



Terms of Reference (ToR)

For

CONDENSATE & PRODUCTS PIPELINE ROUTE

8'

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1. Introduction

This Terms of Reference (ToR) describes the Project Environment Impact Statement (EIS), Environment Management Plan (EMP) for specific "Condensate and Products Pipeline Route" from Suai to Betano. The aim of the ToR is to outline the process and structure for conducting Environmental Impact Assessment (EIA). The ToR sets objectives, defines the scope of study, method and schedule for the EIA process.

The major stakeholders of the project are government institution and other related non-governmental organization. They are responsible to ensure that the negative environmental impacts are minimized and the wellbeing of the community is increased. This ToR describes the hydrocarbon products that will be transported through pipeline route of which the environmental impact is assessed and mitigated as per Timor Leste Environment Decree law 5/2011.

In line with the EIA process for **Category A** as set out by the NDE, the proponent will submit the ToR to NDE for review, after which accepted will be developed further and used as part of the bidding documents in the procurement process. The proponent will be prepared the EIA Invitation to Bid (ITB) that will be issued to qualified EIA consultants. The ITB will describe the work scope per this ToR. The EIA contractor who qualified for EIA work will be requested to propose the following plan on their proposal.



2. Background Information

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 Pipeline route will be constructed in order to respond to the delivery of condensate and products from Betano Refinery to Suai Supply Base.

The Betano Refinery will be the first refinery in Timor-Leste. The objective of the Refinery is to turn the self-owned 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 proposed project is Condensate and Refined Products Pipeline from Betano to Suai. The pipelines for both condensate and products between Betano and Suai will run along the proposed highway where the total pipe length is approximately 78 kilometers. The product itself consists of Condensate, Light and Heavy Naphtha, and Diesel. The pipeline with Right-of-Way (ROW) refers to the land that surrounds a pipeline, including of the space for inspection, test, repair and maintenance pipeline. The pipeline ROW route is located along the side of the highway. The width of pipeline Right-of-Way ROW is 45 meters to the south of highway. The Pipeline is buried underground, at minimum of 1.0 m (According to the international based practice; API, ASCE and ASME Standard) which measured from the ground surface to the top of the pipe (TOP).



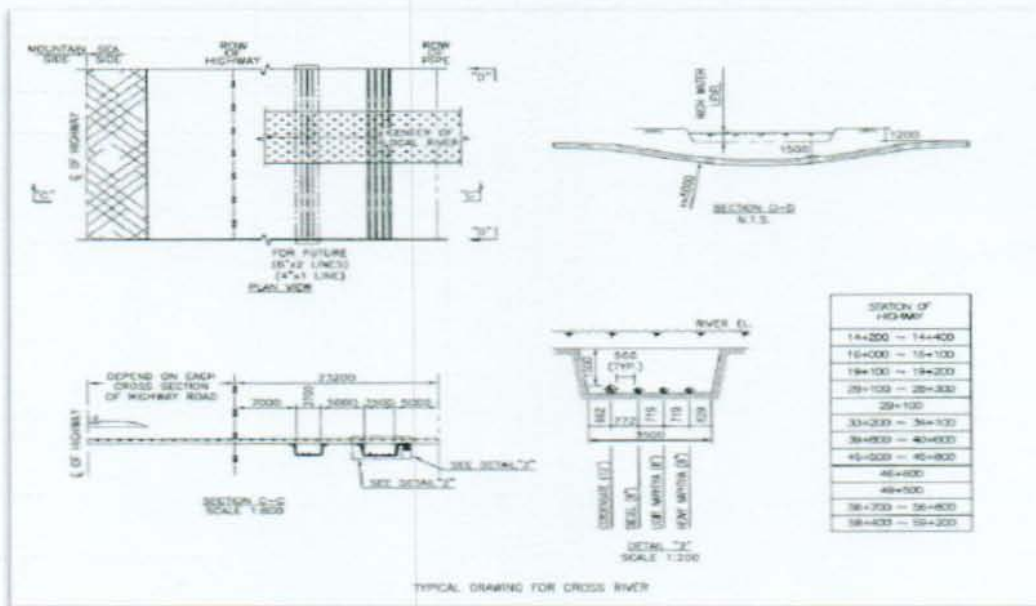


Figure 2.1. Pipeline Engineering Design Crosses Rivers

Design concept of bridges structures

The design rack of pipeline route from Suai to Betano has been identified; the following table describes more details of the distance and length of pipe rack:

