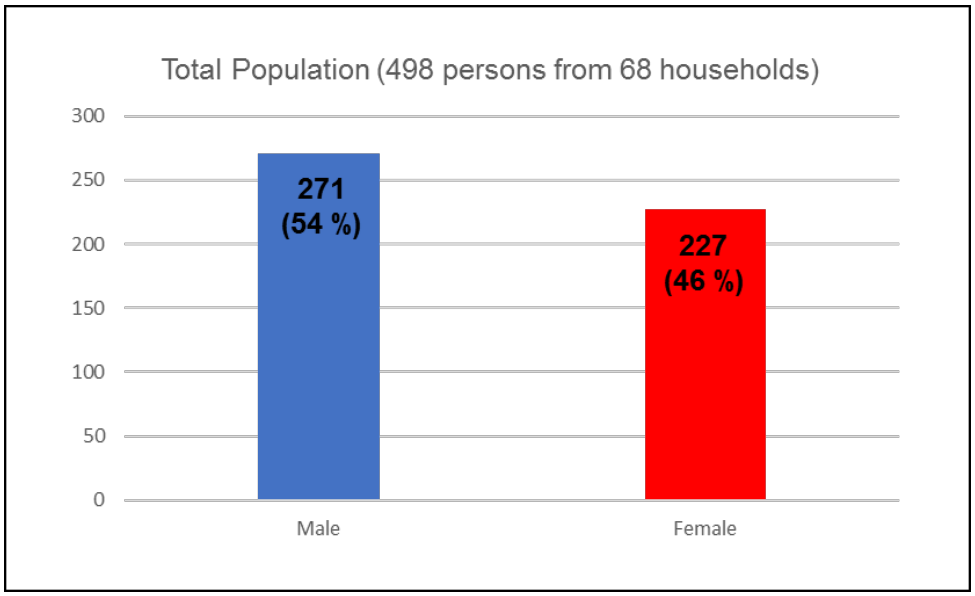
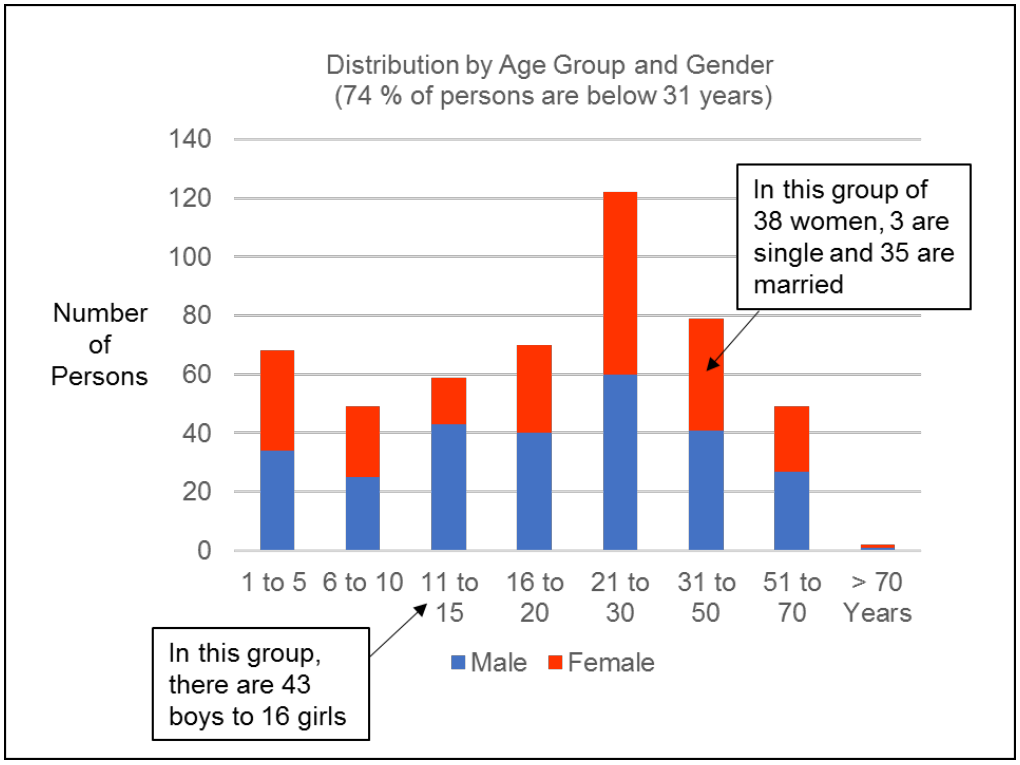
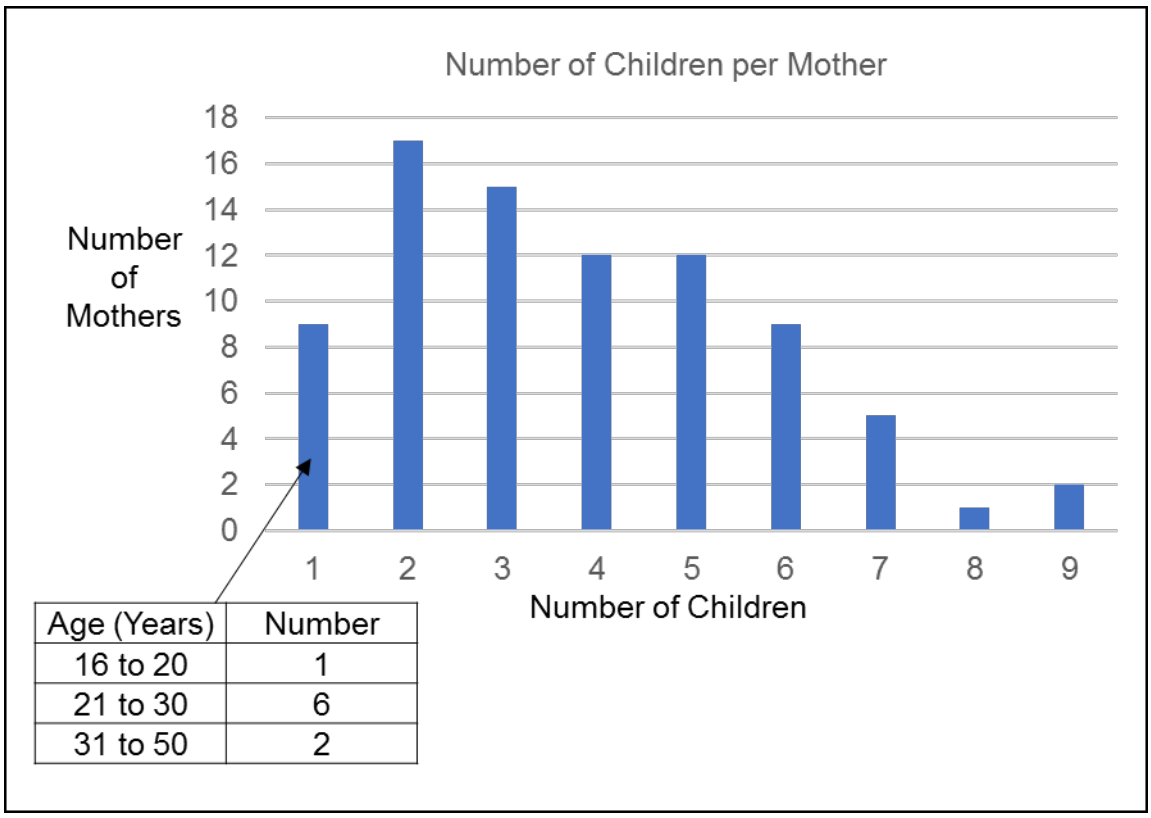


Figure 10. Distribution by Age Group and Gender



10. Women have little difficulty getting married. In the 31 to 50 year age-group, only 3 women are single, as shown at Figure 10. The birth-rate is excellent. Family size is large. The great majority of mothers have more than 2 children. Of the 9 mothers with only one child each, 7 are still below 31 years, as shown at Figure 11.

Figure 11. Number of Children per Mother



Age (Years)	Number
16 to 20	1
21 to 30	6
31 to 50	2

Education

11. All children reaching school age go to school. The younger generation is better educated, as illustrated by Figures 12 and 13. For both sexes, the great majority of people more than 51 years do not go to school at all. There is significant improvement for women, with 16 persons in the 21 to 30 age group with university education, compared with only 4 in the 31 to 50 age group. Similarly, for these 2 age groups, there is a 3-fold increase in secondary education for women.

Figure 12. Males – Education Level by Age Group

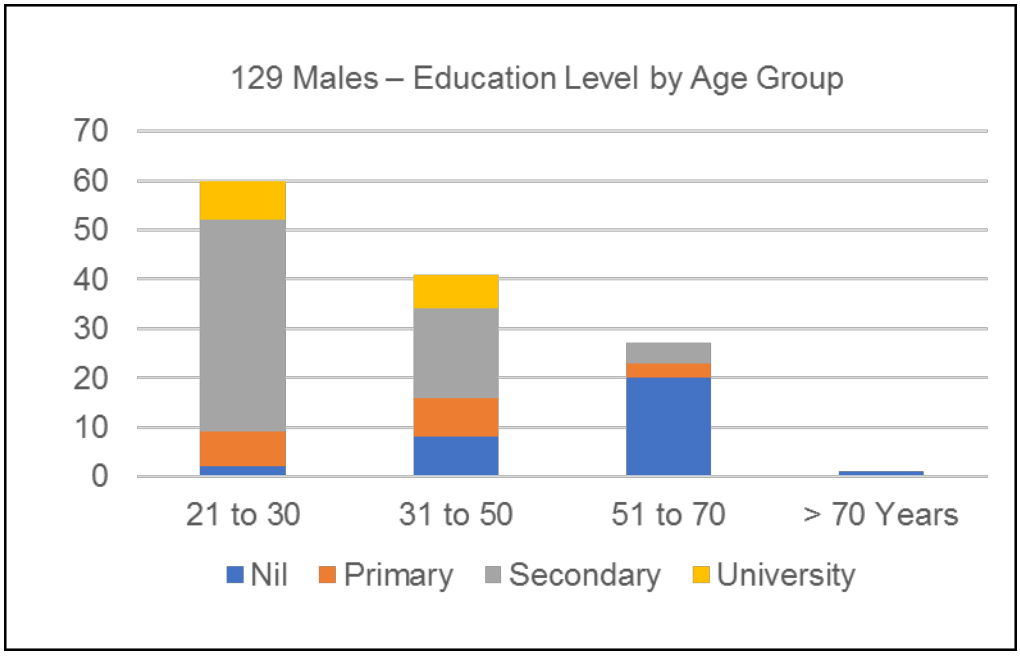
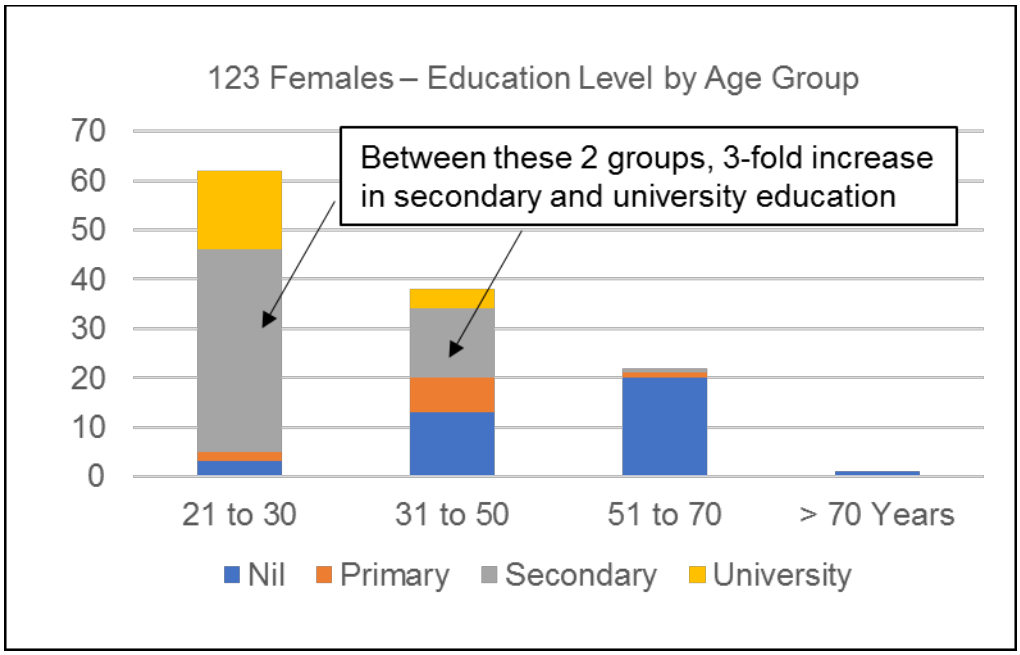


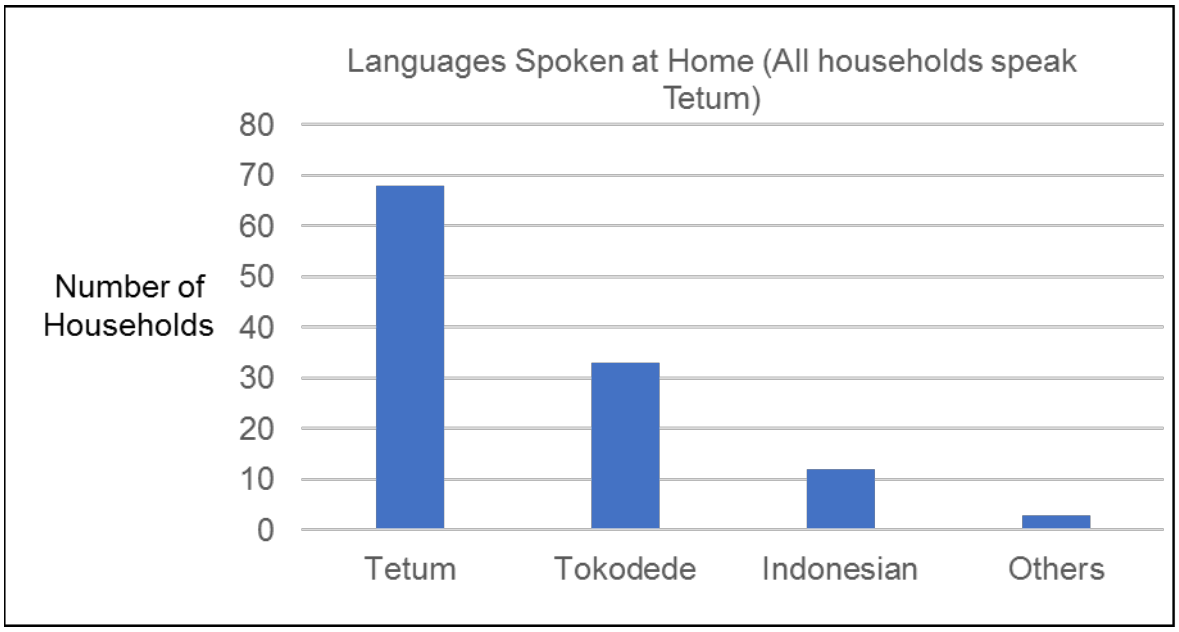
Figure 13. Females – Education Level by Age Group



Language and Religion

12. All but 1 of the 68 families are Catholics. Islam is the religion of the one family. All families speak Tetum. In addition, 33 families speak Tokodede, the dialect of the area. Figure 14 shows the different languages spoken by households.

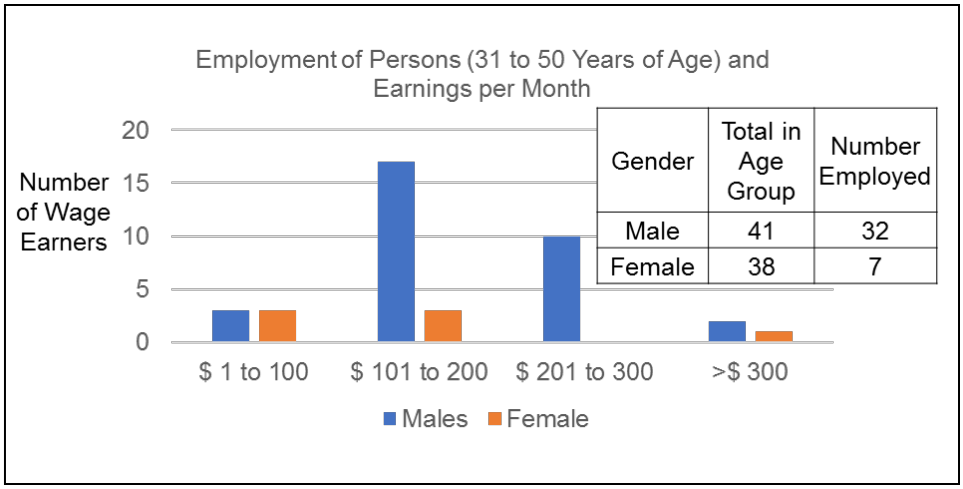
Figure 14. Languages Spoken at Home



Employment

13. In the prime working age group of 31 to 50, 32 out of 41 men are earning a living. However, only 7 women out of 38 are working, as illustrated at Figure 15. Over all age groups, 82 persons are employed, with the types of work classified in the groups of “unskilled”, “semi-skill” and “academic skills”; shown at Figure 16. From this figure, and also from Figure 17, it is deduced that earnings are less than $300 per month, because the large majority of workers are not in the highly desired “academic skills” and therefore better paying group. There are only households with dual income, i.e. one with 2 teachers, and the other with a security guard and a driver.

Figure 15. Employment of Persons (31 to 50 years age group)



Gender	Total in Age Group	Number Employed
Male	41	32
Female	38	7

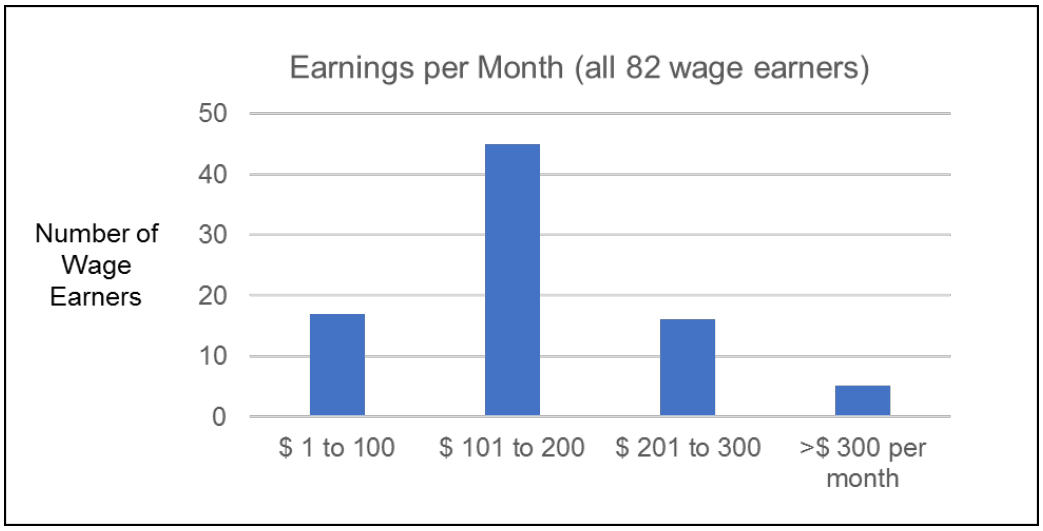
Figure 16. Type of Occupation (all age groups)

SN	Unskilled	Qty
1	Construction Worker	15
2	Wood Seller	11
3	Security Guard	8
4	Driver	8
5	Cement worker	3
6	Vegetable seller	3
7	Fruit Seller	1
8	Marine worker	1
9	Waitress	1
10	Pensioner	1
11	Total	52

SN	Skilled	Qty
1	Mobile Machine Operator	7
2	Mechanic	3
3	Construction Supervisor	2
4	Soldier	2
5	Shopkeeper	2
6	Farmer	2
7	Retail Sales	1
8	Cook	1
9	Fisherman	1
10	Total	21

SN	Academic Skills	Qty
1	Teacher	6
2	Engineer	2
3	Bank Employee	1
4	Total	9

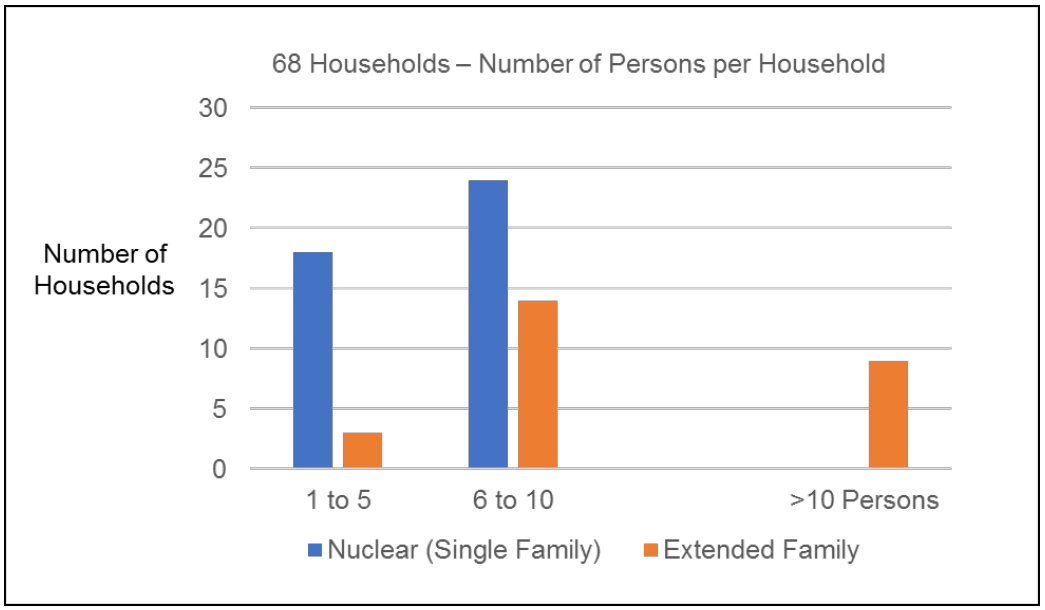
Figure 17. Earnings per Month (all 82 wage earners)



Households

14. 21 families are comfortably housed, with up to 5 persons per home. However, as shown at Figure 18, there are 9 extended families, with each having more than 10 persons.

