ENVIRONMENTAL MANAGEMENT PLANS (EMP) - GLOBAL OIL STORAGE TERMINAL IN LAUHATA, WITH THE CAPACITY OF 10,000 M^3 TANK

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DRAFT REPORT OF "EMP" OF GLOBAL OIL STORAGE TERMINAL IN LAUHATA, WITH THE CAPACITY OF 10,000 M^3 TANK

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For Global Oil Terminal, LDA

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1. EXECTUTIVE SUMMARY

The environmental impact statement (EIS) of the proposed project development has been prepared based on Timor – Leste environmental licensing law (DL 5/2011) and other relevant regulation that required every major development to conduct the environmental impact assessment (EIA) prior to construction and operation of the project. The environmental license is also required information by ANPM to approve the project location and eventually the design document of the project.
The proposed project development of fuel terminal in the Suco Lauhata, Liquica, with the total capacity of storage tank of 10,000 KL, is considered major development, which will contribute the adverse impacts to the environment (land, marine water, groundwater, soil, and air), socio-economic and occupational health safety. All these mentioned impacts should be properly assessed, during the preparation of project (project planning and design) in order to mitigate the impacts during the implementation of the project (construction and operation stages). The impact assessment would also need to consider the baseline information (existing condition = no project yet) prior to the commencement of the project, which is important, as the reference point/information to project of predict environmental condition with the project development already in operation.

Based on the impacts and scenarios, developed, the mitigation measures are designed in order to eliminate, minimized or offsetting the impact that potentially arise during the project implementation. The environmental management and monitoring plan (EMMPs), as presented provide the detail information of the impact, mitigation, measured, and cost required to implement them. The monitoring program with the clear KPI (Key Performance Indicator) would also be necessary in order to ensure the effective implementation of EMMPs.

1.1 Project Overview

The project development of fuel storage terminal with total storage tank of 10,000 KL which planned to be constructed in Suco Lauhata is an investment an investment proposal from Global Oil Storage Terminal LDA, an international company originated from Singapore that has been in petroleum product trading and distribution in Timor – Leste since 2004. The development will take a total land of 1.3 HA, which has been secured by the project through the long-term lease with Timor Cement LDA. This total area of land will be used to construct the for storage tanks, supporting office, loading and unloading bay, and other supporting utilities such as fire water, fire management system, piping system, bridges, and other miscellaneous items to make safety and sustainable operation of the fuel storage facility.
The existing jetty and other basic infrastructure such as national road of Dili – Liquica and National Power gridline, make the selected project location is most suitable, compare to other place. The project owner will not have to invest its own capital to construct the jetty, power grid, and road access to the project area and to the costumers.
Two downstream petroleum products (Gasoline and Diesel fuels) will be imported from foreign countries and stored in this storage terminal and distributed to various market outlets such as fuel filling stations in Timor – Leste or any other company such as constructor that required bulk amount of fuel in their construction area. As the scale and potential impacts would significant (similar industry in other places), the environmental and social impacts assessment would necessary to plan a proper mitigation measures in order minimize the impacts and ensure the safety and sustainable operation.

1.2 Relevant Regulatory Framework

The review of existing regulations is very important to provide a legal information that need to be complied by both Government as the regulatory body and project proponent as the implementing agency that execute the project. The following table provides the summary of the important relevant legal framework in Timor – Leste to the current proposed development project.

Table 1.1. Summary of the Relevant Legal Framework to the Business Development

Subject	Regulation	Relevant Article
Environmental Protection	1. Constitution of Republic of Timor – Leste 2. Environmental Licensing law (Decree law 5/2011)and base law of environmental (decree law 12/2012)	• Article 6- f: Protection of environment and natural preservation to ensure the sustainability • Decree laws on environmental protection: these two DL are relevant to the project development. • Require for every major development to have proper environmental license prior to the commencement of the development
Downstream Petroleum product related business	1. Decree law 1/2012: on the Downstream sectors 1. ANPM Regulation no.2/2014, of 24, October 2014, first amendment of the decree law No. 1/2012 2. ANPM Regulation No. 1 /2013 3. ANPM Regulation no.3/2014, of 24, October 2014, 4. ANPM regulation No. 1/2016, March 2, 2016, on Installation and Operation of Fuel Storage Facilities	Basic regulation for the business related to the downstream petroleum products, including the procedures and police for safety the installation and operation of fuel storage facilities
Crime against the Environment	Penal Code II Crime Against the Environment, such as water, air, marine, and soil pollution: Article 215 – 218	Proper punishment for the crime against the environment
Land owner and territorial	• Law 3/2017 – land title in Timor - Leste • Law 13/2017 - Special Regime on non-moveable properties • Lei 6/2017 – 19 of Abril 2017 - Spatial Planning Law	Entire regulation should be complied by the project owner in solving the land issue and title
Biodiversity and protected zones	• Decree Law 5/2016 on Protected Area	Assessment on the protected zone and any relevant sensitive biodiversity

	• Decree Law on Biodiversity (March 2012)	around project area that will be affected by the project development
Fishery	• Decree Law 5/2004 - General Regulation on Fishing • Law No.6/2004 on Legal • Decree Law 14/2004 – Offences of Fisheries	General guidance on the fishery zone and regulation to be complied when fishing, including the size of the net, etc.
Air Quality Guideline	• World Health Organization (WHO) – 2006 – Air quality Guideline for PM 10 • IFC Performance Standard on Ambient air quality	Adopted in absence of regulation in Timor – Leste. This guideline provide the threshold of ambient water quality standard measure in PM and flue gases (SO_2, NO_2, Ozone)
Labor Code	Law 4/2012 – labor code	Labor and employer right and responsibility to be complied
Solid Waste management	Decree Law 2/2017 – Urban Solid waste Management System	Regulate the current mechanism of urban solid waste collection and disposal system
Noise and Vibration	UNTAET Guideline on Ambient Noise - 2002	Adopted the ambient noise issue from UNTAED in absence of Timor – Leste own regulation
Climate change related issue	• UN Framework to combat global climate change in 1992 and Kyoto Protocol • Vienna Convention in 1993 for the protection of ozone layer and Montreal protocol	Overall guidance on the climate change issue and how to build climate adaptation program
Soil pollution	No regulation yet. But the groundwater will be issue if soil shall be polluted	
Water resources and drinking water	• Decree law 4/2004 - Water Supply for Public Consumption • Draft – Law on Water Resource Protection • WHO – Drinking water quality Standard	Drinking water quality standard for human consumption. Some other laws such as water resource protection need to be developed and approved
Occupational health and safety	IFC and other relevant best practice internationally	Various options provided in order to minimize the accident rate related to the occupational, health, and safety system. The project owner could take this reference and tailor into the project need

Beside the legal frame work, the baseline data collection is also an important part of the study to provide the necessary data and information to properly asses the impacts and provide the mitigation measures.

1.3 Baseline Environmental Information

The baseline data of environmental and socio-economic are important to be established prior to the development, which will be used as reference information by the project owner and regulatory agencies during the implementation of the project.

This baseline information is used to perform various analyses to support the environmental impacts assessment and proposed the mitigation measures. The baseline data should also be useful information as reference to conduct the monitoring program/activities during the project implementation. For this study, the following baseline data of environment and socio-economic were stablished or collected as part of the Environmental Impact Assessment (EIA) study.

- Groundwater availability and Quality within the project boundary (groundwater pumping test and quality measurement)
- Surface water availability and quality from the river, including the flood flow analysis
- Baseline information of air quality measured in term of particulate matter (PM10, PM2.5) , CO_2, NO_2, and
- Noise and Vibration
- Soil quality
- Marine water quality and benthos
- Bottom sediment in coastal area
- Topographic of the project area
- Direct observation on the coral and fisheries (for the selected spots)
- Geo-technical site investigation and other soil transport parameters
- Tidal data collection
- Social economic data collection (direct survey and interview)

These above baseline information/data was used to help assess the environmental and social impacts of the project development. Based on the impacted, the mitigation and monitoring program were established to minimize or prevent the impacts.

1.4 Summary of Impacts and Mitigation Measures

Using the baseline information combine with the environmental modeling (hydrologic, hydraulic, and hydrodynamic) and review of various literatures and information from past experience of similar industry, the environmental and social impact of each stage of project development (construction, operation, and decommissioning) were established. The following table provides summary of each impact and mitigation measured in relation of the project implementation of proposed fuel storage terminal system in the Suco of Lauhata.

Table 1.2. Summary of Impact and Mitigation Measures during the Construction of Phase 1 A

Impact Assessed and Mitigation Measure during Construction of Phase 1 A			
Impacts	Area of Coverage	Particular concern	Mitigation Measure
Air quality Degradation	1.3 HA of land surrounding area	PM	• water spraying • Measure the PM level in case any complaint
		Flue gases (CO2, NO2, Sox)	• Application of latest version of equipment that produce less flue gases • Measure the flue gas level during the construction to know if any major issue related to the gases
Marine water quality	1.3 HA of land surrounding contributing area to the marine waterbody	High turbidity of storm water runoff can impact the marine water body (high turbidity and sediment load to the coral)	Temporary detention basins to reduce and filter the suspended sediment
Occupational Health and Safety	People who work inside the facility	• Work related electricity • Exposure to heat • Exposure to the dust and particular matter • Risk injury related to accident (vehicle, heavy duty equipment, etc) • Risk of death	• Proper training prior to executing the certain work. Certain special work such as electrical work should be done by person who has certified training related to electrical work • Using the proper PPE (eye, nose, ear, protection system) • Supervisor to control the worker to follow proper working procedures • Temporary medical help in the project site to provide help in case accident • Dedicate team to response the emergency in the field • Evacuate as soon as possible to the nearest help center or hospital • Proper compensation to the death
Traffic disturbance	Vehicular get in and out of construction area	• Traffic accident • Temporary congestion • Loss of life	• Assign dedicated person to watch and direct the traffic related to construction activity • Response team to help resolve the traffic accident

Noise	Within the project area up to 50 meter radius	• Disturb the convenience of the community • To big noise could potentially cause the health hazard	• Use the PPE (ear protection equipment) within the project area • Schedule the construction activity only during the day time
Vibration	Within the radius of 100 m	• Potential collapse of old Aipelo prison • Structural crack of the building within the radius of 50 m	• Monitor the vibration level from the source of vibration and further distance away from the source to know the vibration level • Apply some safer technique of foundation work that produce minimum vibration • Apply PPE for the worker within the project area during the execution of work

Table 1.3 Summary of Impact and Mitigation Measures during the Operation of Phase 1 A and Phase 1 B

Impact Assessed and Mitigation Measure during Operation of Phase 1 A and Phase 1 B			
Impacts	Area of Coverage	Particular concern	Mitigation Measure
Flooding	Project area	storm water washed the oil polluted surface and contribute pollution to marine water body	• Application of oil-water separator • Frequent washing the ground where the oil spill prior to the heavy rain • Isolated a major spill and cleaned up quickly prior to the heavy rain
	Riverine flooding	Flood magnitude at higher frequency of 50 –year could overflow from river and cause damaged in the project site - emergency situation	• Retaining wall • Construction of main drainage canal to reroute the overflow of flood water • Construction elevated floor level • Emergency flooding insurance for higher frequency of 50 -years • Flooding warning system and emergency preparedness • Flood emergency response • Monitoring the rainfall

	Coastal Flooding	During the high tide, could potentially wipe out the facility - emergency condition	• Coastal wall protection • Elevated floor level of project rea • Emergency response planning and recovery system • Monitoring the tidal level
Major oil spill	In the project area	Polluted the marine water body and economic loses	• Oil boomer • Oil slimmer • Applied absorbent to catch the oil • In-situ burning of the oil layer in the marine water body • Prepare emergency oil response planning and team • Coordinate with the national and international team to help in case of major large oil spill
	Marine waterbody	polluted the marine water body and transported to large extend of coastal area	• Coastal cleaning • Monitoring of marine water quality • Implement emergency response plan
		Impact to mangrove	• Mangrove re-planting • Compensation to the loss • Cleaning and removal of oil spill debris in the mangrove forest
		Impact to coral and fisheries	• Coral cleaning • Compensation to the economic loss • Coral rehabilitation (if possible)
		Impact to beach	• Provide public information to close the beach access due to pollution form the oil • Cleaning of the beach and other impacted area • Compensation of the economic loss, especially coastal community who rely on the income from the coastal resources

		Impact social at the coastal community	• Proper compensation • Proper community engagement plan
Fire Hazard	Storage tank	Prevention	• Major fire could be prevented by design and construction of the storage tank/yard according the best international specification and ANPM • Proper spacing the storage tanks • Using the water coolant to control the temperature • Proper detection of fuel leaking (automatic sensor) • Proper operation procedure of loading and unloading of fuel from the tank • Fire drill periodically to build fire awareness in the entire facility
		Response to fire emergency (already happens)	• Fire alarm system and evacuate people from the place fire to the assembly point to further moving away from the storage yard • Isolate the area that under the fire • Evaluate the scale of emergency and mobilize the resource to response the emergency (ties1, tier1, tier 3) • Mobilize the internal team of fire fighter to kill the fire (tier 1) • Communicate with external agency to mobilize any help require in responding the emergency • Evaluate the incident to know the cause of the fire for future improvement • Apply fire damaged compensation (insurance) • Restore the emergency condition
	Fuel filling area	Prevention	• Proper design and construction according to the best international standard (fire proof) • Proper procedure to be in place to regulate the operation so that the spill of fuel can be minimized • Installation of fire equipment system to kill

			immediately before the fire getting bigger • Proper control the operation system so that any failure could be detected (such as fuel spill)
		Response to fire emergency (already happens)	• Fire alarm system and evacuate people from the place fire to the assembly point to further moving away from the storage yard • Isolate the area that under the fire • Evaluate the scale of emergency and mobilize the resource to response the emergency (ties1, tier1, tier 3) • Mobilize the internal team of fire fighter to kill the fire (tier 1) • Communicate with external agency to mobilize any help require in responding the emergency • Evaluate the incident to know the cause of the fire for future improvement • Apply fire damaged compensation (insurance) • Restore the emergency condition
	Jetty	Prevention	• Ensure that the pipe (fuel pipes) is properly connected to the tanker and proper inspection by the certify person prior to pumping of the fuel from tanker in the jetty to the fuel storage system • Regular inspection to the piping system (prior to the loading and unloading in the jetty • Follow all the procedure of operation as recommended in best practice of industry • Installation of proper fire equipment system in the jetty • Special team need to be ready during the loading and unloading of the fuel tanker • No smoking must be allow during the unloading of fuel tanker in the jetty • Unloading during the good weather (to avoid unnecessary accident) to avoid fire incident

		Response to fire emergency (already happens)	• Fire alarm system and evacuate people from the place fire to the assembly point to further moving away from the storage yard • Isolate the area that under the fire • Evaluate the scale of emergency and mobilize the resource to response the emergency (ties1, tier1, tier 3) • Mobilize the internal team of fire fighter to kill the fire (tier 1) • Communicate with external agency to mobilize any help require in responding the emergency • Evaluate the incident to know the cause of the fire for future improvement • Apply fire damaged compensation (insurance) • Restore the emergency condition
	other project area (office building, buffer zone, outside the project area)	Prevention	• Cutting grass regularly within the buffer zone and within the certain distance from the project area • Fire drill regularly to all employees • Proper installation of fire equipment system • Management waste management system, especially the rubbish that easily be burn • Perimeter fencing should be fire proof so that no fire bushes from outside the project facility should affect the project
		Response to fire emergency (already happens)	
Soil pollution	within the project area	oil polluted to soil and transport downward to groundwater	• Monitoring periodically to detect as early as possible the pollutant transport from the soil to the soil column • Taking the soil sample within the project area once a year to measure the soil quality • Management the oil spill in the facility to prevent

			the transport of contaminant to the soil column • Waste periodically the ground surface that that contaminated by the minor oil spill • Follow the proper SOP in transferring the fuel to minimize the risk of spills
Groundwater	Quantity	Over pumping	• Monitoring the water utilization rate within the facility to optimize the water utilization • Monitor the groundwater pumping (drawdown level in the aquifer) • Enhance tree-planting in the upland catchments to achieve more recharge rate of rainfall to groundwater • Help population by providing water supply if their shall well get dry
	Quality - pollution	Pollution due to over pumping (salt water intrusion and groundwater contamination)	• Sampling measurement of the groundwater to detect the trend of water quality change • Minimize the spill in the ground surface • Response quickly to the spill so that the risk of contaminant transport downward will be reduced • Inform the government that groundwater is contaminated and stop utilization of groundwater • Pumping out the contaminate water and treated it polluted water • Measure also the well in surrounding project area if the polluted well is localized or entire aquifer
Waste production	General solid waste	Production of general solid waste during the operation	• Collect properly the solid waste and apply 3R (recycle, reused,. Reduced, and disposal) • Dispose the waste into Tibar control landfilled area • Mange the solid waste to achieve the minimum target to landfill
	Hazardous waste	From the bottom product of tank (0.05% of the total volume will deposit at bottom of the tank to be cleaned and treated)	• Have proper treatment system of hazardous material (see the method of treatment at the part of waste management)

			• Produce the concrete material from hazmat (liquid hazmat is mixed within the concrete cement and produce concrete block
	Liquid hazardous waste	• Oil residue • Oil from the oil- water separator	• Apply special treatment method onsite or out scorching the external company to treat the B_3 waste • Treated the oil residue and recycle into the reusable fuel (third party should be contracted to do it • Deliver the oil residue to the third party that already has proper oil residue treatment in place • Deliver the oil residue to Tibar (government provided the holding tank) • Proper collection of the waste to be handled by the third party
Traffic management		Vehicle coming in and out of the proposed development facility	• Proper traffic management system • Proper traffic sign • Designated person to watch the traffic and manage it • Proper parking arrangement
Climate change	Sea level rise	Coastal inundation	• Proper design and construction of the sea wall protection • Elevated floor level at the storage yard (based on tidal measurement and HAT data) • Adjust the groundwater treatment, as the water will be getting salty
	Flooding	More frequent rain with high frequency	• River improvement • Retaining wall • Proper drainage system
	Drought	Prolong dry season	• Water storage • Minimize the water utilization • Sea water treatment (optional) • Provide water to the community

Occupational Health and Safety	Proper Design and Operation	• Integrity of workplace structure • Severe weather and facility shutdown • Woks space and Exit • Fire Precaution • Lavatory and Shower • Portable water supply • Clean eating area • Lighting • Safe access • First Aid • Air supply • Work Environment Temperature	Detail to be provided in the annex 13
	Communication and Training	• OHS training • Visitor orientation • New employee and contractor training • Area Signage • Communicate Hazard code • Labeling Equipment	Detail provided in the annex 13
	Physical Hazard	• Rotating and Moving Equipment • Noise • Vibration • Electrical • Eye hazard • Welding/Hot work • Industrial Vehicle Driving • Working Environment Temperature • Working at height • Illumination	Detail provided in the annex 13
	Chemical Hazard	• Air quality • Fire and explosion • Corrosive, oxidation, and reactive chemical	Detail provided in the annex 13

		• Volatile Organic compound	
	Other Special Hazard		Detail provided in the annex 13
	Peroneal Protective Equipment (PPE)	Protection equipment to protect various part of the body to prevent the hazard (eyes, nose, ear, skin, hat, body, foot, etc)	Detail provided in the annex 13
Community health and safety	• Groundwater accessibility • Traffic accident • Large fire hazard	• Water conservation and monitoring system • Traffic management system • Fire hazard management and socialization to the community members in Lauhata, as well as evacuation route	Actions to be taken to minimize this impact of the project to the community health and safety is provided in annex 13

Table 1.4 Impacts and Mitigation Measures during the Construction of Phase 1 B

Impact Assessed and Mitigation Measure during Construction of Phase 1 B			
Impacts	Area of Coverage	Particular concern	Mitigation Measure
Occupational Health and Safety	People who work inside the facility	• Work related electricity • Exposure to heat • Exposure to the dust and particular matter • Risk injury related to accident (vehicle, heavy duty equipment, etc.) • Risk of death	• Proper training prior to executing the certain work. Certain special work such as electrical work should be done by person who has certified training related to electrical work • Using the proper PPE (eye, nose, ear, protection system) • Supervisor to control the worker to follow proper working procedures • Temporary medical help in the project site to provide help in case accident • Dedicate team to response the emergency in the field • Evacuate as soon as possible to the nearest help center or hospital