No	River	Station	River width (m)	Span Length configuration (m)
1	Raiketan	14+285,200	190	40+40+40+40+40
2	Zolai	16+079,300	110	25+40+25
3	Haimanu	19+140+282	110	30+40+30
4	Lumea	28+194,300	240	30+40+40+40+30
5	Mola	33+308,000	400	25+16@40+25
6	Belulic	42+700,000	240	6@40
7	Ukasa	56+750,000	60	40+40
8	Karau-Ulun	58+800,000	800	30+19@40+30

Table 2.1. Distance & Design of Pipe crosses rivers

The Government of Timor-Leste, through the Secretaria de Estado dos Recursos Naturais (SERN) and Ministry of Finances 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 PT VIRAMA KARYA 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 and in September 2011 Detailed Engineering Design Environment and Social Economic Assessment for Highway Road From Suai to Beaco.

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 and PT VIRAMA KARYA 2011*). 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.

3. Details of the Proponent

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4. Details of the Consultants

Once this ToR has been approved by NDE, 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

- Decree Law No 5/2015 Environmental Licensing
- UNTAET Regulation No 19/2000 on designated protected areas
- Government Resolutions No 25/2011 Protection of Culture Heritage
- Decree Law No 11/2003 Telecommunication Law

- Decree Law no. 18/2008 Article 17 Protection of Agriculture & Fisheries Area
- Down Stream Law No. 1 2012
- Environmental Basic Law No 26/2012
- 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

Geographically, the proposed area of the project is relatively flat where some of the areas are hilly. The EIA study area of Pipeline Route for both condensate and products between Betano and Suai will run along the proposed highway which approximately 78 km.

The type of pipes that will be used for the proposed project of pipeline route vary from 8 to 12 inches in diameter.

Maps of the geographic area

The following 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 Condensate and Products Pipeline route.



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

6.1. Affected Area

The majority of the proposed site development area is comprised of agricultural land used for subsistence farming, natural landscape and scattered dwellings along the project. The land around the area allocated for Pipelines had mostly natural vegetation and plantations along the existing roads cutting through the site. Human activity in the development area included grazing land and some terraced fields. The primary crops grown are corn, cassava, peanuts, long beans, papaya, watermelon and banana. Some of

the commercial trees in Covalima, Ainaro and Betano including mango, coconut, teak kapok, sago and banana.



Figure 6.2 land 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 along the Pipeline Route 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 Pipeline Route 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.

The recent finding from phase one (1) of field identification, the team has identified highly environmental sensitive areas which composed of, tropical rainforest, that support high biodiversity, and spring water. Species found include many crocodiles, anacondas, monkeys, snakes, squirrels and diverse bird species such as parrot and cockatoo and also four spring waters with “Wemon” the biggest, “Wecui” and other two. These springs irrigate all the rice fields in Boko where farmers cultivate up 3 to 4 times a year. Moreover, local people also

regard the area as sacred for example a tree where “Wecui” comes out is used to perform rituals.



Figure 6.3. Spring water called “Wecui” located right on the edge of tropical rainforest

Based on feedback from interviewees during socialization some cemeteries or sacred land are maybe located along the pipeline route and should contact with cultural leader, before Pipeline Route along the Highway development. There may; however, be some scattered graves located within the footprint along Pipeline route.

6.1.1 Watercourses

There are 8 (eight) rivers found pipeline crosses area from Suai to Betano, however, the closer river of pipeline route will be connected to Suai Supply Base throughout to the Raiketan river west site to the proposed site. The detailed description is shown in below table.