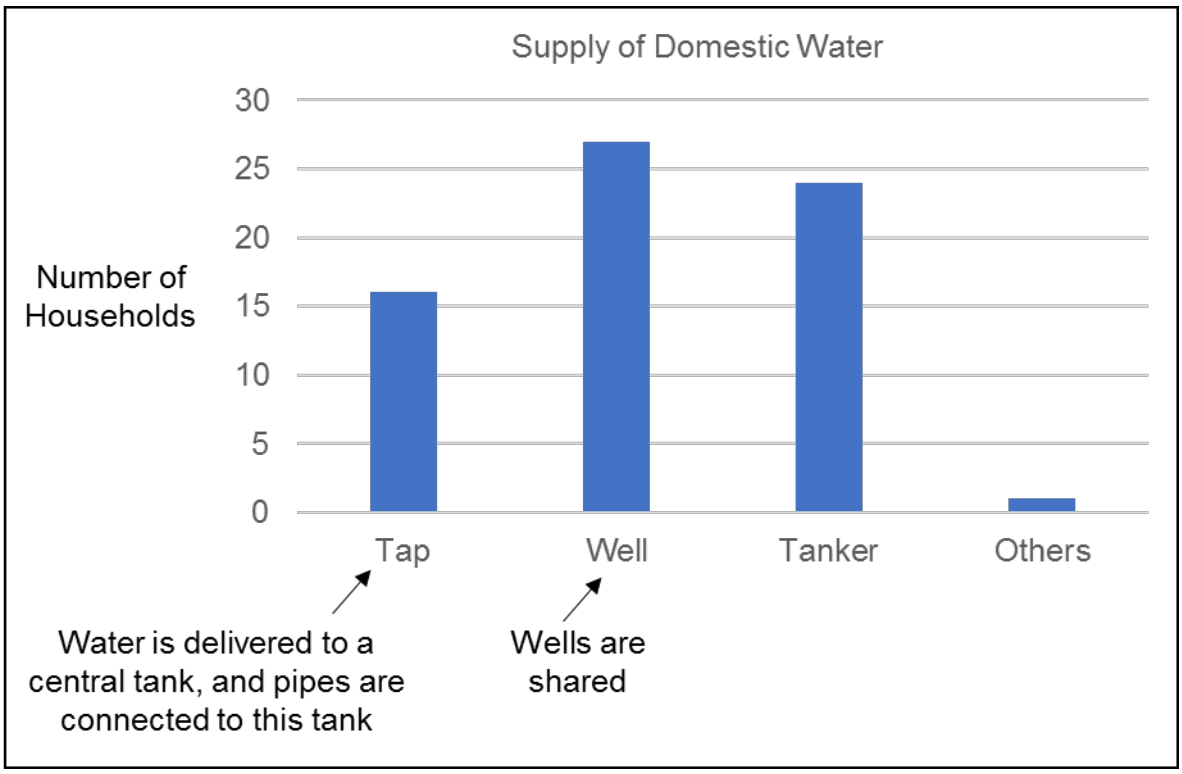
Figure 18. Number of Persons per Household



Utilities

15. All homes are connected to the government provided mains electrical supply. Domestic water is generally obtained from wells. This water has a high salt content that is not desirable. Some families, especially those living near the coast, i.e. north of the main road, have their water delivered by tankers. Figure 19 shows the different supply types of domestic water.

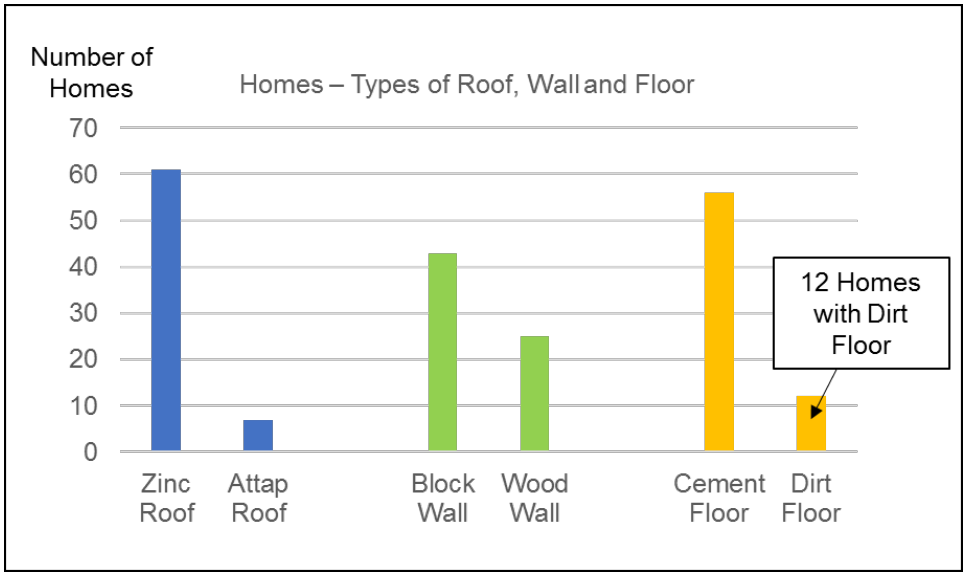
Figure 19. Supply of Domestic Water



Buildings

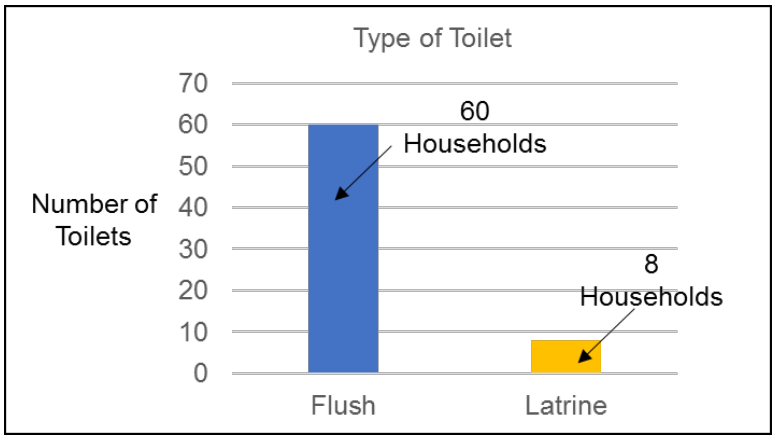
16. All persons interviewed said that they own the homes that they live in. Whether made of bricks, wood, zinc or leaves (i.e. usually coconut leaves), there is adequate shelter. There are 12 homes with dirt floor, with the rest of the 56 with concrete floors, as shown at Figure 20.

Figure 20. Types of Roof, Wall and Floor



17. 60 households have water flush toilets. The remaining 8 households use pit latrines. Figure 21 illustrates the figures.

Figure 21. Type of Toilet



Husbandry

18. Husbandry - the care, cultivation, and breeding of crops and animals. The community is resourceful with the keeping of chickens, pigs, and goats for home consumption. The distributions of animals and households are shown in Figures 22 and 23. Only one family has ducks. There is no animal husbandry for commercial purposes.

Figure 22. Distribution of Chickens and Pigs

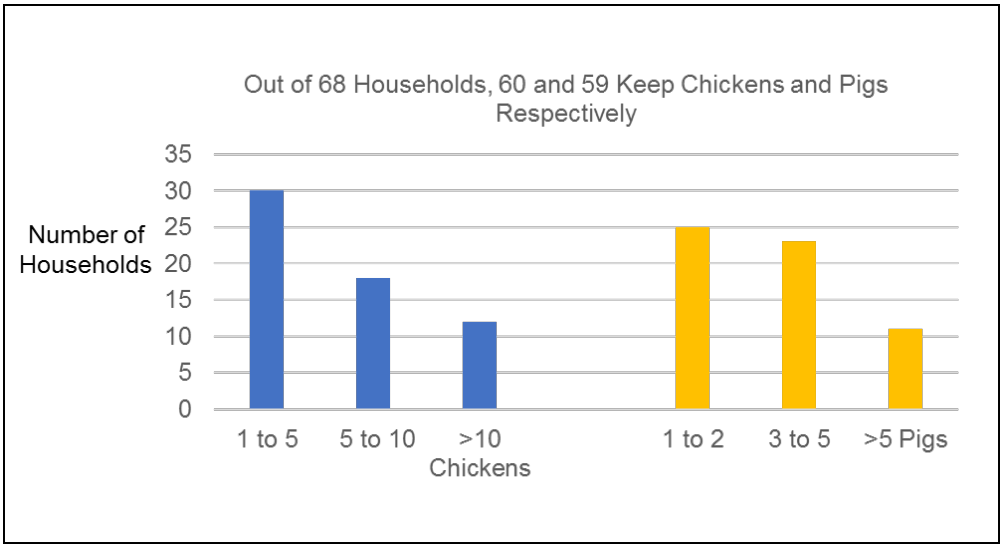
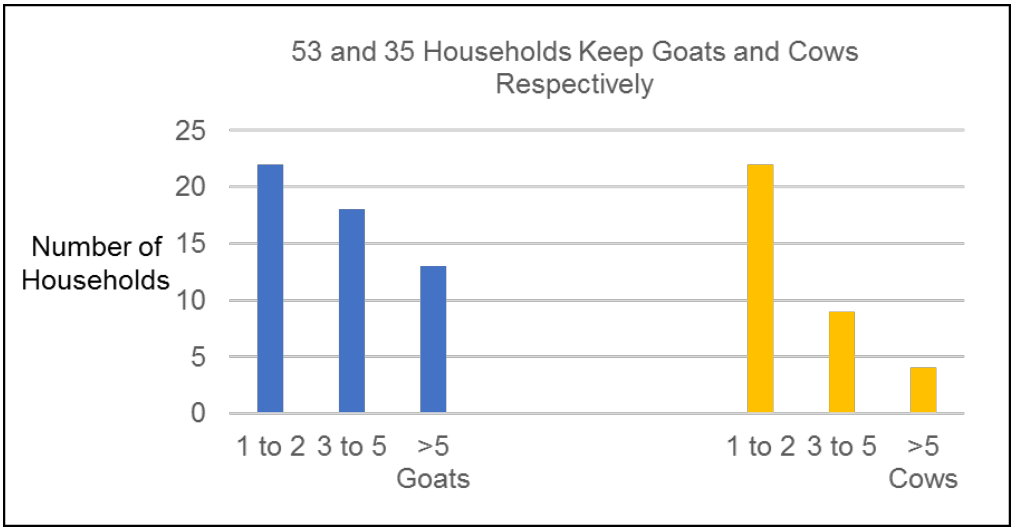
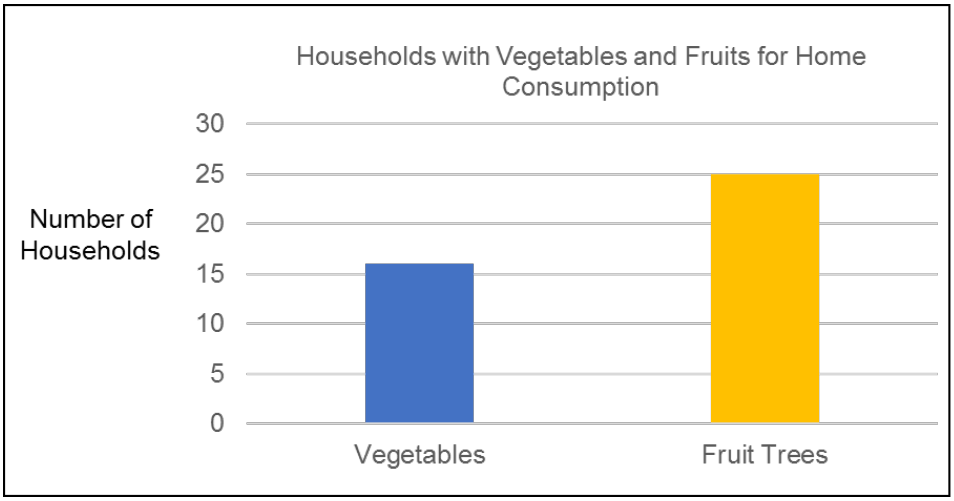


Figure 23. Distribution of Goats and Cows



19. Only 16 families grow vegetables for domestic consumption. 25 families have fruit trees, usually of the coconut type, as illustrated at Figure 24. There is no cultivation for commercial purposes.

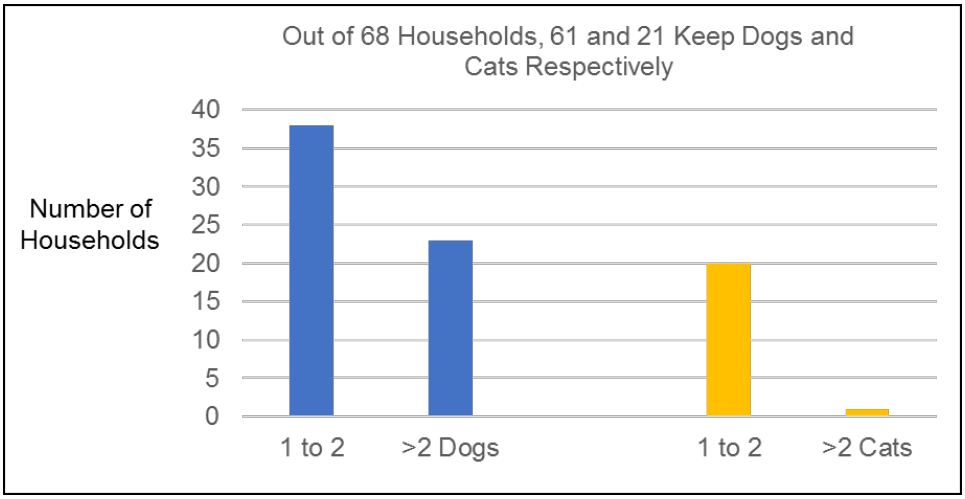
Figure 24. Families with Vegetables and Fruits



Pets

20. Dogs are the favourite domestic pet, with 61 households keeping them. A distant second are cats in only 21 households, as shown at Figure 25.

Figure 25. Families with Pets



Other Facilities and Activities

21. Except for a primary school, i.e. Ensino Basico Filial Caitehu (Figure 26), there are no other education centres in Mota Ulun. There is one Church, the Capela da Sagrada Familia (Figure 27).

Figure 26. Ensino Basico Filial Caitehu Primary School

Figure 27. Church (Capela da Sagrada Familia

22. There are no medical centres in Mota Ulun. The 2 nearest clinics are at Ulmera, and at Liquica.

23. The only and small number of employment opportunities are at the low intensity bulk fuel station, and the few small-scale companies operating stone works, i.e. making gravel and casting concrete parts. There are no plantations or raising of animals on a commercial basis.

24. Whether common or individual, there are no informal property or customary rights to land or natural resources. The nearby seashore has no mangroves. Families go to the nearby hills to collect wood, followed by preparation and bundling at home, and placed by the road side to sell to passing motorists, as shown at Figure 28.

Figure 28. Bundles of Wood for Sale at the Roadside

25. Only one person states employment as a fisherman. At the beach behind the primary school, there are 2 small one-person wood type fishing boats. There is no fish for sale by the roadsides, or at the few grocery shops.

26. The primary school has a dirt type football field, and a basketball court with a broken-up surface. There are no other social or recreation areas, other than 2 places with one billiard table each, as shown at Figures 29 and 30.

Figure 29. Billiard Station next to Mdm Anna Clara Shop (with Mr. Jose Silvestre (red/black T-shirt), and Friends)

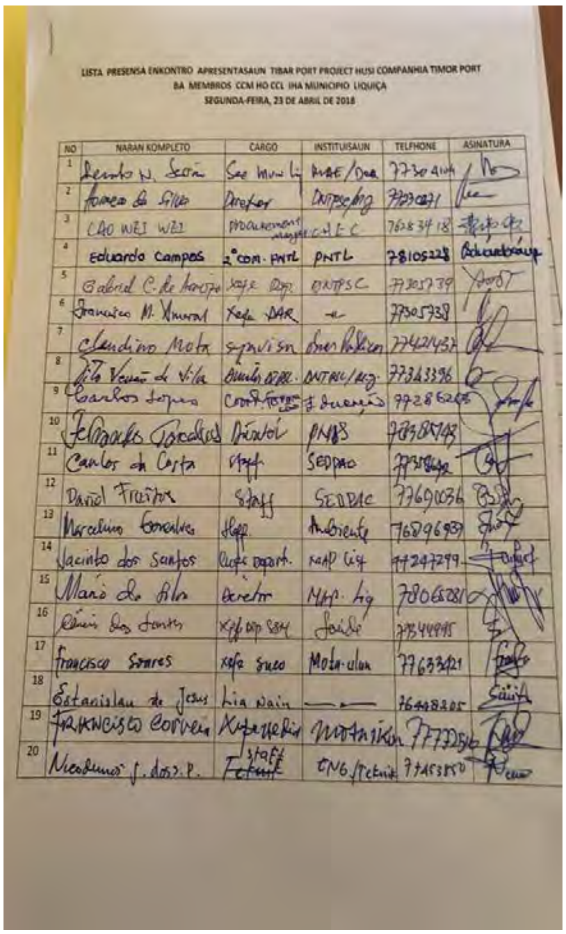
Figure 30. Billiard Station (about 100 m west of Mdm Anna Clara Shop, and on the opposite side of the road), with Mr. Bartolomeu Mesquita (purple T-shirt) and Friends

Attachment I Public Consultations and Household Visits

Photograph 1. Formal Public Consultations (Audience)

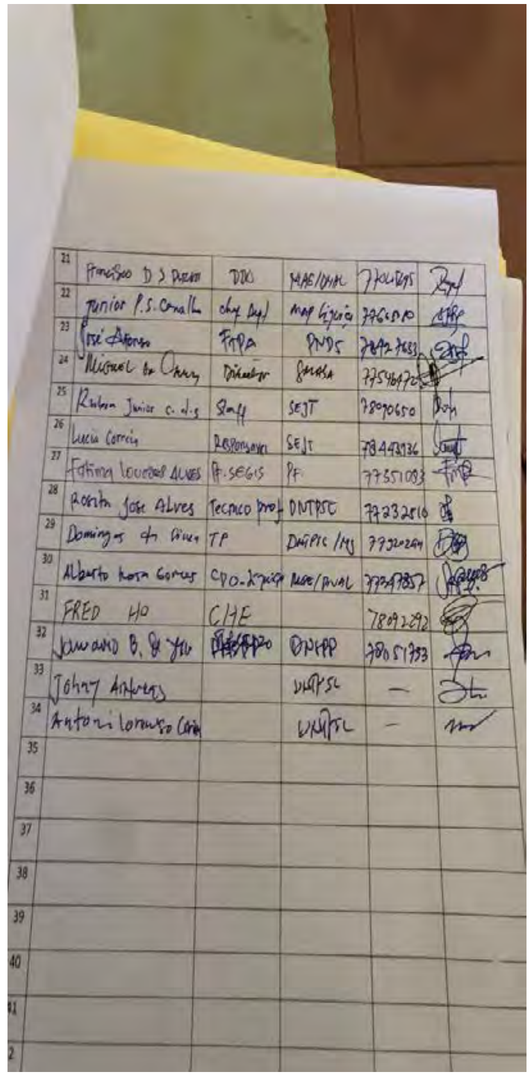
Photograph 2. Formal Public Consultations (Official Table)

Photograph 3. Attendance List (23 Apr 2018)



LISTA PRESENSA ENKONTRO APRESENTASAUN TIBAR PORT PROJECT HUSI COMPANHIA TIMOR PORT
BA MEMBROS CCM HO CCL IHA MUNICIPIO LIQUIÇA
SEGUNDA-FEIRA, 23 DE ABRIL DE 2018

NO	NARAN KOMPLETO	CARGO	INSTITUISAUN	TELFHONE	ASINATURA
1	[illegible]	Sec Muni Liq	MAE/[illegible]	7730 41[illegible]	
2	[illegible] da Silva	Diretor	[illegible]	77230271	
3	CAO WEI WEI	procurement manager	CHEC	76283418	
4	Eduardo Campos	2° com. PNTL	PNTL	78105228	
5	Gabriel C. de Araujo	Xefe Dep.	DNTPSC	77305739	
6	Francisco M. Amaral	Xefe DAR	"	77305738	
7	Claudino Mota	supervisor	[illegible]	7742143[illegible]	
8	[illegible]	[illegible]	DNTPSC/Liq	77343396	
9	Carlos Lopes	[illegible]	[illegible]	7728620[illegible]	
10	[illegible]	Diretor	PNDS	[illegible]	
11	Carlos da Costa	Staff	SEDPAC	[illegible]	
12	Daniel Freitas	Staff	SEDPAC	77690036	
13	Marcelino Gonçalves	Staff	Ambiente	76896939	
14	Jacinto dos Santos	Chefe depart.	[illegible] Liq	77247299	
15	Mario da Silva	Diretor	MAP. Liq	78065081	
16	[illegible] dos Santos	Xefe dep [illegible]	Saude	77344995	
17	Francisco Soares	Xefe Suco	Mota-ulun	77633421	
18	Estanislau de Jesus	Lia Nain	—	76448205	
19	FRANCISCO Correia	[illegible]	Motaikun	77733516	
20	[illegible] J. dos P.	staff	ONG/Tetuk[illegible]	77453850	