			• Proper compensation to the death
Traffic disturbance	Vehicular get in and out of construction area	• Traffic accident • Temporary congestion • Loss of life	• Assign dedicated person to watch and direct the traffic related to construction activity • Response team to help resolve the traffic accident • Proper traffic signal and speed limit • Only license/authorize personel would allow to operate the machinery/vehicles
Noise	Within the project area up to 50 meter radius	• Disturb the convenience of the community • To big noise could potentially cause the health hazard	• Use the PPE (ear protection equipment) within the project area • Schedule the construction activity only during the day time • Apply noise barrier in the perimeter fence
Vibration	Within the radius of 100 m	• Potential collapse of old Aipelo prison • Structural crack of the building within the radius of 100 m	• Monitor the vibration level from the source of vibration and further distance away from the source to know the vibration level • Apply some safer technique of foundation work that produce minimum vibration • Apply PPE for the worker within the project area during the execution of work

Table 1.5. Expected Impacts and Mitigation Measures during the Decommission phase of Fuel Storage Terminal

Impact Assessed and Mitigation Measure during Decommissioning phase			
Impacts	Area of Coverage	Particular concern	Mitigation Measure
Occupational Health and Safety	People who work inside the facility	• Work related electricity • Exposure to heat • Exposure to the dust and particular matter • Risk injury related to accident (vehicle, heavy duty equipment, etc) • Risk of death	• Proper training prior to executing the certain work. Certain special work such as electrical work should be done by person who has certified training related to electrical work • Using the proper PPE (eye, nose, ear, protection system) • Supervisor to control the worker to follow proper working procedures • Temporary medical help in the project site to provide help in case accident • Dedicate team to response the emergency in the field • Evacuate as soon as possible to the nearest help center or hospital

			• Proper compensation to the death
Traffic disturbance	• Vehicular get in and out of construction area • Vehicle taking the demolished or dismantled material	• Traffic accident • Temporary congestion • Loss of life	• Assign dedicated person to watch and direct the traffic related to construction activity • Response team to help resolve the traffic accident • Proper traffic signal and speed limit • Only license/authorize personel would allow to operate the machinery/vehicles
Demolition of storage tank	Chemical hazard such as gas that trapped inside the storage tank	• Cause health hazard • Potentially cause death	• Authorize and trained people to dismantled the storage system • Using proper PPE
Noise	Within the project area up to 50 meter radius	• Disturb the convenience of the community • To big noise could potentially cause the health hazard	• Use the PPE (ear protection equipment) within the project area • Schedule the construction activity only during the day time • Apply noise barrier in the perimeter fence
Vibration	Within the radius of 100 m	• Potential collapse of old Aipelo prison • Structural crack of the building within the radius of 50 m	• Monitor the vibration level from the source of vibration and further distance away from the source to know the vibration level • Apply some safer technique of foundation work that produce minimum vibration • Apply PPE for the worker within the project area during the execution of work
Social Impacts	loss of opportunity and job	• 30 people will loss the job and income • Project owner will loss the economic opportunity • Fuel supply will be impacted and potentially the price will increase	• Proper compensation and transition program • Transfer the workers to other similar facility • Find other alternative busies modality

Economic Impacts	Loss of source of income	• No tax payment to the government • Loss of revenue from the project owner • No social corporate responsibility to the local people	• Required a new business modality • Government to diversify the economic into other sector

1.5 Summary of Cost of Mitigation Measures

The environmental management plan only is implemented effectively if budget is allocated properly by the project owner. The following table provide summary of rough cost estimation of the mitigation measures various impact identified during the project implementation.

Table 1.6. Summary of Cost Estimation of EMP (CAPEX and OPEX)

Stage of Project Implementation	Estimated cost (CAPEX)	OPEX - Without major Incident	OPEX with Major Incident
Construction of Phase 1 A	$ 155,000	0	
Operation of Phase 1 A	$ 1,332,000	$300,000.00	$ 17,600,000.00
Construction of Phase 1 B	$ 33,000	0	
Operation of Phase 1 A and 1 B	-		
Decommissioning	$ 285,000	0	0
Total Cost	$ 1,795,000	$350,000.00	$17,600,000.00

Note: Major Capital expenditure has been construction of flood protection (Storm runoff and coastal water), equipment to retain oil spill (Boomer, skimmer, etc.) and fire equipment system. Further detail breakdown of the cost per item of mitigation measures can be found in the cost estimation of the EMP.

1.6 Monitoring of Implementation of EMPs

Monitoring the implementation of EMPs is very important to ensure effective implementation of the plan in order to achieve the objective of the environmental protection and social safeguard system. The following table provided the summary of impacts, cost, monitoring agency and frequency of monitoring activity for the proposed project development.

Table 1.7 Summary of Environmental Impact, Mitigation, and Monitoring Plans

IMPACT MITIGATION				MONITORING		
Environmental Impact	**Mitigation Measures**	**Mitigation Responsibility**	**Mitigation Cost (US$)**	**Monitoring Measures**	**Frequency and means of verification**	**Monitoring Responsibility**
Construction Phase 1 A and 1 B						
Air Quality	• Operation of well-maintained construction vehicle and equipment to avoid polluted exhausts. • Proper piling of spoil from earth work • Spraying of water in the working area • Construct fence on the project area	Project owner	US$ 45,000 (mainly to build the fence and operation cost for water spraying)	• Periodic qualitative monitoring within mining areas; • Assessment of record of dust complaints from workers and communities living near project area.	Day to day monitoring especially during dry period.	Project owner and regulatory agency (if necessary)
Marine water quality from soil erosion	• Construction of temporary detention basins to catch and filter the sediment • Compact the soil during the dry period with the gravel or non-eroded material to prevent the erosion	Project owner	$15,000	• Measurement of marine water quality after the rain (grab sample) to measure the sediment • Monitoring the TSS of the effluent at the detention pond	Day to day monitoring, especially after the onset of rain.	Project owner and regulatory agency (if necessary)
Traffic	• Installation of signage near the facility to inform general traffic those construction vehicles might make an access in and out of the facility. • Appointing designated personnel to help smoothing traffic out during an especially heavy vehicle movement • Regulate speed limit in and out of project area • Only authorize personnel must drive the vehicles	Project owner	US$ 30,000	• Installation of permanent signage near the facility to inform general traffic that costumer vehicles are making an access in and out of the facility • If a long queuing actually happened and could heavily disrupt traffic, several designated personnel should help smoothing the traffic in and out of the facility.	Day to day monitoring, especially after the onset of rain.	Project owner and regulatory agency (if necessary)
Noise and Vibration	• All noise-generating equipment should be insulated and well maintained to ensure that they operate within the noise limits	Project owner	US$ 10,000	• Record of complaint about noise/vibration from workers and communities living near	Day to day monitoring especially during dry period.	Project owner and regulatory agency (if necessary)

	they were designed to operate. • Operation of noise generating equipment should only be during the day • Provision of personal protection measures from noise to workers (see section on Occupational Health and Safety)			the project. • Follow with the noise level measurement		
Occupational health and safety	Hazard minimizing measures: • Minimize exposure to hazard through workers rotation and limitation to working hours (max. 8 hrs) • Provision of training for proper equipment handling and safety precautions for equipment handling • Adequate supervision for handling of heavy machinery • Adjustment of work and rest period for workers when days are especially hot (e.g. there have been several hotter than usual days in Timor Leste in 2014). • Provision of adequate and easy access to drinking water. Provision of PPE: • Facemasks, eye protection • Ear protection • Helmet, boots, safety shoes • Rubber gloves • Body protection	Project Owner	$30,000	Keep daily record on any event related to the OSH inside the project area, including the major accident related to work execution	Day to day monitoring system	Project owner with the surveillance from local authority and relevant agency
Operation Period						
Flooding	• Construction of retaining flood protection in the river • Elevated the floor level	Project owner	$1,000,000	• Monitoring the rainfall in the upland catchment system • Tide gauge for tidal measurement • Inspection of the	daily to day and long-term operation	Project owner, supervision consultant and relevant government agency (if needed)

	• Construction of main drainage canal • Construction of oil-water separator • Isolated a major spill and cleaned up quickly prior to the heavy rain • Coastal wall protection • Frequent washing the ground where the oil spill prior to the heavy rain • Emergency flooding insurance for higher frequency of 50 -years • Flooding warning system and emergency preparedness • Flood emergency response • Monitoring the rainfall • Emergency response planning and recovery system • Monitoring the tidal level • Measurement of rainfall at upstream area			flood protection work		
Major Oil spill	• Purchase Oil Boomer • Oil Skimmer • Chemical Absorbent • In-situ burning system • Coastal Cleaning • Mangrove re-planting • Coral rehabilitation	Project owner	CAPEX = $100,000 (if no accident) OPEX = $50,000 If accident, the cost could be range from $10M – $15 M	Project owner to monitoring the current and wind to ensure operation safety	• Record daily event inside the fuel storage facility • Record the loading and unloading event in jetty	Project owner and relevant agencies (if needed)

	• Cleaning of the impacted beach • Design and construct the fuel terminal and other supporting facility with the highest standard in the industry to minimize the equipment error and equipment failure • Developed the proper operating procedure in every part of operating system • Proper communication protocol during the operation • Prepare emergency oil response planning and team • Monitoring of marine water quality • Implement emergency response plan • Compensation to the loss • Compensation to the economic loss • Coordinate with the national and international team to help in case of major large oil spill • Provide public information to close the beach access due to					

	pollution form the oil • Compensation of the economic loss, especially coastal community who are rely on the income from the coastal resources • Proper community engagement plan • Proper insurance system					
Fire hazard	• Proper fire prevention system (design construction with the highest standard, proper operating procedure, minimize leaking from the system, control processing) • Modern Fire prevention equipment system in place • Well structure and trained fire management system • Fire drill and evacuation system • Fire insurance system	Project owner	CAPEX = $200,000 OPEX = $100,000/year	• Control the operating system (automatic control), i.e. mass balance and volume rate • Inspect the all the operating equipment system before and after loading and unloading the fuel	Day to day monitoring	Project owner and report to be reviewed by the relevant entity
Soil pollution from oil spill	• Soil remediation system • Minimize the spill by proper design and operation • Taking the soil sample within the project area once a year to measure	Project owner	US$ 15,000	Monitoring periodically to detect as early as possible the pollutant transport from the soil to the soil column	Day to day monitoring especially during fuel loading and unloading	Project owner

	the soil quality • Management the oil spill in the facility to prevent the transport of contaminant to the soil column • Wash periodically the ground surface that that contaminated by the minor oil spill • Follow the proper SOP in transferring the fuel to minimize the risk of spills					
Groundwater	• Enhance tree-planting in the upland catchments to achieve more recharge rate of rainfall to groundwater • Help population by providing water supply if their shall well get dry • Response quickly to the spill so that the risk of contaminant transport downward will be reduced • Inform the government that groundwater is contaminated and stop utilization of groundwater • Pumping out the contaminate water and	Project owner	$15,000/year	• Sampling measurement of the groundwater to detect the trend of water quality change • Monitor the groundwater pumping (drawdown level in the aquifer) Minimize the spill in the ground surface • Monitoring the water utilization rate within the facility to optimize the water utilization	• Day to day monitoring • Real time measurement in the groundwater pumping	Project owner and could be inspected by the relevant government agencies

	treated it polluted water • Measure also the well in surrounding project area if the polluted well is localized or entire aquifer					
Solid waste impacts	• Collect properly the solid waste and apply 3R (recycle, reused,. Reduced, and disposal) • Dispose the waste into Tibar control landfilled area • Mange the solid waste to achieve the minimum target to landfill • Have proper treatment system of hazardous material (see the method of treatment at the part of waste management) • Produce the concrete material from hazmat (liquid hazmat is mixed within the concrete cement and produce concrete block • Apply special treatment method onsite or out scorching the external company to treat the B_3 waste Treated the oil residue and recycle into	Project owner	S$30,000	• Record keeping and assessment to adapt the practice. • Promote public education on the proper solid waste collection system	Day to day monitoring and provide the monthly report	Project owner (designated officer).

	the reusable fuel (third party should be contracted to do it • Deliver the oil residue to the third party that already has proper oil residue treatment in place • Deliver the oil residue to Tibar (government provided the holding tank) • Proper collection of the waste to be handled by the third party					
Traffic impacts	• Proper traffic management system • Proper traffic signal • Proper parking arrangement • Designated person to watch the traffic and manage it • Limit the speed limit in the project area • Only authorize person could drive the vehicle	Project Owner	$5,000/year	• Keep the record of vehicle in and out of the project area and any related event • Record if any traffic accident	Day to day monitoring	Project owner and local authority
Climate change	• Proper design and construction of the sea wall protection • Elevated floor level at the storage yard (based on tidal measurement and HAT data)	Project owner	$20,000/yr	Monitoring it tide (already proposed)	Sharing the data of the climate change information (rainfall and tidal measurement)	Project owner

	• Adjust the groundwater treatment, as the water will be getting salty • River improvement • Retaining wall • Proper drainage system • Construction of Water storage • Minimize the water utilization • Sea water treatment (optional) • Provide water to the community					
Occupational health and safety	Hazard minimizing measures: • Minimize exposure to VOC usually associated with gasoline through rotation of workers handling diesel fuel and gasoline. • And limitation to working hours (max. 8 hrs) Provision of PPE: • Use of proper PPE for workers exposed to high emission of VOC (especially during handling of transfer of fuel into storage). • Provision of PPE for workers exposed to high risk from fire and explosion.	Project owner	US$ 35,000/Year	It is recommended that monitoring measures involve routine (every year) risk assessment involving the following objectives: • Identify where fire and explosion hazards may exist; • Consider procedural practices, what have been done wrongly, what and who have been affected; • Evaluate the findings and see if precautionary measures implemented are enough to significantly reduce risk from fire and explosion. • Keep a good record of the findings • Plan for intervention as found necessary		Project owner (designated officer) can be coordinated with local forestry officer
Community Health	• Water conservation and	Project owner	$50,000/year			

and Safety	monitoring system • Traffic management system • Fire hazard management and socialization to the community members in Lauhata, as well as evacuation route					
Decommissioning Phase						
Traffic	• Installation of signage near the facility to inform general traffic that vehicular movement access in and out of the facility. • Personnel to direct the traffic when necessary	Project owner	US$ 2000 /decommissioning	• Installation of permanent signage near the facility to inform general traffic that costumer vehicles are making an access in and out of the facility • If a long queuing actually happened and could heavily disrupt traffic, several designated personnel should help smoothing the traffic in and out of the facility.	Day to day monitoring, especially after the onset of rain.	Project owner
Noise	• All noise-generating equipment should be insulated and well maintained to ensure that they operate within the noise limits they were designed to operate. • Operation of noise generating equipment should only be during the day • Provision of personal protection measures from noise to workers (see section on Occupational Health and Safety)	Project owner	US$ 1,000	• Record of complaint about noise/vibration from workers and communities living near the project.	Day to day monitoring especially during dry period.	Project owner (designated officer).
Occupational health and safety	Hazard minimizing measures: • Minimize exposure to hazard through workers rotation and limitation to working hours (max. 8 hrs) • Provision of training for proper equipment handling and safety		$30,000			

	precautions for equipment handling • Adequate supervision for handling of heavy machinery • Adjustment of work and rest period for workers when days are especially hot (e.g. there have been several hotter than usual days in Timor Leste in 2014). • Provision of adequate and easy access to drinking water. • Minimize exposure to VOC usually associated with gasoline through rotation of workers handling diesel fuel and gasoline. Provision of PPE: • Facemasks, eye protection • Ear protection • Helmet, boots, safety shoes • Rubber gloves					
Social and economic impacts	• Compensation to the employee • Transfer the employee to other facility and business modality	Project owner and worker inside the facility	$200,000			Project owner and relevant government agency

1.7 Performance Indicators

Effective implementation of any plan is only possible with the rigorous monitoring system by both internal and external parties. To be objective, the some performance indicators and baseline information must be used by the relevant parties. Performance indicator must result in the compliance to standard performance of clear environmental parameters. In following performance indicators shall be used as part of the environmental management plan (EMP) document, this study, to judge the compliance of project owner to the overall implementation of the EMP during the project execution.

- OSH (IFC Standard, 2007)
- Noise Indicator (relevant to human health)
- Ambient air quality (IFC standard)
- Ambient water quality standard (swimmable, fishable, drinkable, etc.)
- Drinking water quality standard (WHO)
- Effluent waste water quality standard (WHO and IFC)

The following table provides the summary of indicator to be complied in order to achieve the objective of the environmental protection and social safeguard principles.

Table 1.8. Summary of Environmental Performance Indicator

Type of Indicator	Measureable Parameters	Standard Threshold
Occupational Health and Safety (OHS)	Number of Incident per month	Zero
Noise Level	Noise indicator at the receiving site	<80 dB without PPE
Ambient Air Quality	CO_2	Refer to the table 1.9
	NO_2	Refer to the table1.9
	$PM_{.2.5}$	Refer to the table 1.9
	PM_{10}	Refer to the table 1.9
	SO_2	Refer to the table 1.9
Receiving water Quality	Drinkable	Refer to the standard quality of drinking water: Physical, Chemical, and Biological indicator
	Swimmable	The discharge of any effluent to a water body shall not cause the water body to lost its function as swimmable
	Fishable	waste load into water body but the fish is still eatable by health standard
Effluent waste water discharge	BOD_5, mg/L	25
	COD, mg/L	125
	PH	6-9
	Total Nitrogen, mg/L	10
	Total Phosphorus, mg/L	2
	Oil and Grease, mg/L	10
	TSS, mg/L	50
	Temperature increase, C	<3
	Total Coliform , MPN/100 mL	400

Table 1.9. Ambient Air Quality Indicator

Parameter	**Average Period**	**Guideline Value (µg/m^3)**
Sulfur dioxide (SO_2)	24-hour	20
	10 minute	500
Nitrogen dioxide (NO_2)	1-year	40
	1-hour	200
PM_{10}	1-year	20
	24-hour	50
$PM_{2.5}$	1-year	10
	24-hour	25
Ozone	8-hour daily maximum	100

Table 1.10. Drinking Water Quality Standard in Timor – Leste

No	Paramter	Unit	WHO/Timor - Leste Guideline	Testing Method
			Physical	
1	PH		6.5-8.5	PH meter
2	E. Conductivity	mc/cm	NS	Conductivity meter
3	TSS	mg/L	50	Gravimentry
4	TDS	mg/L	1000	Gravimentry
5	Salinity	ppt	0.25	Conductivity meter
6	Temperature	C	Natural	Conductivity meter
7	Turbidity	NTU	5 NTU	Turbidity meter
			Chemical	
1	NH3 -N	mg/L	1.5	Spectrophotometer
2	NO3-N	mg/L	10	Spectrophotometer
3	NO2-N	mg/L	1	Spectrophotometer
4	Fe	mg/L	0.3	Spectrophotometer
5	Mn	mg/L	0.5	Spectrophotometer
6	Flouride	mg/L	1.5	Spectrophotometer
7	Cl2	mg/L	0.5	compactor
8	Ca.Hardness	mg/L	NS	Titration
9	Arsenic	mg/L	0.01	compactor
	Total hardness	mg/L	200	Titration
10	Total alkalinity	mg/L	NS	Titration
11	Sulphate	mg/L	250	Spectrophotometer
			Biological	
1	Total Coliform	CFU/100 mL	0	Membrane Filtration
2	E. Coli	CFU/100 mL	0	Membrane Filtration

1.8 Positive and Negative Social and Economic Impacts

There are always impacts, as consequences of any project development. Zero impacts would be certainly impossible to be achieved, unless the project is not continued or no development. No development scenario. The following table provide the positive and negatives impacts of the project development, including no development, which could be used to quickly evaluate in order to make a high level decision to proceed or to stop the project development.

Table 1.11. Summary of Positive and Negative Impacts of the Project Development

Alternative option	Negative Impacts	Positive Impacts
Project Development	1. Temporary Environmental impacts during the construction that can be managed on-site 2. Oil spill impacts that can be managed but risk of major spill and cause the coastal pollution 3. Potential large fire hazard but can be minimize with high standard of design and construction and other fire protection system 4. Pollution of VoCs – can be minimized with proper design of the system and on site mitigation measure 5. Contribute to the marine water quality degradation 6. Contribute to the air quality degradation (if there is any major fire that create the smoke)	• High return of investment on the project development • Provide stable fuel supply with the competitive price • Contribute to the economics of Timor – Leste (national and local in Lauhata) • Create the jobs and other economic opportunities • Contribution directly to the taxation to the government of Timor – Leste • Provide various corporate responsibility to the local population •
No project Development	• No job creation and no other opportunities will be created • No income to the country from the tax payment • Perhaps high fuel price in Timor – Leste due to lack of competition	• No marine water pollution and no other disturbance in the coral and other coastal resources • No environmental and social impacts

Considering the more positive impacts that project development can contribute, it is recommended to continue and government to endorse the project development, if and only the negative impacts would be able to be managed and minimized by the project owner.