(Table 6.1 Pipeline route crosses the river)

No	River Name	Effective River Width	Span Length Configuration (m)
1	Raiketan	190	40+40+40+40+40
2	Zolai	110	25+40+25
3	Haimanu/ Foura	110	30+40+30
4	Lumea	240	30+40+40+40+30
5	Mola	400	25+16'@40+25
6	Belulic	240	6@40
7	Ukasa	60	40+40
8	Caraulun	800	39+19@40+30

(Source: Report of Reconnaissance Survey,
Ministry of Finance Petroleum Infrastructure Development Project)

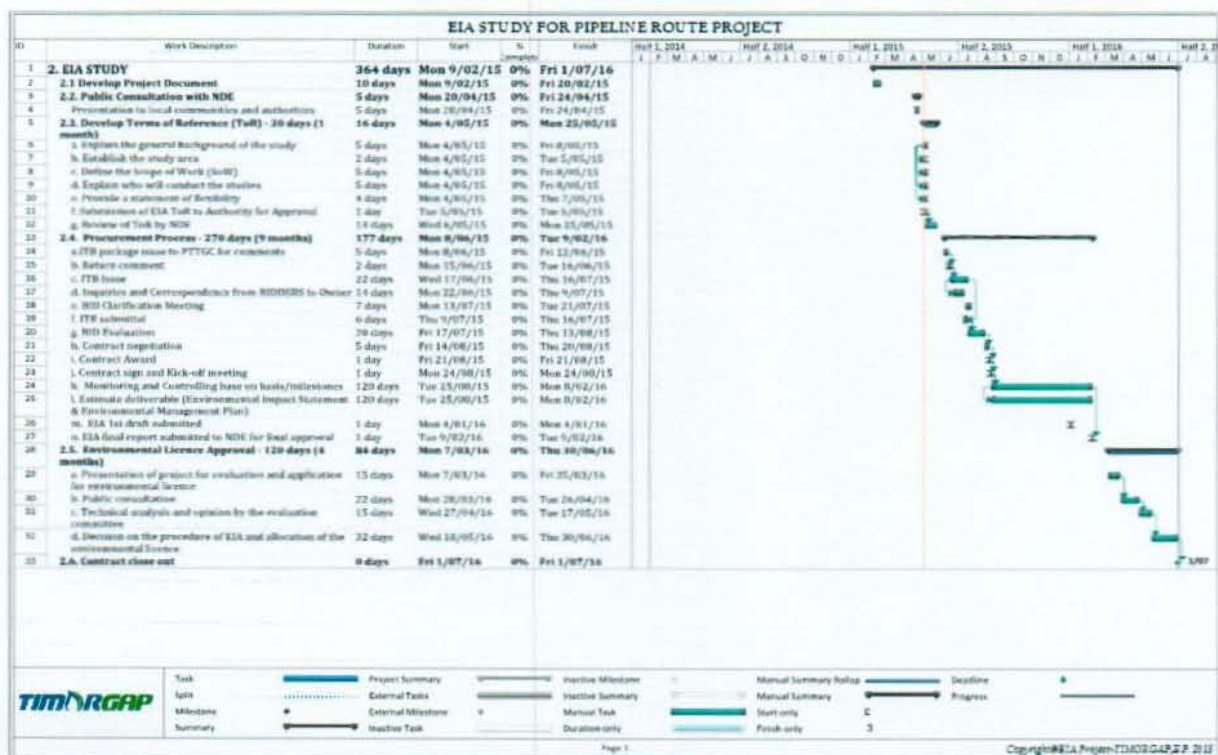
6.1.2 Linear and transport components

The affected area does not have any existing airports or functioning ports. However there are various electrical power transmissions across the highway. Figure 6.3 shows the electrical power transmission route in relation to the planned Highway connecting Suai, Betano and Beaco.



