

Appendix III



Terms of Reference (ToR)

For

BETANO REFINERY & NOVA BETANO

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1. Introduction

This Terms of Reference (ToR) describes the project Environmental Impact Assessment (EIA), Environmental Management Plan (EMP) and Health Impact Assessment (HIA) plan specific to Betano Refinery Project and Nova Betano. The purpose of the ToR is to outline the process and structure for conducting Environmental Impact Assessment (EIA) and Health Impact Assessment (HIA). The ToR sets objectives, defines the scope of study, method and schedule for the HEIA process.

In line with the EIA process for Category A as set out by the Secretary of State for Environment (SEMA), the proponent will submit the ToR to SEMA for review, after which accepted will be developed further and used as part of the bidding documents in the procurement process.

2. Background Information

The Betano Refinery and Nova Betano form the centre cluster of the Tasi Mane project. The petroleum sector which includes the Tasi Mane project has been designated by the Timor-Leste Strategic Development Plan 2011-2030 as a key pillar of the nation's future development. The Tasi Mane project is envisaged to bring petroleum development to Timorese shores and provide a direct economic dividend from petroleum industry activities.

The Government of Timor-Leste, through the Secretaria de Estado dos Recursos Naturais (SERN) commissioned a study to assess the likely environmental and social impacts of the Tasi Mane Project. The study was carried out by Worley Parsons and produced the final report for the Strategic Environmental Impact Assessment (SEIA) for the Betano Refinery and Beaco LNG Plant which was issued in June 2012. The Strategic Environmental Impact Statement (SEIS) was based on engineering design studies that are, in part, conceptual in nature or entirely absent hence, as detailed design proceeds, much of the project, the description on which the predicted impacts are based could change. In some instances, generic information has been used to guide field studies and to inform the discussion to at least provide an indication of the scale and type of development that may eventually occur when the projects do proceed (*Worley Parsons, 2012*). With the FEED studies now completed for the Betano Refinery Project, it is now possible to carry out a more detailed assessment to undertake an EIA and produce a final EIS.

The Betano Refinery will be the first refinery in Timor-Leste. The objective of the Refinery is to turn the self-own crude to finished petro products for Timor-Leste domestic fuel demand. The project will provide energy security and add value to raw crude oil sale. The project will generate economic growth and increase local income of Timor – Leste. The refinery will be built on the land allocated by the government per the Tasi Mane Project (Strategic Development Plan 2011-2030).

The present residents on the assigned land will be relocated to Nova Betano. Nova Betano project is a new town located about 7 km from the refinery site. The town is planned for residents dislocated by the refinery and new population who will support the refinery operation.

There are five major components of the proposed project:

- i. Refinery
- ii. Water Supply from Quelan river including the water pipeline to Refinery
- iii. Condensate and Products Pipeline to and from Refinery
- iv. Jetty and Refinery tank farm Facilities in Suai
- v. Nova Betano

Map to show the different components to scale can be found in Figure 6.2.

3. Details of the Proponent

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4. Details of the Consultants

Once this ToR has been approved by SEMA, the Proponent will then commence the tender process. The tender process will follow TIMOR GAP's procurement procedure and guidelines to determine the potential Consultant to conduct the EIA study.



5. Legal Requirements

The EIA study will be conducted in accordance with the Government of Timor-Leste Decree Law no. 5/2011 'Environmental Licensing'. As defined in Annex 1 of the decrees, all petroleum projects are classified as Category A and therefore, require assessment by means of an EIA.

Article 8 of Decree Law no. 5/2011 defines the following phases of an EIA:

1. Presentation of the project for the evaluation and application for environmental licensing.
2. Public Consultation
3. Technical analysis and opinion by the evaluation committee
4. Decision on the procedure of environment impact assessment and allocation of the environmental license.

Likewise, there are also a range of legislation and guidelines that are deemed applicable for the EIA study for the proposed project. The legislation and guidelines are grouped into three distinct categories;

1. International Standards and Guidelines

- European Union (EIA Directive);
- World Bank guidelines (Environmental Assessment Sourcebook)
- IFC (International Finance Corporation) Performance Standards (Social and Environmental Assessment and Management Systems; Pollution prevention and abatement);
- ISO 14001; Environmental Management Systems
- ISO 9001 Quality Management System
- OHSAS 18001 Occupational Health and Safety Management System

2. National Regulation

- Down Stream Law No. 1 2012
- Pollution Control Law
- Water Supply Law No. 4/2004
- Traditional Regulation and Custom '*Tara-Bandu*'
- *Port Decree Law No. 19/2003*
- *Road Transport Decree Law No. 2/2003*

3. International Agreement and Conventions

- United Nation Framework Convention on Climate Change (UNFCCC) 1994(Control of Greenhouse Gas Emission)
- United Nations Convention on Biological Diversity
- UNESCO Convention Concerning the protection of the world cultural and Natural Heritage

Aside from the above legislation and guidelines, the contractor is also required to provide other relevant environmental law and regulation as well as guidelines which will be applied for the proposed project.

6. Study Area

The EIA study area encompasses 5 components of the project. The refinery site is approximately 230 hectares of land. The land is located between the new proposed highway and the Southern coastline. The refinery fence line is adjacent to EDTL's power plant. The source of water for the operation of the refinery is approximately 10 km away from the refinery which will be transported through pipeline by means of gravity flow.