2. DETAIL OF THE PROJECT PROPONENT

Global Oil Storage Terminal, Lda is a Timor Leste registered company. It is a part of the Global Group with operations in Singapore, Greater China, Indonesia, and Myanmar. They are involved in the oil and gas industry as well as in infrastructure development. In Timor Leste, the group (Petroleum Division) is involved in downstream petroleum business that imports and provides wholesale fuel supplies to construction companies and petrol stations. The company owns downstream supply chain from cargo procurement, quality control and logistic deployment.
Since 2014 until today, Global Group has hired and trained local labors into qualified officers in the business of petroleum trading. Since then, several have risen through the ranks to become trusted partners of its operation in Timor Leste.

2.1 Contact Information

The project is proposed by Global Oil Storage Terminal, Lda. The company's contact detail is provided as follows:

Mr Kelvin Lim Project Manager
Tel: +670 7706 0008 Email:
Kelvin.lim@globalsgp.com

Project Manager (FEED Design)
Mr. Bani
Email: annadurai.banikannan@rotaryeng.com.sg

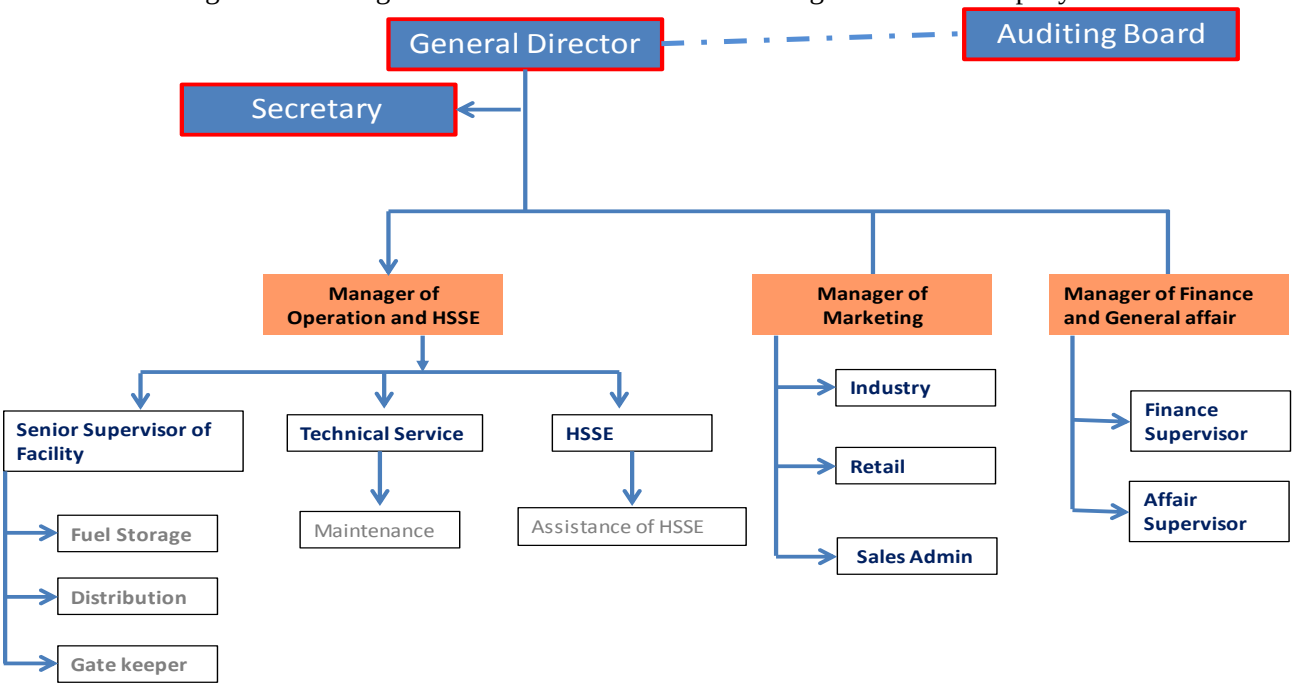
Jonio Sarmento (Assistant Project Manager)
Rua Estrada, Avenida Nicolau Lobato Dili, Timor Leste
Tel: +670 7728 6603 2)

Ms. Maria Elizabeth (Project Secretary)
+670 77663574

2.2 Management Structure

The following is the general management structure of the company.

Figure 3.1 Management Structure of Global Oil Storage Terminal Company



The project owner should be flexible to modify this organogram based on the need in the organization in responding to the vision and objective of the project development.

2.3 Company Vision and Values

To be customer's first choice in the area of petroleum supplies and risk management. Providing industry-exceeding class wholesale and retail level oil supplies and services through continuous improvement driven by integrity, trustworthiness, responsibility, teamwork and operational excellence.
The strategy to achieve our vision is to implement the roadmap our mission, which is enduring. It declares our purpose as a company and serves as the standard against which we weigh our actions and decisions.

- Energy that comes alive through focus on societal well-being
- To create value and make a difference
- Protecting the health of our employees, the environment, and putting safety first at all times

Aim to achieve customer satisfaction and operational excellence through striving for quality and quantity (QQ) assurance

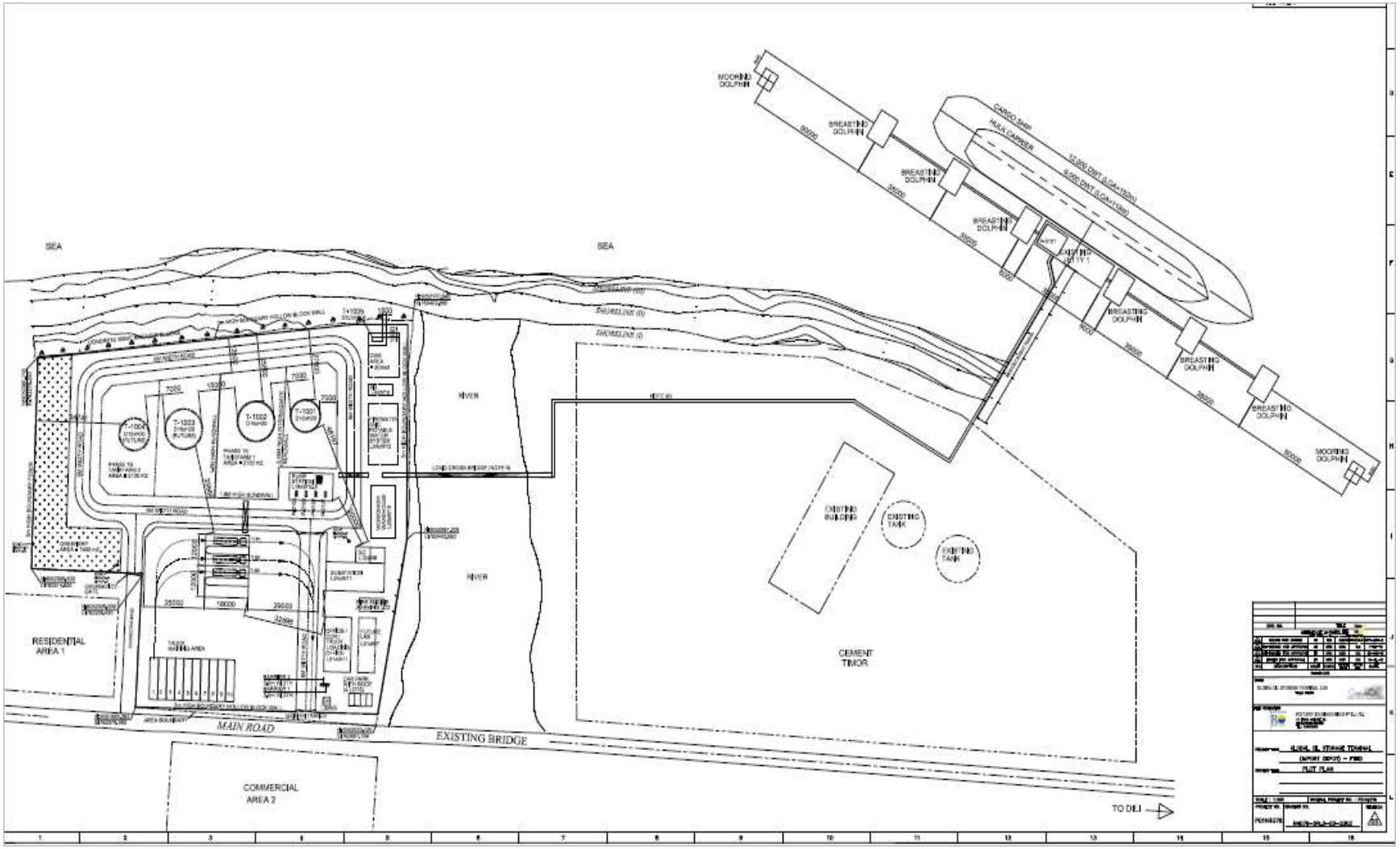
3. DESCRIPTION OF THE PROJECT

3.1 Project Overview

The proposed development project consists of construction of fuel storage tanks and supporting facilities in a total area of 1.3 Ha lands, which has been secured by project owner. Project owner has also planned for the use existing jetty structure located approximately 300m to the east of project site as unloading point of oil from tanker ship that belong to the Timor Cement SA. The following figure provides information on the general layout of the project. Current lay out is at a conceptual level, with more detailed layout/project engineering design to be provided once they are made available by the engineering department.

Construction of the facility is planned to be completed within 2 years. It is projected, that by 2022, the facility will be operated fully by the project proponent or any other designated operator.

Figure 3.1 Project Concept and Site Plan (See Annex 4 for more detailed drawing)



There two petroleum products that will be stored and distributed within this proposed facility. They are gasoline and diesel fuels, which are mainly used in Timor Leste as the source of automobile fuel and also other such power generation fuel. The specifications of gasoline and diesel fuels are presented in the following table.

Table 3.1 Summary of Physical and Chemical Properties of Gasoline

No	Parameter	Units	Limits		Grade	Test Method
			Min	Max		
1	Sulphur	mg/kg		150	All grades	ASTM 0543
2	Research Octane Number (RON)	--	92		All grades	ASTM D2699
3	Motor Octane number (MON)	--	78		All grades	ASTM D2700
4	Distillation, Final Boiling Point	°C		210	All grades	ASTM D86
5	Olefins	% v/v		18	All grades	ASTM D1319
6	Aromatic	% v/v		42	All grades	ASTM D1319
7	Benzene	% v/v		3.0	All grades	ASTM D5580
8	Lead	mg/L		5.0	All grades	ASTM D3237
9	Oxsigen	% m/m		2.7	All grades (no ethanol)	ASTM D4815
				3.5	All grades (with ethanol)	ASTM D4815
10	Ethanol	% v/v		10	All grades	ASTM D4815
11	Oxygenates Except Ethanol, Each	% v/v		1.0	All grades	ASTM D4815
12	Phosphorus	mg/L		1.3	All grades	ASTM D3231
13	Copper corrossion (3hrs at 50°C)	rating		Class 1	All grades	ASTM D130
14	Existent Gum (washed)	mg/100 ml		5.0	All grades	ASTM D381
15	Induction Period	minutes	360		All grades	ASTM D525
16	Rapid Vapour Pressure	kPa	45	65	All grades	ASTM D323
17	Flexible Volatility Index	index		100	All grades	ASTM D86 & ASTM D323

Table 3.2 Diesel Fuel Specifications

No	Parameter	Units	Limits		Test Method
			Min	Max	
1	Sulphur Content	mg/kg		500	ASTM D5453
2	Cetane Index	--	45.0		ASTM D4737
3	Density at 15°C	kg/mg³	820	850	ASTM D4052 ASTM D1298
4	Distilation T95	°C		360	ASTM D86
5	Polyaromatic Hydrocarbon (PAHs)	% m/m		11	IP 391
6	Ash Content	% m/m		0.01	ASTM D482
7	Viscosity	mm2/s	2.0	4.5	ASTM D445
8	Carbon residue (10% distilation residue)	% m/m		0.2	ASTM D4530
9	Water Content	mg/kg		200	ASTM D6304
10	Total Contamination	mg/kg		24	EN 12662
11	Conductivity at Ambient Temperature	pS/m	50.0		ASTM D2624
12	Oxidation Stability	mg/L		25	ASTM D2274
13	Colour	Rating		2.0	ASTM D1500
14	Copper Strip Corrosion (3 Hours at 50°C)	Rating		Class 1	ASTM D130
15	Flash Point	°C	61.5		ASTM D93
16	Filter Blocking Tendency	Rating		2.0	ASTM D93
17	Fatty Acid Methyl Ester (FAME)	% v/v		5.0	EN 14078
18	Lubricity	mm		0.46	IP 450

Understanding these physical and chemical properties are very important and they indicate the type of pollutant that will be transferred to the receiving environment such as soil and water body.

3.2 Project Identification

The proposed fuel terminal facility was identified by the project owner as the final effort to involve in the current business of fuel supply and distribution in Timor – Leste. By constructing the fuel terminal, the

project owner shall have greater flexibility in the distribution and control the price fluctuation in the market. The location of the project was also identified as viable one by taking advantage of already constructed jetty, where the size of the land is reasonably large to construct the decent volume of the fuel terminal area.

3.3 Project Category

The project document submitted to the National Petroleum and Mineral Authority (ANPM) and approved has resulted the proposed development project fall under the category A, which required full scale environmental Impact Assessment (EIA) to identify various adverse impacts to the environment, people, and ecosystem. Based on the impact assessment, the proper mitigation measures can be proposed to minimize or prevent the impacts.

3.4 Project Location and Boundary

The project is located along the national road of Dili – Liquica, approximately within 30 minutes of overland travel from Dili to the west. Study area would be composed of project footprint, surrounding areas including residential, marine water body, upland catchment system that will affect the project by contributing runoff rate to the river nearby the project location.

Figure 3.2. Project Location in Reference to Capital Dili

The study area however, will cover up to the radius of 10 KM and beyond. Especially, the investigation on the coastal resources and pollution contribution from the project that will be transported along the coastline will be investigated within the radius of 15 KM. The following map shows the coverage of study from the project location toward east and west and north south.

Figure. 3.3 Extend of the study.

The northern part is marine water, which will be impacted by the project in term of the operation of jetty and also the marine water can become the ultimate receiver of the pollutant generated by the project due to oil spill and wastewater discharged by the project. The Preliminary study and information suggested that the depth up to 20 m, is where most of the marine resources such as coral, mangrove, benthos, and fisheries, are located. The following figure shows the NOAA coastal research that has shown the coastal marine habitat.

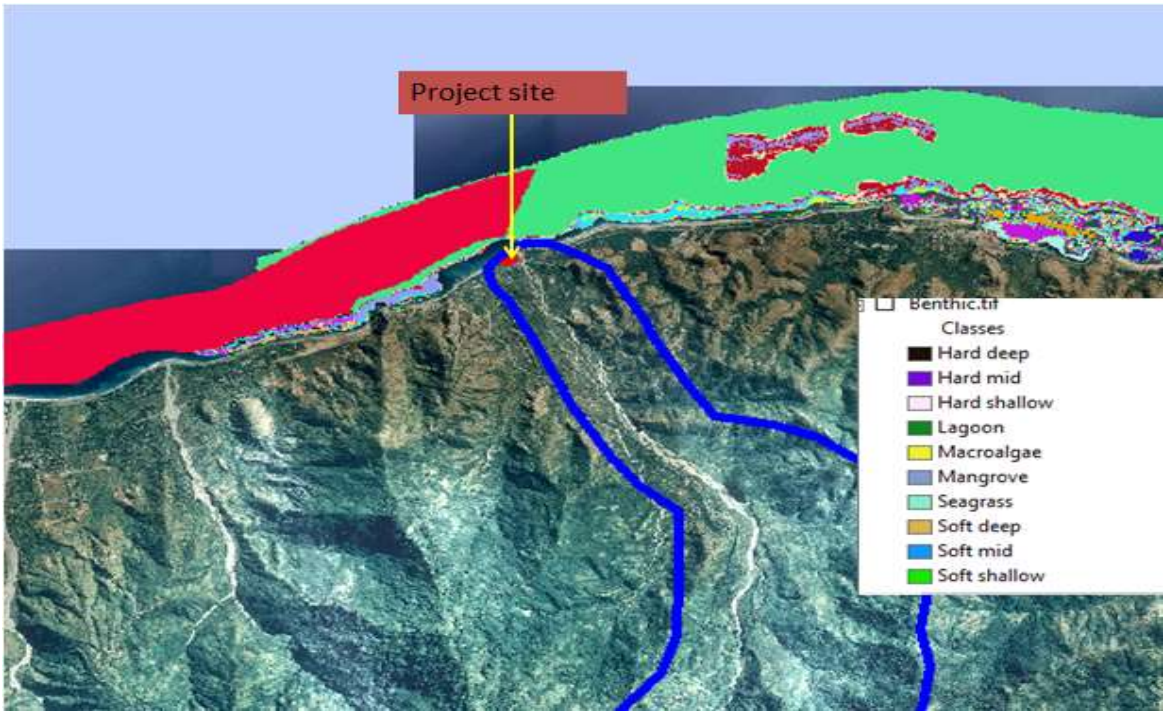


Figure 3.4 . Benthic Marine Habitat (Source: NOAA Coastal Research Program)

Therefore, the environmental investigation toward the northern side will be limited by the water depth up to 30 meter, as many of the marine resources are within the 30 meters of water depth. Toward the east and west boundary, the extend of the study will be enlarged to the distance of 15 KM, as the movement of fate or pollutant could cover up to 15 KM from the point of origin, depending on the season and magnitude of current. Toward the southern boundary, the study shall cover up to the boundary of watershed, with the total contributing area of 18 KM^2. Several rivers locate along the northern part of Liquica contribute the runoff during the rainy season to the marine water, which will affect the turbidity of the marine water, which will be only temporary.

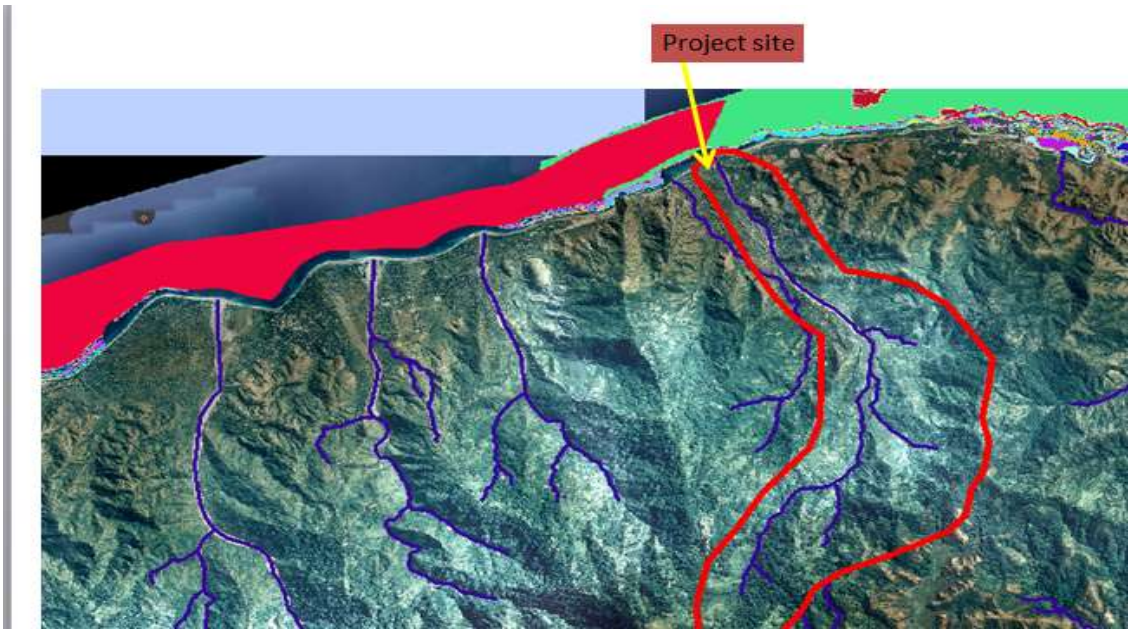


Figure 3.5. Major River Contributing Runoff

The rainfall-runoff analysis will be conducted to estimate the flooding risk carried by the small river that will affect the directly to the project.