Figure 6.3 Electrical Transmission Route and Proposed Highway

Timeline of the Proposed Project



7. Scope of Work

a. Description of Proposed Project

The proposed project is Condensate and Products Pipeline route from Betano to Suai.

The pipelines for both condensate and products between Betano and Suai will run along the proposed highway where the total pipe length is approximately 78 kilometres. The Product itself consists of Condensate, Light and Heavy Naphtha, and Diesel.

The Transferring pipes from Betano Refinery with sizes vary from 8 inches to 12 inches in diameter shall continue along the high way route to the Tank Farm area located in 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.

There will be fourth (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 South coast of Highway. The pipeline with Right-of-Way (ROW) refers to the land that surrounds a pipeline, including of the space for inspection, test, repair and maintenance pipeline. The pipeline ROW route is located along the side of the highway. The width of pipeline Right-of-Way ROW is 45 m to the south of highway. The Pipeline is buried underground, at minimum of 1.0 m (According to the international based practice; API, ASCE and ASME Standard) which measured from the ground surface to the top of the pipe (TOP).

Relevant Scale of the Proposed Project

The relevant scale of the proposed project covers components on the southern coast project as shown on the figure 7.1. The project components of this EIA plotted on a South Coast map to show the relative size of the overall project.



Figure 7.1. Map of the project components in relation to Proposed Project (scale 1:7,000,000)

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.

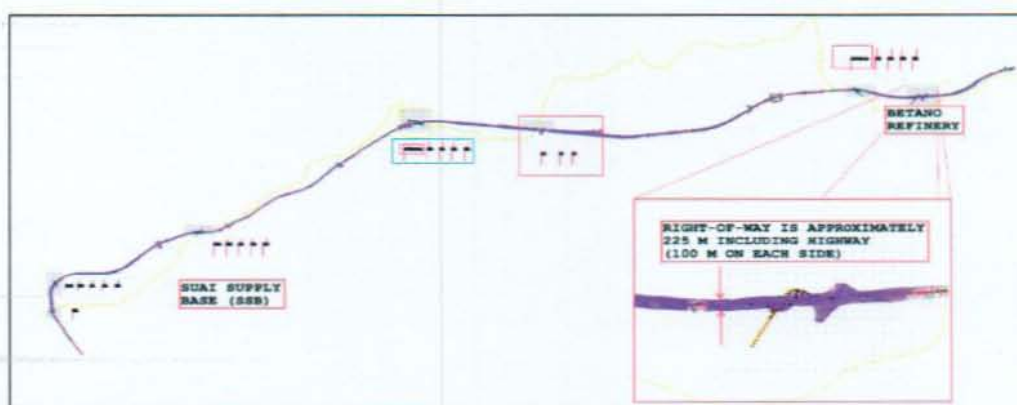


Figure 7.2 Pipeline Route Plan

b. Description of the Environment

Most of the information with respect to the description of environmental baseline information is covered in the '*Preliminary, detailed engineering design environment and social economic assessment for highway roads from Suai to Beaco*' which was done by PT. Virama Karya- Multi Arch, LDA, The following is detailed description on the baseline data of the environment:

1) General Topography and Climate

General topography in the districts is mountains and low lands. The highest mountain in Cova Lima District is Taroman Mount with 1,765 m height, in Ainaro District is Sabiria Mount with 2,495 m height, in Manufahi District is Kablaki Mount with 2,459 m height, and in Viqueque District is Mondoperdidu Mount with 1,790 m height. Some rivers that flows throughout year in districts and districts they crossed are as followed. Tarafa River is located in Cova Lima District. Boronuhu River is located in Ainaro District. Two rivers are located in Manufahi District, i.e. Laklo do Sul and Belulik Rivers, and the second river crossed in Ainaro District. In Manatuto District are three rivers, i.e. Laclo, Dilor, and Sahem Rivers, and the third river crossed in Manufahi District. In Viqueque District there are four rivers, i.e. Laleia River is crossed in Manatuto District, Seisal River is crossed in Baucau District, Luka River dan Kuak River.