The pipelines for both condensate and products between Betano and Suai will run along the proposed highway where Suai is approximately 75 km South West of Betano. The jetty facility and refinery facility in Suai will be dedicated to support the operations of the refinery in Betano. These facilities will be integrated with the Suai Supply Base Project. The EIA for the Suai Supply Base project was done by Worley Parsons and the project was issued its Environmental License in June 2013.

The new petroleum city, Nova Betano, is approximately 1,190 hectares of land and located about 7 km North West of the refinery.

Maps of the geographic area

Figure 6.1 shows the map of the entire Tasi Mane Project (Southern Coast Project) which consists of three centres: Beaco, Betano and Suai. As explained previously, this EIA focuses on the refinery in Betano, water supply in Betano, pipelines, jetty and refinery facilities in Suai and the new town (Nova Betano).



Figure 6.1 Map of the Tasi Mane (Southern Coast) Project

Figure 6.2 shows the project components of this EIA plotted on a South Coast map to show the relative size of the overall project and the project components in relation to each other.

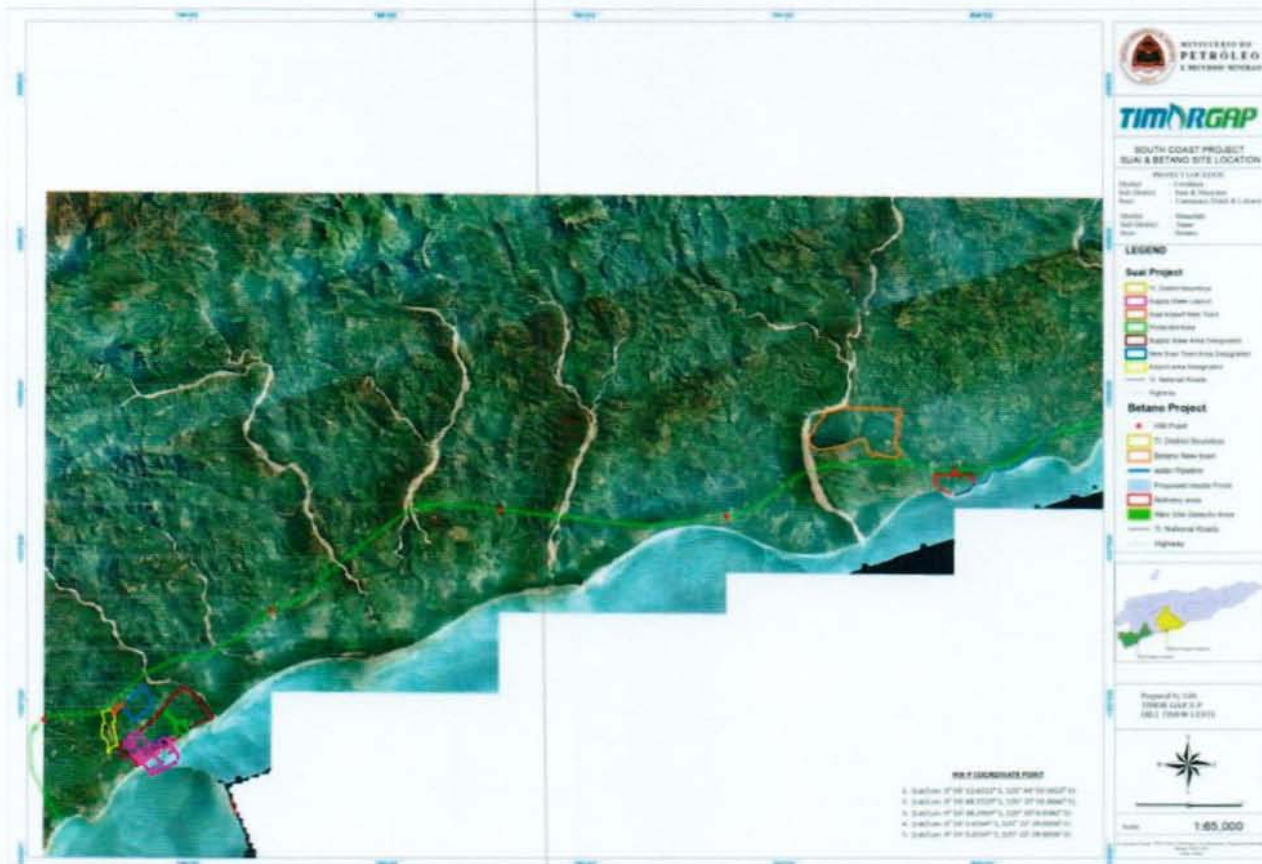


Figure 6.2 Map of the project components in relation to each other (scale 1:60,000)

Affected Area

Mostly natural vegetation with some crops and a few scattered dwellings along the coast line and mostly natural vegetation at Nova Betano the plantations along the existing road cutting through the site. Few scattered dwellings on the southern boundary that may or may not have to be resettled



Figure 6.3 Buildings and roads affected by proposed project
(Source: Worley Parsons Resources & Energy, 2012)

This impact relates to a loss of land affecting landowners, and resources such as crops and natural resources (including fishing and potable water) on the land. The latter affects land users, who may or may not be the same persons as the landowners.

Local villages in and around the Betano development are reliant on arable land and natural resources (wood for fuel, building materials, medicinal plants, fruits, fishing, water, etc.).