Figure 3.6. Project Location along the National Road of Dili – Liquica

The proposed development is located along the northern shoreline of Timor Leste. It is bounded by the sea in the northern part, residential houses to the south, a river to the east and local community houses to the west. Aipelo prison, a historical site, is located approximately 250 m to the west of the site. Along the North coast of Liquica, various beautiful touristic places could be found and have identified as site to be improve in order to attract the tourism industry in the country.

The old Prison Aipelo and other touristic places, along the north shore of Liquica areas, could be affected by the project during the operation, especially in the event of emergency such as major oil spill in the sea, fire accident, and other natural hazard that may cause by the project.

- Salt Lake Maubara
- Maubara Fort
- Lauhata Resort
- Black Rock
- Loes River

Toward the eastern side of the project boundary, there are recreational resort and government major project that could potentially affected by the project.

- Tibar Port Development
- Industry area
- Tibar Resort area
- Kaitehu, protection area due to special coral reef

Toward south, the project location is bounded by the following features:

- River contribute runoff to the marine aquatic environment
- Mountain hike
- Coffee plantation in Bazartete area

However, in term of cross border impacts, the transport of impact from the project to east, west, and northern part of the project. Therefore, more focus of the study should be on the east, west, and northern boundary of the project site

3.5 Project Rationale and Feasibility

The project proponent proposed the development facility based on market analysis of demand growth of fuel supply in Timor – Leste and the opportunity to construct a new facility that will strengthen their existing business in the country. The new storage facility will also help in rapidly increasing in-country storage capacity that will contribute to easing of price fluctuation of fuel in domestic market. At the same time, having such a large capacity of storage will ensure competitiveness of the business, the price of which will eventually be passed on to the customer in the form of better retail price at consumer's level. Market feasibility study done by the project owner suggested that current increasing trend in fuel consumption will continue and therefore, it is profitable for the project owner.

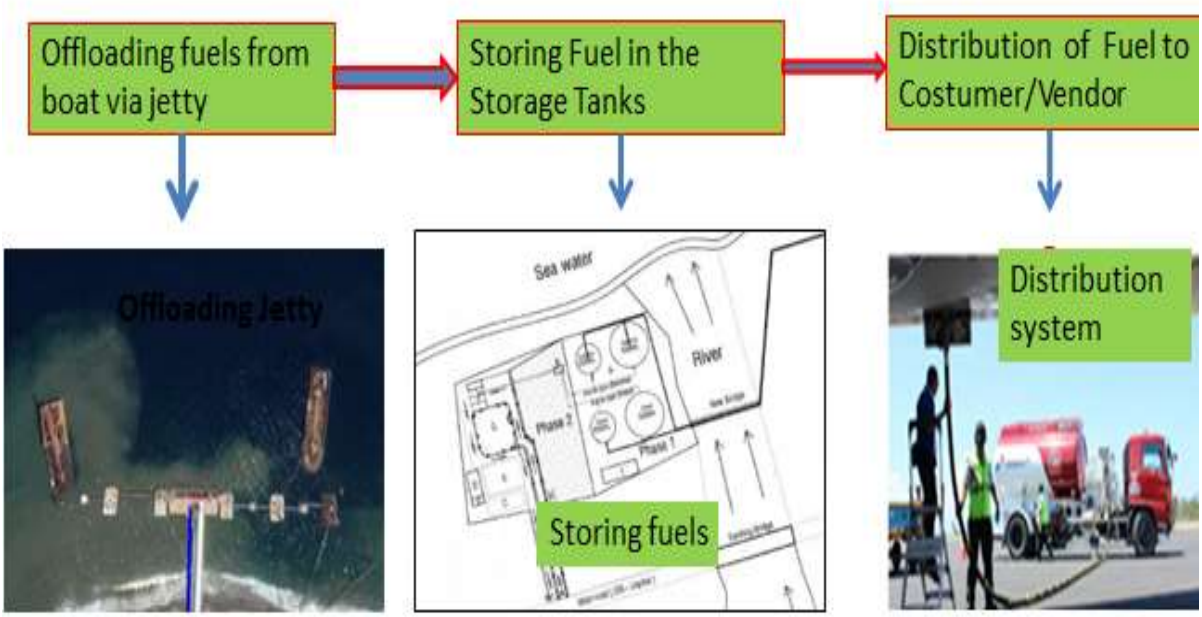
3.3 Project Financing

The proposed development project will be financed through one hundred percent equity from the parent company in Singapore. The construction of the facility will be completed within 2 years with operation planned to commence by 2022. The facility will be operated fully by the project proponent. It is estimated that revenue over 10 years of operation in Timor Leste will cover the investment.

3.4 Project Components

The proposed development consists of the construction of fuel storage tanks and supporting facility on a 1.3 Ha land area. Land for the development has already been secured by project proponent. General lay out for the fuel storage complex is provided in the following figure.
Project components consist of - (i) unloading of fuel in Jetty, (ii) storing the fuel in the storage tanks, (iii) transporting and distributing the fuel from the fuel storage to users and small vendors of the fuel in Timor Leste. All the required facilities such as storage tanks, piping system, utilities, office, parking, etc., shall be constructed as part this development project. Information related to project component, including processes involved will be described as followed.

Figure 3.7 Overview of Main Project Operation Components



Offloading Jetty

The jetty has already been constructed (existing jetty structure). Project proponent will use this jetty as unloading point and in return the project proponent is subject to user charge that will be applied by the owner of the jetty. The existing jetty was desgined and constructed in 2012 -2013 to serve the purpose of offloding of breakbulk cement to be stored in the facility owned by the jetty owner. The total designed capacity of jetty is around 10,000 DWT. Project proponent planned to carry out unloading of its petroleum products twice a month. It is planned that fuel tanker with the capacity of 4,500 – 5,000 KL will transport the product, which will typically carried by the ship with a maximum capacity of 12,000 DWT (Dead Weight Tonnage).

Figure 7.3 Existing Off Loading Jetty (around 100 from the shoreline)

Figure 3.8 Jetty Platform

Figure 3.9 Jetty Structure

Piping System

A piping network will be constructed in order to allow for fuel transfer from unloading point to the storage tanks and from storage tanks to the fuel truck. The design and specifications of the piping system will be carried by the professional independent engineers by taking the standard best practice in relevant industry (American Petroleum Institute/API standard).

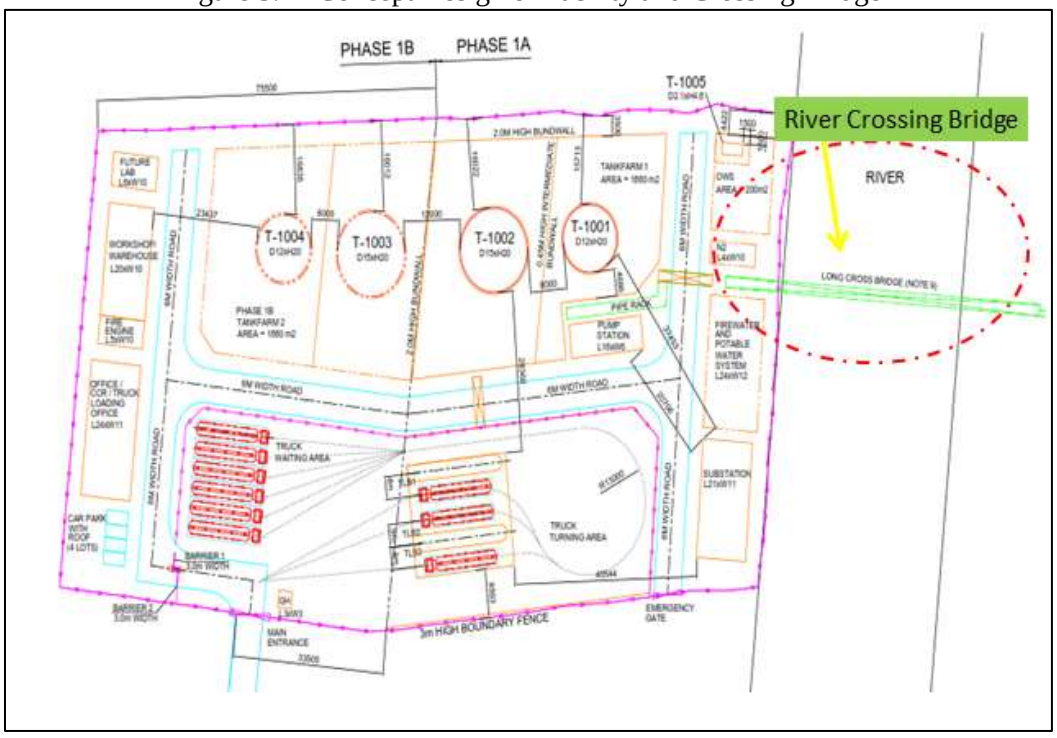
Figure 3.10 Concept Layout of Main Fuel Pipes

Two fuel pipes, one for gasoline and the other one for diesel fuel with the size of 6 inches, will be installed from the off loading jetty platform all the way to the storage tank. The pipe shall be above the ground and laid on the top of river crossing bridge. Detail layout of pipeline in respect to jetty, storage tanks, and other facilities can be seen in the figure 7.7 or annex on the DED document.

River Crossing Bridge

As the off loading jetty and storage area is divided by an existing river, a bridge crossing structure will be developed as part of the project. The bridge will be constructed such that it will be able to withstand high river flow. A hydrology analysis will be conducted as part of the EIS, however, preliminarily, it is recommended that the bridge structure has to be designed to withstand a minimum of 50 years flooding frequency. A more detailed study will be conducted to provide flooding magnitude information that will be used in detailed design work.

Figure 3.11 Concept Design of Facility and Crossing Bridge



Storage Tanks

A total of 4 storage tanks, with the capacity of 2,000 m^3 and 3,000 m^3 will be constructed on the 1.3 Ha of land that has already been secured by project owner via long-term lease arrangement with the land owner. Project development phasing and volumes of tanks to be built are presented in the following table.

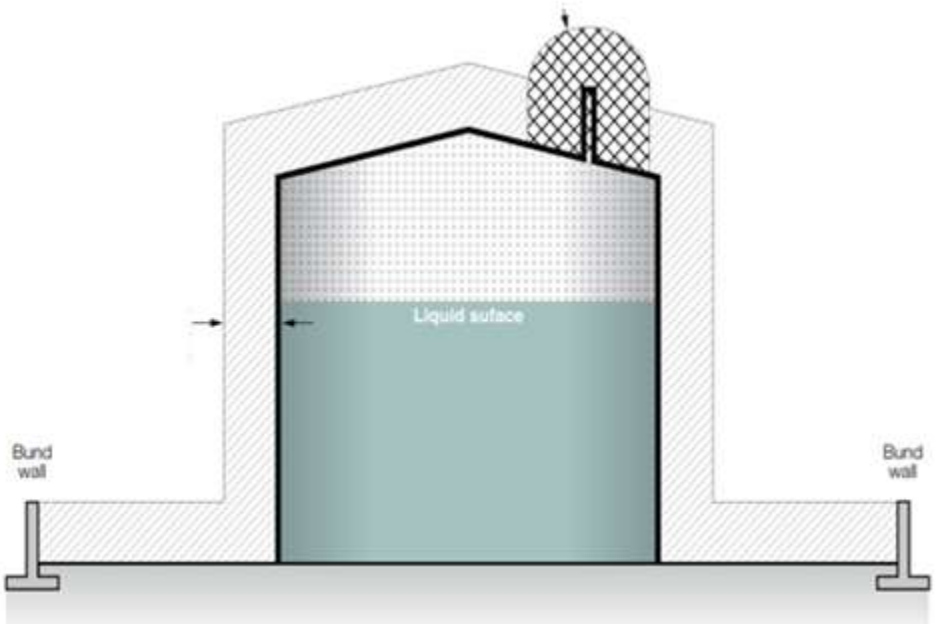
Table 3.3 Number of Storage and Respective Volume

Phase	Number of Tank	Volume of each Tank, m3	Total Volume (m3)	Height (m)	Diameter (m)	Type of Fuel
Phase 1 - A	1	2000	2000	20	12	Gasoline
	1	3000	3000	20	15	Diesel
Phase 1 - B	1	2000	2000	20	12	Gasoline
	1	3000	3000	20	15	Diesel
Total	**4**		**10000**			

A total volume of 5,000 KL storage tank will be constructed in the first phase (phase A) of the project and it is expected to be completed by the end of 2022. After the completion of the phase 1 A, the management will start to plan for the phase 1 B with an additional volume of 5,000 KL storage tank, aimed to be complete by the end of 2025 if found feasible. The design and construction of the fuel storage system shall include all necessary components to operate sustainably by considering health, safety and

environment (HSE) aspects. This includes but not limited to bund walls as the secondary and tertiary containments that will contain the fuel if there shall be any overflow or accident in the fuel tank or any major spill of oi, in the storage farms.

Figure 3.12 Typical Tank Design with Secondary Containment



The decision of whether or not to expand to phase 1-B will depend on the country's economy and rental demand for storage tank. Therefore, design for phase 1-B is subject to change. The design of the fuel storage tank, including the material selection, type of tanks, tanks spacing, and ratio of height to diameter shall follows standards recommended by the API.

Secondary Containment

The secondary containment should be constructing as part of the storage facility with the total capacity of 110% of the total volume of the largest tank or a group of tank or 10% of the total volume of tank (Europium Union Standard, 2010). The main purpose of the containment is to retain the fuel spill (in case on emergency) from the storage tank and already consider the fire water.
There are two methods to estimate the dimension of secondary containment; (1). Based on 110% of the largest volume of the tank; (2). Base on the 10% of the total volume of tank group.

- First method: Volume of Secondary containment = 3,300 KL
- Second Method: Volume of Containment = 1000 KL

This means that the total volume of the secondary containment of 3,300 m^3 will be constructed.

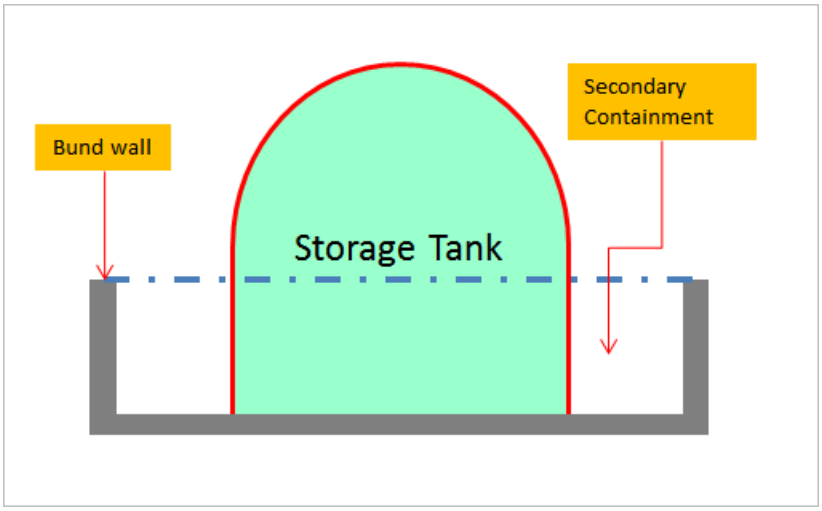


Figure. 3.13 Secondary Containment and Bund wall

With this containment, the major spill of oil, in case an emergency major oil spill will be retained inside this confined space. The secondary containment consists of the following:

- Dike or retaining wall that is impervious to retain or keep fuel inside this perimeter
- Curbing or drip pan
- Sumps and collection system
- Drainage system
- Weirs, boom or other barrier
- Spill diversion pond
- Retention pond
- Sorbent material

Detail Engineering Design (DED) should present the detail layout of the each tank and the respective secondary containment.

Fuel Distribution System

Fuel in the storage shall be pumped into the distribution unit, where it will then be loaded on to the fuel truck for further delivery to the fuel filling station.

Utilities System

Utilities required consist of water, electricity and back-up power system as well as life and fire safety system (described separately below). The utilities are necessary components to ensure smooth operation of the facility.

Water Supply System

Water will be sourced from a groundwater pumping well, which will be constructed as part of this project. In normal condition, the capacity of water demand will be reasonably small around 2000 L/day or 0.14L/s assuming the pump is continuously active for four hours per day. A much larger amount, however, will be needed during a fire event.

A pool that store water for every-day use and fire event will be constructed near the storage area with a total capacity of 3000 m^3. The pool will be filled with water from the well in the facility which will require a gradual pumping until it reaches the capacity. After the capacity is reached, the pumping rate will be reduced to cover the daily need of 2000L/day and evaporation loss. Detail information on the production well for water supply presented in the section of water resources.

Power Supply

Power supply for the project will be source from the national power grid available in the project site. The power will be utilized for pumping water and fuel, general office need, and other electricity needs. The total power requirement is around 1 MW per year during operation stage, which is a reasonable size of power consumption for this type of facility.

Wastewater and solid waste treatment

Two types of waste will be produced from the facility, the wastewater and solid waste. Wastewater will be mainly coming from domestic sanitation activities which include black water (resulting from toilet flush) and grey water (resulting from kitchen sink, other washing facility) and runoff during rainy events. Black and grey water will be flushed into a septic tank which will be designed to allow for in-situ treatment of the water with effluent discharged into the drainage which will eventually enter the marine waterbody. Storm runoff, on the other hand, will be washed off the ground surface in the project area and likely to be contaminated by fuel products (due to minor spill). Storm runoff will pass the oil-water separator to catch the oil prior to the release of the treated wastewater into the drainage system. Detailed engineering design (DED) of each wastewater treatment system (septic tank and oil-water separator) will be provided as part of design approval.

Fire Protection System

Fire management system is an important part of project development, as fuel is susceptible to fire. Project proponent shall construct a system that meet the international life and fire safety standards to ensure integrity of its own facility, safety of workers and surrounding community.

Fire protection system shall consist of the following element:

- Pump, with a high capacity pumping head to the reach a storage tank of 20 m high
- Fire hose
- Fire hydrant system
- Moveable fire extinguisher
- Fire water system (pool)

Site layout on the arrangement of fire management system, including the equipment, fire fighter team, and mechanism of responding should fire actually happens will be developed by the project owner as separate document.

Support Office

Support office mainly consists of the office space for staff, security post, parking zones, and unloading zone of the fuel from storage tanks to the buyer trucks. Detail engineering design on the support office will be presented as part of the EIS and EMP report.

3.5 Project Implementation Timeline

The project will be implemented according the general stages, which include, Design and construction, operation and maintenance, and decommissioning. The project preparation such as study and design is only small portion of the project and this stage is mainly related to the survey and analysis of the data, which shall not produce any major impacts. So in term of environmental impact assessment, this can be taking as an integral part of design and construction. The duration of the design and construction will roughly take 3 –years since the commencement of the study. The following implementation timeline shall be used an indicative for the project implementation.

Table 3.4. Project Implementation Schedule

Stage	Year								
	2019	2020	2021	2022	2023	2024	2025	----	2055
Planning and Preparation									
Procurement and Construction									
Operation and Maintenance									
Decommission									???

3.5.1 Planning and Preparation

During the planning and preparation stages, various works related to the legal issue such as land title, market feasibility study, environmental impacts assessment study, data collection and water resource investigation were carried out. Based on this information, the design engineer will prepare the detail engineering design, which provide a detail information and layout how to construct the facility, including the cost of the construction, as well as material engineering requirement.

It is expected that by the end of 2020, all the work related to the planning and preparation have already completed and the project owner will seek the approval of the design, which will become a basis to further procure the contractor to build the proposed development fuel terminal.

3.5.2 Procurement and Construction

The procurement and follow with the contract award is planned to be commenced by the end of 2020 or initial 2021. The construction of phase 1 A, is expected to take two years' time. By the end of 2022, the fuel terminal facility is expected to be completed already.

3.5.3 Operation and Maintenance

Starting from 2022, the inspection and testing of all the component of the facility will be done. It is hope that by the end of 2022, the operation approval for the phase 1 A will already been granted. Then the facility will be ready to be operated by the beginning of 2023.

Depending on the market condition in Timor – Leste, the project owner will inform the ANPM, regarding the construction of the phase 1 B.