NO	NARAN KOMPLETO	CARGO	INSTITUISAUN	TELFHONE	ASINATURA
21	Francisco D S [illegible]	DDC	MAE/[illegible]	77[illegible]	
22	Junior P.S. Carvalho	chefe Dept	Map Liquiça	776[illegible]	
23	José Afonso	FTPA	PNDS	[illegible]	
24	Miguel [illegible]	Diretor	[illegible]	7754647[illegible]	
25	Rubem Junior c. d. s	Staff	SEJT	78070650	
26	Lucia Correia	Responsavel	SEJT	78443136	
27	Fatima Lourdes Alves	F. SEGIS	PF	77351083	
28	Rosita Jose Alves	Tecnico prof	DNTPSC	77232510	
29	Domingos da Silva	TP	DNGPIC/MJ	7732[illegible]	
30	Alberto [illegible] Gomes	CPO-Liquiça	[illegible]/PNAL	777[illegible]857	
31	FRED HO	CHE		78092292	
32	[illegible] B. [illegible]	[illegible]	DNHPP	78051933	
33	Johny Antunes		DNTPSC	—	
34	Antoni Lourenço [illegible]		DNTPSC	—	
35					
36					
37					
38					
39					
40					
41					

Photograph 4. Sample of Feedback Form

Notice of Public Consultation for the Environment Impact Assessment

Location: Kaitehe, Mota ikun, Mota ulun
Date and Time of the Public Meeting: 8/07/2018
Type of the Public Meeting: public consultation
Type of the Proposed Project: quarry
Project Proponent: China harbour Timor. LDA

I. Details of Respondent

Name	Manuel Pereira
Sex	M
Age	64
Aldeia	Mota ikun
Suco	Mota ulun
Designation	

II. Baseline Environmental Condition

Climate and Weather: Udan ho Bai Loron
Community Livelihood Condtion: Agriculture, pescador e Pequeiria
Access to the Public Facilities: Drinking Water: poso, Ajuda husi star Eng Electricity: EDTL Health Service: CEDE ALDEIA, MOTA ulun Education: TK & SD Market: MOTA ULUN, LAQUICA & Dili Road and Transportation: Microlet, Angunu Others:
Surrounding Economic Development: Hotel Ai, Projeito Quarry, peskas, Agricultura
Heritage and Cultural Site: Diributi
Natural Hazard: Baajir

… continue next page

III. Environmental Concerns on the Proposed Project

- Baujir "BE SAE"
- Barulho
- Rai Rahun
- Tesi Ai (Oho ai horis)

IV. Suggestion and Recommendation

- Hadia drainase (tambok ponaskan etc)
- Rega be dala, 3 ba loron 1
- Ajuda dada bemar

V. Consultant's Surveyors

No	Name	Signature
1	Sergio Valdano	[signature]
2	Udranud H. S. Pinto	[signature]
3	Francisco da Costa Araujo	Costaarq
4		
5		
6		

The following photographs show CHT staff with Mota Ulun villagers, during social visits by CHT HSE Advisor Koh Chee Thong, and CHT Community Liaison Officer Adelina do Rego Soares. Ms Adelina is not in most of the photographs, because she was taking the photographs.

Photograph 5. With Mr. Francisco Soares (Chief of Mota Ulun Village), and Ms. Adelina do Rego Soares (CHT Community Liaison Officer)

Photograph 6. With Occupants of House Near the Junction of Access Route and Main Road

Photograph 7. With Mr. Zery Correia and Friend

Photograph 8. With Ms. Joana Ribeiro (with green T-shirt) and Friends

Photograph 9. With Mr. Paul Ribeiro and Family

Photograph 10. With Mr. Bartolomeu Mesquita (purple T-shirt) and Friends

Photograph 11. With Mr. Jose Silvestre (red/black T-shirt) and Friends, at recreation centre

Photograph 12. With Ms. Anna Clara dos Santos (white top) and Friends

Photograph 13. With Ms. Anna Clara dos Santos at her shop

Photograph 14. With Mr. Venancio dos Santos (yellow T-shirt) and Friends at his motor workshop

Photograph 15. With Ms Maria Soares (carrying baby) and Friends

Photograph 16. With Mr. Manuel dos Reis (white T-shirt) and his 2 young children and CHT driver (Mr. Ano)

Attachment I1 Notes of Public Consultation (18 Jan 2019)

Notes of Public Consultations with Mota Ulun Community Leaders

Date: Fri 18 Jan 2019, at 10.00 am.
Place: Café below CHEC Office at Palm Office Bldg.

Attendance: Francisco Soares, Chief of Suco Mota Ulun.
Germano Augusto, Mota Ulun Council Representative.
Jorge da Conceicao, Mota Ulun Council Representative.
Francisco Correia, Mota Ulun Council Representative.
Noel Bernardo de Carvalho, CHT Public Relations Officer.
Koh Chee Thong, CHT HSE Advisor (Note taker for the meeting).

A photograph of the Attendees, and the Attendance Register, are at Appendix A of this Attachment.

Background

1. China Harbour Timor Lda (CHT), a subsidiary of China Harbour Engineering Company (CHEC), is operating a quarry at Mota Ulun, as well as a rock type jetty, sited about 60 m west of the Laiara Bulk Fuel Station at Mota Ulun (in Barzetete, Liquica).

2. There have been several other consultations with the local community about the jetty and the quarry (sited directly across the road, about 1.5 km away, and up in the hills) projects. This meeting is a continuation of public consultation activities until site closure.

Purpose

3. The purpose of the meeting is to further inform the community leaders about the status of implementation of the quarry and jetty projects, and to obtain information that probably only persons with knowledge of the local environment can provide. All are encouraged to bring-up any subject matter for discussion.

Layout

4. Koh presented the revised layout plans of the quarry and the jetty. The explosives store is no longer sited within the area. The reasons for choosing the location of the jetty, i.e. near the CHT and other quarries, present non-usage by other parties of the site, and not near any historical or cultural spots, were explained. The location is also not a nature reserve, or a place with special scientific interest, or with protected or endangered flora and fauna. Jetty activities are also of the non-environmental polluting type. There is no housing quarter in the jetty compound. The beach area remains open to the public, and the existing paths from the main road to the beach are not obstructed.

Benefits

5. Koh re-emphasized the benefits of the quarry. He also described the advantages of the jetty, including serving as transport hub for CHT and for the other quarries. In the future, it could be used as a transit hub for cargo ships from Dili, Oe-cussi, and other parts of Timor-Leste, and even from Indonesia. These activities point towards improvement for the economy of the local community. The aim of CHT is to be a beneficial part of the local community, and also society in general.

6. Transport of rocks and gravel by the jetty means that there will be less heavy trucks using the road to / from Tibar Bay where the new port is being constructed, i.e. greatly reducing road traffic pollution, and other safety concerns.

Implementation Status

7. Noel informed the meeting about the process for obtaining environmental licenses for the quarry and the jetty. For the quarry, the project documents (PD) had been approved, and the Terms of Reference (TOR) document is being reviewed by ANPM, the Environmental Authority. As for the jetty, the PD has already been submitted to the Environmental Authority, i.e. the National Directorate of Pollution Control and Environmental Impact (NDPCEI), for obtaining Project Classification. Further environmental studies of the land and sea conditions will be conducted. It is planned to start jetty construction in Apr 2019.

Discussions

8. Mr. Francisco Soares expressed his appreciation to CHT for providing updated information, and for staging projects in the community, with the advantages of economic growth, employment and the learning of new trades and skills.

9. Mr. Francisco Soares also mentioned that items for support of quarry and for jetty construction and operations can also be obtained from the community, so as to allow local enterprises to grow.

10. Mr. Noel said that for jetty work, a 7 m width of vegetation alongside the road will not be removed, i.e. preserved to keep a “green buffer” between the road and the fence of the jetty compound. This retains the pleasant visual image of a country road and the surroundings, i.e. industrial development need not degrade the environment.

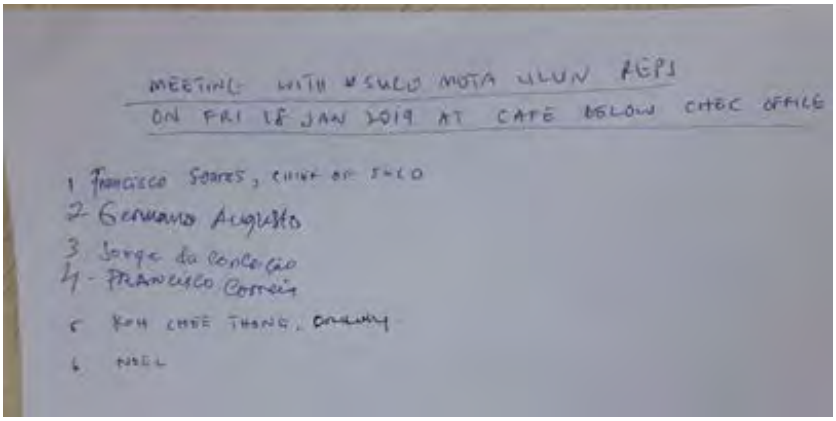
11. Mr. Germano Augusto added that such a “green” feature is welcomed. He cautioned against jetty users littering the beach. CHT replied that employees are trained on environmental awareness, and that there is daily housekeeping.

12. Mr. Germano Augusto also said that meetings, such as the one being held, are useful for all sorts of dialogue, e.g. notifications, discussions, and feedback.

Appendix A

Figure 1. List of Participants. Mr. Francisco Soares is the 3rd person from the left (wearing a brown shirt)

Figure 2. Attendance Register



Attachment I2 List of Stakeholders

1. The List of Stakeholders for public consultations are shown at Tables 1 to 4.

Table 1. Consultations and Dialogue with Local Community Leaders and Local Community Meet-the-People Sessions (as at 7 Mar 2019)

SN	Stakeholder	Dates of Past Meetings
1	Various leaders and representatives of Liquica, Barzetete and Tibar	23 Apr and 8 Jul 2018
2	Mr. Francisco Soares, Chief of Suco Mota Ulun and 3 other village leaders	31 Oct 2018 and 18 Jan 2019
3	Mr. Bento Correia da Conceicao, Chief of Suco Tibar	6 Feb 2019
4	Mr. Domingos da Conceicao Dossantos, Administrator of Liquica Municipality, and Mr. Joao Nascimento Braz, Administrator of Barzetete Sub-District	27 Feb 2019
5	Dialogue with general community (Mota Ulun)	31 Oct 2018
6	Dialogue with general community (Mau Meta)	28 Feb 2019

Table 2. Stake Holders (Central Government) Engagement Plan (as at 7 Mar 2019)

SN	Stakeholder	Interest
1	Ministry of Petroleum and Mineral Resources (National Directorate of Mines and Minerals)	Environmental license and quarrying activities
2	Ministry of Justice (National Directorate of Land, Property and Cadastral Services)	Land lease
3	Ministry of Finance	Royalties, duties and taxes
4	Ministry of Public Works, Transport and Communications (Directorate of Roads, Bridges, and Flood Control)	Access road
5	Servico de Registo e Verificacao Empresarial (SERVE) - Registration	Quarry registration

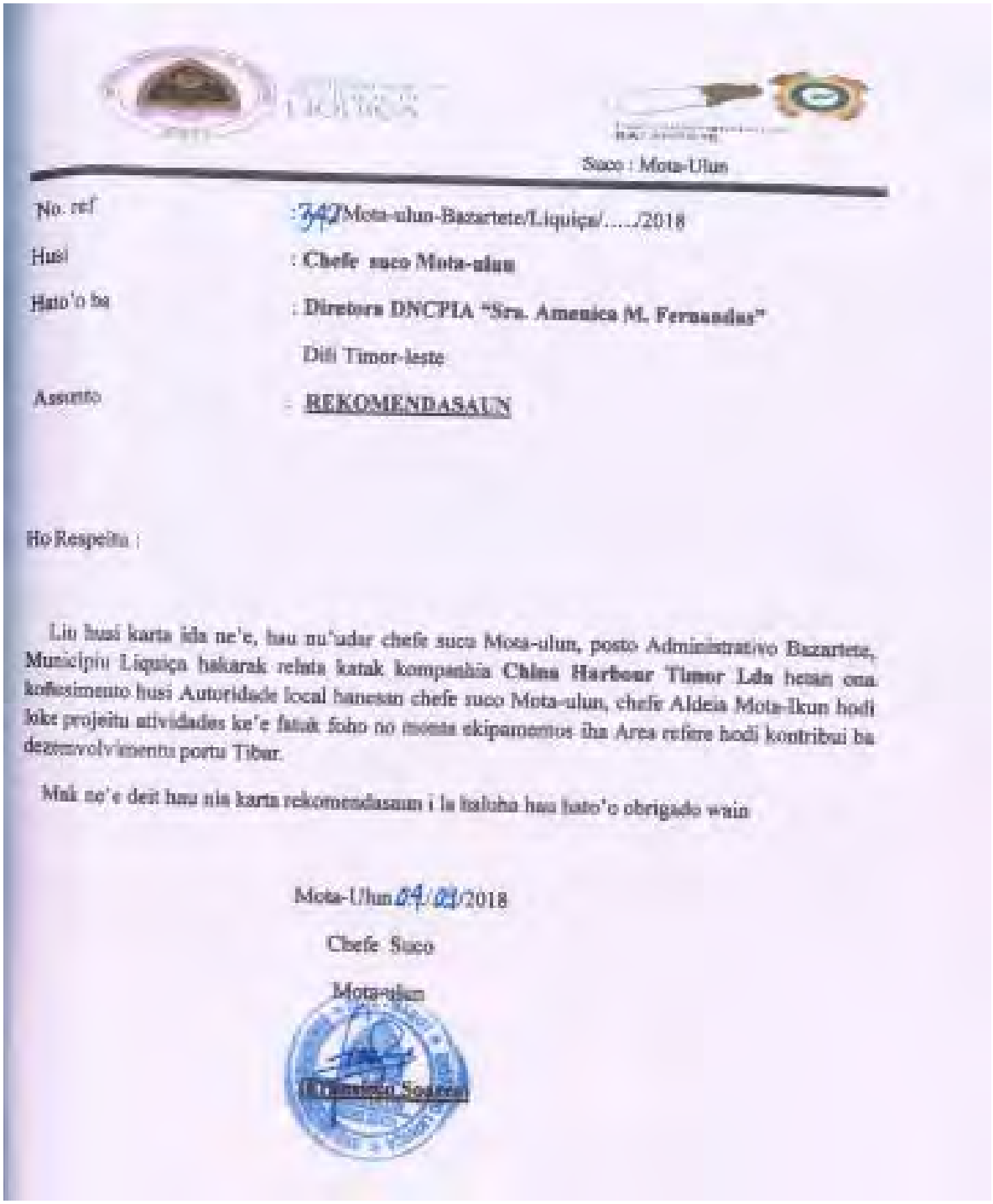
Table 3. Stake Holders (Local Government) Engagement Plan (as at 7 Mar 2019)

SN	Stakeholder	Dates of Previous Dialogue
1	Liquica District Municipality Representatives	20 April 2018, 8 Jul 2018 and 27 Feb 2019
2	Barzetete Sub-district Representatives	20 April 2018, 8 Jul 2018 and 27 Feb 2019
3	Suco Council Mota-Ulun	31 Oct 2018, and 18 Jan 2019
4	Local Police (PNTL) – Tibar Police Station	13 Mar 2019

Table 4. Stake Holders (Civil Communities) Engagement Plan (as at 7 Mar 2019)

SN	Stakeholder	Dates of Previous Dialogue
1	Local Youth Organizations	20 to 26 Dec 2018 (Mota Ulun Community Profile Survey)
2	Local Women's Organizations	
3	Academic (Mr. Helio Casemiro Gutteres, President IPG – Institute of Petroleum and Geology -	On-going dialogue (e.g. on suitable rocks)
4	Trade Association (Senhor Oscar Lima, President CCI-TL, Camara do Comercio e Industria de Timor-Leste)	On-going dialogue (e.g. on quarry and other operations)
5	FONGTIL, umbrella body for NGO (Lourenco Tito Ximenes Lopes, Chefe Sebisu Membrus and Publiku)	13 Mar 2019
6	NGO - Lao Hamutuk	31 Jan 2019 and 8 Feb 2019
7	NGO – Luta Hamutuk	

Attachment J "No Objections Letter" from the Chief of Suco Mota Ulun



Suco : Mota-Ulun

No. ref : 342/Mota-ulun-Bazartete/Liquiça/...../2018

Husi : **Chefe suco Mota-ulun**

Hato'o ba : **Diretora DNCPIA "Sra. Amenica M. Fernandes"**

Dili Timor-leste

Assunto : **REKOMENDASAUN**

Ho Respeitu :

Liu husi karta ida ne'e, hau nu'udar chefe suco Mota-ulun, posto Administrativo Bazartete, Municipiu Liquiça hakarak relata katak kompanhia **China Harbour Timor Lda** hetan ona konfesimento husi Autoridade local hanesan chefe suco Mota-ulun, chefe Aldeia Mota-Ikun hodi loke projetu atividades ke'e fatuk foho no meeta ekipamentos iha Area refere hodi kontribui ba dezenvolvimentu portu Tibar.

Mak ne'e deit hau nia karta rekomendasaun i la esaluno hau hato'o obrigado wain

Mota-Ulun 04/01/2018

Chefe Suco

Mota-ulun

(Domingos Soares)

Attachment K Quarry Closure Plan

1. The purpose of this attachment to present the closure plan for the quarry, covering the choices of continuation, transformation, and final closure, and the activities required for each choice.

2 The matter of CHT monetary contributions to the Mining Rehabilitation Fund is not discussed in this document.

Closure Plan Guiding Principles

3. The steps to achieve a closure plan beneficial to the local community and district in general, and the country as a whole, include the following step by step approach.

4. The Land Authority, in consultation with the local authorities, e.g. the Suco (village) Chief, decides on the future use of the land. Options include continue mining, keeping the land "empty", converting to plantations or livestock rearing, and rezoning to housing usage.

5. These decisions should be taken by Jan 2010, for usage by CHT is planned to end in Feb 2021. At least a year of lead-time is required for interested operators and developers to plan, take over and obtain the necessary licenses for new or renewed use of the land.

6. The start-up cost of a quarry is about a few million US $. Therefore, this lead time is also required by CHT to plan whether to keep people and machinery at the site, to sell lock, stock and barrel, to remobilize to another location in-country or overseas, or to decommission completely.

Quarry Continuation by CHT or Another Operator

7. CHT might decide to continue quarry operations, either to support other construction activities in Timor-Leste, or even exporting material for work in other countries. If this is the case, then a Closure Plan is not required for the time being

8. Once the supplying of rocks and gravel for the Tibar Port project is completed, the main and only reason for CHT to operate the quarry is over. CHT might hand-over the quarry to another operator. It is presumed that

such a sale would be on an “as is” basis, for this provides signification savings both for the new operator, and for CHT. It follows that decommissioning work by CHT is minimal, with usually a Site Closure and Handing / Taking-over Report. The in-coming operator warrants to the government, and takes responsibility for continued operations.

Conversion to Other Uses (Agriculture)

9. CHT has built roads and installed water and electricity supplies, and constructed habitable buildings and supporting infrastructure. CHT has also levelled large tracts of the hilly terrain to flat ground, and with a stockpile of topsoil. There is a now a reservoir holding about 400,000 m3 of fresh rain water.

10. The local community, or an external commercial entity, might want to convert the land to vegetable growing, or other similar agricultural and livestock pursuits. The stockpile of topsoil is especially suitable for laying on and preparing the earth for vegetation. The supply of fresh water from the reservoir is also an essential factor, to ensure the viability of the crop growing industry.

Conversion to Other Uses (Housing)

11. Contrary to other types of mining, granite quarrying does not irreversibly scar the land. The activity might even be a plus factor in developing a previously hilly region. CHT leaves large tracts of flat land about 20 m above ground, and with access roads. Property developers might want to use the land for housing.

12. Houses on this elevated land have scenic views of the sea. The road to Dili is now upgraded to meet the transport requirements of the new Tibar Port. Start-up cost for a developer is greatly reduced, for roads and utilities are already in place, and there is available accommodation for workers building the homes. The ex-quarry is readily transformed to the location with the premiere residential address in Dili.

13. In Singapore, there is a wonderful example where a disused granite quarry was transformed into a nature park, as shown at Figures K-1; greatly enhancing property prices in the vicinity. This place in Singapore is called Singapore Little Guilin, after another well-known scenic spot in China.

14. For conversion to other types of use, whether agricultural or housing, CHT will negotiate with the incoming owner on what to remove and what to leave behind. A fuller discussion on full removal and complete rehabilitation is at paragraphs 15 to 22 of this Attachment.

Figures K-1A, B and C. Views of Singapore Little Guilin

Complete Clearing Out

15. It might be that CHT is required to leave the land in an "empty" state. This process entails the following work.

16. Remaining stock of material is sold-off, for the rocks and gravel have commercial value. Similarly, for the machinery, equipment and the crusher.