The loss of land to the Betano development would certainly result in the loss of agricultural land and natural resources found in the land. Access to water points will also be affected and new residents and workers, and water requirements of the project, will increase water usage in the area

Based on feedback from interviewees all cemeteries are located in the villages and would not be affected by the Betano development. There may; however, be some scattered graves located within the footprint of the Betano area.

Timeline



7. Scope of Work

a. Description of Proposed Project

The capacity of the refinery is being designed to process 30,000 barrels of crude per day and will produce: Diesel, Heavy and Light Naphtha, Gasoline and LPG. The products will be used for domestic supply to meet national demand and the remaining product will be exported.

The refinery main complex consists of the process unit, and the process support units such as utilities units, waste treatment unit, tank farm, fire water and land fill for solid waste management. The refinery complex will have non- process related supporting facilities such as Warehouse, Operation Building, Administration Building, Laboratory Building, Fire and Safety Office and Canteen.

The water from the Quelan River will be diverted through 10 inches diameter of underground pipeline about 10 km from the refinery area.

There will be 4 pipelines to transport the condensate and products connecting refinery in Betano and refinery facility and jetty in Suai. The pipelines will run mostly underground alongside the Tasi Mane Southcoast highway.

The refinery facilities and jetty in Suai are product tanks, condensate tanks and jetty with loading arms for product loading.

A new city, Nova Betano is located approximately 5 km to the north of the existing Betano village and adjacent to the Caraulun River (to the west), and will cross Betano to Same Main Road. Nova Betano's area encompasses 1,190 hectares of land. Nova Betano will contain several land uses: Offices, Commercial Areas, Hospitality Areas, Single Family Residences and Multiple Family Residences, Club House, Sports Club and Recreational Area, 18 Hole Golf Course, Driving Range, National Elementary and Secondary School, International Elementary and Secondary School and Hospital. There will also be environment facilities such as waste management and sanitary system. These main land uses will also be supported by a Fire Station, Security Station and Maintenance Facility. Nova Betano will also house the resettlement area of the refinery.

Refinery

The plot plan for the refinery has been completed and can be found in Figure 7.1. It includes the various components of the refinery and shows its location in relation to the planned highway.

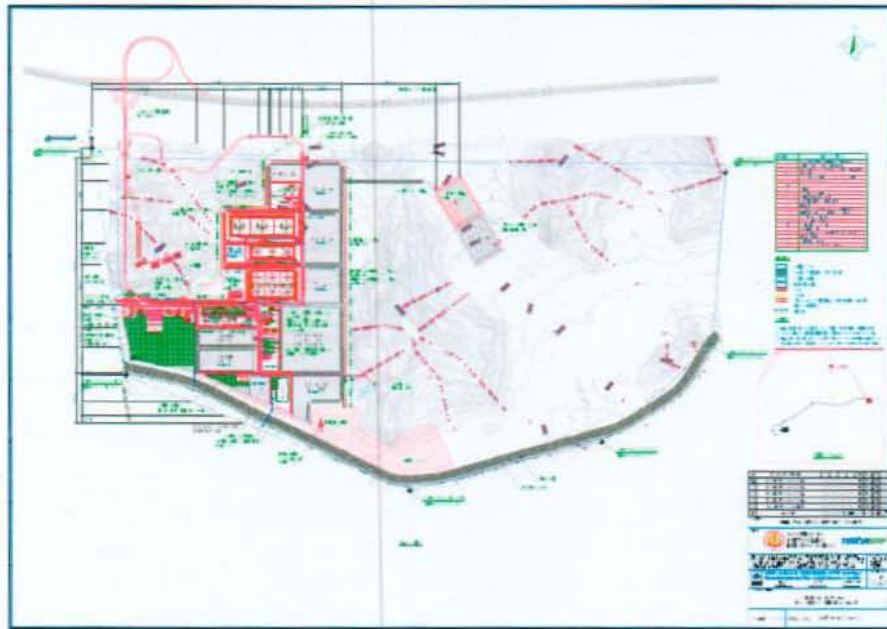


Figure 7.1 Refinery Plant Layout

Water Supply

The design for Water Supply is currently underway and the proposed supply and pipeline route can be seen in Figure 7.2.



Figure 7.2 Water Supply Route

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Pipeline route plan

As explained earlier, the route of the condensate and product pipelines will follow the proposed highway route. The total pipe length is 78 km for each line of condensate, light naphtha, heavy naphtha and diesel. The overall pipeline route from Suai Supply Base to Betano Refinery with Right-Of-Way can be found in Figure 7.3.



Figure 7.3 Pipeline Route Plan

Jetty and refinery facilities at Suai

As explained earlier, the refinery also has its own facilities in Suai. These facilities include storage tanks for both feedstock and products. The liquid jetty in Suai will be used to unload and load these feedstock and products. The plot plan for the refinery facilities can be found in Figure 7.4 while the jetty plan in relation to the whole Suai Supply Base can be found in Figure 7.5.