3.5.4 Decommission of the Facility

The normal age of the facility is designed for 30 –years of operation and after this service years, the project owner will make a decision to continue or decommission the facility. The extension to continue the operation of the facility is also up to the government, considering the performance of Global Oil Terminal LDA, in relation to the compliance of environmental, safety, and social regulation, as stipulated in the EMP document.

3.6 Justification of Project

The proposed project development is a private business that would like to take the opportunity to build larger fuel terminal system in the Liquica. As any other business development, this proposed development is being considered as the business case is justifiable (economically, financially, and commercially). According to the market study done by the project owner, the development is justified as a Better Business Case (BBC) and therefore the project owner decide to go further into this project development toward the realization. With this new business development, the Global Oil Terminal Storage hopes to contribute to a better and efficient fuel supply with the competitive price in Timor – Leste. The Environmental Impacts Assessment (EIA) study on the other hand, shows that the project location is not within any sensitive or protected area defined by the regulation in Timor – Leste. Moreover, the major impacts related to process can be mitigated with technical, as well as non-technical approach to mitigate them.

With this successful project development, the project owner shall contribute to the Timor – Leste economy in a larger scale through the following project benefit:

- Contribute to the job creation to the youth that currently employed
- Technological transfer to Timor – Leste in managing the large project that contain high risk
- Contribute to the tax payment to the government (in line with the government plan on the economic diversification)
- Enhance other economic activity in local (multiply effect) and provide the good image of the business development in Timor – Leste so that may foreign direct investment will entering into Timor - Leste

Given the better business case (BBC), which is profitable, that ensures the financial sustainability with the expected minimization of the environmental and social impact, the project owner decided to pursue this development project.

3.7 Proponent's Endorsement

The project proponent has already reviewed and approved this document as part of the application for the approval of the location of the project. Therefore, we endorsed this report.

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3.8 Structure of EMP Report

The structure of the EMP document, as presented in the table of content, follows standard guidelines released by DNCPIA, as provided in the Expert 101 package according to decree Law 5/2011:

- Executive Summary
- Detail of project Proponent
- Detail of EIA Consultant
- Description of project which cover the location, justification and rationale of the project, and detail component of the proposed project
- Legal framework and institutional arrangement of environmental protection in Timor Leste
- Description of existing environment
- Alternative options considered in the project development
- Environmental, social, and economic analysis related to the project development
- Environmental Management Plan (EMP)
- Public consultation and stakeholder engagement during the project development and implementation
- Difficulties and problems that may occur during the project development
- Conclusion and recommendation.

4. LEGAL REQUIREMENTS

The development project of fuel storage terminal and associate supporting facilities will be constructed in the Suco Lauhata and owned by the foreign company, which has already registered locally under the Timor – Leste jurisdiction. Therefore, the construction and operation this proposed development project is subject to various local jurisdictions in Timor – Leste and other best practice regulation or standard such as ISO (international Standard Operation), International standard regulation and best practice in the related industry. Especially, the legal framework on the business related project and environmental safeguards principles that must be complied by the project owner. While, legal framework of international standard and other best practice are only an optional, when the local regulation is not available, the relevant regulations in Timor – Leste are mandatory to be complied. Therefore, review of the following legal framework, existing policies and standard, as well as best practice in the proposed development industry will be provided.

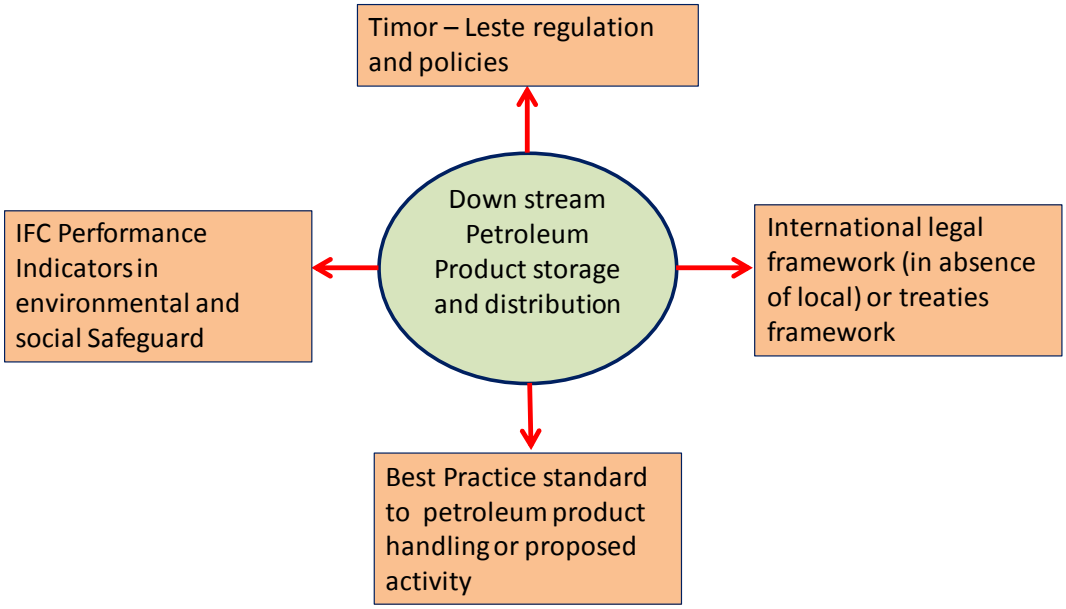

Figure. 4.1 Scope of Review of Policies and Legal Framework

Moreover, the institutional arrangement to ensure the effective the implementation of policies and regulation would be also proposed, particularly related to the environmental management and monitoring system.

4.1 Relevant Policy and Legislation in Timor – Leste

4.1.1 Constitution of RDTL

The Constitution of Timor Leste has mandated the protection of environmental and preservation of natural resources (article 6 – f) to ensure that the development of the economics of Timor Leste, should not jeopardizing the natural environment, in achieving the national goal. It is the highest hierarchy of law, which must be complied by every citizen who perform any kind of business activity in Timor – Leste, including the petroleum and gas sectors.

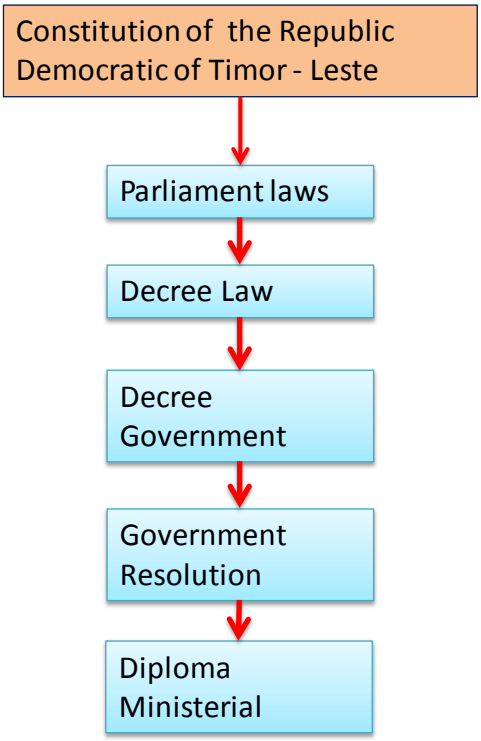

Figure 4.2. The Hierarchy of Law in Timor – Leste

4.1.2 Downstream Petroleum Product Legal Framework

Other laws are more technical regulation to regulate the technical operation of specific activity but should be in-line with the Timor – Leste Constitutional. For example the following laws present the specific regulation on the downstream petroleum activity, which must be complied by the business related to the downstream petroleum activity.

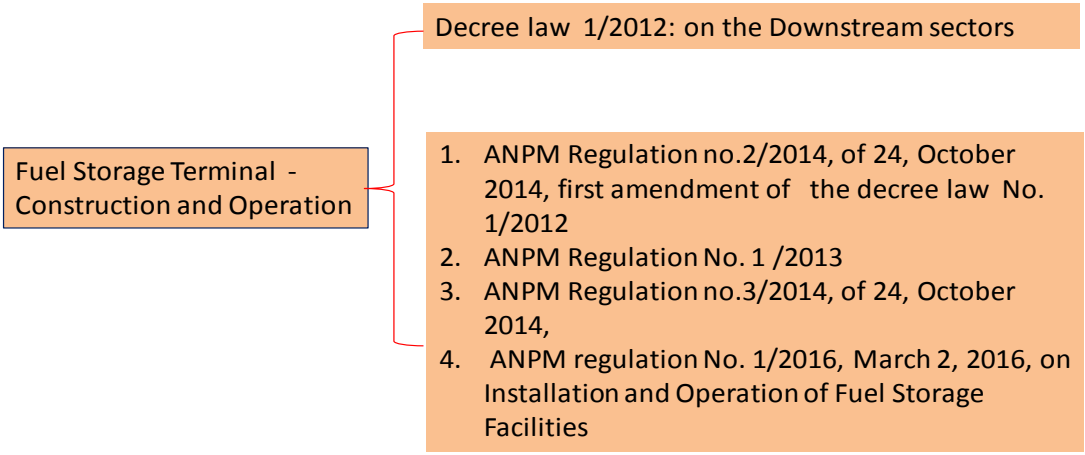

Figure. 4.3 Timor – Leste Regulation of the Downstream Petroleum Activity

More detail procedure on the installation of the fuel storage, including the technical requirement is presented in the section 5.5

4.1.3 Environmental Protection and Safeguard Policy

To ensure the implementation of the laws related to the downstream petroleum activities, especially, to protect the natural environment, other technical laws related for the environmental protection should be created. Since 2011, the Government of Timor – Leste, has made it mandatory for every major business or major projects to have proper environmental study as the pre-requirement prior to the granting of the environmental permit to commence the construction. Decree law 5/2011- Environmental Licensing provides a technical guideline on how to exercise the constitution mandate in securing environmental permit to start development activities. According to this decree law, every major development should go through proper environmental impacts assessment (EIA) in order to get the environmental licensing prior to the commencement of the development to ensure that the impacts of the proposed development is identified and mitigation measures are proposed in order to minimize the environmental and social impacts. Knowing the negative impacts and proposed mitigation measures to the impacts of the project in the early project development is very important and is considered as a good initial investment to the project, as it would be more expensive to mitigate the impacts that were not identified prior to the project implementation. The guidelines for the formulation of required documents to prepare for environmental license have been developed through the Expert101 system that contains checklist and other necessary documents for the preparation of Project Document, Environmental Impact Statement (EIS) for category A projects and Simplified EIS for category B projects.

The following figure shows the regulation related to the environmental licensing in Timor – Leste

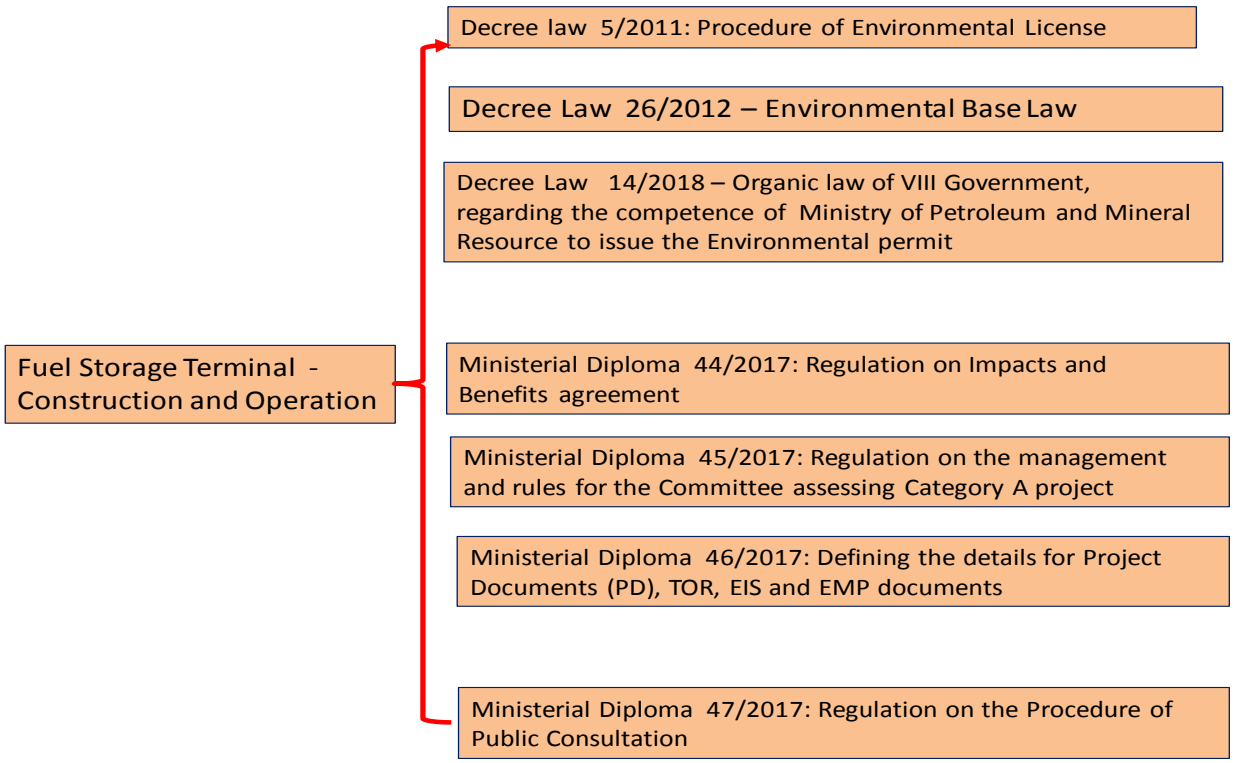

Figure. 4.4 Regulation Related to the Environmental License and Preparation of Related Document
More detail on the actualization of the environmental licensing law is presented in the section 5.6.

4.1.4 Crime against Environment

The penal code of Timor – Leste defined clearly, the crime against the certain article related to the environmental violation, including the type punishment applied to the project owner. The following table provides the detail information on the law

Table 4.1: Summary of Penal Code on the Crime Against the Environment

Regulation	Summary	Relevancy
Penal Code- Section II	Crime Against the Environment, such as water, air, marine, and soil pollution: Article 215 – 218	Article 215: (1). Defined emission from private property to any receiving environment should not be greater than the natural assimilation capacity. If it is above the natural ability, then according this article, the institution can be sentenced 3 – years in prison or fined Article 216 Related to the pollution discharge and punishment that the company may get if violate any rule and regulation. The project owner must provide all the record to anytime, they can proof on the compliance to the environment. Article 217 The pollution that cause the damaged of flora and fauna can be punished with 3 years jail or fined. Article 218 Pollution from the project, that cause the loss or damaged of the endangered species will be punished or fine. Relevance of the project activities to these above

		mentioned articles would be related to the pollution emission to the marine waterbody, soil/groundwater and air emission that will cause the irreversible damaged of environment and affect people. The project owner is subject to fined or jailed if the pollution threshold will be greater than the maximum allowable that can be received by the specific environment (waterbody, marine water, soil, or air)

4.1.5 Land Owner and Territorial law

The land title is still a major issue in Timor – Leste and that contribute to the limited grow of private investment in the country. Although the National Parliament has already passed the land title for Timor – Leste in 2017, various adjustments will need to be made in order to fully implement the law smoothly in the territory of Timor – Leste. The following table summarizes the land ownership and any related spatial planning laws that should be taking into consideration in the planning and designing of any proposed development project.

Table 4.2 Land Title and Spatial Planning

Regulation	Summary	Relevancy
Law No. 3/2003 -	Law of land and property	The entire regulation
Law 3/2017 – land title in Timor - Leste	Proper compensation to the land owner and public interest	The project development in Lauhata will take 1.3 HA that was secured by the project owner through the long-term lease arrangement. The land title was arrange base on the existing law
Law 13/2017 - Special Regime on non-moveable properties		
Lei 6/2017 – 19 of Abril 2017 - Spatial Planning Law	The law defines the policy of spatial planning and utilization of space for public interest. There are two important matter related to the public space: - National level - Municipal level	The project is located in the Municipality of Liquica and required to follow proper legal framework according to the proper arrangement of national spatial plan and municipal level

4.1.6 Biodiversity and Protected Area

The objective of the laws of biodiversity and protected area is to protect the natural resources, especially the biodiversity and endangered species , as well as to reserve the area that consider as valuable resources to be protected in the specific zone due to uniqueness and specialties. During the planning stages, the identification proper regulation and protection of the biodiversity and protected area would be necessary to be done in order to properly design and map out the impacts of any project development to the

biodiversity and protected land and nature. The following table summarized the relevant legal frameworks for the biodiversity and area of protection zone in Timor – Leste.
The following table provides the summary of the evolution of framework since the UNTAET administration.

Table 4.3 Summary of legal framework on Biodiversity and Protected Zones

Regulation	Summary	Relevancy
Decree Law 5/2016 on Protected Area	This decree law provides general guideline on the protected area in Timor –Leste. The most relevant article from the decree law, specifically to the project would be annex 1, the list of protected area in Timor – Leste, where the project owner should identify and conclude that the project location is not within any protected area, as stipulated in the decree law 5/2016	By law the any project development should identify the location and its relation of the projected zones. The protected zones and national parks are reviewed as presented in the section 6.2.5
Decree Law on Biodiversity (March 2012)	This law is still in draft since 2012. However, there are several article that are relevant to the project: 1. Article 6 (h), the responsibility of the relevant ministry to ensure that the biodiversity issue is incorporate in the EIA 2. Article 18 (section 4) - related to biodiversity data clearance, urge private sector to provide any biodiversity data to the government if identified in their project activity 3. Article 22 – Management of protected area, at the section 4 – urge stated to ensure any activity within the protected area do not jeopardize the integrity of biodiversity in the protected area	The EIA has already incorporate the biodiversity into the study and assessment of the certain important biodiversity according the regulation should be considered

4.1.7 Fisheries

Fishery is one of the important sectors that can contribute to the economic development of the country. The legal regime related to fishery can be summarized in the following table:

Table 4.4 Summary of Legal Framework of Fisheries in Timor – Leste

Regulation	Summary	Relevancy
Decree Law 5/2004 - General Regulation on Fishing	Provide the general guidance on the importance of fisheries and sustainable exploration and encourage to create the employment through the fishery industry	Fisheries industry could be enhancing by the proposed project development.
Law No.6/2004 on Legal	Basis for Management and Regulation of Fisheries and Aquaculture	Article 95 – The zones of Fisheries that will be regulated by the diploma ministerial. The northern coast is also indicated at the area of fisheries, and then pollution emission becomes an issue.
Decree Law 14/2004 – Offences of Fisheries	Provide the legal framework on the type and method of fishing activity that prohibited as they will damaged in fisheries industry and to protect aquatic environment and achieve sustainability in fishery	Pollutant contribute by the proposed project development will implicate the coral and marine fisheries habitat. Assessment on the fishery type in the project location and boundary is important to provide the baseline information for future monitoring program

4.1.8 Air Quality Guidelines

The regulation on the air quality protection from the pollution generated from various point and non-point source have not being established. The ambient air quality standard has being use widely to evaluate the air quality issue. In the absence of national standard and regulation, the international best practice shall be adopted. The following table presents the framework

Table 4.5 Summary of Policy Framework on Air Quality Protection

Regulation	Summary	Relevancy
World Health Organization (WHO) – 2006 – Air quality Guideline for PM 10	The standard ambient quality for Timor – Leste has not being established. Currently the WHO standard of water quality of ambient measured in term of the following parameters have been adopted: SO_2, NO2, PM, CO2, and Ozone	The project involve the storing and distribution of fossil fuel, which is the primary source of CO2 and other flue gases such as SO2, NO2, H2O, which will be emitted by the project (directly and indirectly)
IFC Performance Standard on Ambient air quality	Similar of WHO standard	The project involve the storing and distribution of fossil fuel, which is the primary source of CO2 and other flue gases such as SO2, NO2, H2O, which will be emitted by the project (directly and indirectly)

4.1.9 Labor Code

The labor code is very important and relevant to any project to be complied. Timor – Leste labor law and related regulation to be considered in the phase of planning in the project development is provided in the following table.

Table 4.6. Summary of the Labor Code Relevancy

Regulation	Summary	Relevancy
Law 4/2012 – labor code	It is the responsibility of the company, as the employer to provide good working environment to the workers, include any risk mitigation measures related to occupational health and safety, including the utilization of Personal Protective Equipment (PPE) to ensure the safety and minimize the risk. This law also regulate the responsibility of each parties (employee and employer) to be complied	The impact of OHS related to the fuel terminal operation is highlighted, especially to provide the PPE in each section of the operation

4.1.10 Solid Waste Management

Solid waste management laws have not been established at national level that covers the Timor – Leste territory. However, it is important to regulate the solid waste management system in order to achieve the sustainable management of waste collection and disposal, which are important to ensure the good quality of environment to human health and other component of ecosystem.