General climate in all districts based on the recording data at Comoro Station, Dili. The rainfall pattern of all districts is of equatorial type. The rainfall pattern is bimodal with heavy rains occurring in March to April and December while the short rains are experienced in January to February and May to November per years. The average annual rainfall is 72.7-527.4 mm. Range of temperatures is between 22.9-31.3 °C.

2). Geology

The geology of Timor-Leste comprises predominantly limestone and metamorphosed sediments overlying ancient Proterozoic basement rocks. Several theories attempt to explain the tectonic and formational history of the island and discussion on the geological history continues. However, all theories agree that the island is composed of contributions from both the north-north-easterly moving Australian continental plate and highly deformed rocks from the Banda Terrane of the southerly moving Eurasian plate. This suggests that Palaeozoic conditions similar to that shown in the Bonaparte Gulf Basin

(Northern Australia) should be present. The carbonate sedimentary rocks deposited since the Permian and the lack of noncarbonated material indicate that the area has existed as an island for a long period of time.

Globally, Timor-Leste is one of the most significant contributors of sediment to the world's oceans (Milliman *et al.*, 1999).

3). 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.

4). 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 Organization, 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 PM2.5 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 localized 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).

5). 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. Noanthropogenic 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 recognize 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.

6). Social Services and Community Facilities

Most of the existing social facilities lack basic services such as water, sanitation, electricity and solid waste disposal. The situation is particularly grim in the informal settlement. Social facilities such as schools are inadequate

7). Economic Activities and Employment

The district depends on agriculture for its livelihood. It is the main source of income and employs about 90% of the labor force. Therefore to exploit the full potential of the sector, efforts should be made to strengthen the delivery of services to farmers and improved infrastructure.

8). Terrestrial Biodiversity

Timor-Leste is a country positioned in a biodiversity hotspot, known as Wallacea, which harbors a number of globally significant ecosystems and endemic species. The hotspot is second in rank to the Tropical Andes in terms of bird endemism. The geographic position of Timor-Leste also places it in a strategic area for marine biodiversity being a part of the Coral Triangle, which sustains about 120 million people and where 76 percent of the world's coral species and 6 of the world's 7 marine turtle species can be found (NEGA, 2010 and IBA, 2007).

The composition of the flora of Timor island is influenced by Timor's location in Central Malesia (Wallacea), a transition zone between the main rainforest blocks of the Sunda (Peninsula Malaysia, Sumatra, Borneo, West Java) and Sahul (New Guinea) shelves (van Welzen, *et al.* 2005 in Cowie 2006). While Timor has a flora that is in many ways transitional between these areas, it lacks the diversity of many of the major rainforest elements found in those blocks such as Dipterocarpaceae, Rhododendron, and Myristicaceae (van Steenis, 1979 in Cowie, 2006).

From the survey of birds in Timor-Leste, 3 were identified to be endangered [Timor green pigeon (*Treron psittacea*), local name (L.N.): Punai Timor; Timor imperial pigeon (*Ducula cineracea*), L.N: Pergam Timor]; and Wetar ground dove (*Gallicolumba hoetdii*) L.N.: Delimukan Wetar]; one (1) is critically endangered (Yellow-crested cockatoo (*Cacatua sulphurea*), L.N.: *Kakatua jambulkuning*]; and one (1) is vulnerable [Timor sparrow (*Padda fuscata*) L.N.: Gelatik Timor]. The non-bird fauna of Timor-Leste and its associated islands is poorly known.

However, the recent surveys discovering new species of bats, frogs, geckos and skinks,

c. Analysis of Alternatives

The proposed project will be the first onshore pipeline that will be linked from Betano Refinery to Suai Supply Base. The aim of the proposed pipeline project is to secure local or National Energy demand for petroleum product.

The project will generate business opportunities, knowledge, and technology, skills, less reliance on imports and improved energy security and development to Southern Coast among other impacts.