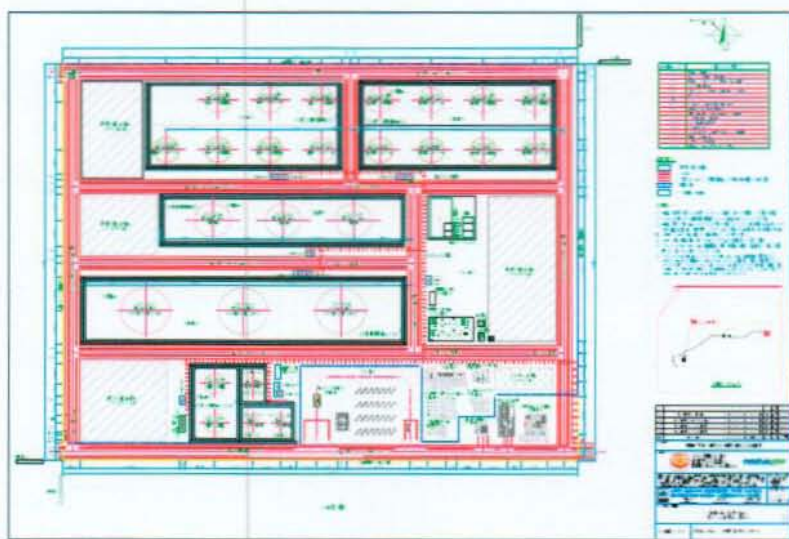


Figure 7.4 Plot plan for refinery facilities in Suai

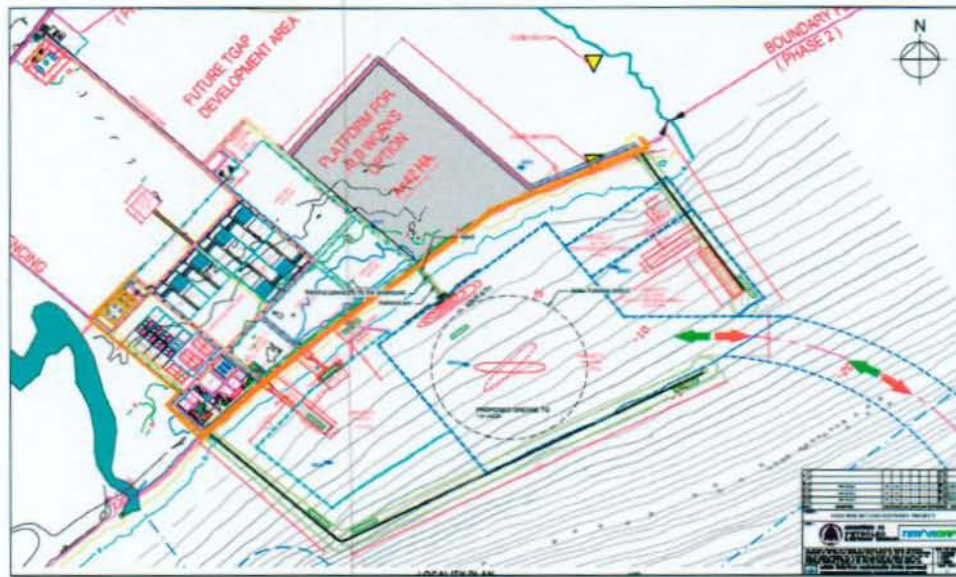


Figure 7.5 Jetty at Suai Supply Base

Nova Betano

The development for Nova Betano has only reached the pre-conceptual design phase. The pre-conceptual plan for this residential area is available in Figure 7.6.



Figure 7.6 Illustrative pre-conceptual master plan for Nova Betano

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b. Description of the Environment

Most of the information with respect to the description of environmental baseline information is covered in the '*Strategic Environmental Impact Assessment (SEIA)*' which was done by Australian Company (Worley Parsons). The following is detailed description on the baseline data of the environment:

➤ Climate and Meteorology

The project area has a typical tropical monsoonal climate with distinct wet and dry seasons. Seasonal variation in temperature is minimal, with the diurnal temperature variation often greater than the seasonal variation. Daytime temperatures are typically in the low to mid 30s and night-time temperatures are in the mid 20s.

Little historic wind speed and wind direction information was available therefore, generalised trends cannot be determined at this time. Since 1920, two cyclone events have been reported to be within 100 km of the Betano study area and an additional nine cyclone events within 200 km.

➤ Land Use and Visual Amenity

The project area comprises a mosaic of rural subsistence farms serviced by a small network of roads and tracks. In some hilly areas, the farmland has been terraced. Where they occur, villages and towns are clustered around the inter-regional roads while scattered housing is also prevalent. A variety of animals (chickens, pigs, cattle and goats) and food crops (corn, cassava, peanuts, long beans, papaya, watermelon and bananas) are raised. Trees such as mango, coconut, teak, kapok, sago and banana are also farmed and artisanal fishing in the sea is common.

➤ Air Quality

The existing air quality in the project area has been sampled and, in the absence of Timor-Leste standards, has been compared against World Health Organisation, US EPA or Australia's National Environment Protection Council (Ambient Air Quality) standards.

The assessment shows that most existing sources of air pollutants (dust particles as PM_{2.5} and PM₁₀ and gases such as nitrogen dioxide, sulfur dioxide and carbon monoxide) originate mainly from human activities such as burning of the vegetation, vehicular traffic and, to a lesser extent, power generation exhausts although, aspects such as total suspended particulates are likely to vary widely during the year due to seasonal effects. Naturally occurring sources of pollutants such as methane emissions from cattle are unlikely to be a significant influence on air quality. Current air quality

indicators are, with the exception of Freon 12 (a refrigerant gas), all below the limit of reporting or the assessment criteria set in the standards. During construction, the exposure of large areas of soil accompanied by vehicular traffic will cause localised increases in airborne dust particles. During operations, the potential impacts of emissions of gaseous pollutants will need to be assessed (including BTEX, VOCs, and NOx).