Currently, the regulation has been established locally based on the need to respond to the existing problem. In Dili area, the solid waste has become an issue and therefore the government central established the resolution to help the relevant entity to manage well urban solid waste in Dili. Similar arrangement should also be applied to Liquica and other municipalities. Moreover, no provision has made regarding the hazardous solid waste that produced by the industry, which should be managed and regulated by best practice in the industry related. The following table provides a summary of this relevant solid waste management legal framework

Table 4.7. Summary of Legal Framework of Solid Waste Management

Regulation	Summary	Relevancy
Decree Law 2/2017 – Urban Solid waste Management System	The law on Urban Solid Waste Management System introduces the management of municipal solid waste for the purpose of promoting and ensuring cleanliness of municipal towns that will positively impact the well-being of its citizens while enabling an integrated, sustainable and socially inclusive management system. Decree Law No.2/2017 sets out nine principles for the management of urban solid waste, as follows: 1. Protection of public health and the environment; 2. Promotion of universality and equality of access; 3. Quality and continuity of service and protection of the interests of users; 4. Economic and financial sustainability of	The proposed development project will produce solid waste that should be management through the proper collection, treatment, and disposal according to the existing legal framework. Section 5.1.9, presents further detail information on the solid waste produced by the proposed development projects and method to manage them during the operation of the project

	services; 5. User-payer principle; 6. Citizen responsibility, adopting preventive behavior in relation to production of waste, as well as practices facilitating the reuse, recycling or other forms of valuation; 7. Transparency in the provision of services; 8. Efficiency assurance and continuous improvement in utilization of affected resources, responding to the technical requirements and best environmental techniques available; Promoting economic and social solidarity, the correct planning of the territory and regional development	

4.1.11 Noise and Vibration

Noise and vibration regulation have not been established. Currently, the UNTAET regulation will be still enacted in the absence of national regulation.

Table 4.8 Summary of Regulation on Noise

Regulation	Summary	Relevancy
UNTAET Guideline on Ambient Noise - 2002	During the UN administration in Timor Leste, UNATET adopted the guideline, which derived from best practice international to protect public from noise and vibration from various machineries in outdoor environment.	The background Noise and Vibration are measured by this study and mitigation measures were proposed as part of this document

4.1.12 Climate Change related

Climate change regulation issue was initiated globally as the nature of impact that is cross boundary from one country to the other. Timor – Leste, as part of the global community, particularly, a small island that should be prone to impact from global climate change, should be part of campaign in promoting the mitigation measures to minimize the climate change impacts. The following international framework, where Timor – Leste is also a member should be considered in the national policy such as in the infrastructure development, carbon credit, etc.

Table 4.9. Summary of Relevant Framework and Legal Regime Related to Climate Change

Framework	Summary	Relevancy
UN Framework to combat global climate change in 1992 and Kyoto Protocol	Under this framework, the threshold of greenhouse gas emission to the atmospheric was established to limit the emission rate from industrialized country. Timor – Leste, is exempted from this and can get the carbon credit, as the greenhouse has contribution is very much below the threshold	The project locates in the coastal area and shall be impacted by the climate change such as sea level rise, rainfall pattern change (frequent flooding, etc.). this study consider the climate and impacts that should be considered and mitigated
Vienna Convention in 1993 for the	Under this framework, the ozone layer should be protected by controlling certain chemical, as part of a product/substance	As part of the study, the assessment shall be provide on utilization of chemical that affect

protection of ozone layer and Montreal protocol	that cause the ozone depletion	the ozone depletion such as Freon and other chemical elements that induce the ozone layer

4.1.13 Soil pollution

Soil pollution law does not exist at a moment in Timor – Leste. However, as many emerging businesses that could potentially contaminated the soil and eventually groundwater, the regulation should be established to control the contaminant transport to the soil. In the absence of national legal regime, an international best practice and legal regime should be adopted in order to ensure that the certain activity shall be mitigated properly its contaminant transport into the soil. The soil pollution shall be related to directly to the drinking water standard, as the pollutant will eventually pollute the groundwater body, where the groundwater shall be extracted for the water supply purposes. The penal code, as presented in the section 5.1.4, could be applied to the project owner the cause the soil pollution.

4.1.14 Water resources

Water resource is the most valuable vital resource for human consumption that must be regulated in order to ensure enough quantity and good quality for consumption. The resource protection and delivering as part of public utility should be strengthening in Timor – Leste. However, at this stage, there are still gaps in regulation that need to be improved in the future. The following table shows the available legal framework related to the water consumption and some draft for the water resource protection.

Table 4.10. Summary of Legal Framework for Water Resource

Regulation	Summary	Relevancy
Decree law 4/2004 - Water Supply for Public Consumption	This decree law define the government intuitional (DNSAS) that responsible for water production and distribution for domestic consumption in urban and non-urban area	In line with this regulation, the project should comply this regulation by ensure that the community well in supplying water in each house is sustainable and no disturbance
Draft – Law on Water Resource Protection	DNCQA – is the proponent of this proposed law , to protect the groundwater resource and utilization	The Project will utilize the groundwater and will comply the law, especially the permit will be asked to the government once the law is enacted. The groundwater study shall be conducted in order to ensure the sustainability of groundwater resource in the aquifer
WHO – Drinking water quality Standard	Define various physical, chemical, and biological parameters related to health and human consumption	The study conduct water quality testing for water source that will be utilized by the project (boring well) and wells from the community

Further detail description on the relevant regulation of environmental license and the license of the installation and operation of fuel storage terminal will be presented in the section 5.8 and 5.9.

4.1.15 Occupation Health and Safety (OHS)

Occupation health and safety are one of the important tools and framework to be adopted by the large operation of the facility to ensure that the sustainable operation of the proposed development project. In term of regulation and policy framework, it should be developed locally by each country and respective industry. However, some best practice in the industry, as guided by the IFC (International Finance Corporation), ILO (International Labor Organization), ISO (International Standard Organization), and US-OHSA (United States Occupational Health and Safety Administration) would be the most appropriate one to be adopted, as these agencies and guidelines have already developed many years ago and already validated in the best related industry.

Table 4.11 Policy and Guideline on OSH

Regulation	Summary	Relevancy
IFC	IFC guideline one the OHS, consist of general project activity and specific of OSH related work to the proposed development industry Moreover, the IFC also established 8 criteria of assessment standard that should be considered by the private and public sector in doing the business in the member county of the international community that ratified the convention	Major section of the EIS and EMP discuss about the OHS issue related to the project and how this proposed project shall adopted a specific part of the guideline in the project implementation
ISO	ISO also has its own standard best practice concern related to environment, health, and safety	The project owner should develop it own standard operating system in relation to environment, health, and safety system by taking the reference from all the best international practice and the experience during the operation
Timor – Leste : Civil Defense regarding the Fire safety and Hazard		

The above, list of guidelines are a general one, and specific to fuel terminal construction and operation have also been developed overtime. However, to be really fit in this specific project in given location and reality in Timor – Leste, the project owner must adopt the part and tailored into the local needs.

4.2 International Finance Corporation Performance Indicator

Timor – Leste, as a member of International community, should also complies with various legal and standard performance indicator that already ratified by members of the community. Beside the national legal framework, other international best practice of legal should also be adopted in substituting the absence of the national legal framework.

- Air emission quality Standard
- Noise and Vibration
- Marine water quality Standard (marine receiving water)
- Hazardous Material Standard and management

The legal framework for these above mentioned subject for Timor – Leste have not established. In absence of national legal regime, the international law shall be adopted. In addition to the above legal framework (national and international), the project development should also consider and compliance the other international standard best practice in order to the meet the objective of the environmental, health, safety, and social safeguard principles. Particularly, the IFC standard indicator could be considered, as guideline in the development of the environmental and social impact assessment study and in the monitoring of the project implementation. The following

1. Environmental health and safety General Guidelines
2. EHS Guidelines for Ports, Harbor, and Fuel Terminal
3. Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Market
4. IFC Performance Standards.

The summary of these 8 IFC performance standards and relevant international guidelines that must be complied by the project is summarized in the following table.

Table 4.12 IFC standard Performance and Relevancy to the proposed project

No	IFC Performance	Relevancy to the existing proposed development project and this performance will be met by this project
1	Assessment and Management of Environmental and Social Risks and Impacts	The environmental and social impacts assessment will be conducted as part of the study in this project. All the relevant standard (environmental and social indicators) will be considered and follow in order to ensure the sustainability of the project within the environmental and social safeguard policy
2	Labor and working condition	The Plan and design of the system will considered a good working condition to ensure the safety of , construction and operation within the proper occupational health and safety (OHS) standard
3	Resource efficiency and pollution prevention	Resource efficiency should be considered
4	Community, Health, Safety and Security	Community health and safety related to the spill, fire, and major emergency situation should be considered and anticipated
5	Land acquisition and involuntary resettlement	Several houses should be relocated and compensate as, they are very close the project area and could be affected by the project, especially in case of emergency condition
6	Biodiversity conservation and Sustainable management of living natural resource	Marine ecosystem as a primary recipient of the pollutant if released by the project. Therefore, study and identification of biodiversity in marine aquatic environment will be major part of the study to provide comprehensive information of the status of marine environment as baseline information for future

		reference. The mitigation measure on managing the pollutant and prevention will be the key to help reduce the risk in order to achieve the sustainable operation and keep natural ability of ecosystem to recover from the pollutant
7	Indigenous people	Local people in Lauhata should be incorporate in the project development
8	Cultural Heritage	Apelo prison preservation and impact to the proposed development project

4.3 Best Practice of International Standard

Furthermore, the proposed development is also has very high risk to fire and oil spill, therefore the best industry practice standard regulation would be considered in designing the system. The following standard of the designing the fuel storage and its' fire management plan shall be considered.

Table 4.13 : Standard Practice of Industry to be considered

Design Component	Common Practice	Relevancy with the current Proposed development Project
Storage Tank Design and specification	API 650 and 620	Standard design and material selection for fuel storage system
Fire Management System	NFPA330	Standard Guideline to the fire safety concept of the flammable liquid storage
Electrical Installation code and standard	NFPA 70	This standard and document provide an overview of electrical code for the industrial business owner that approved by American National Standard. By follow this code it is hope that practical safeguard that protect people and property from electrical hazard can be minimize or eliminated
Standard for low, medium, and high expansion foam	NFPA 11	This standard document cover the aspect of design, installation, operation, testing, and maintenance of low, medium, and high expansion foam system for fire protection to help minimize the fire hazard
Standard for dry Chemical extinguishing system	NFPA 17	This code and document provide the standard for dry chemical extinguishing system for the fire suppression system
Standard for installation of foam – water installation and foam –water spry system	NFPA 16	This document provide standard for the installation of foam-water sprinkler and foam-water spry system, which outline the requirements for the design, installation, and maintenance of the system for reliable fire protection system
Standard for the installation of Sprinkler system	NFPA 13	This document specified how to properly design and install a sprinkler system using the proper component and material whenever the project owner decide to use the sprinkler system
Piping Standard Design and installation	API 570 or ASME B31.3	Over all guideline on the design and inspection of the piping system in the chemivcal plant and other industrial application
Construction Standards		
Flood Frequency Standard Design	River flow of minimum 50 –year of flood frequency should be considered	Storage facility locates adjacent to the river and prone to the riverine flooding. Therefore, design of retaining wall, floor level area must consider the higher frequency of rainfall design • Retaining wall • Crossing Bridge • Floor level

4.4 Relevant Institutional Aspects

There are several institutional aspects related to the implementation of Decree Law 5/2011 on Environmental Licensing that are relevant to the proposed development. The first one is institutions responsible for general environmental protection (marine, coastal and terrestrial). The second one is institution responsible to regulate and monitor downstream petroleum industry including large scale fuel storage. The third one is institutions responsible for the protection of public health and safety. These institutions are identified in the following table.

Table 4.14 Government Responsibility and Relevant Institutions

No	Responsibility	Relevant Institutes
1	Environment and Nature Protection (Terrestrial)	Ministry of Commerce and Environment (MCIA)
		Ministry of Agriculture and Fisheries (MAF)
2	Marine and Coastal Environment	Ministry of Agriculture and Fisheries (MAF)
3	Water and Sanitation System , Power and energy consumption	Ministry of Public Works - Water and Sanitation
4	Public Health and Safety	Ministry of Health
		National Directorate for Civil Protection
5	Worker Health and Safety	State Secretary for Professional Training (SEPFOPE – Portuguese Acronym)
6	Oil and Gas industry	Ministry of Petroleum and Mineral Resources – ANPM

4.5 Procedure of the License of Installation and Operation of Fuel Storage System

Decree – Law 1/2012 on February 1, 2012, has mandated the National Petroleum and Mineral Authority (ANPM) to approve the technical requirement, including the principles and conditions to be complied in the installation and operation of the Fuel Storage Facility in Timor – Leste.

To exercise the above mention mandate, the ANPM approve the ANPM regulation, no. 1/2016, which defined the technical criteria and requirement that must be followed by the project proponent who wish to install and operate the fuel storage system in Timor – Leste, including the existing facility. According this regulation, there are two stages of approvals required prior to granting the license for the installation and operation of fuel storage system.

- Approval of Project Location
- Approval of Project

There are minimum requirement that must fulfilled by the project proponent in order to get the approval of the project location, include securing the environmental license, soil boring testing report and proof of flooding free zone of the propose project location. All these pre-required information should ensure that the proposed location of the project is technically feasible and environmentally sustainable. Prior to granting the license, the project proponent will submit the detail engineering design of the whole facility (fuel storage and other supporting) to the ANPM for the review and comment prior to the approval. Based

on the approval of the technical detail in the DED, the ANPM shall issue the license to the project proponent to commence the project.

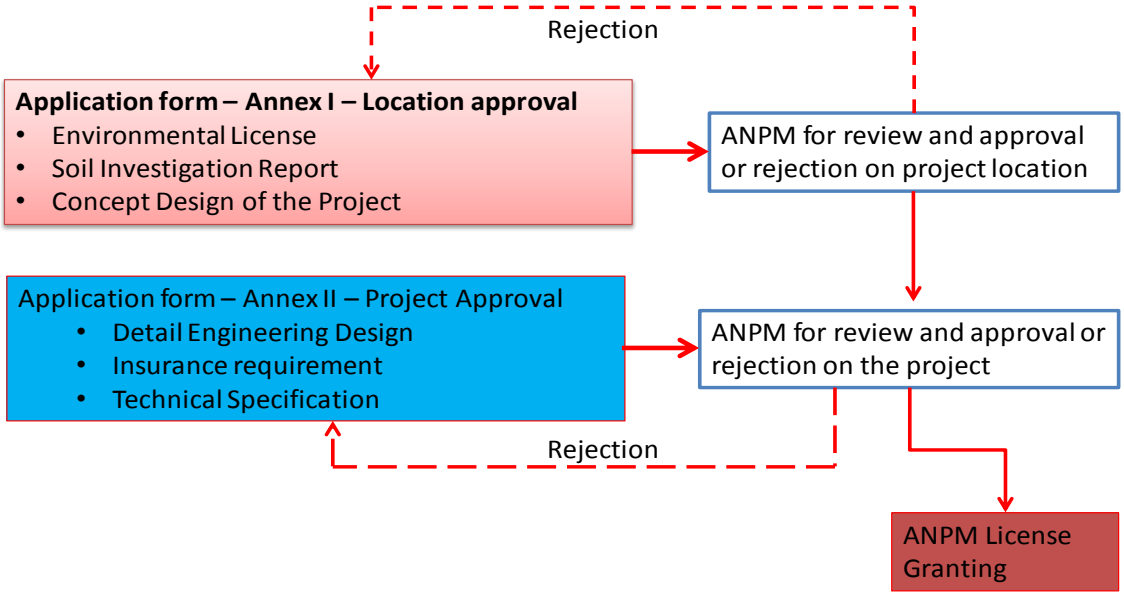

Figure 4.5 Procedure of License Granting for the Installation and Operation of Fuel Storage System in Timor – Leste

The role of government as the regulatory agency is to ensure that all these existing policies and regulations have been rigorously follow or complied in the design and construction of the proposed facility to ensure the sustainable operation without jeopardizing the quality of the environment.

4.6 Procedure of Environmental License

The decree law 5/2011 provide a specific guideline on how to issue environmental license and urge to follow several steps in order to ensure a duly implemented classification, review and monitoring of the environmental impacts. These steps include screening, scoping, preparation of an EIS/Simplified EIS and monitoring of the implementation of Environmental Management Plans (EMPs) contained in the EIS/SEIS. The process for issuance of environmental permit according to Decree-Law No 5/2011 is shown in the figure below.

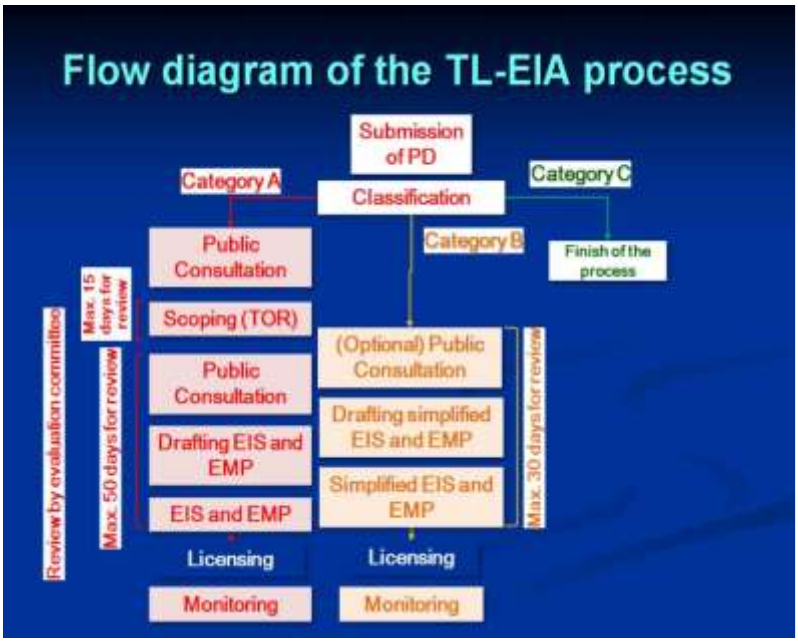

Figure 4.6. Processes for Issuance of Environmental Permit

Complementary regulation of the environmental licensing law is the Organic Government of the VIII Constitutional, which provide competent to the Ministry of Petroleum and Mineral to overseeing the environmental license for the area related to the petroleum and mineral.

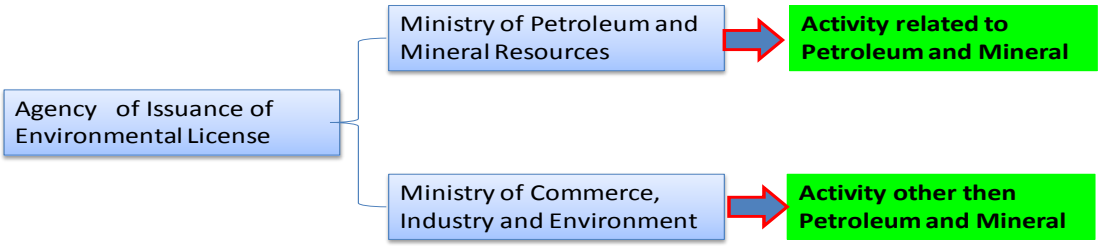

Figure. 4.7 Complementary Regulation of Environmental Licensing Agency in Timor - Leste

The environmental licensing process starts with screening of the project based on project document (PD) and application form submitted by the project proponent. The result from screening is a classification of projects into either Category A, B or C (No EIA required). For Category A projects, screening is followed by scoping, where project coverage is defined. Opinion on the environmental scope of the project is issued by ANPM within 15 days of the receipt of the project documentation such as application form, project document, and any feasibility assessment document. For Category B projects, no scoping is required and project proponents can proceed to preparing the SEIS.

EIS for category A or SEIS for category B as well as the application document is then prepared by project proponent and submitted to ANPM for reviewing. Upon duly submission of all required documentation, technical review process commenced. As shown in Figure 2.1, Category A projects are required to go through lengthier review process through the formation of an evaluation committee and conduct of public consultation. The evaluation committee usually consists of representatives from several relevant entities.