17. Signs are removed. Structures, if not left behind for the local community, are demolished. Concrete floors should be left intact, for the villagers as staging areas. Any protrusions will be levelled, so as not to create tripping hazards.

18. Material of no further use to CHT, will be given to the local community, if wanted by them. This will be arranged by the CHT Community Liaison Officer, in close consultation with the Suco Chief, and other community leaders.

19. All waste material are completely taken out of site, and disposed at government approved locations.

20. Items that should preferably be left intact include:

    20.1 Electrical poles and lights with solar energy panels, for the mains supply are left standing.

    20.2 The site access roads, and haul roads remain, for these are required for future surveys of the land.

    20.3 The wells in the quarry; for these are long-term viable assets.

    20.4 The reservoir with fresh water. This item is especially important for the water in the village wells have a high salt content due to close proximity to the sea.

21. Remaining bare land are covered by earth from the topsoil stockpile. In consultation with the villagers, vegetation will be planted to restore greenery.

22. A CHT Quarry Closure Manager remains available for preparing the final Site Closure Report, and the Site Handing / Taking-Over document. Drawings, with co-ordinates of positions of remaining structures, e.g. wells, are also provided.

Cost of Closure

23. The monetary cost of complete closure is not significant, and need not be expressed in quantitative figures for the following reasons:

    23.1 The sale of stock material is recognised as a profit.

    23.2 Machinery after 3 years of usage are written-off.

    23.3 The high value crusher, if not sold, is kept in storage.

    23.4 The top soil is “free of charge.”

24. The major part of the cost is towards replanting vegetation. However, with close collaboration with the villagers, cash crops could instead be grown, and instead of expenses, profits are made.

Conclusion

25. The quarry, if not continued as is, has potential for conversion to plantations or housing. The land was hilly. It now has large tracts of level ground. Roads, utilities, housing structures, and even a fresh water reservoir is available, all enhancing the value of the land. The ex-quarry has scenic views of the sea, and with a good road to Dili. It can readily be transformed to premiere housing.

Attachment L Biodiversity Survey Report

Prepared By:

Kayla Noble, BSc Hons Zoology.

Kate Barker, BSc Hons Marine and Freshwater Biology.

Ivan Samra Loria Shelley, Field Guide.

Date of Report: 15 January 2019.

Report on Biodiversity Study for China Harbour Timor Lda (a subsidiary of China Harbour Engineering Company (CHEC))

Quarry at Mota Ulun, Liquica, Timor-Leste.

Abstract

Considering both small size of the study area, in addition to the timeframe of the fieldwork the recorded biodiversity is reasonably high: 16 plant species, 22 bird species; the presence of bats, a macaque monkey, Asian common toad, gecko species and a colorful array of insects. The majority of bird species are listed as IUCN least concern with a few data deficient. The Timor imperial pigeon (*Ducula cineracea*) is listed **endangered** whilst the White bellied bushchat *Saxicola gutturalis* is **Near Threatened**.

There is little information on the vegetation, but the cedar and sandalwood trees are IUCN **vulnerable** but from our research we know they are rare in Timor-Leste. The Burmese redwood is listed as **endangered.** Despite recording the presence of bats, we were unable to identify the species, yet the numbers are few in the area (5 or 6 individuals).

Limitations included the time frame, access to published scientific articles from Timor, identification aids and to some extent a lack of local people's knowledge, however ample time was spent on observations during the designated 6 day period. Using a group of six people split into three teams greatly increased the overall accuracy of sightings, especially during sunrise/sunset studies where individuals observed both sites thus allowing for varying perspectives and knowledge. Further study by persons specialized in these fields would be

needed to truly identify bat and insect species and could act to confirm the data shown here.

Overview

1. This short report follows on from a request from China Harbour Timor Lda (CHT), for a biodiversity study of an area for their proposed quarry. The framework for the study was based on the following requests.

    1. Vegetation clearance, habitat destruction, transit corridor changes, migration routes, caves, roosting areas, wetlands and groundwater dependent ecosystems.

    2. Literature review of existing studies and NGO records for the area.

    3. Consultation with the community to obtain their understanding of habitats in the area.

    4. Bat and bird survey at dawn and sunset to identify and count the presence of fauna.

    5. Classification of species against the IUCN Red List, and other information, e.g. migratory, breed at ground level or in trees, preference for specific trees, (e.g. eucalyptus), and other habitats that could be used instead.

    6. Aerial photography interpretation to identify vegetation zones. (footage provided by a CHT drone)

    7. Mapping of vegetation types, distribution and health.

    8. Mapping of significant fauna habitats and key trees and nesting areas.

Background

2.1 The following background information was provided by CHT.

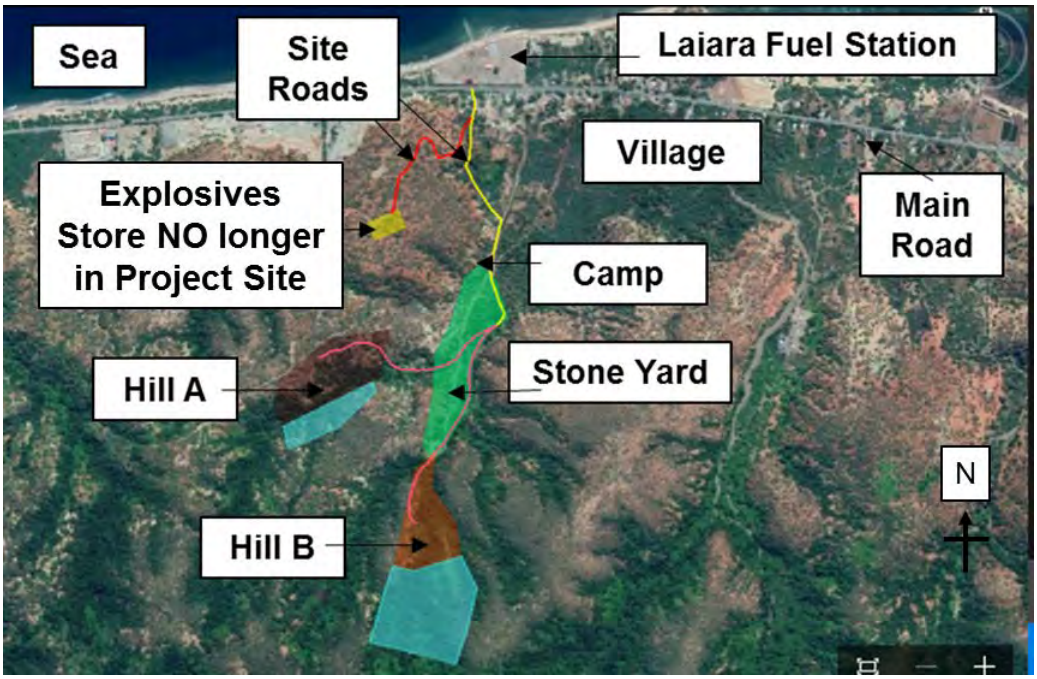


Figure 2-1. Site Map (provided by CHEC)

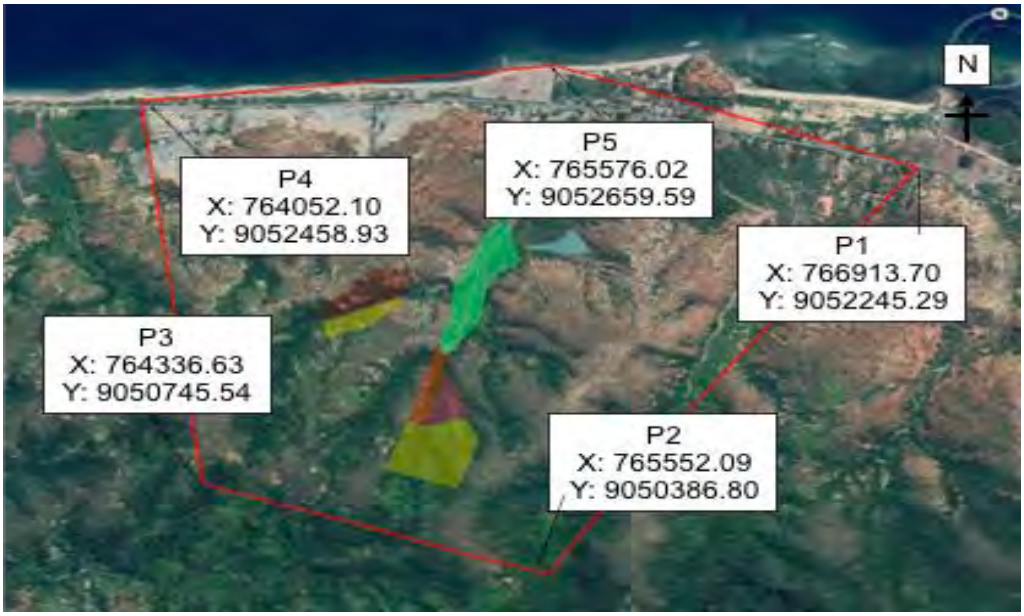


Figure 2-2. Site Map by CHT with GPS Coordinates of the Quarry Area

2.2 Mota Ulun is a small village with about 457 people in about 162 families, living in scattered dwellings, usually of the timber, zinc and thatched roof types. Water obtained from the few wells are salty, for the village is near the sea, and not near rivers or streams. There are no plantations or live-stock industry or fishing using boats. Families grow crops and keep a few animals for home consumption.

2.3 Commercial activity is very low, with 2 family-owned and operated small provision shops. The only and small number of employment opportunities are at the low intensity bulk fuel station, and the few small-scale companies operating stone works, i.e. making gravel and casting concrete parts. Mota Ulun has a primary school with a football field, the Church of Capela da Sagrada Familia, and at the rear of the Church, the convent Irmas Franciscanas de Nosa Senhra das Victorias. There is no Clinic. There are no social or recreational facilities, other than 2 billiard tables at 2 locations

2.4 Figure 2-1 shows the location and layout of the quarry at Mota Ulun. Also shown at the top of Figure 2-1 is the Quarry Jetty, sited about 60 m west of the brick wall of the Lai-Ara Bulk Fuel Station. The identified 2 hills (A and B) at Mota Ulun are the main focus of the biodiversity study. Figure 2-2 shows the full area with GPS coordinates.

Local Testimonials

3.1 During our survey we asked some of the local people and people working around the area about the wildlife and to some extent the vegetation in the study area. Not many of them were knowledgeable about the bird life, although the blue quail was mentioned, presumably due to the eggs, but we had lots of assistance with the plant life. The names of the plants were evidently given in Tetum and we later had to re-identify the common and scientific names.

3.2 Some of the people we spoke to include the security guards working in the parking area - both day and night teams. We also met the security persons watching over the radio tower at the top of hill A. Additionally, almost every day, we met a local bringing firewood down to the village from one or both of the hills. As each team had at least one Tetum speaker, we were able to ask them a series of questions to aid in our research. Mainly we asked what animals are common to see in the area and asked about the plant life around us.

3.3 Everyone we asked confirmed the presence of monkeys, the only species in Timor is the crab-eating macaque monkey (*Macaca fascicularis)*. Occasionally, both the common palm civet (*Paradoxurus hermaphrodites*) and common spotted cuscus (*Phalanger orientalis*) are witnessed in the area and very rarely Rusa deer (*Cervus timorensis*); obviously local livestock such as cattle, chickens and goats also graze there. In regard to the vegetation the locals were able to help us identify mainly fruiting plants they eat plus a few of the local bushes; the custard apple tree (*Annona squamosa*), elephant foot yam (*Amorphophallus paeoniifolius*), the tamarind tree *(Tamarindus indica)* and the cinnamon tree (*Cinnamomum verum*). The main fuel wood they use comes from the white and black eucalyptus.

Introduction

General Overview

4.1 Timor is part of the Walleacean biogeographic region (Braby & Pierce 2007). This biogeographic region is recognized globally for its unique and overall high biodiversity (Myers 2000); including a large number of endemic species. At least 1,500 plants, 262 birds, 127 mammals, 33

frogs, 99 reptiles and 50 freshwater fish species are found specifically in this region (Wikramanayake *et al*. 2002a; Wikramanayake *et al.* 2002b). Unfortunately, though and despite a global significance, there is a low level of biological research on many islands in Wallacea, with Timor island being one of the least studied of all the main islands. Obstacles for the further research have included and continue to include limited access during the occupation by Indonesia, a lack of indigenous researchers or visiting international ones, little knowledge of threatened species and restricted areas of forest and woodland. (Trainor 2010). Studies from Timor island have shown fauna is usually characterized by low species richness but high levels on endemism, which considering its proximity to Australia and being an island environment is evolutionary consistent (Grantham et al. 2010).

4.2 Birds and vegetation are by far the most studied group, whilst the other main fauna is generally poorly known. Regrettably, much of Indochina's biodiversity is still unknown although the more common groups, such as mammals, have been better described since the 1990s.(Conservation International, 2011). A minimum of 262 bird species is known from Timor (Trainor 2005) whilst vegetation of Timor-Leste can be grouped by savannah formations comprised primarily of Eucalyptus (*Eucalyptus alba*) and Tamarind trees (*Tamarindus indicus*), open or moderately dense forest; containing a dominant species of black Eucalyptus (*Eucalyptus urophylla*) and several fern species and tropical monsoon forest; made up from a larger variety of species including *Santalum album, Canarium reidentalia, Toona sureni, Pterocarpus indicus* and *Tectonia grandis* (Henriques et al. 2011).

4.3 Bats have 34 representative species, 12 of which are fruit bat species There are seven species of rats and mice, five shrews (2 endemic). Other mammals include the common spotted cuscus (*Phalanger orientalis*) which is the only marsupial on Timor and long-tailed macaque (*Macaca fascicularis*) the only primate. Additional mentions include 1 common palm civet (*Paradoxurus hermaphroditus*), the Eurasian wild pig (*Sus scrofa*) and Rusa deer (*Cervus timorensis*) (Trainor *et al* 2007). There are 15–20 amphibian species and 40 or more reptiles on Timor (Kuchling et al. 2007).

Vegetation

4.4 Although Botanical surveys in Timor-Leste have recorded more than 1,000 plant species, the predictions, based upon parallels with many

other Malesian islands, are that up to 2,500 species might be present on Timor Island (Cowie 2006).

4.5 Timor-Leste is internationally recognized for naturally occurring forest species including *Santalum album, Eucalyptus urophylla, Pterocarpus indicus, Casuarina junghuhniana* and *Tamarindus indica* (Old et al 2003). Along the north coast, from sea level to low-mid altitudes; such as where this survey is to be carried out, is dominated by woodlands and savannas. The savanna woodlands are usually made up of *Eucalyptus alba*, palm and/ or acacia. At higher altitudes there may be open forests comprising mainly of *Eucalyptus urophylla* (Grantham et al. 2010).

Birds

4.6 Whilst Trainer (2005, 2007b) showed a minimum of 262 bird species from Timor; 169 of which are considered resident, 76 regular migrants and 17 vagrants, the website avibase.bsc-eoc.org (updated to present date) reports 280 known species in the country seven of which are on the red list, with four being introduced species. Birdlife International (2008) recognizes four globally threatened and 14 near threatened birds in Timor-Leste; of which all depend on the tropical forest habitats (Trainor et al. 2008). As a side note - the Christmas Frigate bird, *Fregata andrewsi* has been recorded as a critically endangered vagrant.

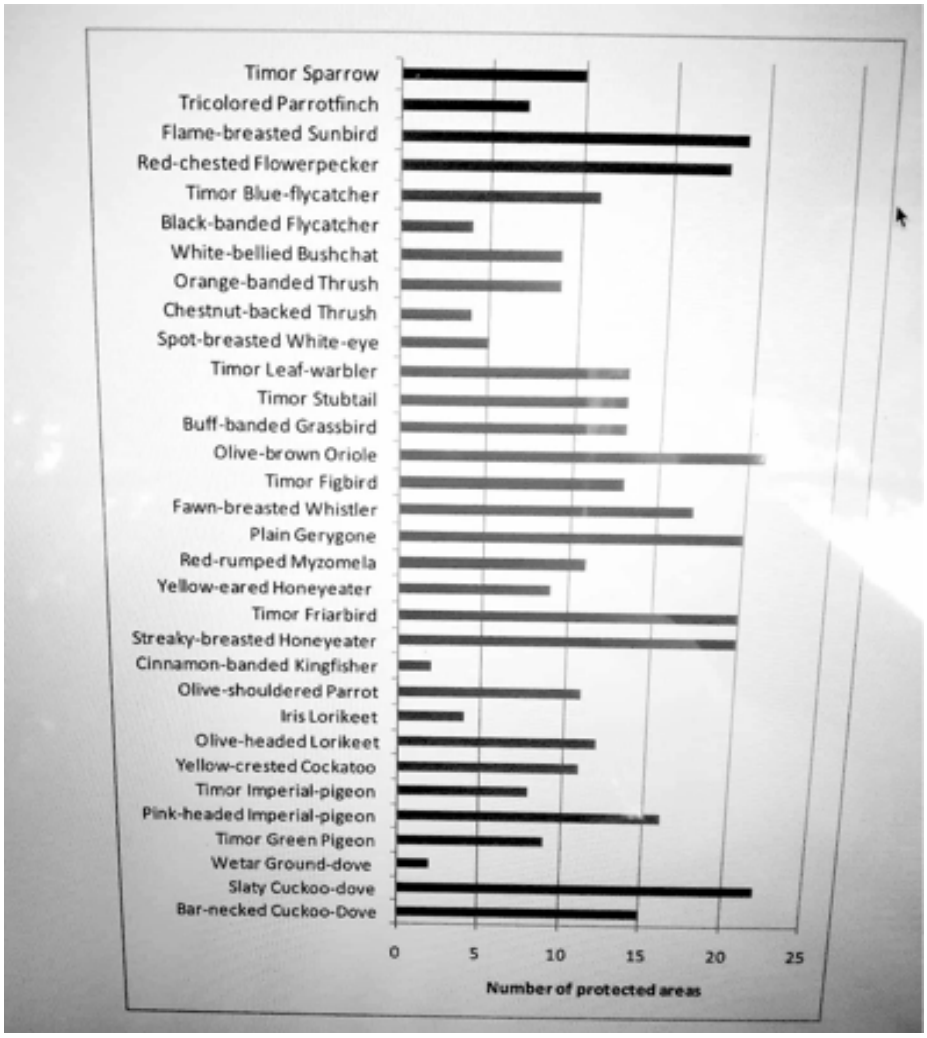


Figure 4-1. List of threatened and endemic bird species. Source: Timor-Leste Gap Analysis 2011

Mammals

Bats

4.7 As previously mentioned, there are 34 bat species, 12 fruit bat species, on Timor (Birdlife 2007). Regrettably, there have been few studies to expand on all these species, www.inaturalist.org indicates only 12 of 34 species have been sighted, plus bat identification can be difficult. The species *Pteropus vampyrus* of the flying-fox family has been recorded (Breed *et al*., 2010). Another noted species is *Pipistrellus javanicus* (Cranbrook, 1991). The Timorese horseshoe bat *Rhinolophus montanus*

is listed as endangered on the IUCN red list but little other information is available (Armstrong, K. & Csorba, G. 2016). Indonesian Short-nosed Fruit Bat, *Cynopterus titthaecheilus* has also been sighted (www.inaturalist.org).

Other Species

4.8 The Shrew (*Crocidura tenuis)* and Timor Rat (*Rattus timoriensis)* are the only endemic mammal species aside from the bats, with all others being introduced by human activity (Glover 1986). Species introduced include the house mouse (*Mus musculus*), house rat (*Rattus tanezumi*), brown rat (*R. norvegicus*) and field rat *(R. exulans*). Additionally, the common spotted cuscus (Phalanger orientalis), long-tailed macaque (*Macaca fascicularis*), common palm civet (*Paradoxurus hermaphroditus*), Eurasian wild pig (*Sus scrofa)* and Rusa deer (*Cervus timorensis*).

Reptiles and Amphibians

4.9 During September 2004 and July 2009 fieldwork in Timor-Leste recorded 263 herpetological specimens (100 amphibians, 163 reptiles) of which at least seven species are frogs and toads (most commonly *Duttaphrynus melanostictus*, rice paddy frogs (genus *Fejervarya*), and treefrogs (*Polypedates cf. leucomystax)*). Reptiles comprised 20 species of lizards inclusive of six geckos, two monitor lizards, about 10 skinks (Kuchling et al. 2007), seven species of snakes; at least one blind snake, three pythons, one viper snake, approximately eight colubrid snakes, one file snake, at least four primitive sea snakes (Kuchling et al. 2007), two species of turtles, and one species of crocodile (Kaiser et al 2011).

Insects

4.10 Data regarding insecta is scarce, however www.inaturalist.org indicates 110 species present in Timor-Leste. Although limited, most of these species are photographed. With over 670,000 species of insect worldwide and limited information available for representative in Timor-Leste it is fair to say any sightings will be noted and/or identifications made as possible. Though insect information was not directly requested for this survey we wish to provide at least a brief overview.

Threatened Species

4.11 According to the IUCN (2010), species **threatened with extinction** include three tree species, four birds, three mammals and one butterfly on Timor (**Figure 3)**, mostly due to habitat loss. It is likely that this IUCN's assessment is now outdated as well as a gross underestimation, as little is known of the status of many amphibians and flora across the island of Timor (Grantham *et al,* 2010). This also does not consider species that are vulnerable or near threatened, plus many species will fall under the data deficient category.