➤ **Noise**

The main existing sources of anthropogenic (i.e., caused by human activity) noise in the project area are talking, the play of children, use of power tools, music and electrical generators. Nonanthropogenic sources include the weather (wind, thunder and rain) and animals such as chickens and dogs also contribute to the current noise environment.

Project-specific noise limits have been developed based on the Western Australian Environmental Protection (Noise) Regulations 1997. These limits recognise the need to have varying permissible noise levels depending on the time of day (e.g., to protect sleeping patterns) and the sensitivity of the affected premises (residence, commercial premises or industrial site). Based on the existing background noise levels, the calculated allowable noise levels range from 45 to 57 dB (A)LA1 for noise-sensitive sites such as residences to 75 dB(A)LA1 for commercial premises and 80 dB(A)LA1 for industrial and utility premises.

➤ **Waste Management**

With the exception of sewage from Nova Betano, the predominant source of all wastes will be gaseous, solid and liquid wastes from the petroleum refinery and petrochemicals plant. These wastes will largely be contaminated by hydrocarbons but, will include inorganic wastes such as mercury, incinerator ash and gaseous wastes emitted to the atmosphere from vehicle exhausts and stationary plants sources such as gas turbines.

A waste management plan should be implemented in accordance with the waste hierarchy of reduce, reuse and recycle.

➤ **Socio-economic**

Socio-economically the project will have a profound impact on both the local Community and the whole country. With a population of 5,151, the nearest village, Betano, is typical of many south coast villages in that households typically have around 5 members, 41% are aged between 0 to 14 years, they rely on subsistence farming, 60% own a mobile telephone and 34% own bicycles while only

15% owned a motorcycle. Cars are quite rare; only 2% of households owned one. Most people relied on one of the 100 wells in Betano for their drinking water and 94% cooked over a wood fire. Nearly half of the population (47%) aged 5 or older does not have any formal education and less than 1% had a tertiary education. Malaria is common.

c. Analysis of Alternatives

The proposed project will be the first refinery in Timor-Leste. Therefore until this day, domestic demand for petroleum products is met by imports. Without a refinery, Timor-Leste would continue to rely on imports and the condensate that is produced locally would continue to be exported and processed elsewhere. A local refinery brings with it jobs , for example the new refinery will create new local jobs, bringing in new technology and drive economic growth. Jobs include direct jobs, indirect jobs and induced jobs creating income for the nation. Furthermore, the project will save money from importing finished petro product and the savings will circulate domestically for further domestic economic growth. The project will generate business opportunities, knowledge, technology, skills, less reliance on imports and improved energy security and development to Southern Coast among other impacts.

As a refinery plant is the only processing method of converting crude or condensate to finished product, the only other alternative to achieving the objective of access to petroleum products is a 'do nothing' scenario, that is to continue importing.

As mentioned earlier, the Betano cluster is only one part of the entire Tasi Mane project. As one cluster, it shares infrastructure such as the highway, with the other two clusters, Suai & Beaco. Not going ahead with the Betano cluster will impact the entire Tasi Mane project.

d. Determination of the Potential Impacts

The primary information regarding potential both positive and negative impacts either direct or indirect as well as cumulative impact is highlighted in the SEIA. Consultant is therefore required to provide the detailed potential impacts for the comprehensive information regarding the proposed project. In addition the consultant is also required to provide the detailed environmental Cost and Benefit Analysis (CBA) for the proposed project. Potential impacts can be divided into three phases:

i) Design phase

The refinery will be designed to protect and minimise the environment impact. The engineering consultant who will perform the detail design of the project will be selected with a consideration of their environment design experience. The requirement on the environment control design will be stated as their responsibility.

ii) Construction Phase

The Construction impact to community is considered minimal due to distance between the construction site and the community area. The environment construction impacts forecast are noise, dust, waste. The project team mitigation plan is to state environment control plan and monitor the result. The construction contractor is to submit the plan and follow the guideline as stated below:

- Construction Contractor is to provide report for construction activities that may create high noise level such as piling
- For the dust that may be generated during site development, the contractor will be required to monitor the dust contained in the air at the closest residential area
- Contractor is required to submit their waste management plan with their proposal
 - Solid construction material waste
 - Human waste such as toilet waste
 - Trash control and disposal plan

In addition to waste management, the construction contractor is required to provide the good working environment for their workers. The follow facilities are to be provided on site to maintain healthy and safe work condition: Drinking water, toilet, bio waste management food, personal protective equipment, lighting in work area, site medical treatment facility, safety induction and safety management plan.

Any unusual material/ object found from land excavation must be reported to TIMOR GAP for further arrangement.

Local content: Local content pertains to local personal development contribution. Construction contractor will be required to submit the local content plan with their proposal and is part of



contract evaluation criteria. As a requirement of the construction contract, the construction constructor must develop local training for specific technical workforce that will become a main support to refinery operation, maintenance and the industry development such as welder, instrument technician, electrical technician, etc.

iii) Operation Phase

TIMOR GAP has PTT Group-Thailand as partner for the Betano Refinery. It is expected that PTT will bring in their experience in refinery operation and will train several technical TIMOR GAP personnel to operate the refinery. The following are to state the refinery operation environment conduct that will be part of Betano Refinery operation principle.