In terms of safety wise, the transferring hydrocarbon product through pipeline is more safely in comparison to other types of transportation.

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.

The alternative technology of Pipeline project from Betano to Suai based on International best practices, regulation and standard are described as follow:

1. Corrosion protection

The pipeline corrosion is caused by current flow-electrodes leaving the iron in the steel by used impressed current system involves connecting rectifier to the line.

The pipeline for normal range of flow velocity is 1 – 2 m/s, except for hydrocarbon containing a separate water phase, velocity is higher than 1.5 m/s to prevent corrosion in the unlined carbon steel and Corrosion protection

2. Pigging launching and receiving station

Pigging shall be required for using pipeline inspection to perform various maintenance operations without stopping the flow in pipelines. This is accomplished by installing launching station closed to the pressure-driven flow to push it along down the pipe unit it reaches the receiving station.



3. General pipeline instrument

General pipeline instrument such as flow measurements, control valve and pressure transmitter Safety facility equipment such as pressure reducing valve etc.

4. SCADA

SCADA is the one of the distributor control system (DCS) will be provided for monitoring process.

The pipeline and associated facilities are designed in accordance with, but not limited to, the following regulations, standards and codes:

CFR – Code of Federal Regulations

- Title 49, Part 192 : Transportation of Natural and Other Gas by Pipeline ;
Minimum Federal Safety Standards.
- Title 49, Part 195 : Transportation of Hazardous Liquids by Pipeline.
- API – American Petroleum Institute
- API 5L : Specification for Line Pipe.
- API 6D : Specifications for Pipeline Valves.
- API 6FA : Fire Test for Valves.
- API 1102 : Steel Pipelines Crossing Railroads and Highways.
- API 1104 : Standard for Welding Pipelines and Related Facilities.

ASCE – American Society of Civil Engineers

- ASCE 7 : Minimum Design Loads for Buildings and Other Structure.

ASME – American Society of Mechanical Engineers

- ASME B31.4 : Pipeline Transportation Systems for Liquid Hydrocarbons and Other Liquids.
- ASME B31.8 : Gas Transmission and Distribution Piping Systems.
- ASME B16.34 : Valves-Flanged, Threaded and Welding End.
- ASME B16.5 : Pipe Flanges and Flanged Fittings.

NACE – National Association of Corrosion Engineers

- NACE RP-0169 : Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
- NACE RP-0175 : Control of Internal Corrosion in Steel Pipelines and Piping Systems.
- NACE RP-0286 : Electrical Isolation of Cathodically Protected Pipelines.
- SSPC – Steel Structures Painting Council

The design-contingency condition is defined to include the sustained loadings for normal operating conditions, combined with occasional loadings from extreme environmental events. Design contingency conditions are anticipated to occur rarely, if at all, during the lifetime of the system. The stresses and strains produced in the pipeline by these loadings shall remain within design-criteria limits. The loadings for the design contingency condition on the above-ground pipeline shall include, at a minimum:

- Internal design pressure
- Temperature differential
- Dead and live loads
- Contingency earthquake
- Loss of a support
- Wind design load

Design for Underground pipeline project from Betano to Suai can be seen in table below

	Item No.	Item Description
Pipeline Component	1	External Coating
	2	Internal Coating
	3	Cathodic Protection
	4	Painting (as External Coating for A/G pipeline)
	5	Insulation
	6	Pipe Support
	7	Fencing
	8	U/G and A/G Interface
Pipeline Control System	1	SCADA (Supervisory Control and Data Acquisition System)
	2	Environmental Impact (wildlife movement blockage)



d. Determination of the Potential Impacts

The potential negative and positive impacts that will be associated with the development of the proposed Condensate and Products pipeline route project. The impacts will be related to activities carried out during construction, operational, maintenance, commissioning and decommissioning phases of the project including activities carried out at the labor camps, contractor's yard and other project development components.

The impacts of the project can be categorized into: *impacts on the biophysical impacts; socio-economic impacts; and health and safety impacts*. Below is both positive and negative impact during pre-construction, Construction and Operation phases.