Common name	Scientific name	IUCN status	Threatening process
TREES			
Sandalwood	*Santalum album*	VU	Habitat loss, fires, agriculture, extraction
Borneo Teak	*Intsia bijuga*	VU	Habitat loss, selective logging
Burmese Rosewood	*Pterocarpus indicus*	VU	Habitat loss, agriculture, selective logging
BIRDS			
Timor Green Pigeon	*Treron psittaceus*	EN	Habitat loss, hunting, agriculture
Timor Imperial Pigeon	*Ducula cineracea*	EN	Habitat loss, hunting, agriculture
Wetar Ground-dove	*Gallicolumba hoedtii*	EN	Habitat loss, hunting, agriculture
Yellow-crested Cockatoo	*Cacatua sulphurea*	CR	Habitat loss, harvest for pet trade, agriculture
MAMMALS			
Thin Shrew	*Crocidura tenuis*	VU	Habitat loss, degradation, restricted range
Western Naked-backed Bat	*Dobsonia peronii*	VU	Habitat loss, extraction, restricted range
INSECTS			
Timor Yellow Tiger	*Parantia timorica*	EN	Severely fragmented population with ongoing decline

Figure 4-2. The IUCN List of Threatened Plants and Animals of Timor-Leste. Source: Timor-Leste Gap Analysis 2011

Methodology

5.1 Flora and Fauna species, particularly birds, insects, bats and other mammals, were recorded in Liquica, Timor-Leste during eight field visits over a total six day period spanning from 2nd January to 5th January and 7th and 8th January. A full breakdown of the field work schedule can be found in Appendix 1. The research site was dictated by that of a proposed quarry; located in the province of Mota Ulun (-8.573 and 125.614 (Lat./Lng.); S -8° 34' 22" and E 125° 36' 51", Liquica district where this survey was conducted.

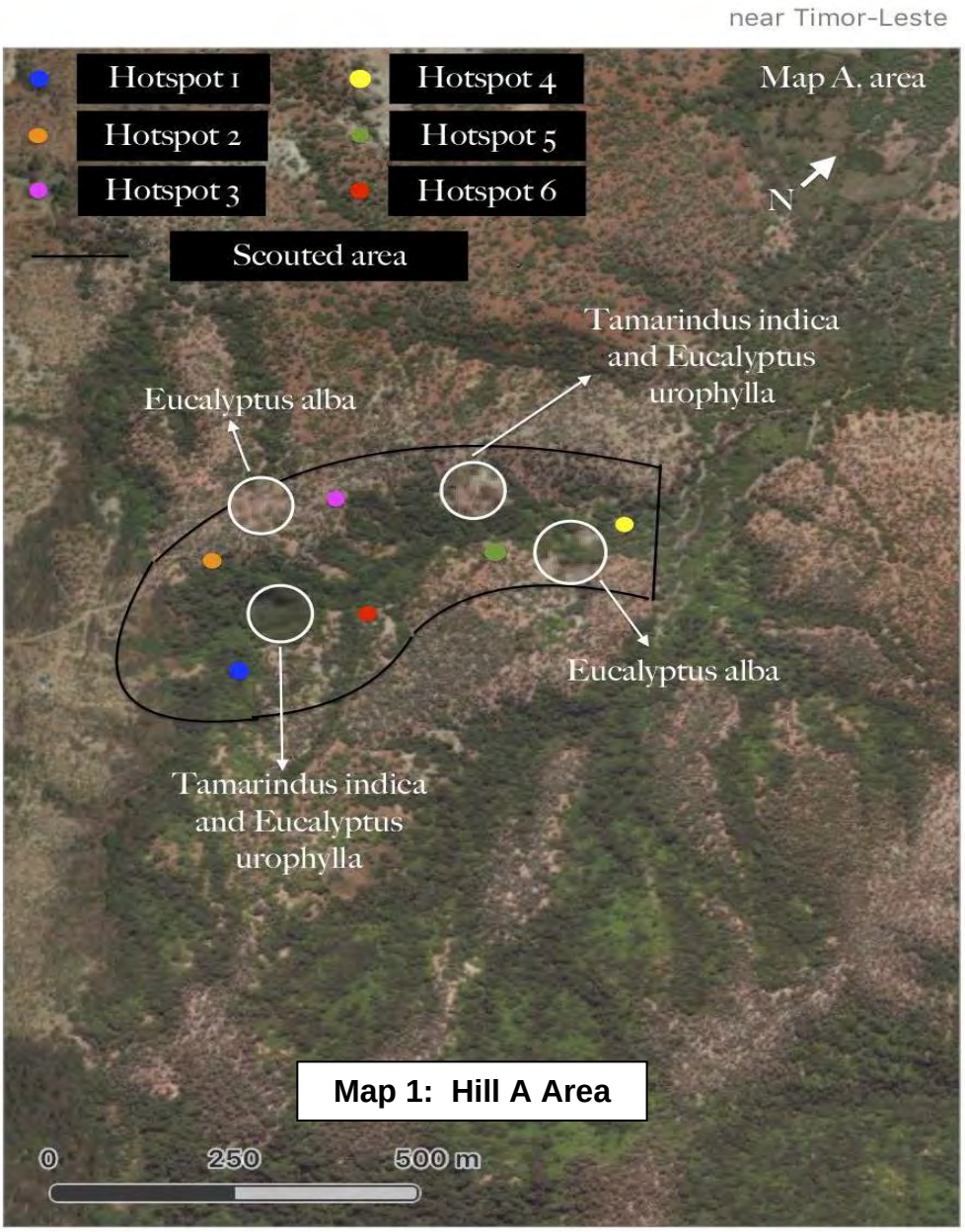
5.2 Various areas were investigated over 6 days however the main focus was on the 2 hills to be used for terracing (Figure 2-1). We have provided maps of Hill A and Hill B indicating the hotspot areas we surveyed (Maps 1 and 2). Most sites were identified during the first day as flora or fauna hotspots and thus became the focus for observations. The team was then split into 3 groups; one team scouting Hill A and two teams scouting Hill B due to the topological differences. Each hill had a total of 6 hotspots. Fauna was observed using the naked eye as well as with binoculars, camera equipment was available within each team and where possible photo documentation was taken to assist with identifications.

5.3 All species of flora witnessed was photographed and recorded. Identifications were made with the assistance of websites, papers and books (see our references). Observations of number of sightings and locations were recorded as well as any important notes on habitat or nesting behaviors or locations. With the aid of google maps and GPS, hotspot locations were also noted. All data was recorded in a notebook, if photos were taken this was recorded too, for later cross referencing. Location names are recorded as the common English and local Tetum (where available).

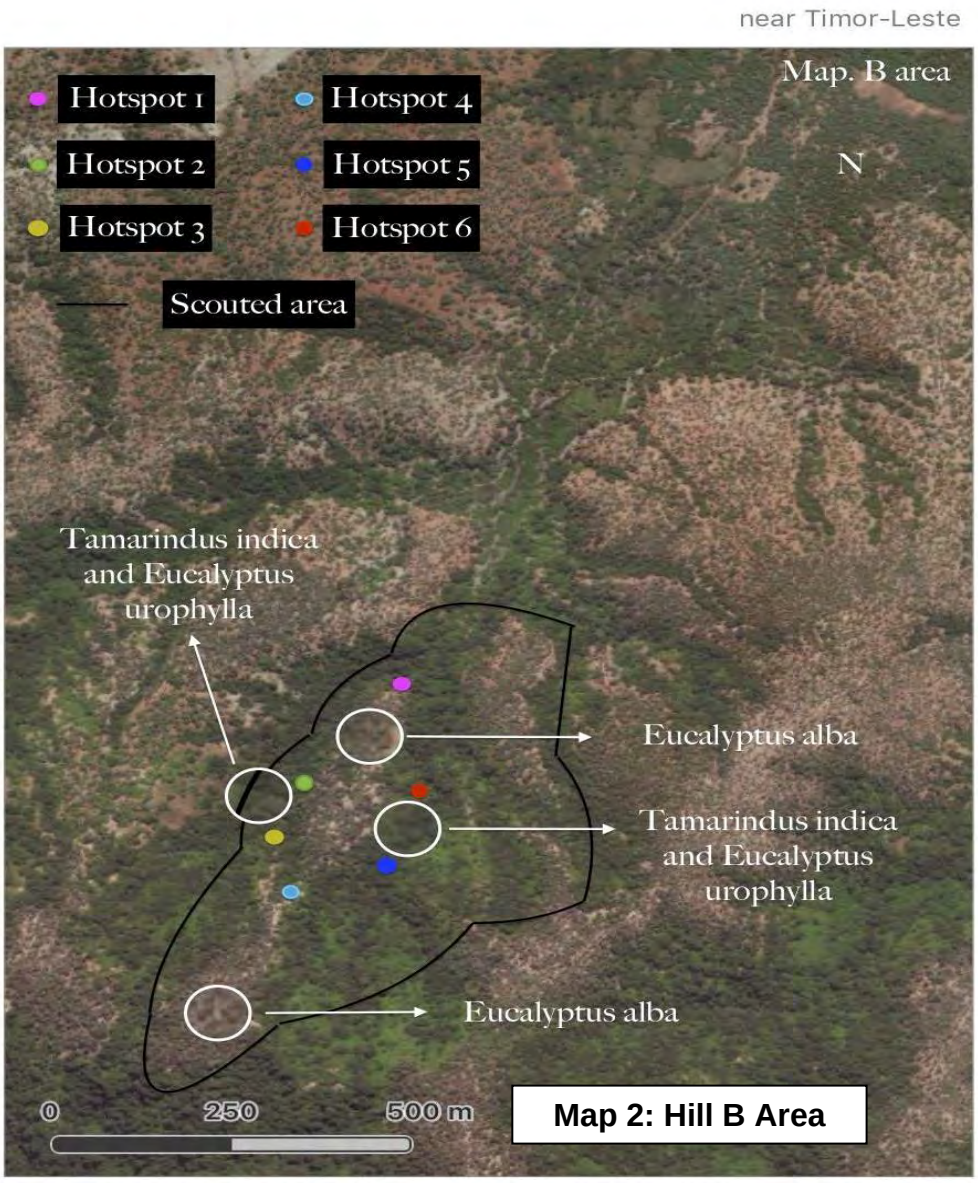
5.4 Sunrise and sunset observations were made on January 4th and 8th in a clear area at the base of both hill A and B. Focusing mainly on birds but also recording bat sightings. Sunrise is defined as approximately 30 minutes before sunlight and 1 hour after sunlight. Sunset is defined as 1 hour before sundown and 1 hour after initial darkness. Sunrise observations focused primarily on bird sightings with any bat sightings noted as well. Sunset observations focused on bird sightings during the early hour and move to focus on bat sightings at sunset and after sunset. The numbers of bats and birds were recorded, different types of bird calls were recorded, and sightings of different bird and bat species were

recorded. Notes were added for identification purposes regarding the color and size of birds and bats.

5.5 Additionally, to aid in bat sightings, a white sheet was set up, hanging from a tree, with artificial white lights shining onto it, aiming to attract insects which in turn attracted any bats to hunt near the sheet. This was studied for around 1 hour after there was no light. Additional equipment used included GPS location devices and torches for spotting animals at night and in small holes.



Map 1: Hill A Area



Map 2: Hill B Area

Results

Birds

6.1 Bird sightings are shown at Table 6-1.

Table 6-1. Bird Sightings

Key: LC – Least Concerned

Common Name	Scientific Name	IUCN listing (where available)	Notes
Timor Oriole	*Oriolus Melanotis.*	Unknown	Endemic to this island
Zitting Cisticola	*Cisticola Juncidis.*	LC and increasing	Resident. Low lands and
Brush Cuckoo	*Cacomantis Variolosus.*	LC and stable	Resident. Low lands.
Rainbow Bee-eater	*Merops Ornatus.*	LC and stable	Resident. Low lands. Abundant in area B.
Sunda Thrush	*Zoothera Andromedae.*	LC but decreasing	Resident. Low lands.
Thick-billed Flowerpecker	*Dicaeum Agile.*	LC and stable	Resident.
Northern Fantail	*Rhipidura Rufiventris.*	LC and stable	Resident. , Low lands. Have photo. Sighted in both A and B areas.
Lesser Coucal	*Centropus Bengalensis.*	LC and increasing population	Resident.

Oriental Reed-Warbler	*Acrocephalus orientalis.*	LC and decreasing	Resident.
Timor Leaf-warbler	*Phylloscopus Presbytes.*	LC and stable	Endemic to the region.
Barred Dove	*Geopelia Maugeus.*	LC and stable	Resident. Area A and lowlands.
Long-tailed Shrike	*Lanius Schach.*	Unknown	Resident. Low lands and area A.
Timor Blue-flycatcher	*Cyornis hyacinthinus*	LC but decreasing	Area A
Timor imperial pigeon	*Ducula cineracea*	Endangered	Area B
White bellied bushchat	*Saxicola gutturalis*	Near Threatened	Area B
Spectacled Monarch	*Symposiachrus Trivirgatus.*	LC and stable.	Resident. Low lands and area A.
Red-chested Flowerpecker	*Dicaeum Maugei.*	LC and stable	Endemic to the region. Area A.
Streaky-breasted Honeyeater	*Microptiloptis Reticulatus*	Unknown	Endemic to this island.
Slender-billed Cicadabird	*Edolisoma Tenuirostre.*	LC and stable.	Resident. Area A.
Flame-breasted Sunbird	*Cyaniris Solaris.*	LC and stable	Resident.
Japanese sparrowhawk	*Accipiter gularis*	LC	Area A
Black kite	*Milvus migrans*	LC	Area A

Vegetation

6.2 Vegetation sightings are shown at Table 6-2.

Table 6-2. Vegetation Sightings

Common Name	Scientific Name	IUCN List (where available)	Notes
Sandalwood	*Santalum album*	Vulnerable	Area A, young
Spanish Cedar	*Cedrela odorata*	Vulnerable	Area A, young
White Gum Tree	*Eucalyptus alba*	Unknown	Area A and B
Tamarind Tree	*Tamarindus indica*	LC	Area A and B
Yellow Oleander	*Thevetia peruviana*	Unknown	Area A
Bellyache Bush	*Jatropha gossypifolia*	Unknown	Area A and B
Siam Weed	*Chromolaena sp.*	Unknown	Area A and B
Custard Apple Tree	*Annona squamosa*	Unknown	Area B
Big-Sage	*Lantana camara*	unknown	Area A and B
Rubber Bush	*Calotropis procera*	Unknown	Area B
Elephant Foot Yam	*Amorphophallus paeoniifolius*	Unknown	Area B
Cinnamon Tree	*Cinnamomum verum*	Unknown	Area B
Cabbage Tree	*Andira inermis*	LC	Area B

Hairy Brown Uvaria	*Uvaria hirsuta*	Unknown	Area B
Bignonia species	*Bignonia sp.*	Unknown	Area A and B
Burmese Rosewood	*Pterocarpus indicus*	Endangered and decreasing	Area A and B

Bat Sightings

6.3 On the 4th January around 5 bats were spotted during the sunset/evening investigations. None of these were attracted to the white sheet but were flying around the base area. On the 8th January again 4-5 bats were sighted; giving the impression of one family living in the area. During sunrises the bats were seen moving from Hill A to Hill B (NW) Identification proved impossible as bats were only seen flying and a specimen could not be obtained. Further investigation is required for full identification of species. No roost was found nor were bats sighted in the trees during day time. However, presence of bats at night strongly indicates an unlocated roosting area somewhere in or close to Hill A.

Insect Sightings

6.4 These sightings were not specifically requested but they have been included for reference. Despite insect sightings, recordings, and photos being substantial, especially with use of the white sheet during night surveys, identifications were difficult due to a lack of information. As mentioned in the introduction there have been few studies into the insects of Timor island or Timor-Leste. Table 6-3 lists the positive identifications we did manage; none of which are listed as endangered.

Table 6-3. Insect Sightings

Common Name	Scientific Name	Type of Insect
Common Mormon	*Papilio Polytes*	Butterfly
Malay cruiser	*Vindula dejone*	Butterfly
Lemon migrant	*Catopsilia pomona*	Butterfly
Plain tiger	*Dariaus chrysippus*	Butterfly
---	*Papilio Pericles*	Butterfly
The common crow	*Euploea core*,	Butterfly
---	*Xylocopa perforator*	Beetle
---	*Tropidothorax fimbriatus*	Beetle
Crusader Bug	*Mictis profana*	Beetle
Common house fly catcher	*Plexippus petersi*	Spider
Australian Golden Orb-Weaver	*Nephila edulis*	Spider
Giant Honey Bee	*Apis dorsata*	Bee
Blue flower wasp	*Austroscolia soror*	Wasp

Other Sightings

6.5 **Livestock:** Cows, goats and chickens from the surrounding village.

6.6 **Monkeys:** A long-tail macaque monkey (*Macaca fascicularis)* was sighted and heard on multiple days of the study. A small group was seen traveling through the lower levels of the forest on Hill A.

6.7 **Amphibians:** The Asian common toad (*Duttaphrynus melanostictus)* was sighted during evening surveys for bats and birds.

6.8 **Geckos and lizards**: Tokay gecko (*Gekko gecko*) and the *House gekko (Hemidactylus frenatus)* were heard and/or seen around the area.

6.9 Considering both small size study area in addition to the timeframe of the fieldwork the recorded biodiversity is reasonably high: 16 plant species, 22 bird species; the presence of bats, the macaque monkey, Asian common toad, geckos species and a colourful array of insects.

Discussion

7.1 Vegetation clearance is historically known from during the Portuguese colonisation period, when the Portuguese were interested in the ample sandalwood timber; following this the Indonesian occupation resulted in significant deforestation with little reforestation; growing of crops was more of a focus (*Gusmão 2003*). Between 1972 and 1999, forest cover in East Timor decreased by almost 30%; (*Sandlund et al. 2001).* Traditionally, many communities used slash and burn agriculture (Trainer et al 2008). *Eucalyptus alba i*s an indigenous species which is a common coloniser after clearing or fire *(*Old *et al 2003).* Small sections of the area here indicate clearance of vegetation in the past. From our observations these areas show a lower variety of species, although many insects were noted.

7.2 Evaluation of aerial footage for the survey areas confirmed the presence of two main forest types present on both Hills A and B; the top and flatter areas of each hill dominated by reasonably sparse Eucalyptus forest (*Eucalyptus alba*) whilst the valley sections of each hill consist of Tamarind trees (*Tamarindus indica*) and low shrubs (See map 1 and 2). Confirming the observations from the field study, aerial footage shows

that the Eucalyptus forest area is comprised of younger trees with less vegetation present in the canopy understory; whereas the valley areas consist of a more dense forest canopy plus larger, older trees. These older trees offer effective foliage and space for a variety of bird species. Thick, lower level bush provides roosting and foraging areas for species occupying lower parts of the forest. Areas suitable for roosting were identified in Hills A and B.

7.3 Between 1972 and 1999, forest cover in East Timor decreased by almost 30%; perhaps only 6% of that remaining is primary forest (endemic forest) (Sandlund et al. 2001). More recently it has been shown to be between 50-70% of its forest remaining which is also heavily fragmented (Grantham et al. 2010). Around half the land has a slope of 40% or more (Mota 2002) thus deforestation likely began at the base and peak of hills which could explain the distributions of *E. alba* found here.

7.4 The clearance of vegetation leads to the destruction of a wide array of habitats as well as fragmentation or modification of said habitats which in turn can lead to localized extinctions via increased predation (less cover for the prey), reduced breeding or feeding areas, and soil erosion and nutrient loss which can affect the type of plants that may recolonize an area. Limited seed dispersal and/or pollination due to fewer animals will also affect plant colonization (Heywood et al 1992). Most species occupy small niches thus increasing the probability of chance extinctions (Gaston 1994), within those small areas there will be limited numbers of individuals (Brown 1984) and these areas are threatened by human activity (Cincotta et al. 2000).

7.5 Observations showed particularly birds and reptiles (gecko species) were roosting in and around trees and bushes. Butterflies and an array of insects were found near the ground level of the forest either flying or on a variety of plants or perched on rocks. It has been shown that invertebrates, such as butterflies, and small vertebrates like lizards require less habitat to continue to thrive in an area (Brooks et al 1999*)* but many mammals and birds need full coverage forest areas (*Peters, 1983*).

7.6 A majority of the bird species identified prefer nesting and general habitats in thick bush cover and low level trees. Several exceptions include the barred dove (*Geopelia maugeus*) commonly found in agricultural areas and *Cisticola spp*. which tend to be found in grasslands (Trainor et al 2008). The Timor Imperial Pigeon (*Ducula cineracea*) was found to prefer habitat dominated by Eucalyptus trees (*Eucalyptus alba*) and the Red-chested Flowerpecker (*Dicaeum maugei*) was identified as

having preference for Tamarind trees (*Tamarindus indica*) as a food source (https://www.hbw.com).

7.7 Species with preference for certain forest types include the White-bellied Bushchat (*Saxicola gutturalis*) commonly found in *Eucalyptus alba* woodlands and the Flame-breasted Sunbird (*Nectarinia solaris*) often sighted in tropical dry forests (Trainor *et al.,* 2008). The majority of birds identified feed primarily on insects. Fruit, pollen or nectar eating birds include the Timor imperial pigeon (*Ducula cineracea*), red-chested flowerpecker (*Dicaeum maugei*), streaky-breasted honeyeater (*Microptiloptis Reticulatus*), and thick-billed flowerpecker *(Dicaeum agile)*. Identified birds which feed on small animals or carrion include Long-tailed shrike *(Lanius schach)*, Japanese sparrowhawk (*Accipiter gularis)*, and Black kite (*Milvus migrans) (*https://www.hbw.com*)*.