Air Release Management

Refinery operation will monitor the instrument that permanently install at refinery stack to ensure that refinery release to air is within the environment limitation.

The Refinery Operation will monitor the smell sources and smell impact around the refinery complex, the example of smell source are tank vent, flare stack. The hydrocarbon vapour will be measured manually and is specified as a routine operation requirement in operation procedure. The record will be kept to monitor the change and investigate the source of problem. If the smell become a nuisance source or the smell is out of the international level, the new facilities will be added or designed to improve the smell.

After the refinery was started up, refinery will generate noise map by measuring the noise level around the equipment at site during operation. The high noise area will be managed by sign posting at the area entrance indicating ear protection requirement. Refinery will provide the tool to measure noise so that the noise around the refinery can be monitored. Due to the distant between the refinery and Nova Betano, it is believed that the operating noise will be at low level and will not impact the Nova Betano residences.

Hazardous area will be identified such as potential H₂S leak area. This type of area will require additional personal protective equipment such as H₂S sensor.

Wind direction indicator (wind stack) will be provided throughout the refinery as visible location.

Spill and ground contamination control

It is possible that the hydrocarbon or liquid chemical accidentally spill onto the soil. The accident is from mishandling. The contamination in soil will affect the ground water. The spill water is controlled by refinery spill control procedure. The refinery will establish operation practice guide to reduce the risk of environment spill. Example: Equipment handling procedure will state requirement that has potential

to cause leak or spill (such as electrical generator) must have spill retaining tray under such equipment to protect potential spill.

Ground water monitoring well

The ground water wells around refinery will be regularly monitored to ensure no leak of chemical and hydrocarbon to ground water.

Promoting environment awareness among employee and community

Betano refinery management will arrange regular environment activities for employee and community to raise the environment awareness. Example of environment activities are: trash collecting by community volunteers and refinery staff, contest in environment article writing by school students, village drinking sampling that witness by community, tree growing, etc.

Liquid waste management

Through a period of operation, the refinery need to clean the equipment based on many reasons such as maintaining their performance, equipment inspection, maintenance and repair, the liquid chemical will be used for cleaning. The refinery will review the chemical property of the cleaning liquid to ensure that it can be treatment unit cannot handle the chemical, the cleaning constructor will require exporting the waste to proper waste treatment facility.

Solid Waste Management

Refinery will develop the solid waste management procedure to state the work step for solid waste disposal. In general principle, the refinery will establish the process to separate type of solid wastes to: Solid waste that can be recycled,

Turnaround

At internal of 4 to 5 years, refinery will have a major shutdown call "Turnaround". After 4 to 5 years operation, the scale will slowly grow and deposited at various equipment and tubes. The scale comes from hydrocarbon deposit or from corrosion deposit. The scale lower the equipment performance and result refinery overall performance. At this occasion, this is the process to ensure that equipment will be safely operated. The turnaround process involves the refinery total shutdown that will result a bigger flare than normal operation. After the refinery shut down, the whole system will be blown by steam to remove the hydrocarbon film from the system. The steam blow process will be created a loud noise and smell. The noise will be reduced by installing silencer at the releasing point to minimize the noise.

Incident investigation

Refinery will establish an incident investigation in the refinery work system. The purpose of system is to follow up the error that may happen during refinery operation such as spill over the specified limit, contamination, operation outside operating window, environmental complain, unsafe act, accident with refinery. The result of investigation will improve the work method to avoid the future incident.

Potential Positive Impacts

From a positive perspective, the Betano study area will be redefined as a hub of activity and economic opportunity. This may inject a new level of energy into local communities who may be inspired to find ways to adapt to and benefit from the host of activities and opportunities associated with the Betano development.

The Betano refinery project of implementation will affect various aspects of the livelihoods of local people including changes to land use, employment opportunities and induced development. The construction period will also create a great demand for various services (food, accommodation, entertainment services, etc.) in order to serve the workers.

i. Design phase

This activities will involve the participation of local workers and private local construction phases companies. The significance of these positive impacts is major since it will stimulate the local economy.

ii. Construction phase

In construction phase, the average number of direct and indirect labourers is estimated at about 10.000 persons. Additionally 1000 employees will be required for EPC and Supervision. Betano refinery will create a major significant positive impact on workers employed during construction phases as well as their families.

iii. Operation Phases

During operation period, the Betano Refinery will require an estimated work force of 1000 people, of whom 500 are forecasted to be Timorese while the remaining will be expatriates. Most of the employment responsibilities opportunities will require good technical knowledge and skills.

Construction and operation phase will create a range of sustained indirect economic opportunities at local, district and national levels. Local sourcing of goods and services will result in revenues for local businesses and entrepreneurs, provided they can offer sufficient quality and reliability and can meet project standards, particularly on health , safety and environment

e. Assessment and Evaluation

This section will describe the environmental indicators that will be applied for the proposed project.