1). Negative impact of the proposed pipeline project

a) Negative Impact during Pre-construction Phase

Land Ownership

The proposed project was planned with 78 kilometers length and right of way (ROW) 45 meters. It means the proposed pipeline project will run along the highway project about 100 meters land of width to implement the project. For this need should be processed by the contractors and proponents of the project implementation. Generally, the community supported to the project implementation and need a fair substitute to their lands, farms, crops, paddy lands, houses, etc. from the contractors or government.

b) Negative Impact during Construction Phase

Analysis of Anticipated Negative Environmental Impacts of Construction Activities

Extraction and Use of Materials

The pipeline construction materials such as hard core, ballast, rough stone, gravel and water will be required for the construction activities and will be obtained from quarries, rivers and land. Since substantial quantities of these materials will be required for construction of the pipeline, the availability and sustainability of such resources at the extraction sites will be negatively affected, as they are not renewable in the short term. In addition, the sites from which the materials will be extracted may be significantly affected in several ways including landscape changes, displacement of people, intrusion into settlement, animals and vegetation,

poor visual quality and opening of depressions on the surface leading to destruction of agricultural crops, several human and animal health impacts.

Dust Emissions

During construction, the project will generate substantial quantities of dust at the construction site, diversions, material site and its surrounding. The sources of dust emissions will include excavation, construction, leveling works, and to a small extent, transport vehicles delivering materials. Emission of large quantities of dust may lead to significant impacts on construction workers and the local residents, which will be accentuated during dry weather conditions.

Exhaust Emissions

The trucks used to transport various building materials from their sources to the project site will contribute to increases in emissions of CO₂, NO₂ and fine particulates along the way as a result of diesel combustion. Such emissions can lead to several environmental impacts including global warming and health impacts. Because large quantities of materials are required, some of which shall be sourced outside the districts, emissions released can be enormous and may affect a wider geographical area. The impacts of such emissions can be greater in areas where the materials are sourced and at the construction site as a result of frequent gunning of vehicle engines, frequent vehicle turning and slow vehicle movement in the loading and offloading areas.

Noise and Vibration

The construction works, delivery of materials by heavy trucks and the use of machinery or equipment including bulldozers, generators, grinders, mixers, compactors and crushers, drills will contribute high levels of noise and vibration within the construction site and the surrounding area. Elevated noise levels within the site can affect project workers and the residents, passers-by, domestic animals, wildlife and other persons within the vicinity of the project site.

Risks of Accidents and Injuries to Workers

Because of the intensive engineering and construction activities including grinding and cutting, masonry work, among others, construction workers will be exposed to risks of accidents and injuries. Such injuries can result from accidental falls from high elevations, injuries from hand tools and construction equipment cuts from sharp edges of metal sheets, failure and collapse of machines. Injuries and/or fatal death can also occur due to attacks by wild animals or bandits. Open ditches, unfinished works and improper storage of materials can lead to accidents to both the public and workers.

Clearance of Vegetation

There will be little realignment of the pipeline project thus minimum vegetation clearance. Some section requiring deviation will require clearance of bushes which will lead to disruption of animal's ecosystems, death of animals, among others.

Increased Soil Erosion

The area has been exposed to massive erosion and structures need to be developed to reduce soil erosion during road construction. Soil erosion leads to sediments loading and silting water sources, reduction in river or stream flows upon abstraction or siltation, expose aquatic life to risks and depleted oxygen levels, affects wildlife watering location, destruction of river banks and basin.