7.8 Several species are restricted-range species, found specifically in montane areas including the Timor Imperial Pigeon (*D. cineracea)*, however other species are unexpectedly sighted in the lowlands, including the Timor Blue Flycatcher (*Cyornis hyacinthinus*), which can also be spotted on coffee plantations (*Trainor et al 2008*). Nesting preferences are generally for thick bush covered vegetation or roostings within trees with one exception, the rainbow bee-eater (*Merops ornatus*), a ground dwelling species which creates a burrow nest (http://www.environment.gov.au).

7.9 There is limited data about bird migration patterns in Timor-Leste, thus it is unclear if there are any direct migration routes within the survey area however as the area is relatively small, it is not likely any development will disrupt major migration paths for birds (Trainor *et al.,* 2008). Migration of other animals is also unclear but tracks present do indicate movement throughout the survey area.

7.10 The long-tailed Macaque monkeys (*Macaca fascicularis*) were observed moving across the mountain side and vocalizations were heard on different sides of the survey area during different days, indicating movement throughout the area, particularly on Hill B. Troops are reported to have a home-range area which can vary from 12.5 ha (hectares) to over 300 ha. Many Southeast Asian islands attribute prehistoric human introduction for the presence of *M. fascicularis*. The natural range for this species stretches from Bangladesh and Southern Burma down to the Lesser Sunda islands, including the island of Timor. Consistent with our findings, *M. fascicularis* tend to favor lower and middle levels within the forest canopy (Fooden, 1995).

7.11 Despite bat sightings, no caves were found during this survey, and owing to the limited number of bats observed this seems consistent. Sighting most likely indicate one family roosting in a small area. In forested areas bats can be characterized by those that roost in foliage of trees or those roosting in cavities or crevices of trees (Christy and West, 1993). Foliage-roosting bats typically roost by hanging from limbs, leaf petioles, or small branches in tree canopies (Constantine, 1966). Cavity and crevice-roosting bats roost in cracks, spaces under exfoliating bark, holes in decaying limbs, and hollow trunks of live trees (Christy and West, 1993). Some bat species may prefer to roost in more open areas and thus may not be so adversely affected by deforestation (McMahon et al., 1998)

7.12 Additionally, no wetlands were identified as the majority of the area is mountainous. Due to the presence of mountains all water sources flow directly downhill; as no springs or other groundwater sources were noted in the top areas, further investigation by a specialist would be needed to confirm. There are indications of streambeds which likely fill with water during large rainfall. According to an assessment by World Bank Group (2018), the monsoon climate found in Timor-Leste leads to variations in the flow of rivers from changing consistency and flash floods during the wet season to dry riverbeds during the dry season. However, only those larger primary rivers will have a consistent water flow throughout the year. The existence of multiple dry streambeds indicates the potential presence of water dependent species. One species, the Asian common toad (*Duttaphrynus melanostictus)* was documented during field research.

7.13 As wetlands are extremely limited in Timor-Leste and due to the mountainous geography of the survey area, none of the varying wetland types which include freshwater or saline lakes, swamps, marshes as well as wet grasslands, intertidal sand and mudflats, and also sandy or rocky beaches, mangrove habitats and exposed coral reefs were noted in the survey area (Trainor 2008).

7.14 Limitations in time frame for observations, the low volume of published scientific articles relating to previous studies in Timor, restricted identification aids available and to some extent a lack of local people's knowledge about wildlife may have affected results. However ample time was spent on observations during the designated 6-day period. Using a group of six people split into three teams greatly increased the overall accuracy of sightings, especially during sunrise/sunset studies where individuals observed both sites, thus allowing for varying perspectives and knowledge. Further study by persons specialised in

these individual fields would be needed to truly identify bat and insect species and could act to confirm the data shown here.

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Appendix 1.

Methodology

Schedule

Day 1 January 2nd: Overall site investigation to find hotspots and map each hill in more detail.

Day 2 January 3rd: Initial survey of the 6 hotspots chosen on both hills 6.30am to 10.30am.

Day 3 January 4th: Sunrise and sunset surveys for bats and birds 6am - 8am and 6pm to 9pm.

Day 4 January 5th: Second survey of hotspots 6.30am to 10.30am.

Day 5 January 7th: Third and final survey of hotspots 6.30am to 10.30am.

Day 6 January 8th: Sunrise and sunset surveys for bats and birds 6am - 8am and 6pm to 9pm.

Day 1 02/01/2019. Finding hotspots summary;

Hill A: Team 1: Kate and Mario;

Starting from the base of the hill, we trekked up the road which is already carved. Along the way we found one wet spot with some fresh tracks - bird and goat or deer. For future reference this will be used as hotspot 3.

Continuing up we reached a plateau where the pylon is - leading up to the radio tower. This area is mostly eucalyptus trees and not very dense. We chose one point up here for hotspot 2.

After the radio tower is a small path which allowed us to access some clearings at the top of the hill. Giving us an overview of the main valley between the hills.

One of these clearing was fairly noisy with bird songs and bug noises. We marked a tree there for hotspot 1.

We trekked down from these clearings by following a small river bed, although it was do-able we would prefer not to use that route in the future due to the steepness and large rocks we encountered. We chose not to mark any areas along this route as later access may pose hazardous.

Eventually as you get closer to the bottom you reach a track which is already made that leads down to the base of the hill again. Along this track we chose 2 points as hotspot 5 and 6. 5 is a clearing nearer the base where you can see the top of the hill; namely the radio tower. Whereas 6 is better accessed from the base area; it is part of the river bed with lots of vegetation coverage yet a small opening in the trees where you can see the electric cables.

Hotspot 4 is right at the base of the hill where the small river bed is broken by the road building.

No rain was recorded this day

Hill B: Team 2: Ivan and Melky observed areas beginning at the base of hill B and moving halfway up the mountain, noting and marking hotspots along their way. Team 2 identified four hotspots.

Upon further review, both teams agreed that the hotspots identified at the top of Hill B ranging to halfway down the hill were outside the target area. These spots were chosen due to difficult access to other areas by Team 3. Further observations were made along the southeastern side of Hill B by Team 2 and three new hotspots were identified. Team 3 subsequently observed the three lower hotspots identified by Team 2 and Team 2 observed the new hotspots identified further to the east on Hill B.

Hill B: Team 3: Kayla and Atinu observed Hill B beginning a general assessment walking from the hill base to the peak along the main road and following a footpath to the hill peak. Heading Northwest from the hill peak, Team 3 assessed the surround areas, noting and marking hotspots* along the descent. Four hotspots were identified ranging from the hill peak to halfway down the hill.

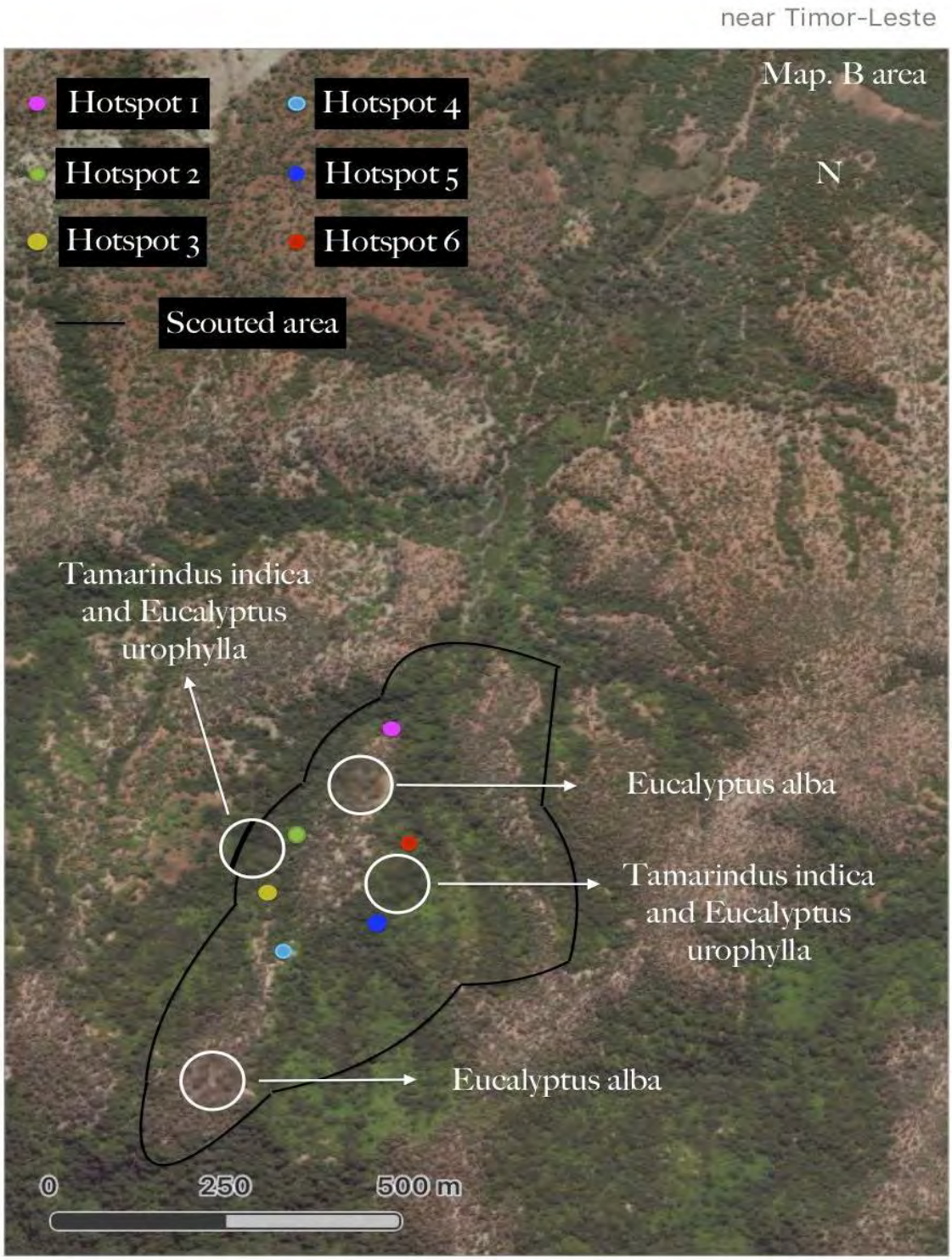
Days 2, 4 and 5 - 03/01/19, 05/01/19 and 07/01/19 respectively - each team visited their designated hot spots, Team 1 visited all 6 zones of Hill A whilst Teams 2 and 3 had 3 spots to survey (this was due to the topography, vegetation coverage and steepness difference between hills). Each hotspot was surveyed for 20 minutes, in which time teams made notes of all flora in the hotspot plus

any sightings of animals or indications of animals being present (bird calls, scats, tracks, etc.).

Days 3 and 7 - 04/01/19 and 08/01/19 were devoted to sunrise and sunset bird and bat studies. Sunrise surveys were conducted between 5.30am and 8.30 am whilst sunset/night surveys took place from 6pm to 9pm.

Hill A Map Area Enlarged

Hill B Map Area Enlarged



Photographs of Site Flora and Fauna

Key: LC – Least Concern (IUCN classification).

Figures P-1A and P-1B. Rainbow bee-eater; *Merops ornatus*

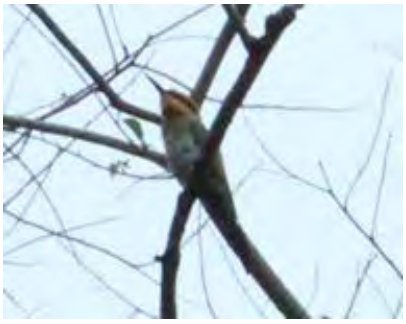


Figure P-2. Northern fantail; *Rhinopidura rufiventris*. Resident. Low lands. LC and stable. Sighted in both B and A areas.

Figure P-3. Barred dove; *Geopelia maugeus*, Resident. LC and stable. Area A and low lands

Figure P-4. Long-tailed Shrike; *Lanius schach*. Resident. IUCN status unknown. Lowlands and Area A

Figure P-5. Timor imperial pigeon; *Ducula cineracea*.
IUCN status: near threatened. Area B

Figure P-6. Japanese sparrowhawk; *Accipiter gularis.*
IUCN status: LC. Area A

Figure P2-7. White gum tree; *Eucalyptus alba*

Figure P-8. Timor White Gum; *Eucalyptus urophylla*

Figure P-9. Tamarind tree; *Tamarindus indica.* Scattered along both river beds and particularly abundant on the hill east from B area

Figures P-10A and P-10B. Yellow Oleander; *Thevitia peruviana*

Figure P-11. Bellyache bush; *Jatropha gossypiifolia*

Figure P-12. Siam weed; *Chromolaena sp.*

Figure P-13. Custard apple tree; *Annona squamosa*

Figure P-14. Big Sage (Malaysia-term); *Lantana camara*

Figure P-15. Sodom's apple, milkweed; *Calotropis procera*

Figure P-16. Elephant foot yam; *Amorphophallus paeoniifolius*

Figure P-17. Cinnamon tree; *Cinnamomum verum*

Figure P-18. Cabbage bark tree; *Andira inermis*

Figure P-19. Hairy brown uvaria; *Uvaria hirsuta*

Figure P-20. Yet to be identified Bignonia sp.

Figure P-21. Burmese rosewood; *Pterocarpus indictus*

Figure P-22. Carpenter bee; *Xylocopa perforator*

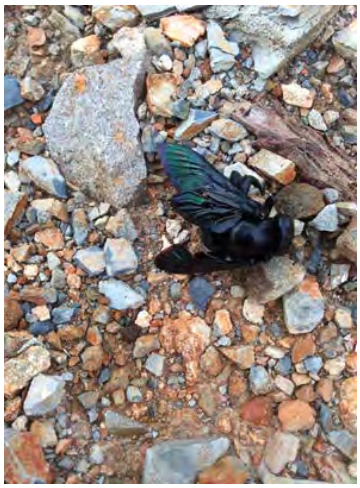


Figure P-23. Genus of ground bugs; *Tropidothorax fimbriatus*

Figure P-24. Blue flower wasp; (*Austroscolia soror*)

Figure P-25. Crusader bug; *Mictis profana*

Figure P-26. Giant Honey Bee; *Apis dorsata*

Figure P-27. Yet to be Identified Butterfly

Figure P-28. Common crow; *Euploea core*

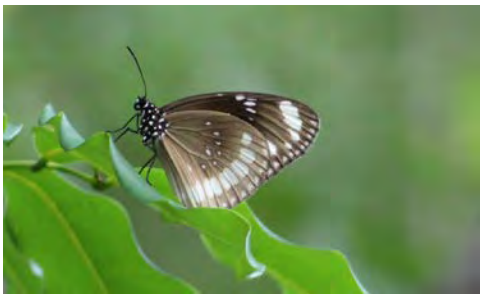


Figure P-29. Common house fly catcher (*Plexippus petersi*)

Figure P-30. Yet to be Identified Insect

Figure P-31. Yet to be Identified Insect (on white cloth)

Figure P-32. Yet to be Identified Insect (on white cloth)

Figure P-33. House Gekko; *Hemidactylus frenatus*

Attachment M Dust Management Plan

Locations of CHT Quarry and Neighbours

1. The China Harbour Timor Lda (CHT) quarry is at Mota Ulun, about 25 km west of Dili. A drawing showing the quarry and the surroundings is at Figure 1. The layout plan of the quarry is at Figure 2.

2. The stone processing yard, and the hills where blasting takes place, are about 1 km and 1.5 km respectively from the main road. The nearest local residences, located at the east of the main entrance, is about 1.5 m away from the stone processing yard.

3. There are 3 existing quarries, with excavation of rocks, making gravel and casting concrete parts, located 100 m west of the CHT quarry entrance at the main road. The name plates of these quarries are at Figure 3. The impacts of these dust generating sources are to be considered when conducting evaluations during CHT quarry operations. Evaluations for cumulative impacts might be difficult for these are quarries belong to the competition.

Method

4. According to the International Standardization Organization (ISO 4225 - ISO, 1994), "Dust: small solid particles, conventionally taken as those particles below 75 μm in diameter, which settle out under their own weight but which may remain suspended for some time". Smaller dust particles can remain airborne longer, potentially increasing local ambient concentrations of suspended particulate matter. Therefore, in addition to “total dust level”, environmental dust monitoring concentrates on PM10 and PM2.5 particles. File note: PM refers to “particulate matter, 10 refers to “10 micro-meter, and 2.5 refers to “2.5 micro-meter”. In other words, PM10 is airborne particulate matter with a diameter less than 10 microns (μm), and PM2.5 is less than 2.5 μm.

5. The quarry dust management plan has a focus on only dust prevention, suppression, and monitoring. Other environmental aspects of quarry operations, including dust generated by vehicle exhausts, are not included. The method for the said plan consists of the following steps:

    5.1 Establish baseline conditions of the existing dust climate around the site of the proposed operations.

5.2 Identify site activities that could lead to dust emission without mitigation.

5.3 Identify site parameters which may increase potential impacts from dust.

5.4 Recommend mitigation measures, including site design and layout.

5.5 Make proposals to monitor and report dust emissions to ensure compliance with appropriate environmental standards and to enable an effective response to complaints.

Figure 1. Location of the Quarry

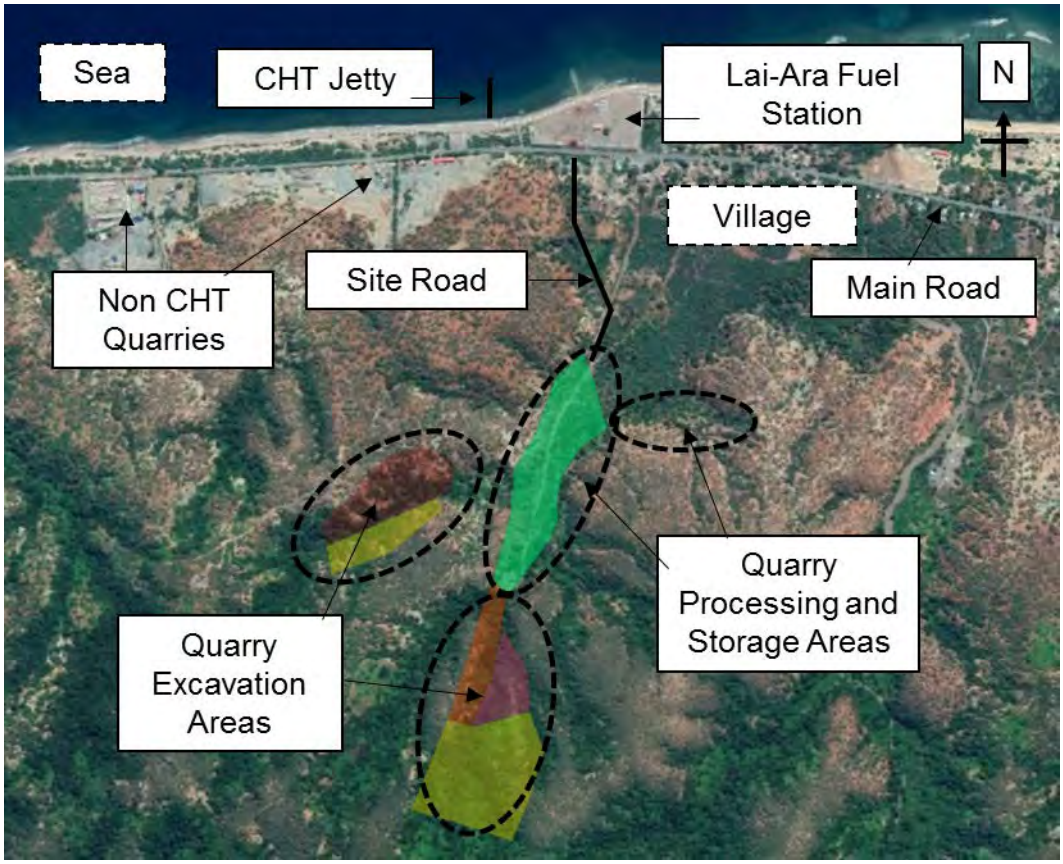
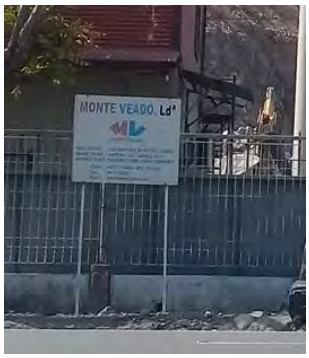


Figure 2. Quarry Site Layout

Figure 3. Neighbouring Quarries



The Quarry Works

6. The conventional method for obtaining rocks is used, i.e. using controlled explosions for breaking up a rock wall, and followed by transporting rocks to a crushing machine for processing into the required smaller sizes. There is no tunnelling, or open-cast, i.e. pit, type of mining. The rock / gravel processing and storage area is about 70,000 m2. The rock crushing machine has a capacity of about 300 tons per hour. Recycled water, stored in an enclosed tank, to prevent evaporation loss, is used to water the rocks in the crusher to mitigate against dust pollution.

7. About 1,030,000 m3 of rocks is produced, over an approximate 3-year timeframe, starting from May 2019. The estimated volumes of material to be extracted each year in 2019, 2020 and 2021 are 300,000, 700,000 and 30,000 m3 respectively.