Method Statements

Environmental Impact Assessment

The study is intent to conduct environmental impact assessment that will describe:

- ▶ The sites and other areas likely to be affected
- ▶ The regulatory context (government law and policy)
- ▶ The existing environment (biological, physical, and social)
- ▶ Potential project related impacts
- ▶ Recommended management plans/mitigation measures

No.	Component study	Expected Output
01	Topography and land use	Land use compatibility assessment
02	Geology	1.Characteristic of study area 2.Geotechnical assessment for the surface condition 3.Assessment of soil erosion
03	Climate and meteorology	1.Seasonal and annual wind speeds and directions in the form of wind rose 2. Climate parameters 3. Rainfall patterns
04	Air Quality	Air quality of study area
05	Noise	Noise quality levels in comparison with the limits as per WHO environmental guidelines
06	Hydrology and Drainage	Rainfall – runoff relationship Estimation of Q (m ³ /s) during dry and wet season Flooding scenario
07	Marine and River water quality	Existing water quality data for freshwater and marine water at the selected sampling stations will be established

08	Land Transport	Future traffic condition from or to the project area
09	Terrestrial flora and fauna	Description of species found within and outside the proposed project area whose habitats will be affected by the development A list of fauna species found within and outside the proposed project area
10	Marine ecology and Fisheries	Checklist and diversity of marine communities around the proposed project site The existing freshwater ecosystem quality estimation using diversity indices
11	Population distribution	Present a description demographic profile of the local population according to size, age, sex, and ethnic group encountered during the survey.
12	Socio - Economic	To present a description of socio-economic profile of the local people To present general view and opinions of local people on the implementation of the project To solicit the degree of acceptance and opposition, as well as the condition set by the public on the proposed project

Table 7.1 Assessment component

Health Impact Assessment

For Betano Refinery Project, the minimum health assessment is to collect the baseline data and carry out the follow up annually.

The "Health Baseline data" is a collection of health data of the resident in the area such as the disease type (example: TBC, malaria, dengue, typhoid, cancer).

The methods of data collection are:

- 1) From the local hospital record
- 2) Direct interview (verbal interview or submitting health form). The base line data should be done in accordance of statistic ratio (total number of population to the required data).
- 3) Identifying the carcinogenic material within the refinery process and calculate the potential impact from the concentration.

f. Environmental Management Plan

The prominent aim of the Environmental Management Plan (EMP) is to ensure that the mitigation of the negative impacts and enhancement of the positive impacts is undertaken effectively throughout the life span of the project (Pre-Construction, Construction, Operation and Maintenance). The EMP shall prepare as a stand-alone document. The contractor is requested to follow the minimum requirements of EMP based the environmental guidelines that is available in Environmental Authority.

Development of an outline Environmental Management Plan (EMP) for the project will be made with emphasis on the guidelines and regulatory framework for EIA.

The findings of the EIA study will lead to the conclusion as to acceptability of the environmental impacts and the measures that can be taken to minimize effects on the environment. The need and benefits of the project should outweigh the adverse impacts, where the plant is deemed to have incorporated all relevant considerations in terms of the plant design, control systems and mitigation measures.

Formulation of Environmental Management Plan (EMP) for each significant negative impact or major risk, the Consultant should recommend and describe a measure to avoid or mitigate (reduce to acceptable levels) or when unavoidable, to compensate for the damage. In the description should include an estimate of capital and recurring costs and should identify the party/parties responsible for implementation. To revise the disaster management and emergency response plan for the area. The Consultant should assist OWNER to propose options for compensation to affected parties for impacts which cannot be mitigated especially those being displaced as a result of the proposed development. The complete set of recommended measures - in the management plan (EMP) - should also be presented in a summary table.

The document of Environmental Management Plan should cover all three phases of the project:

- a) Design phase
- b) Construction phase
- c) Operation phase

g. Public Consultation

Public consultation aims to create an environment of informed and constructive participation of all parties interested in, or affected by, a proposed development. On its own, consultation cannot prevent conflict; rather it facilitates a process in which people feel heard and included in decision making and project design, and where potentially satisfactory outcomes are identified.

The SEIA identified two main categories of stakeholders: primary stakeholders who refer to those who are directly affected or can influence the development and secondary stakeholders are those who are not directly affected but who have a strong interest in the project.

Primary Stakeholders	Secondary Stakeholders
<p>Directly affected residents (landowners and land users) within 500 m of the proposed development areas. More specifically, the following villages should be consulted during forthcoming stakeholder consultation:</p> <ul style="list-style-type: none"> • Betano: Betano. • Beaco: Maluru (Beaco), Uma-Uain Craik, Uma-Uain-Leten and Watu Dere. 	<p>Nearby settlements (between 500 m and 1 km from proposed developments). The following villages should be included in forthcoming consultations:</p> <ul style="list-style-type: none"> • Betano: Foho-Ai-Lico. • Beaco: Caraubalo and Uma Quic.
<p>Regulatory authorities, councillors and tribal authorities covering national, district and sub-district levels with authority in the directly affected project area including:</p> <ul style="list-style-type: none"> • NDSMA – main regulatory body for assessment and approval of ESIA. • Ministry of Agriculture, Forestry and Fisheries (MAFF). • Ministry of Public Works (MPW). • Minister of Justice (in case a business license is required). 	<p>NGOs and community-based organisations (CBOs) active at a national and local level, as well as those having international representation in the country. The following NGOs were reported to be active in the project-affected villages:</p> <ul style="list-style-type: none"> • Betano: Kadalak Sulimutuk Institute (KSI), La'o Hamutuk. • Beaco: GTZ, Caillalo, Colegas da Paz, La'o Hamutuk (No NGOs were reported in Maluru village).
<p>Government ministers with directly relevant portfolios:</p> <ul style="list-style-type: none"> • Ministry of Environment. • MAFF. • Ministry of Transport and Communication. • Ministry of Development. • Ministry of Education and Culture (Secretary for Culture). • Secretariat of State for Employment and Professional Training (SEFOPE). • Ministry of Planning and Finance. 	<p>Other government ministers:</p> <ul style="list-style-type: none"> • Ministry of Health. • Ministry of Justice. • Ministry of Internal Administration.