Waste Generation

Large quantities of solid waste will be generated at the site during construction of the road and related infrastructure. Such waste will consist of excavated materials, vegetation, metal drums, rejected materials, surplus materials, surplus spoils, paper bags, empty cartons, waste oil, wasting bitumen, among others. Such solid waste materials can be injurious to the environment through blockage of drainage systems, choking of water bodies and negative impacts on human and animal health. This may be accentuated by the fact that some of the waste materials contain hazardous substances such as waste oil, solvents, while some of the waste materials including metal cuttings and plastic containers are not biodegradable

and can have long-term and cumulative effects on the environment. Stored materials shall also generate waste in form of oil spills from storage tanks, filling platforms and transfer tanks.

c) Negative Impact during Operation Phase

Contamination of Environment

Contamination of soil, water and air might take place during the pipeline construction process. Soil contamination can occur through aerial deposition and spills of soil related pollutants; leakage/oil spill, storm water this will lead to silting and development of gulley and depressions. Air quality will be reduced due to generation of dust, hydrocarbon emissions nitrogen oxide, sulphur oxide and particulate matter from machineries. Noise generation from machinery, equipment and increased traffic will also lead to disturbance of community members, scare domestic and wild animals.

Water will be contaminated due to siltation of water pans, rivers; deposit of construction residual materials hydrocarbons. The hydrological patterns will also be affected with increased flows from collection drains and surface run off from the pipeline route. The water quality is also likely to change in terms of turbidity, hydrocarbon levels, silt, suspended solids, organic matter etc.

Hydrocarbons levels at water sources shall increase due to spillage and deposit of oil residue from pumping machines and water transportation tankers this will lead to damage of river banks and basin near points of abstraction, transfer of hazardous material into aquatic and human systems leading to health risk

2). Potential Positive Impacts of proposed project

From a positive perspective, the pipeline route project from Suai to Betano 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 Tasi Mane project development.

The Pipeline route 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.

a) Pre- Construction phase

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

b). Construction phase

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

c). Operation Phases

During operation period, the proposed project 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	<p>Description of species found within and outside the proposed project area whose habitats will be affected by the development</p> <p>A list of fauna species found within and outside the proposed project area</p>
10	Marine ecology and Fisheries	<p>Checklist and diversity of marine communities around the proposed project site</p> <p>The existing freshwater ecosystem quality estimation using diversity indices</p>
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	<p>To present a description of socio-economic profile of the local people</p> <p>To present general view and opinions of local people on the implementation of the project</p> <p>To solicit the degree of acceptance and opposition, as well as the condition set by the public on the proposed project</p>

Table 7.1 Assessment component

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.

In general, the document of Environment Management Plan (EMP) should cover all three (3) phases of 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).</p> <p>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.</p> <p>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, Cailalo, 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 NDE, the proponent has already undertaken one public consultation in Betano on July 31st 2014, and other public consultations in Hatu-udo, Cassa, Suai and Zumalai on April 21st-24, 2015.

The proponent used Information Dissemination through a public meeting to inform the public about the progress of the Betano Refinery Project specific for the pipeline route along the highway project and particularly about the EIA process including the development of the ToR. Please refer to Annex A and B 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

Terms of Reference (ToR) provides the framework for preparing the EIA and EMP report and will serve as a benchmark for reviewing those report.

The important thing to note that the commitments described in this ToR are a minimum that must be met, and that more be required if necessary. It is envisioned that such changes may include:

- Requirements for additional schedules and/or expended scope of work , to ensure that the nature and magnitude of potential environmental effects are fully and accurately identified
- Changes in methodology of the studies referred to in section 6.0 of this ToR. This may be in response to studies that showed environmental effects to be greater or less than previously estimated
- Modifications to the consultation program
- Any other modifications required or available through changes to Acts or Regulations

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 (ROW) 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

Piping sizing is designed to cover the future expansion of condensate capacity at 40,000 BPD (Barrel per Stream Day)

For designed pressure of pipeline, highest elevation or static head is considered Booster Station for Pump is considered in case the distance more than 160 kilometers (100 miles)

**Appendix A- Attendance & Minutes of Meeting for Public Consultation in Manufahi-
Suco Betano on 31/07/2014**

**Appendix B- Attendance & Minutes of Meeting for Public Consultation in Ainaro &
Covalima Districts on 21 – 24 April 2015**