The evaluation committee has a duty to carry out technical evaluation of the document, review public input and recommend the approval or denial of application for environmental permit. Public consultation has to be conducted starting 10 days after the formation of the evaluation committee. The public is given 24 days to submit comments, recommendations or proposals on the EIS and EMP.

To complete technical evaluation and decide on the recommendation for approval or denial of the project, the Evaluation Committee has 50 days, counted from 5 days after the formation of the Evaluation Committee. During the review period, the Evaluation Committee may request additional information from project proponent, local communities where the project is going to take place or government agencies that have interest on the project. The 50 days allowance to come to decision is suspended until all required information is received. The Environmental License Law also allows 10 days for review of additional information submitted by proponent.

After the technical review, the Evaluation Committee will write a report that contains recommendation for approval or denial of the application. The report is then submitted to the Superior Environmental Authority that will issue final approval. Environmental permit should be released within 15 days from the time the Evaluation Committee report is received. When an application is not approved, the proponent will be notified of the decision. Decree Law No. 5/2011 makes provision for an Impact Benefit Agreement between project proponent and local communities affected by the development. Negotiation for Impact Benefit Agreement can start at the time the approval for environmental permit is published.

For Category B projects, after an SEIS which contains and EMP and the application are submitted, the Environmental Authority has 30 days to complete technical evaluation of the application. Similar to the EIS process, the Environmental Authority may ask for additional information from project proponent, affected communities or government agencies with interest on the project. The 30 days period will be suspended until all required information is submitted. The Environmental Authority has 10 days to review additional information and may require a public consultation be conducted on the project.

Once the evaluation is completed, the Environmental Authority then submits to the Superior Environmental Authority the approval or denial recommendation. The Superior Environmental Authority, within 10 days of receipt of the evaluation, shall then issue an order for issuance of environmental permit.

For projects that do not require preparation of an EIS/SEIS (Category C projects), the Environmental Authority would recommend that the projects implement certain measures to protect the environment and maintain an environmental management plan.
The Decree Law No.5/2011 categorizes projects according to the potential impacts to the environment. There are three categories of projects:

1. Category A – to include projects that potentially cause significant environmental impacts. These projects are subject to Environmental Impact Statement (EIS) developed based on Impact Analysis and Environmental Management Plan (EMP) in accordance with the Decree Law No. 5/2011.
2. Category B – to include projects that potentially cause environmental impacts and are subject to the procedure of Simplified Environmental Impact Statement (SEIS) developed based on the EMP in accordance with the Decree Law No. 5/2011.
3. Category C – to include projects where environmental impacts are negligible or nonexistent and not subject to any procedure for Environmental Assessment in accordance with Decree Law No.5/2011.

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

Further detail of the above regulations have been strengthening by the government diploma to regulate the technical procedure on how to carry out the study, forming the evaluation committee, benefit-offset agreement, and mechanism how to the conduct the public and community consultation. The following table presents the summary of diploma ministerial that the government has already approved in 2017.

Table 4.15 Diploma Ministerial on the Guidelines for the Implementation of Decree Law No. 5/2011

Type Diploma and Responsible Ministry	**Content of the Diploma Ministerial**
Diploma Ministerial no. 44/2017 under the Ministry of Commerce, Tourism, Industry, and Environment	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
Diploma Ministerial no. 45/2017 under the Ministry of Commerce, Tourism, Industry, and Environment	Regulation on the management of and the rules for the Committee assessing Category A projects
Diploma Ministerial no. 46/2017 under the Ministry of Commerce, Tourism, Industry, and Environment	Defining the details for Project Documents (PD), TOR, EIS and EMP documents, as stated in Annexes 1, 3, 4 and 5 respectively.
Diploma Ministerial no. 47/2017 under the Ministry of Commerce, Tourism, Industry, and Environment	Regulation on public consultation Procedures and requirements during an environmental assessment process.

This EMP report has been prepared by using the latest guideline and policy as presented, especially the diploma ministerial no 46/2017, regarding the table of content of the report of EIS and EMP that have strictly followed by this report

5. CONTRACTUAL AND CORPORATE OBLIGATION

The project development should not only comply with various legal and policies framework as presented in the chapter 5 but also any other relevant more technical agreement to regulate smooth operation of the proposed development plans.

- Rental agreement of the land utilization between the project owner and Timor Cement SA or between the community member and project owner
- Share holder of the ownership of the fuel storage facility
- Agreement on the rental of the fuel storage to the third party, where the project owner become the renter, which both parties can developed contract agreement on the rental fee, etc.
- Impact benefit agreement only will be realize if there is any major impact such as major oil spill that cause the damage of coastal and other natural resources

The new proposed development project is owned 95 % by Global Oil Terminal, and 5 % will be shared by local that comply with Timor-Leste's downstream regulation – Decree law No 1/2012 particularly Article 9 that stipulated that all downstream petroleum companies in Timor Leste should have at least 5% local ownership. However, as a foreign owned company, such as Global Oil Terminal, might subject to various policies that recognized internationally, which consist of:

- Environmental Management System (ISO 14000)
- Occupational Health and Safety Standard (ISO 18001) and IFC performance indicator (2007)

Moreover, Decree Law No.5/2011 in Articles 15 and 16 established the Impacts and Benefit Agreement procedure to allow for project proponent and affected communities around Category A projects to enter into a legal agreement for the community's benefit (Table 5.1). While there have been no clear guidelines on how to enter into these types of agreement, it is prudent to say that most project proponents are willing to enter into this type of agreement as far as the agreements are reasonable and within the scale of the potential impacts identified in the EMP.

Potential impacts to local community range from negative as well as positive impacts. Potential negative impacts can be direct and indirect impacts that will be felt during operation and maintenance of the project. During the operation and maintenance phase, impacts can come in the form of pollution such as air and water and others. Potential positive impacts are related to job provision in every phase of the project, be it pre-construction, construction and operation and maintenance impacts.

Table 5.1. Impacts and Benefits Agreement in Decree Law No. 5/2011

Chapter	Article	Article Title	Main Point
V	15	Impacts and Benefits Agreement (IBA)	Establishment of the IBA as the legal instrument for communities around or near the proposed Category A projects to enter into an agreement that defines rights and obligations between the community and project proponent in relation to traditional land use, customs and community rights to the scale of potential impacts identified in the updated EMP. Especially in the major event such as oil spill in the jetty that may create extended impacts to the coastal communities: • Fisheries • Mangrove area • Aquaculture production • Salt pan The benefit agreement would also be established between the project owner and government to compensate the coral damage and beach interruption
	16	Negotiation of the IBA	Timing of the IBA negotiation, process, facilitation, conflict resolution and status of the IBA as a "statute." The timing shall be after the major spill and proof of damaged to the marine coastal resources

6. SUMMARY OF IMPACTS

This section provide the summary of impacts that potentially rise during the project implementations from the pre-construction, construction, operation, and de-commissioning phases. The impacts as identified in the EIS document are summarized in the following sections.

6.1 Impacts during the Pre-Construction and Construction of Phase 1 A

The impacts during the pre-construction is minor, as no major project activity, other the preparatory study and design, which is very much produce no impact to the existing environment. The construction activity consist of land preparation such as site clearance, grading, foundation work, installation of pipe, pump, storage tank will produce temporary impacts during the construction phase. These impacts must be mitigated by technical and non –technical approaches. Prior to proposing the solution, the impact should be specified and if necessary quantified. During the construction phase 1 A of the project development, the impacts that arise are summarized in the following table.

Figure. 6.1 Impact during Construction of phase 1 A

- Air quality impact from the construction activity
- Sedimentation and marine water quality
- Risk related to the occupation health and safety hazard
- Noise and Vibration impacts
- Traffic Impacts from the movement of vehicular in and out of project area
- Community health and safety impacts

6.2 Impacts during the Operation of Phase 1 A

The potential impacts that affect the operation of phase 1 A project would be summarized as followed:

- Flooding from the high frequency of rainstorm
- Oil spill impacts (Major and minor spill)
- Fire hazard Impacts (minor and Major)
- Soil and marine pollution
- Groundwater quantity and quality
- Traffic accident and delay
- Solid waste and other hazardous substances
- Air quality impacts from VoCs
- Risk related to occupation health and safety
- Community Health and Safety
- Climate Change impacts

Detail assessment of each of these mentioned impacts and mitigation measures have already presented in the EIS.

6.3 Impacts during the Construction of Phase 1 B

The construction phase 1 B project implementation only installation of additional two fuel storage tanks, installation of piping system, valves, and primary plus secondary containment to the storage tanks. It has already assumed that during the construction of phase 1 B, the operation of phase 1 A would be suspended. The impacts arise during the execution of the phase 1 B plan; can be summarized in the following table.

Table 6.1 Summary of Impact during the Construction of Phase 1 B

Impact Assessed and Mitigation Measure during Construction of Phase 1 B		
Impacts	Area of Coverage	Particular concern
Occupational Health and Safety	People who work inside the facility	• Work related electricity • Exposure to heat • Exposure to the dust and particular matter • Risk injury related to accident (vehicle, heavy duty equipment, etc.) • Risk of death
Air Quality	Ambient air	• Impacts of PM • Gas emission
Traffic disturbance	Vehicular get in and out of construction area	• Traffic accident • Temporary congestion • Loss of life
Noise	Within the project area up to 50 meter radius	• Disturb the convenience of the community • To big noise could potentially cause the health hazard
Vibration	Within the radius	• Potential collapse of old Aipelo prison

	of 100 m	• Structural crack of the building within the radius of 50 m

The mitigation measures of these mentioned impacts are presented in the chapter 7 of this document.

6.4 Impacts during the Operation of Phase 1 A and Phase 1 B

The operation of the phase 1 A and phase B would be realized after the completion of the construction of phase 1 B. Under the operation of phase 1 A and B, the fuel storage terminal will reach the maximum capacity at 10,000 KL. The impacts arise during the operation of phase 1 A and B would be exactly same as phase 1 A, except, perhaps the magnitude of some impacts that may be double compare to the impacts during the operation of phase 1 A only. The impact of fire hazard, would be larger in the phase 1 A and B then in the phase 1 A only, especially in the major fire hazard that involve the large tank. The following table the summary of impacts in the phase 1 A and Phase 1 B

Table 6.2 Summary of Impacts during the operation of Phase 1 A and Phase 1 B

Impact Assessed and Mitigation Measure during Operation of Phase 1 A and phase 1 B		
Impacts	Area of Coverage	Particular concern
Flooding	Project area	storm water washed the oil polluted surface and contribute pollution to marine water body
	Riverine flooding	Flood magnitude at higher frequency of 50 –year could overflow from river and cause damaged in the project site - emergency situation
	Coastal Flooding	During the high tide, could potentially wipe out the facility - emergency condition
Major oil spill	In the project area	Polluted the marine water body and economic loses
	Marine waterbody	polluted the marine water body and transported to large extend of coastal area
		Impact to mangrove
		Impact to coral and fisheries
		Impact to beach
		Impact social at the coastal community
Fire Hazard	Storage tank	Prevention
		Response to fire emergency (already happens)
	Fuel filling area	Prevention

		Response to fire emergency (already happens)
	Jetty	Prevention
		Response to fire emergency (already happens)
	other project area (office building, buffer zone, outside the project area)	Prevention
		Response to fire emergency (already happens)
Soil pollution	within the project area	oil polluted to soil and transport downward to groundwater
Groundwater	Quantity	Over pumping
	Quality - pollution	Pollution due to over pumping (salt water intrusion and groundwater contamination)
Waste production	General solid waste	Production of general solid waste during the operation
	Hazardous waste	From the bottom product of tank (0.05% of the total volume will deposit at bottom of the tank to be cleaned and treated)
	Liquid hazardous waste	• Oil residue • Oil from the oil- water separator
Traffic management		Vehicle coming in and out of the proposed development facility
Climate change	Sea level rise	Coastal inundation
	Flooding	More frequent rain with high frequency
	Drought	Prolong dry season
Occupational Health and Safety	Proper Design and Operation	• Integrity of workplace structure • Severe weather and facility shutdown • Woks space and Exit • Fire Precaution • Lavatory and Shower • Portable water supply • Clean eating area • Lighting • Safe access • First Aid • Air supply • Work Environment Temperature
	Communication and Training	• OHS training • Visitor orientation • New employee and contractor training • Area Signage • Communicate Hazard code

		• Labeling Equipment
	Physical Hazard	• Rotating and Moving Equipment • Noise • Vibration • Electrical • Eye hazard • Welding/Hot work • Industrial Vehicle Driving • Working Environment Temperature • Working at height • Illumination
	Chemical Hazard	• Air quality • Fire and explosion • Corrosive, oxidation, and reactive chemical • Volatile Organic compound
	Other Special Hazard	
	Peroneal Protective Equipment (PPE)	Protection equipment to protect various part of the body to prevent the hazard (eyes, nose, ear, skin, hat, body, foot, etc)
Community health and safety	• Groundwater accessibility • Traffic accident • Large fire hazard	• Water conservation and monitoring system • Traffic management system • Fire hazard management and socialization to the community members in Lauhata, as well as evacuation route

The mitigation of measures of all these mentioned impacts have already presented in the EIS document and also further reinforced in the chapter 7 of this document.

6.5 Impacts during the Decommissioning Phase

Decommission phase is not applicable, as the project owner would like to stay in this business for a long term in the future. After the operating for many years, perhaps some change in regulations, technology, or any new development method, which may affect the impacts assessment and mitigation measures. Therefore, if there shall be any decommission phase in the future, it is better to update the environmental management plan (EMP document.

Nevertheless, the decommission phase of the project means to dismantle or remove all the facility from the site. If this is the case, the impacts that could be anticipated would be similar to the construction phase, except some impacts should chemical or hazardous substance inside the storage tanks, pipe, or valve that could cause poisonous to the people or worker who involve in dismantling the facility. The

following table provide the summary of potential impacts during the decommission stage of the project cycle.

Table 6.3. Summary of Impacts during the Decommission phase

Impact Assessed and Mitigation Measure during Decommissioning phase		
Impacts	Area of Coverage	Particular concern
Occupational Health and Safety	People who work inside the facility	• Work related electricity • Exposure to heat • Exposure to the dust and particular matter • Risk injury related to accident (vehicle, heavy duty equipment, etc) • Risk of death
Traffic disturbance	• Vehicular get in and out of construction area • Vehicle taking the demolished or dismantled material	• Traffic accident • Temporary congestion • Loss of life
Demolition of storage tank	Chemical hazard such as gas that trapped inside the storage tank	• Cause health hazard • Potentially cause death
Noise	Within the project area up to 50 meter radius	• Disturb the convenience of the community • Too large noise level could potentially cause the health hazard
Vibration	Within the radius of 100 m	• Potential collapse of old Aipelo prison • Structural crack of the building within the radius of 50 m
Social Impacts	loss of opportunity and job	• 30 people will loss the job and income • Project owner will loss the economic opportunity • Fuel supply will be impacted and potentially the price will increase
Economic Impacts	Loss of source of income	• No tax payment to the government • Loss of revenue from the project owner • No social corporate responsibility to the local people

6.6 Social Impacts during the Operation Phase 1 A

The social impacts realized during the implementation of the project mainly produce various positive outcomes, which should be expected, especially job opportunity that can be expanded in the project location and cover the wider area. Training of the local staffs and social contribution to the Suco can be considered as net positive impacts.

Table 6.4 Summary of Social Impacts during the Realization of the Project

No	Social Impacts	Indicator	Responsibility
Construction Phase			
1	Historic preservation	Damage to the Aipelo Prison structure	Project proponent and contractor
2	Job opportunities expanded to Suco Lauhata population	Grievance or complaints from local population	Project proponent and contractor
Operation Phase			
1	Job opportunities expanded to Suco Lauhata population	Grievance or complaints from local population	Facility management
2	Opportunities for women workers	Grievance or complaints from local population	Facility management
3	Training for local employees	Progressive responsibility for local workers	Facility management
4	Social contribution to Suco (not social impact per se)	Grievance or complaints from local authority	Facility management

6.7 Economic Impacts Operation of Phase 1 A (and B)

The economic impacts of the project can be positive and negative. The positive impacts such as monetary return and multiply effect to the local and national economy should be enhanced. The negative economic impacts of the project is related to the economic loss, particularly if unexpected catastrophic disaster such as major oil spill and major fire incident.

Though, the mitigation measures that will be taken is expected to minimize the extend of the impact, it is not impossible that the failure of the mitigation measures could occur. In case, any disaster oil spill that cannot be controlled, the impact of pollutant transport would affect the coastal area, which cause the economic loss. The following table provide the rough estimate of economic loss if there shall be any major oil spill in the jetty or piping transmission of the oil.

Table 6.5 Potential Economic Loss from Impacts to Mangrove Areas from Oil Spill

Direction from Project Site	Mangrove Ecosystem Areas (Ha)	TEV per Ha per Annum	Maximum Potential Economic Loss
Eastern	54	USD 55,538.00	USD 2,999,052.00/year
Western	10	USD 55,538.00	USD 555,380.00/year

7. DESCRPTION OF PROPOSED MITIGATION MEASURES

The mitigation measures of the given impacts from the previous chapter are described in detail by this chapter. The mitigation measures consist of both technical and non-technical approaches. The combination of both technical and non-technical solution would provide the better mitigation measures result. Many of the operation failure such as leaking and fire hazard can be eliminated or minimized, which resulted in the minimum discharge such as VOCs, fire hazard, pollution, through the proper design and construction according the Good Industry Practice (GIP), especially the API and NFPA, which highly recommended by the Timor – Leste competent authority (ANPM)

7.1 Safety Design and Construction according to Good Industry Practice (GIP)

Prior to the application of any mitigation measures to be applied in order to prevent, minimize, and or controlled the impacts, there are basic safety standard to be followed by relevant parties, in regard to the design, construction, and operation of the large volume of petroleum product. There should be a proper regulation in place regarding, safety standard to ensure the whole lifecycle of project development of the fuel terminal already being followed.

To ensure the basic safety principles have been integrated throughout the lifecycle of the fuel terminal system, there should regulation to impose the implementation of this standard to the fuel terminal operator and agency or competent authority to control the implementation of the standard safety principle and guideline. National Petroleum and Mineral Authority is the only competent agency in Timor – Leste to regulate and administer the fuel terminal design, construction and operation. Therefore, the standard safety principle that required by ANPM must be followed in order to construct the fuel terminal system that meet the high quality of safety which resulted in the safety operation of the facility. The GLOBAL Oil Terminal LDA, as the project proponent, and will be the operator of the proposed fuel terminal in Lauhata, must considered the basic safety principles of fuel terminal system throughout the lifecycle of fuel terminal system. Moreover, the legal framework should be in place in other regulate and enforce the safety standard design practice, which should be followed by the relevant parties (Authority, operator, investor, and government).

7.1.1 Control from the ANPM (Competent Authority)

The ANPM, as a competent authority and a regulator body of downstream petroleum product storing and handling in Timor – Leste, has already indicated in the current regulatory that for the safety operation of the fuel terminal in Timor – Leste, the operator must adopted the standard design and construction of the fuel terminal and supporting facility from API (American Petroleum Institute), particularly, the following area of design and construction component.

- API 505 - Recommended Practice for Classification of Location for Electrical Installation at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2;
- API 610: Centrifugal Pumps for Petroleum, Petrochemical and Natural Gas Industries;
- API 620: Design and Construction of Large, Welded, Low Pressure Storage Tanks;
- API 650: Welded Tanks for Oil Storage;
- API 2000: Venting Atmospheric and Low-Pressure Storage Tanks;

- API 674: Positive Displacement Pumps – Reciprocating;
- API 675: Positive Displacement Pumps – Controlled Volume for Petroleum, Chemical and Gas Industry Services;
- API 676: Positive Displacement Pumps – Rotary

By adopting the above standard safety of API design in the current proposed fuel terminal in Lauhata, it is hope that the oil terminal facility will be designed, constructed, and operated efficiently, by means of reducing risk related to operational. Furthermore, the ANPM has also recommended, the best international practice of fire management safety standard from American "National Fire Protection Association" ((NFPA) to be considered by the operator or investor to follow in design, implement, and maintain the fire management system. The following codes of fire related protection system was recommended by ANPM

- NFPA 10: Standard for Portable Fire Extinguishers;
- NFPA 11: Standard for Low, Medium, and High Expansion Foam.;
- NFPA 12: Standard for Carbon Dioxide Extinguishing System;
- NFPA 12A: Standard on Halon 1301 Fire Extinguishing Systems;
- NFPA 13: Standard for the Installation of Sprinkler Systems;
- NFPA 14: Standard for the Installation of Standpipe and Hose Systems;
- NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection;
- NFPA 16: Standard for the Installation of Foam-Water Sprinkler and Foam-Water Spray Systems;
- NFPA 17: Standard for Dry Chemical Extinguishing Systems;
- NFPA 20: Standard for the Installation of Stationary Pumps for Fire Protection;
- NFPA 30: Flammable and Combustible Liquids Code;
- NFPA 307: Standard for the Construction and Fire protection of the Marine Piers and Wharves.