Table 7.2 Categories of stakeholders

With the local community being the most directly affected by the entire project, involvement by the community is key to the successful implementation of the project. Following the EIA process for Category A set out by SEMA, the proponent has already undertaken one public consultation in Betano on July 31st, 2014. The proponent used Information Dissemination through a public meeting to inform the public about

the progress of the Betano Refinery Project and particularly about the EIA process including the development of the ToR. Please refer to Annex A for the Attendance List.

In order to prepare the EIS and following the EIA process for Category A, the next public consultation will be the implementation survey for EIA. Survey is a form of information gathering which will collect baseline data from the public to feed into impact prediction. Other possible forms of information gathering include key informant interviews, participatory appraisal techniques. After the formulation of the evaluation committee, a third public consultation will take place.

8. Flexibility

The proposed project has five components of which each of these components may have aspects of the design which may change between the time of the writing of the ToR and the preparation of the EIA and EMP.

Betano Refinery Plant

- a) The stack and flare release calculation: The release calculation as done at this stage is the estimate based on hydrocarbons fuel property, estimated fuel usage, chemical equation. There will be some tolerance (Nox and Sox) on the calculation at this stage. The guarantee release will be obtained from the burner supply vendor at the detail design and equipment purchase. The release then should be indicated with plus and minus tolerance
- b) The water release: The fresh water property from the river was not yet identified. The water treatment plant (water rejection rate) then is only an estimate.
- c) Feed rate : as the design the plant with the flexibility to modified from 30 KBD to 40 KBD (Fired heater and fractionally column estimate)
- d) Feed type: as the design the feed in two alternatives. They are 100% Bayu Undan and Bayu Undan mix with Kitan mixing up to 30%. The possible alternative is import crude including North West Shelf (NWS) condensate
- e) Energy usage: the electrical power usage is only estimation. There should be some tolerance provided.
- f) Labor and manpower are only estimation the tolerance should be provided
- g) Rain water drain to sea is only estimated based on the historical record; the estimated run off area and the highway drain location. The tolerance should be provided.

Tank Farm

The smell impact from tank and hydrocarbon vapor venting from tanks consider minimal and should has no impact to community due to distant between the refinery and the residential area. However, in case that smell and hydrocarbon vapor to be reduced. The storage tanks vent will be designed for a provision for future vapor recovery unit connection so that the improvement can be done easily.

Pipeline along new highway

The total pipe length is approximately 78 km for each line of Condensate, Light Naphtha, Heavy Naphtha and Diesel. Pipeline Right-Of-Way (ROF) is one item component of pipeline design criteria which is refers to the land that surrounds a pipeline, including of the space for inspection, test, repair, and maintenance pipeline.

In case of pipeline is above ground, the height from ground surface to the bottom of pipe shall be high enough to facilitate wildlife movement along the Right-Of-Way.

In case of pipeline is underground (buried) a buried pipeline shall be buried at a minimum of 1.00 m which measured from the ground surface to the top of the pipe.

Nova Betano

Nova Betano is located approximately 7 km inland adjacent to Rio Caraulun. The predominant land use in the region is agriculture, although natural forest remains in the upper catchments and other areas that are too rugged for agriculture.

Nova Betano could be affected by flooding from Rio Caraulun a may require flood protection works and / or suitable setback.

Water Supply system

The main stream namely "Mota Quelan" is the river which has the watershed area of 65 – 75 km² . Generally the long slope of the river is gentle but in some parts where the river is narrow, the slope has higher gradient. Sand and gravel is commonly observed but in some parts large boulders are found. The average height from river bed to river bank is 3.5-4.0 m but in some parts it is higher.



Figure 8.1 catchment area boundary and topography of the weir-closure dam site

Weir location is considered according to the position of intake structure that needs to take out water from the right bank or right side of the headwork. Weir crest of retention water levels is preliminary water level is preliminary estimated by starting from inside pond elevation +8.000m.MSL plus head losses along pipe line 9 km.

8-

One component of the head work of Water Supply System is Weir. Weir crest elevation is considered in according to supply water level at the head pond, river bed elevation and high water level. Upstream river bed elevation is +24.000 m MSL ; hence normal supply water level is upstream apron +24.000 +sand layer 0.5m above pipe invert +pipe diameter 0.60m + submergence 0.40 m = +25.500 m MSL. Flow over weir crest and flood surcharge should be limited to the level that lower than river bank or flood mark level, high water level of 100 and 500 years return period are +27.11 4 and +27.444m MSL respectively and lower than river bank. Therefore, weir crest elevation of +25.500 m MSL is suitable and recommended.

Appendix

Appendix A - Attendance & Minutes of Meeting for Public Consultation in Betano 31/07/14