8. The main steps for producing rocks and gravel are as follows:

   8.1 Surface earthworks and preparation.

   8.2 Drilling and blasting.

   8.3 Loading to crusher plant.

   8.4 Crushing, screening and classification.

   8.5 Stockpiling.

   8.6 Hauling to end user site, i.e. at Tibar Bay.

9. Preparation work for starting the quarry consists of:

   9.1 Making an internal haul road from the main road to the laydown area.

   9.2 Clearing of land for the camp quarters (for 35 persons).

   9.3 Clearing of land for the rock / gravel processing and storage areas.

   9.4 Installing machinery and facilities.

Topography

10. For a quarry, dust is invariably carried by wind to receptors further away. The terrain at the CHT quarry is favourable for containing dust, e.g. quicker settlement and capture, as against blown further away. The reasons are high hill formations and a thick line of tall trees and shrubs surrounding the rock and gravel processing and storage areas, as shown at Figures 4 to 8. The vegetation continues until the nearest residential properties about 1.5 km away. These features have the effect of reducing the strength of the wind, and containing dust.

Figure 4. Looking north from laydown area towards haul road to main road

Figure 5. Hills at north-west side of laydown area

Figure 6. Hills at west side of laydown area

Figure 7. Another view of hills and vegetation at west side of laydown area

Figure 8. Hills at east side of laydown area

Climate

11. Timor-Leste has distinctive wet and dry seasons, with the wet season generally from November to May. Naturally, dust levels will be lower after rain conditions, for rainfall acts as a natural dust suppressant.

12. Wind speed and wind direction obtained from sources are usually for a specific place, e.g. Dili airport, or for the country as a whole, and does not represent local conditions . Such information are generally not useful for the quarry; a location that has different and unique features, especially relating to topography and vegetation. CHT will be setting up a full-fledge weather station at Tibar Bay, about 12 km to the east of the quarry. Information from this nearby weather station will help to provide better analysis for making improvements to the Quarry Dust Management Plan; a document that will be reviewed within 3 months after start of quarry operations.

Baseline Conditions

13. In the quarry areas, and in the vicinity, there are no dwellings, no plantations or animal rearing industries. Therefore, there is no need to conduct baseline monitoring at the quarry areas.

14. The receptors of the housing type, are at least 1.5 km away, along the main road, and consist of village dwellings and the existing non-CHT quarries, as shown at Figure 1. There are no sensitive receptors, e.g. hospitals or homes for elderly persons, or industrial entities especially susceptible to dust.

15. In respect of the housing receptors, baseline environmental dust sampling was conducted from 20 to 22 Jan 2019, at 3 locations (Figure 9), with details at Table 1. The readings are stated at Table 2. The full report is at Attachment M1.

Figure 9. The 3 Dust Sampling Points (20 to 22 Jan 2019)

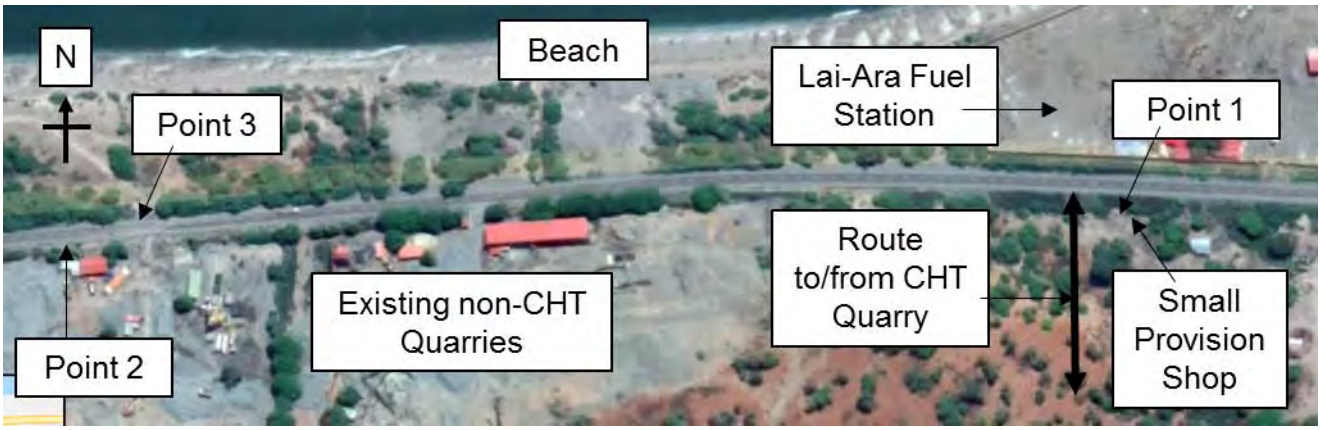


Table 1. Dust Sampling Location and Timeframes

SN	Location	Sampling Date and Time	Wind Speed and Direction
1	100 m east of quarry entrance road. In front of provision shop. 2 m from road.	20 Jan 2019. 08:00 to 16:00 hr.	3.2 m/s, Southwest
2	800 m west of quarry entrance. In from of Star Concrete. 2 m from road.	21 Jan 2019. 10:00 to 18:00 hr.	3.6 m/s, Southwest
3	750 m west of quarry entrance. Opposite Star Concrete. 2 m from road.	22 Jan 2019. 08:00 to 16:00 hr.	3.0 m/s, Northwest

Table 2. Dust Sampling Results

		ug/m3		
SN	**Location**	**PM2.5**	**PM10**	**TSP (Total suspended Particles)**
1	100 m east of quarry entrance road. In front of provision shop. 2 m from road.	ND (Not Detectable)	12	31
2	800 m west of quarry entrance. In from of Star Concrete. 2 m from road.	ND (Not Detectable)	10	23
3	750 m west of quarry entrance. Opposite Star Concrete. 2 m from road.	ND (Not Detectable)	44	94

16. The World Health Organisation (WHO) guidelines for exposure to dust is shown at Table 3.

Table 3. WHO Guidelines for Particulate Matter

SN	Size	Guideline
1	PM2.5 (i.e. particle size of 2.5 micro-meter)	10 µg/m3 annual mean. 25 µg/m3 24-hour mean
2	PM10 (i.e. particle size of 10 micro-meter)	20 µg/m3 annual mean 50 µg/m3 24-hour mean

Dust Emitting Activities

17. The dust emitting activities, i.e. sources, without mitigation measures, are shown at Table 4.

Table 4. Dust Sources

SN	Category	Activity	Location	Frequency
1	Site Preparation	Removal of vegetation, overburden, and land profiling	Site-wide	Daily at construction stage. Weekly at operations
2	Mineral extraction	Blasting	Extraction areas	Once a day for a few seconds (except Sundays)
3	Material handling and preparation	Tipping rocks and gravel onto trucks from blasting area to crusher area	Extraction areas	Daily
4		Rock crushing and screening	Rock crusher area	Daily
5	Stockpiling (exposed material)	Tipping rocks and gravel onto stockpile	Stockpile area	Daily
6		Fugitive dust	Stockpile area	Daily
7	Material movement (on-site)	Tipping rocks and gravel onto trucks for transport out of site	Stockpile area	Daily
8		Trucks travelling on haul routes (unpaved)	Internal haul routes	Daily
9	Material movement (off-site)	Trucks travelling on bitumen roads	External public roads	Daily. Affects general public

Pathways

18. A pathway is the route from which dust from a source reach the receptor. The factors to consider when evaluating pathways include distance, wind, terrain and vegetation. The receptors are more than 1.5 km away from the quarry. Terrain and site vegetation, e.g. trees and tall shrubs, are

essential in stopping dust from being propagated further by the wind, whether prevailing or temporary. There are hills, tall trees and high-type shrubs surrounding the rock processing areas, where most dust is emitted.

19. The mining method is such that the original height of the hills are retained, i.e. the tops are not cut. What remains after end of excavation work, is a stepped pyramid structure, similar to rice terraces, with a circular trekking route from bottom to top. Depending on specific hills, the bottom 20 to 70 m of a hill remain untouched, i.e. there is high ground surrounding the laydown location. Therefore, there is no need to build wind shields, or similar structures.

20. In summary, the quarry is boxed-in by terrain and vegetation, and this natural perimeter border effectively reduces the pathway for dust reaching the already far away receptors.

Receptors

21. The health effects on human receptors can be classified into 3 broad categories, i.e.:

    21.1 High Sensitivity. This includes hospitals, homes for the elderly, and schools, in which a relatively large group of similar type of occupants are exposed, and who are more susceptible to dust. Industrial enterprises that are especially at risk to dust are also included in this category.

    21.2 Medium Sensitivity. The village dwellings, and the industrial enterprises (existing quarries), located at the far north side of the CHT quarry (next to the main road), are placed in this category, for the inhabitants are exposed over a full day.

    21.3 Low sensitivity. Exposure is transient, e.g. persons passing by, and stopping only for shopping.

22. The CHT quarry is not within or near protected natural reserves, or sites with special scientific interest. Therefore, the susceptibility of flora and fauna to dust need not be further discussed. File Note: The level of dust deposition likely to lead to a change in vegetation is very high (over 1 g/m2/day; Farmer, A M, 1993. The effects of dust on vegetation – a review. Environmental Pollution 79, 63-75).

Mitigation Measures

23. Human activities that increase potential impacts from dust include indiscriminate removal of vegetation, tracked vehicles churning-up ground, non-maintenance of haul routes, making sharp turns on unpaved routes, and discharge of material at unauthorised locations. During dust prevention training for operators and drivers, the need for appropriate techniques for reducing dust emissions, are mentioned. Further details on training are at paragraph 25.

24. The areas where mitigation measures are implemented can be classified into the following 3 main groups, as shown at Table 5.

Table 5. Grouping of Mitigation Measures

SN	Group	Mitigation Measures (details at …)
1	Site Design and Planning	Table 6
2	Operational Control	Table 7
3	Training	Paragraph 25

Table 6. Dust Control Measures (Site Design and Planning)

SN	Activity	Control	Responsibility
1	Layout	Keep green buffers	Quarry Engineer
2		Site routes away from villages	Quarry Engineer
3		Retain high ground and vegetation	Quarry Engineer
4		Pave area where haul route meets main road	Quarry Engineer
5		Pave area for off-site vehicles (e.g. staff cars)	Quarry Engineer
6		Balance between the number of stockpiles and height of each stockpile.	Quarry Engineer
7	Equipment and Machinery	Using electric instead of diesel machines, e.g. for the rock crusher	Equipment Manager
8		Rock crusher with internal water spray and water containment for recycled water	Equipment Manager
9		Hopper inlet appropriate for type of trucks, e.g. no side spillages	Equipment Manager
10		Closed system in conveyors, i.e. fitted with covers	Equipment Manager
11		Trucks with fittings for covers	Equipment Manager

Table 7. Dust Control Measures (Operational Control)

SN	Activity	Control	Responsibility
1	Rock crushing	1. Installation and maintenance of shields. 2. Water sprays in crusher head. 3. Daily inspections of condition. 4. Maintenance of equipment.	1 to 4. Equipment Manager
2	Tipping rocks and gravel onto stockpile	1. Designated locations. 2. Designated heights of stockpiles.	1 and 2. Quarry Deputy Manager
3	Tipping rocks and gravel into trucks	1. No overloading. 2. No protrusion of load above the height of the bed.	1 and 2. Quarry Deputy Manager
3	Trucks travelling on internal haul routes (unpaved)	1. Speed control. 2. Watering of routes. 3. Maintenance of haul routes	1. HSE Manager. 2. HSE Manager. 3. Quarry Deputy Manager.
4	Trucks travelling on external bitumen roads	1. Speed control. 2. Tarpaulin cover. 3. Cleanliness condition of trucks	1 to 3. HSE Manager.
5	Land clearance	1. Land Clearance Permit	1. Quarry Deputy Manager
6	Blasting	1. Blasting Permit	1. Blasting Engineer
7	Accumulation of fugitive dust on ground	1. Housekeeping, e.g. gathering-up of spill material, mobile machinery do not run over and crush material	1. Quarry Deputy Manager

Training

25. Machine operators and truck drivers have a very important role in dust management, for their work usually generates dust, especially when travelling on unpaved ground. The Quarry HSE Manager is responsible for training these groups of employees. In the “Dust Control Methods for

Machine Operators and Truck Drivers" training package, the topics include:

25.1 Load and Weight. Load to be least 20 cm below the top height of the bed of a truck. Material is not to be left in a "triangle" type heap over the bed. For a bucket, material from excessive scooping-up will spill over the sides when the bucket swings. Scooping and putting back material creates dust more than necessary. Tyres of overloaded trucks dig deeper into unpaved routes; creating more dust.

25.2 Covers. Use the tarpaulin cover when travelling off-site. This reduces windblown dust, and prevents material from dropping onto the public roads.

25.3 Speed. The faster the speed, the greater the amount of dust churned-up by the tyres, and for the cargo, the greater the wind-blown dust. Stay within the speed limits. Turning a vehicle, or a bucket at too fast a speed causes material to spill out. A moving bucket with trailing gravel droppings creates unnecessary dust. Avoid abrupt changes in direction, stopping, and starting. Slow down when approaching road humps. Do not charge through, for the bounces, and sudden braking, cause spillages of material.

25.4 Tyres. Maintain the correct tyre pressure. Too low a pressure causes the tyres to dig deeper into unpaved routes; creating more dust.

25.5 Height. Rock and gravel dropped at height creates a "striking against" effect amongst the material, and generates dust. The bucket should not be positioned too high above the truck bed, or too high above a stockpile for releasing the load, i.e. the higher the release, the greater the production of dust.

25.6 Distances and Frequency. More dust is created with further distance travelled, and greater number of trips. Work and trip planning are necessary. Examples of what should be avoided include returning with the load (i.e. not able to deliver), delivering with a half-full load (i.e. double the trips), and travelling a long distance to do short work, then returning, and then going out again to a place near the first location to perform another short-time work.

25.7 Vegetation. Keep to the designated haul routes. A tracked vehicle churns-up large tracts of ground, leaving behind bare

earth, and increasing wind-blow dust. When clearing ground, keep to the construction plans, i.e. do not clear more than is necessary, and leave a "green buffer" whenever possible. Do not remove a tree, if work can go around it. Report haul routes that need repair, e.g. a puddle that does not dry up. Going around a puddle by driving on the sides of the route destroys vegetation at the sides, and creates a wider than required haul route, and associated increases in dust.

25.8 Unwanted Material. The disposal of unwanted material at unauthorised places destroys vegetation and creates more places with fugitive dust. Rework, i.e. removal and restoring work, generates yet even more dust.

25.9 Spillages. Keep a spade in the truck to clear gravel spilled on public roads. If there is no tyre wash point, the spade can be used to scrap earth from tyres and other parts of the vehicle under the chassis.

Monitoring and Reporting

26. The types and frequencies of monitoring and reporting of dust control measures and responsibilities, to ensure compliance with appropriate environmental standards, to maintain the dust management plan, and to enable an effective response to complaints are described at Table 8.

27. The HSE Manager has the responsibility of ensuring that monthly dust monitoring is conducted at 2 points, each located about 100 m east and 800 m west of the quarry entrance at the main Dili-Liquica main road. The monitoring results are tabulated against World Health Organisation (WHO) standards for environmental dust level standards.

28. The HSE Manager also conducts daily site inspections, and the work environment, to ensure that conditions do not degrade, and that operators and drivers are adhering to the operations rules for protection of the environment.

Table 8. Monitoring and Reporting

SN	Activity	Report Format	Frequency of Reporting	Responsibility
1	Daily Inspections of Machinery and Equipment	1. Checklist for Rock Crusher. 2. Checklist for tarpaulin sheets on trucks.	1. Daily Summary Report of Condition	1 and 2. Equipment Manager
2	Tipping rocks and gravel onto stockpile	1. Daily inspections of site conditions, including stockpile conditions	1. Daily inspections of site conditions	1. HSE Manager
3	Tipping rocks and gravel into trucks	1. Daily inspections of site work environment	1. Daily inspections of site conditions	1. HSE Manager
3	Trucks travelling on internal haul routes (unpaved)	1. Daily inspections of site work environment. 2. Regular clearing, grading and maintenance of haul routes	1. Daily inspections of site conditions. 2. Weekly report on conditions of haul routes	1. HSE Manager
4	Trucks travelling on external bitumen roads	1. Truck Leaving / Entering Site Form (speed control, and inventory control).	1. Daily Summary Report (part of daily total trips)	1. Quarry Deputy Manager
5	Preservation of site vegetation	1. Daily inspections of site work environment. 2. Land Clearance Permit.	1. Daily inspections of site conditions (part of Land Clearance Permit conditions)	1. HSE Manager
6	Training	1. Training records (operators and drivers)	1. Monthly training report	1. HSE Manager
7	Dust monitoring	1. Monthly dust sampling results at 2 locations (100 m east and 800 m west of quarry entrance at main road)	1. Monthly Dust Sampling Report	1. HSE Manager
8	Complaints	Complaints Log, e.g. based on Grievance Reporting Form	Summary included in Quarry Monthly HSE Report	1. Community Liaison Officer

Dust Impact Risk

29. The Institute of Air Quality Management (IAQM), based in London (UK), has a document titled, "Guidance on the Assessment of Mineral Dust Impacts for Planning, dated May 2016 (v1.1). An estimation of dust impact risk can be based on the 3 factors of "Source", "Pathway" and "Receptor". Page 15 of the said IAQM document, has the following quote:

"The Source-Pathway-Receptor (S-P-R) concept presents the hypothetical relationship between the source (S) of the pollutant, the pathway (P) by which exposure might occur, and the receptor (R) that could be adversely affected. The dust impact at relevant receptors should be predicted using this concept. This approach is applicable to both the disamenity and the ecological effects of deposited dust."

30. An illustration of the Source-Pathway Matrix, after mitigation measures, is at Figure 10. File Note: Figures 10 and 11 are direct copies from similar figures at pages 16 and 17 of the said IAQM document.

Figure 10. Source-Pathway Risk Level (after mitigation measures)

		Residual Source Emission		
		Small	**Medium**	**Large**
Pathway Effectiveness	Highly Effective Pathway	Low Risk	Medium Risk	High Risk
	Moderately Effective Pathway	Negligible Risk	Low Risk	Medium Risk
	Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

31. From Figure 10, the risk levels are tabulated against the sensitivity of receptors to obtain the magnitude of effects, as shown at Figure 11.

Figure 11. Magnitude of Dust Effects

	Receptor Sensitivity		
	Low	**Medium**	**High**
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible Effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible Effect	Negligible Effect	Slight Adverse Effect
Negligible Risk	Negligible Effect	Negligible Effect	Negligible Effect

32. From Figure 10, the pathway for the CHT quarry is in the “ineffective pathway” category, because it consists of tall vegetation and hills, and the receptors are more than 1.5 km away, i.e. dust is dissipated or blocked before reaching the target. Therefore, even if the residual source emission is high, the risk level is classified as “low risk”.

33. The receptor sensitivity is not in the high category, because it is not in the sensitive class, e.g. not a hospital or a home for elderly people. The dwellings 1.5 km away from the quarry can be placed in either the “medium” or “low” receptor sensitivity category. Therefore, it can be concluded from Figure 11, that the magnitude of the effects of dust on these dwellings is “negligible effect”.

Attachment M1 Environmental Dust Sampling Report

ENVIRONMENTAL MONITORING REPORT

Report No: （JY）EM 2019 NO. 01145

Project: Environmental Air Monitoring of China Harbour Timor Lda (CHT) Quarry for the New Container Terminal Project in Tiba Bay, Timor-Leste

Type: Ambient air

Monitoring Category: Baseline Environmental Monitoring

Date of Report: 28 January, 2019

Guangdong Jianyan Environmental Monitoring Co., Ltd

Page 1 of 10 pages

Statement on Monitoring and Report

1. The organization ensures the scientific, impartiality and accuracy of the monitoring and results. The organization is responsible for the monitoring data, and keeps the sample and technical information provided by the entrusted party.

2. The verification report will be invalid under the following situations: no signature of the issuer, alteration, no official stamp of the organization, or no seal on the perforation.

3. Partial copy of this verification report is prohibited without written approval by the organization (complete copy is allowable).

4. The organization accepts no responsibilities for the veracity of samples not taken by the organization.

5. If there is any objection to the results in this report, please forward your checking application within fiftheen days from the day receiving this report.

Guangdong Jianyan Environmental Monitoring Co., Ltd

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Post Code：510520
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Fax：020-37250211
E-mail：jianyan_em@163.com

Guangdong Jianyan Environmental Monitoring Co., Ltd

2016191777U

Environmental Monitoring Report

Unit code: ---

(JY) EM (Ambient air) 2019 NO. 01145

Project: Environmental Air Monitoring of CHT Quarry for the New Container Terminal Project in Tiba Bay, Timor-Leste

Location: Mota Ulun, Liquica, Timor-Leste | Monitoring category: Environmental baseline monitoring

Samples Taken by: Gaojie Xie and Zhanyang Chen | Type: Ambient air | Sample status: Normal

Date of Monitoring: 20, 21, 22 January 2019 | Date of Analysis: 24 January, 2019. | Date of report: 25 January, 2019

Location	Monitoring point	Monitoring Time	Analytic Result Unit: mg/m^3			Meteorological Information			
			PM2.5	PM10	TSP	Temperature (℃)	Atmos (kPa)	Wind speed (m/s)	Wind direction
1	Monitoring Site 1# (S:8°33′51″;E:125°24′43″)	From 08:00 to 16:00 January 20, 2019	ND	0.012	0.031	25.0	100.95	3.2	Southwest
2	Monitoring Site 2# (S:8°33′51″;E:125°24′22″)	From 10:00 to 18:00 January 21, 2019	ND	0.010	0.023	26.0	100.85	3.6	Southwest
3	Monitoring Site 3# (S:8°33′52″;E:125°24′21″)	From 08:00 to 16:00 January 22, 2019	ND	0.044	0.094	24.0	100.80	3.0	Northwest
	(Following blank)								

Remarks: 1. For monitoring points, see attached Figure 1.
2. "ND" indicates Not Detectable.
3. List of monitoring factors and criterion are at Table 1.
4. Particulars of field instruments used are at Table 2.

Prepared by: Lyu Ping Mo Inspected by: Qingya Zhuang Approved by: Zecheng Chen Title of Approver: Chief of Dept., Engineer Issued date: 28 January, 2019

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Figure 1. Locations of Monitoring Points at Mota Ulun, Barzetete, Liquica, Timor-Leste

Table 1. List of Monitoring Factors and Criterion

SN	Monitoring Type	Monitoring Factor	Criterion
1	Ambient air	TSP	Ambient air-determination of total suspended particulates. Gravimetric method. GB/T15432-1995
2		PM10	Determination of atmospheric articles PM10 and PM2.5 in ambient air by gravimetric method. HJ 618-2011
3		PM2.5	
		(End)	

Table 2-1. Particulars of Field Sampling Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Sampling TSP
2	Make	Qingdao Laoshan Applied Technology Research Institute
3	Model	Laoying 2030
4	Serial Number	M03230950
5	Date of Calibration	14 May 2018

Table 2-2. Particulars of Field Sampling Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Sampling PM10
2	Make	Qingdao Laoshan Applied Technology Research Institute
3	Model	Laoying 2030
4	Serial Number	M03350136
5	Date of Calibration	4 July 2018

Table 2-3. Particulars of Field Sampling Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Sampling PM2.5
2	Make	Qingdao Laoshan Applied Technology Research Institute
3	Model	Laoying 2030
4	Serial Number	M03344990
5	Date of Calibration	4 July 2018

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Table 2-4. Particulars of Field Sampling Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Monitoring wind direction and wind speed
2	Make	Shanghai Fengyun Meteorological instrument Co., Ltd.
3	Model	FYF-1
4	Serial Number	06G6818
5	Date of Calibration	6 July 2018

Table 2-5. Particulars of Field Sampling Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Monitoring atmospheric pressure
2	Make	Ningbo Yinzhou Jiang Shan Glass instrument Factory
3	Model	DYM3
4	Serial Number	16072220
5	Date of Calibration	4 December 2018

Table 2-6. Particulars of Laboratory Analyzing Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Analyzing TSP and PM10
2	Make	Sedorius Scientific Instruments (Beijing) Co., Ltd.
3	Model	BS224S
4	Serial Number	23691487
5	Date of Calibration	7 May 2018

Table 2-7. Particulars of Laboratory Analyzing Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Analyzing TSP and PM10
2	Make	Shanghai Jinghong Experimental equipment Co., Ltd.
3	Model	HWS-80
4	Serial Number	H1309413
5	Date of Calibration	30 March 2018

Table 2-8. Particulars of Laboratory Analyzing Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Analyzing PM2.5
2	Make	Mettler Toledo International Trade (Shanghai) Co., Ltd.
3	Model	MS105DU
4	Serial Number	B828107864
5	Date of Calibration	22 August 2018

Table 2-9. Particulars of Laboratory Analyzing Equipment

SN	Item	Particulars
1	Purpose of Equipment	For Analyzing PM2.5
2	Make	Qingdao Rongguang Electronic Technology Co., Ltd.
3	Model	RG-AWS9
4	Serial Number	RGAWS9028
5	Date of Calibration	28 March 2018

List of Photographs

Figure 2:

20 January, 2019

Figure 3:

21 January, 2019

Figure 4:

22 January, 2019

Annex 1：

China National Accreditation Service for Conformity Assessment

LABORATORY ACCREDITATION CERTIFICATE

(Registration No. CNAS L11656)

Guangdong Jianyan Environmental Monitoring Co., Ltd.

(Legal Entity: Guangdong Jianyan Environmental Monitoring Co., Ltd.)

No.6&19, 2nd Street, Kemulang Yellow House, Tianhe District, Guangzhou, Guangdong, China

is accredited in accordance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories(CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence to undertake the service described in the schedule attached to this certificate.

The scope of accreditation is detailed in the attached schedule bearing the same registration number as above. The schedule forms an integral part of this certificate.

Effective Date：2018-11-16

Expiry Date：2024-11-15

Signed on behalf of China National Accreditation Service for Conformity Assessment

China National Accreditation Service for Conformity Assessment(CNAS) is authorized by Certification and Accreditation Administration of the People's Republic of China (CNCA) to operate the national accreditation schemes for conformity assessment. CNAS is a signatory of the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) and the Asia Pacific Laboratory Accreditation Cooperation Mutual Recognition Arrangement (APLAC MRA).
The validity of the certificate can be checked on CNAS website at http://www.cnas.org.cn/english/findanaccreditedbody/index.shtml

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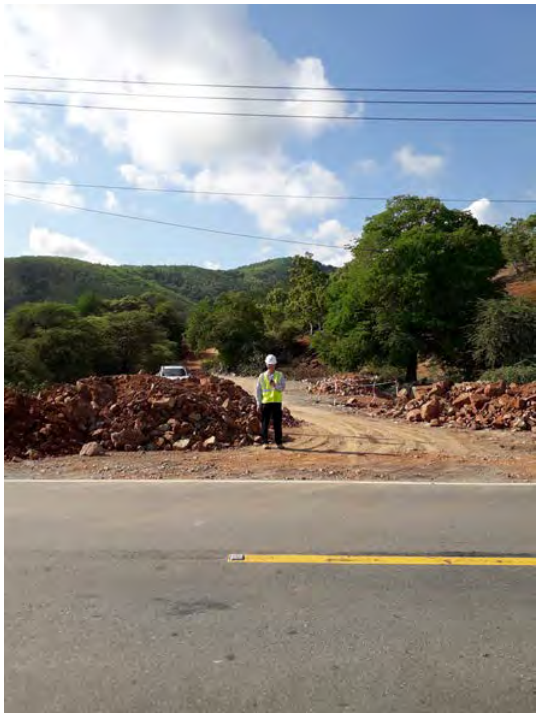
Attachment N Quarry Noise Management Plan

1. Table 1 shows the readings taken during an initial baseline noise sampling conducted on 9 Jan 2019, at the turn-off from the main road to the quarry road. The instrument used was a 3M made, model SD-200, and serial number SD20017508. It was held at a height of 1.5 m, and facing the main road, and 2 m away from it. Figure 1 shows the location (represented by the person taking the sampling).

Table 1. Noise Readings

SN	Vehicle	Reading (dBA)
1	Ambient	62
2	Motorcycles / Sedans	72 to 78
3	Trucks	83

Figure 1. Location of Noise Sampling



2. Sound level is measured in dBA (i.e. a range within the human ear). For every doubling of distance, the sound decreases by 6 dBA. Table 2 illustrates the sound produced by various activities. Table 3 shows the sound level decreasing when a person is further away from noise produced by a working jack hammer. The conclusion is that noise produced by quarry activities does not affect the nearest dwellings for these are more than 1.5 km away. The

generally accepted noise exposure level is not more than 85 dBA over an 8-hour time period.

Table 2. Noise Level Chart
(from website: https://www.noisehelp.com/noise-level-chart.html)

dBA	Example	Home & Yard Appliances	Workshop & Construction
0	healthy hearing threshold		
10	a pin dropping		
20	rustling leaves		
30	whisper		
40	babbling brook	computer	
50	light traffic	refrigerator	
60	conversational speech	air conditioner	
70	shower	dishwasher	
75	toilet flushing	vacuum cleaner	
80	alarm clock	garbage disposal	
85	passing diesel truck	snow blower	
90	squeeze toy	lawn mower	arc welder
95	inside subway car	food processor	belt sander
100	motorcycle (riding)		handheld drill
105	sporting event		table saw
110	rock band		jackhammer
115	emergency vehicle siren		riveter
120	thunderclap		oxygen torch
125	balloon popping		
130	peak stadium crowd noise		
135	air raid siren		
140	jet engine at takeoff		
145	firecracker		
150	fighter jet launch		
155	cap gun		

Table 3. Sound Level at Different Distances from Source

SN	Distance from Noise Source (m)	Sound Level (dBA)	Sound Produced by
1	1	110	Jack hammer / rock band
2	2	104	
3	4	98	
4	8	92	
5	16	86	Equivalent to a passing diesel truck
6	32	80	Equivalent to an alarm clock
7	64	74	
8	128	68	
9	256	62	
10	512	56	
11	1,024	50	Equivalent to light traffic / refrigerator
12	2,048	44	
13	4,096	38	
14	8,192	32	whisper

3. However, noise monitoring will still be carried out during the first week of blasting work, and monthly thereafter, to “make assurance doubly sure”. The following activities are planned for reducing noise pollution:

4. Heavy machinery, especially the rock crusher, generate noise. The methods to reduce the noise nuisance include:

   4.1 Night work is not planned or minimised.

   4.2 The rock crusher is as fully enclosed as practicable. This feature also reduces the emission of dust.

   4.3 Machinery is maintained, with at least a monthly cycle.

   4.4 Machinery operators use a Daily Pre-Start Equipment Checklist to ascertain the conditions of assigned equipment before starting work.

5. Other activities to reduce the noise level include:

   5.1 No speeding, no blasting of the horn except as a warning sound, and to avoid unnecessary revving of engines.

5.2 Starting machinery one by one, rather than all together at once.

5.3 Not operating machinery at maximum engine capacity.

5.4 Switching-off machinery when not required.

5.5 Drivers keep to the designated routes, e.g. not parking near homes.

5.6 Drivers refrain from travelling in a convey, i.e. increasing the build-up of noise.

5.7 Not making steep gradients for haul roads.

5.8 Regular maintenance of machinery and the haul roads.

5.9 Installing rubber linings at inlets of chutes to reduce impact noise.

5.10 Excavators and wheeled loaders minimise drop height of materials to reduce impact noise.

5.11 Operating equipment with covers in place.

5.12 Not carrying noisy work during the night.

5.13 Retaining green buffers, i.e. tall trees and shrubs, as noise barriers.

6. Depending on the specific noise control method, the Quarry Deputy Manager (in charge of operations), Equipment Manager, and the HSE Manager, have the responsibilities of ensuring that noise pollution is reduced to as low as reasonably practicable.

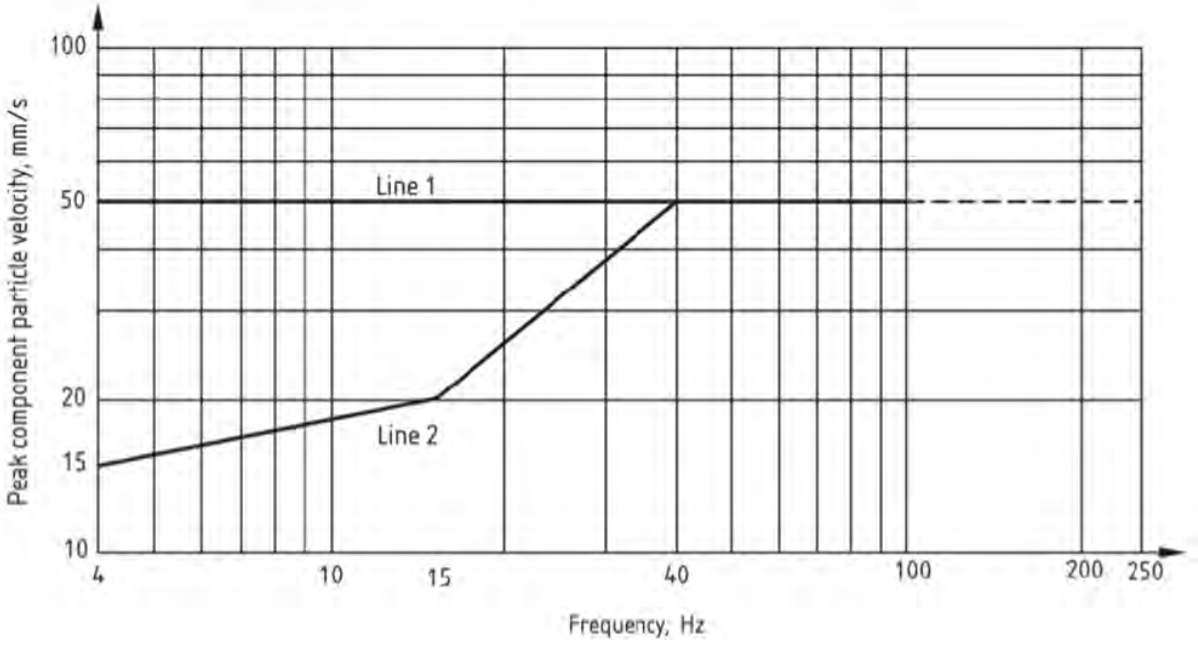
Attachment O Quarry Vibration Management Plan

1. Blasting work creates vibrations. At page 36, Table B.1 of Annex B of document BS 5228 Part 2 Vibration Control on Construction and Open Sites, provides guidance on the effects of vibration levels on human beings and these are reproduced in Table 1. Figure B.1 of the said document, i.e. BS 5228 Part 2, at page 38, shows the vibration levels, at different frequencies, that could create an onset of cosmetic damage to buildings. This figure is reproduced at Figure 1 at below.

Table 1. Vibration Level Effects on Humans

SN	Vibration Level	Effect
1	0.14 mm per second	Vibration might be just perceptible in the most sensitive situations
2	0.3 mm per second	Vibration might be just perceptible in residential environments
3	1.0 mm·per second	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents
4	10 mm per second	Vibration is likely to be intolerable for any more than a very brief exposure to this level

Figure 1. Vibration Levels Creating Cosmetic Damage to Buildings (reproduced from Figure B.1 of BS 5228 Part 2)
Key: Line 1 - Industrial and heavy commercial buildings.
Key: Line 2 - Residential and light commercial buildings.



2. An equation for predicting the vibrations produced by blasting can be obtained from document "Blasting for Construction: some critical aspects", with the front cover shown at Figure 2, and published in the July 2013 edition of Civil Engineering. From this stated document, the equation is shown at page 14 and presented at Figure 3.

Figure 2. Document from which Blasting Equation is Obtained

Blasting for construction

some critical aspects

OVERVIEW

When rock blasting is required for construction projects, the technique has a critical influence on overall project progress and costs. Lack of understanding of the discipline leads to unfortunate outcomes, either through excessive constraints on the operation, or else the adoption of cheap, inappropriate technology. In general, blasting systems used for mining are inappropriate for tight control of breaking, and for protection of sensitive structures. In addition, the general inability on a

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Figure 3. The Blasting Equation

There are various equations used to predict the maximum amplitude of vibration, and the one most commonly invoked in South Africa is derived from the old Dupont Blasters Handbook in the USA. Converted to metric units, it takes the form of Equation 1:

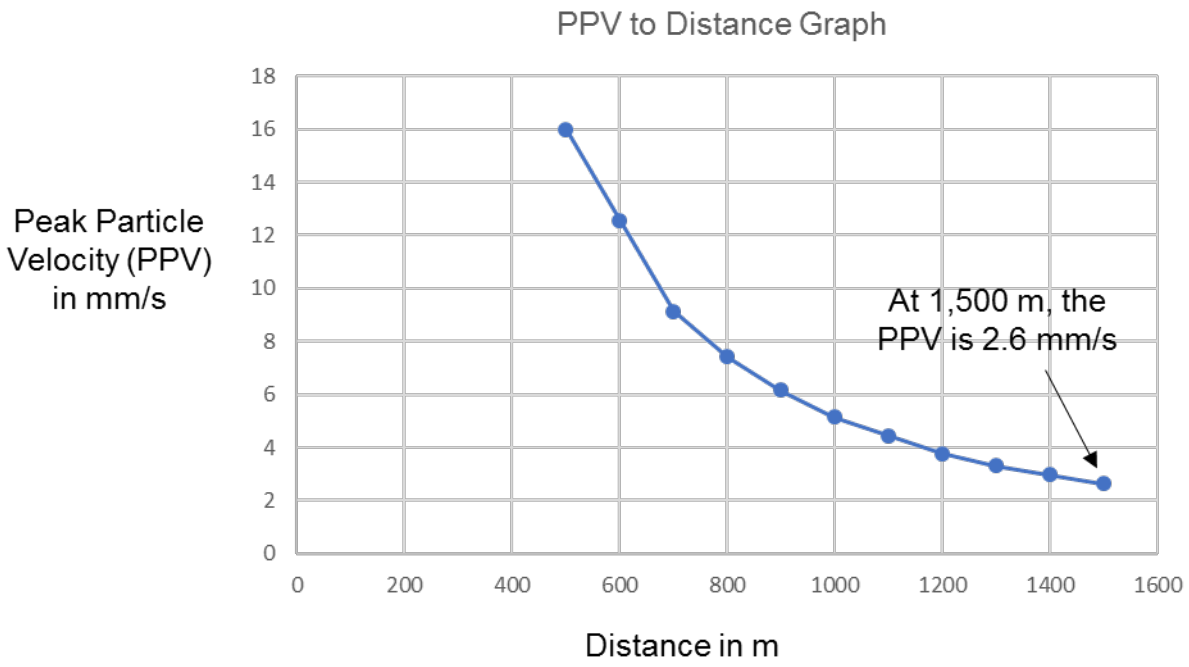
$$V' = 1143 \times \left(\frac{D}{\sqrt{E}} \right)^{-1.65} \qquad (1)$$

Where V' = predicted PPV, mm/s

D = distance from blast hole to point of interest, m
E = mass explosive per 8 ms interval, kg

3. Using the said blasting equation, and using 1,440 tons as the amount of explosives, the graph at Figure 4 is obtained.

Figure 4. Velocity to Distance Graph



4. From the graph at Figure 4, the velocity at 1,500 m is 2.6 mm/s, a level that is considered as tolerable, if prior warning and explanation has been given to residents (as shown at Table 1 at above). Moreover, the vibration occurs only once a day, and lasts for only between 1 to 2 seconds.

5. The level of 2.6 mm/s is also below the threshold level of 6 mm/s as stated at Figure 5, extracted from page 79 of BS 5228 Part 2 Vibration Control on Construction and Open Sites.

Figure 5. Vibration Limits

Annex A of Minerals Planning Guidance Note MPG 9 [12] and Scottish Government Circular 26/1992 [58] give illustrative guides to the planning conditions on vibration limits. These state that:

> "ground vibration as a result of blasting operations shall not exceed a peak particle velocity of [6 mm/sec] [10 mm/sec] in 95% of all blasts measured over any period of [six months] and no individual blast shall exceed a peak particle velocity of [12 mm/sec] as measured at vibration sensitive buildings. The measurement to be the maximum of three mutually perpendicular directions taken at the ground surface."

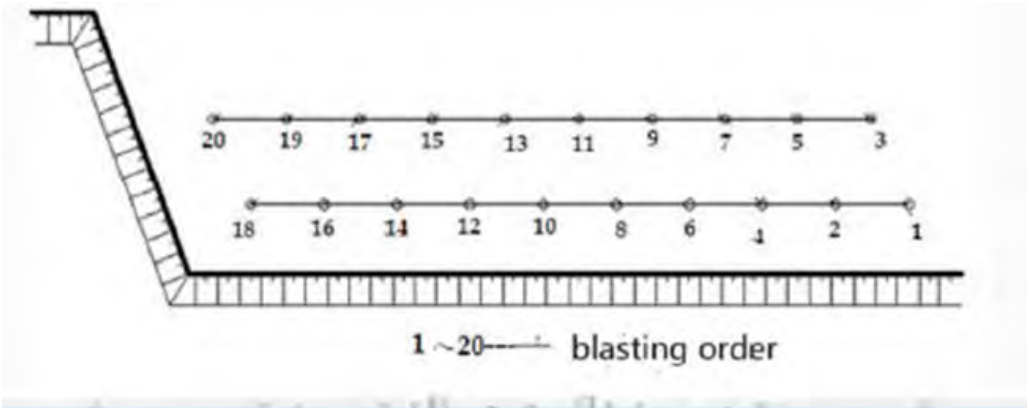
This indicates that the statistical limit should be chosen, for example, between 6 $mm \cdot s^{-1}$ and 10 $mm \cdot s^{-1}$ and that the maximum value should not normally exceed 12 $mm \cdot s^{-1}$.

6. For completeness and ease of reference, the blasting layout is shown at Table 2 and the blasting sequence for the 20 holes is at Figure 6.

Table 2. Blasting Layout

SN	Item	Dimension / Quantity
1	Number of rows	2
2	Distance between rows	4 m
3	Total number of holes	20
4	Hole diameter	140 mm
5	Hole distance	4.5 m
6	Hole depth	10 m
7	Amount of explosives in each hole	72 kg
8	Total amount of explosives in all 20 holes	1,440 kg

Figure 6. Blasting Sequence



7. To reduce vibration, and for safe vibrations, the following measures are implemented:

   7.1 Safe blasting procedure; with a Blasting Plan for each blast.

   7.2 Calculations on amount of explosives used to ensure no excessive noise and vibration, and that the levels stated at Table F-1 and Figure F-1, for discomfort to people, and cosmetic damage to buildings, respectively, are not exceeded.

   7.3 Millisecond delays for each set of explosion to reduce overall impact.

   7.4 No night blasting, no blasting on Sundays, and blasting is planned for regular times of either 11.30 am or 5.00 pm each day.