By considering these various codes into the lifecycle of project implementation, the operational safety of the fuel storage facility in Lauhata shall be ensured.

ANPM, as a competent authority should maintain within the organization expertise to overseeing the following important aspect of the safety.

- Accident prevention, emergency preparedness, response system
- Inspection and audit
- Permitting requirement for operation of oil terminal
- Inspection

It is also the competent of ANPM to ensure that the objective of preventing and limiting the effect of accident are taken into consideration in the land use planning policies with particular regards to ensuring safe distance between oil terminal and residential, building , ad pubic space.

7.1.2 Global Fuel Terminal Operator

The project owner, as the oil terminal operator must have a high commitment to implement the recommended codes (API and NFPA) throughout the project development to ensure the integrity and safety of the oil terminal facility. The recommendation from the Good Industry Practice (GIP), regarding the safety of oil terminal facility that must be followed by the oil terminal operator (ECC, 2010)

- Oil terminals should be designed, constructed, operated and maintained to ensure a high level of protection for human health and the environment. Adequate consideration should therefore be given to various aspects which could affect the safety of an oil terminal, such as inherently safer design and stress factors, operability, quality of material, ageing phenomena, external impact protection, and corrosion and monitoring. For new oil terminals the principle of "design for decommissioning" should be taken into account already during the design and planning stage.
- Oil terminals should be designed, constructed and operated in accordance with recognized national and international codes, standards and guidelines and, where appropriate, internationally accepted industry standards or specifications, as mentioned in the previous section that already being adopted by ANPM
- When considering hazard controls, or changes to existing controls, consideration should be given to reducing the associated risks according to the following hierarchy of controls:

    - Elimination of the hazard;
    - Substitution of the hazard;
    - Engineering controls;
    - Administrative controls (e.g., procedures/work instructions) and/or signage/warnings;
    - Personal protective equipment.

- The oil terminal investor/operator should ensure at an early stage of the oil terminal life cycle (design and planning stage) that all equipment is purchased to ensure a high level of protection for human health and the environment. During construction, the oil terminal investor/operator is responsible for purchasing all equipment and materials as specified and is also accountable for ensuring the "as-built" situation in accordance with design specifications. To this purpose, the oil terminal investor/operator should implement controls on purchased goods and organize the follow-up of inspections and contractor works.
- The oil terminal investor/operator should ensure that an appropriate level of competence is available throughout the life-cycle stages of an oil terminal, and only competent personnel should be allowed to perform high-risk tasks.
- The oil terminal operator should establish and maintain a robust and sustainable oil terminal management system (OTMS) that is adequate to manage the oil terminal risks and to comply with the applicable legal and regulatory requirements. The OTMS should also take into account any other voluntary commitments to which the oil terminal operator subscribes. To this purpose, it is recommended that the oil terminal operator adopt a major-accident prevention policy (MAPP), which should serve as the foundation of the OTMS.
- Hazard identification and risk assessments should be undertaken during all stages of the life cycle, as appropriate, in order to choose among different options and to assess unusual circumstances. The oil terminal operator should adopt a methodology for ongoing hazards identification, risk assessment and determination of necessary control measures for routine and non-routine activities and for management of change.
- To enable safe operation, the oil terminal operator should establish and communicate clear management performance standards for all management levels and define roles, responsibilities and accountabilities for all employees. Lines of control and responsibility should be clearly defined and communicated to all parties.
- The oil terminal operator should establish a list of key stakeholders (all parties involved in the safe operation of an oil terminal) and identify their requirements
- The oil terminal operator should ensure that any person under its control (including contractors and third parties) performing high-risk tasks is competent on the basis of appropriate education, training and experience.

- The oil terminal operator should furthermore establish competence requirements and identify training needs associated with the oil terminal risks and risk controls, as described in the OTMS. Consequently, oil terminal operators should train their personnel and reinforce and revise their knowledge on safety as appropriate.
- The oil terminal operator should determine those operations and activities that are associated with the identified hazards where the implementation of controls is necessary to manage the oil terminal risks.
- For those operations and activities, the oil terminal operator will need to implement and maintain operational procedures and other controls. Oil terminals should have an operating manual that is available to all personnel and to government inspectors. All documents relating to planning, design and construction should be maintained in an accessible way, with records kept permanently for reference at a future time
- Oil terminal operators should implement safety audits for their facilities and promote the use of management systems audits based on international standards.
- The integrity and functionality of tanks and all mechanical equipment, instrumentation and safeguards of the oil terminal should be maintained in keeping with good industry practice (GIP).
- Oil terminals should be decommissioned in accordance with national and applicable international legislation, and where appropriate in line with GIP.
- Oil terminal operators should communicate lessons learned from incidents and accidents to help their national industry to avoid recurrences

7.1.3 Regulatory Requirement

The legal ground to impose the best practice of standard operating system related to oil terminal installation and operation in Timor – Leste, refers to ANPM regulation no 1/2016. However, further enhancement on legal framework in more technical detail may be necessary to help the investor and operator to follow the best practice in ensuring the health, safety, and environment.

7.2 Mitigation of Impacts During the pre and Construction

As already presented from the previous section that the impacts resulted during the phase 1 A construction should be mitigated to control and minimize the impact to the existing environment and human health. The mitigation measure of each impact as presented earlier is described in this section.

7.2.1 Air Quality Mitigation Measures

The air quality problem associate during the construction activity mainly from the particulate matter (PM) and flue gas emission due to combustion of fossil fuel by machinery use during the construction activity. The mitigation of measure of the air quality issue is described in the following sub-sections.

7.2.1.1 Particulate Matter

Particulate matter is originate from the soil/land and when the object or vehicle move from one point to the other, the fine particulate matter shall fly as a result of wind blow. Especially, with broken soil, after the site clearance, where the site remain uncover, the movement of vehicle, on the top of the site will produce flying fine material, which measure in term of particulate matter.

Figure. 7.1 Air Quality Issue related to Particulate Matter

Beside from the soil, the source of PM also is coming from the movement of traffic in the national road of Dili – Liquica. The measurement of the baseline data of PM indicated that the elevated value of PM level measured in PM_{10} and $PM_{2.5}$ in the project location and surrounding area by 2 times.

Table 7.1. Revisit the Measurement of Particulate Matter

Location	Parameters Measurement	
	PM 10, (µg/m^3)	PM 2.5, (µg/m^3)
Within Proposed Terminal	148	64
Community - sensitive receptor	115	48
Standard by WHO	50	25

The potential source of PM in the project site could be caused by the transportation and existing activity. The method to minimize the impact dust or particulate matter would be described as followed:

- Soil compaction by using the water or cover the site with gravel material to cover the fine soil particle
- Re-suspension of the fine particulate matter by regularly spraying the water to site that has no coverage and has already detected often produce dust
- Apply nose coverage (PPE) when inside the project area
- Construct the barrier or fence of the construction site

The monitoring of the particulate matter would be necessary to be done during the construction period to reconfirm the above measurement result.

7.2.1.2 Gas Emission

Emission of gases such as CO_2, SO_2, NO_2, which could be originated from the combustion of fossil fuel and other could be an issue during the construction, due to the machinery operation associate with the construction activity. Field measurement of the above mentioned gases, indicated that the ambient air quality measured by these gases is significantly. However, the mitigation measure to minimize the impact of these gases during the construction phase, especially for those people who shall be very close

proximity to the machine that operate would be required. Mandatory utilization of PPE in the project site would be required to minimize the impacts of those gas emission impacts to human health.

7.2.2 Sediment Control System

Sediment is originated from soil erosion by the rainwater. Two methods are proposed in this study to control the sediment.

- Minimize the soil erosion rate
- Capture the sediment that loss during the rainy day

The erosion rate produced by the size of the project area (1.3 HA) would be considered very small, compare to the catchment area (18000 HA). However, the location of the project is in the coastal area, where the discharge of the sediment would be direct, the minimization would be important. The soil loss can be minimized in the project area by compacting the project site so that the potential soil loss during the rainy day is small. Covering the gravel and sand would help compacted the soil type that easily eroded.

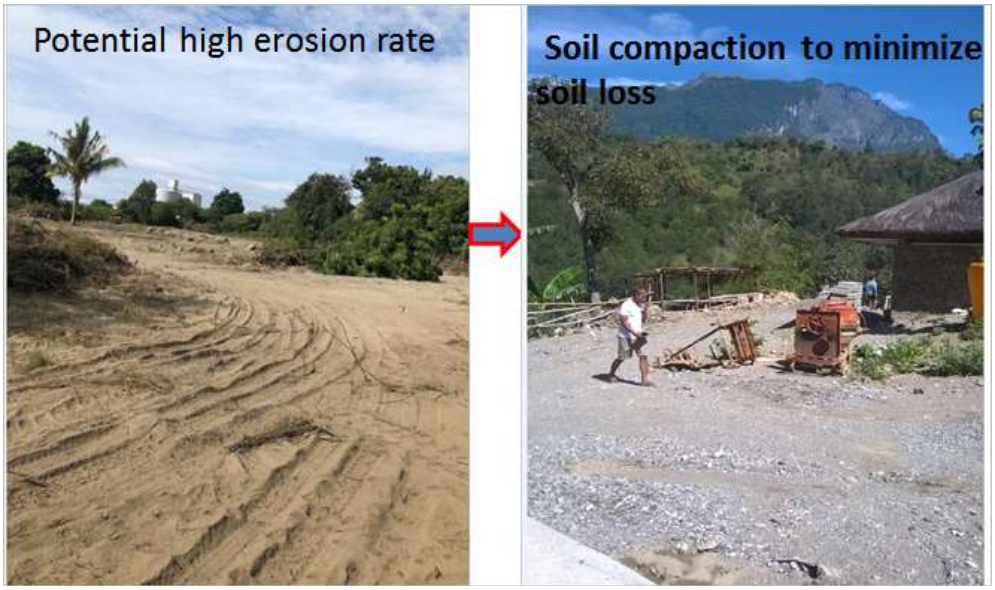

Figure. 7.2 Reduction of Soil Loss from the Project Site with Soil Compaction

Other way, to control the sediment from entering the marine water body is to capture the sediment load that already carried by the storm runoff and detain the sediment in the temporary detention pond/basins. This approach has already proved to be effective measures in the minimization of the sediment impacts to the marine water body.

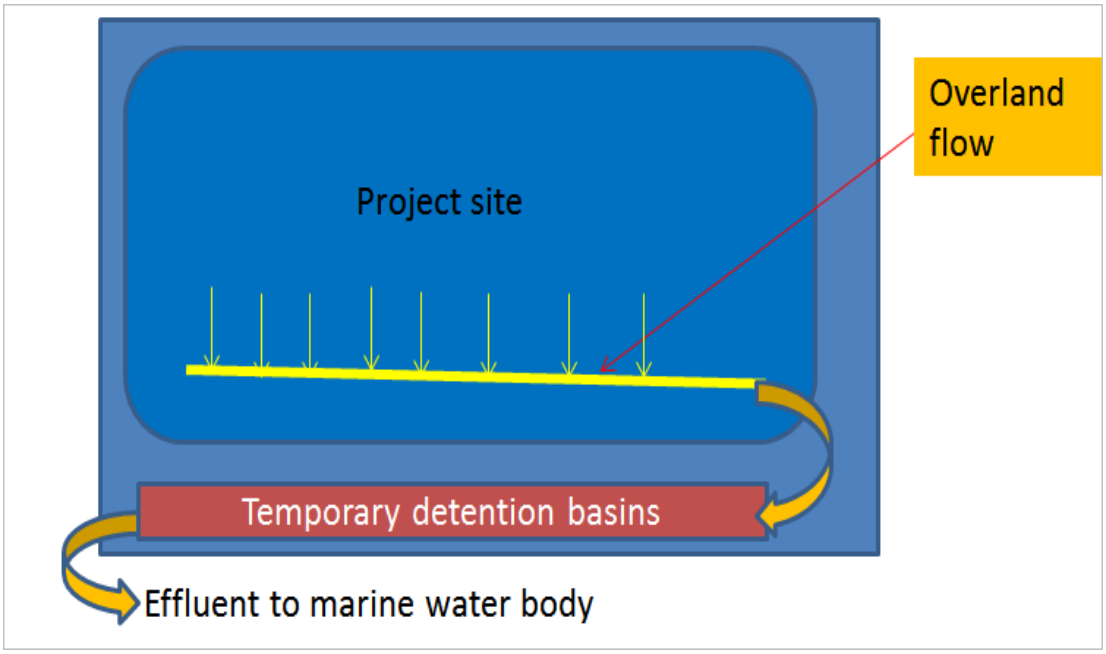

Figure. 7.3 Temporary Detention Basins to Capture Suspended Sediment

The overland flow due to rainstorm will wash all soil that loss from the land and transported into the downstream area. Without the detention ponds, the sediment will enter the marine water body. With the detention ponds, the sediment will be trapped and filtered prior to effluent coming in to the marine water body.

7.2.3 Mitigation of Occupation, Health, and Safety Risk

The occupation health and safety (OHS) is one of the important issues that should be considered by the project owner in order to achieve the project objective, which is completion of the construction phase without any issue related to the health and safety. The risk related to the execution of work (Job) can be minimized by the better understanding of the job and associate risk. The training program prior to the work execution should help

7.2.3.1 Occupational Health and Safety Training

The training program related to the health and safety aspect of a specific job will be very important to be done to the workers prior to the commencement of the work, so that any specific hazard associate to the specific job would be understand clearly prior to the work execution.

1. Use the personnel safety equipment
2. Job description and detail SOP how to execute each item of the job
3. Understanding of various type of personnel safety equipment that can help minimize the risk

With the great understanding of the job (what to do and how) and associate risk with method to prevent or minimize it, it is possible to reduce or eliminate the risk related to the occupation and health and safety system.

7.2.3.2 Application of Personnel Protective Equipment (PPE)

Various personnel protective safety equipment should be available in the project site to be used when necessary for the execution of the job. The following table summarized the PPE that need to be considered as part of the execution of the construction activity.

Table 7.2. Recommended List of PPE to be adopted

Type of Risk Minimization	Type PPE
Flying particles, molten metal, liquid chemicals, gases or vapors, light radiation.	Safety Glasses with side-shields, protective shades, etc.
Falling objects, inadequate height clearance, and overhead power cords	Plastic Helmets with top and side impact protection.
Hearing protectors (ear plugs or ear muffs).	Noise, ultra-sound
Falling or rolling objects, pointed objects. Corrosive or hot liquids	Safety shoes and boots for protection against moving & falling objects, liquids and chemicals
Hazardous materials, cuts or lacerations, vibrations, extreme temperature	Gloves made of rubber or synthetic materials (Neoprene), leather, steel, insulating materials, etc.)
Dust, fogs, fumes, mists, gases, smokes, vapors.	Facemasks with appropriate filters for dust removal and air purification (chemicals, mists, vapors and gases). Single or multi-gas personal monitors, if available.
Extreme temperatures, hazardous materials, biological agents, cutting and laceration.	Insulating clothing, body suits, aprons etc. of appropriate materials.

7.2.3.3 Proper Time Scheduling of Construction Activity

Some risk related to the job can be managed by proper scheduling arrangement in such as a way that the resultant impacts would still in the limits. For example, noise level, within the project area can be mitigated by executing the work at the different time, instead of executing work simultaneously that will produce larger noise hazard risk.

7.2.4 Mitigation of Traffic Impact

The baseline data of traffic survey from 2015, 2017, and 2019, suggested that the annual grow rate of traffic is almost 100%. However, the average traffic volume itself, still be accommodated by the national road of Dili – Liquica in the next 10 –years. The mitigation measure of traffic impact during the operation of fuel terminal facility includes:

- Dedicated person to direct the traffic in and out, as well as watch the oncoming traffic
- Potentially required to install traffic light to regulate the traffic
- Installation of traffic signage and limit the vehicular speed in and out the facility
- Required only authorize personnel can drive the vehicular

7.2.5 Mitigation of Noise and Vibration

Noise could be significant during the construction phase, due to heavy duty equipment and process of executing the activity that produce noise. Though, the noise temporary, the exposure to the limit that is no acceptable by human could cause the permanent hearing loss. According to the WHO, exposure to the

noise below 80 dB for the long-term should not affect any hearing or health issue, with the bench mark provided as followed:

- Repeated long-term exposure to sound above 80 dB can lead to permanent damage. Consider using the hearing protection or move to quieter area
- 80 dB: around 5 hours and 30 minutes a day at this level can cause temporary hearing loss. The weekly limits is 40 hours
- 85 dB: Exposure around 1 hour and 45 minutes a day at this this level can cause temporary hearing loss. Weekly limit at this level is 12 hours and 30 minutes
- 90 dB: Around 30 minutes a day at this level can cause temporary hearing loss. The weekly limits is 4 hours
- 95 dB: just 10 minutes a day at this level can cause temporary hearing loss. The limit of weekly exposure at this level is 1 hour and 15 minutes
- 100 dB: Even a few minutes a day at this level can cause temporary hearing loss. Weekly limits is 20 minutes

The mitigation measures should take this bench mark value into consideration, so that the noise impact to the human health could be minimized. The vibration was measure but no major activity that significantly produce the vibration that become a concern. However, during the construction, especially foundation work, it will be possible to produce some vibration level that could impact to the existing structure surrounding.
The mitigation measured during the construction, would be:

- Construct the noise barrier to delay the propagation of noise so when teach the target people, outside the project area, the noise level become small
- Arranged the schedule of working only during the day time
- Application of heavy duty equipment that produce less noise (latest version of equipment)
- Ear protection for the worker (PPE) with the project area that exposure to the noise level greater than 80 dB

7.3 Mitigation of impacts During the Operation of Phase 1 A

As, the potential impacts that may arise during the operation of phase 1 A project would be significant, which required a solution that will resulted in the minimization of impacts. The description of each mitigation options would be described detail in the following sub-sections. Note that many of the technical approaches of the mitigation measures should be designed and implemented as part of the design and construction of the facility. For instance, technical mitigation of measures to solve the flooding problem, is to construct the river training work, which is considered in the detail engineering design (DED) and construction for the whole facility.

7.3.1 Mitigation of Flooding Impacts

The flood flow analysis as presented in the EIS report indicated that the existing river should be able to handle the river flow up to 25 –year flood water produced by 25 –year ARI. The rainfall frequency higher than 25 – year ARI will produce the overflow of flood water in the existing bridge that will affect the existence of the project. The mitigation measures of the riverine flooding due to high frequency of rainfall composed of technical and non-technical approaches.

7.3.1.1 Technical Mitigation of Flooding Impacts

The technical mitigation measures means flood protection infrastructure that will be able to accommodate the higher frequency of flow. The following infrastructure flood protection should be considered in order to minimize the risk of the flood during the high flow condition and during the coastal flooding.

River Training Work

River training work means improvement of the river section to accommodate the higher capacity of the flow. The flood assessment, as presented in the EIS indicated that downstream river section, after the bridge, will only be able to carry the flow of 50 –year's capacity. However, some flood section of the bank is low, especially at the east side of the river bank. Therefore, the improvement would be needed to reduce the flooding risk at the downstream section of the river.

Figure. 7.4 Section of River that need Improvement

With this improvement, the river capacity shall be able to accommodate the total flood flow of 50 – year ARI and help reduce the risk of crossing bridge that carry the fuel pipes from the existing jetty to the storage tanks. The existing river capacity is equal to 25 –year flow and with this improvement, the river capacity will be able to carry the 50 –year flood flow.

Elevated Floor Level and Re-route the flood Flow

When over flow of flood water occur, in the existing bridge that connects national road of Dili – Liquica, the flood water will entering the project site, next to the river bank and has a low laying area. In order to this overflow flood risk to the proposed development facility, there are two important works that need to be done:

- Elevate the floor level of the project area
- Re-route drainage canal to carry overflow of flood water and reroute into the improved river section already at the downstream

The floor level can be increased by 1.5 m from the existing ground level and the final level shall be equal to the national road of Dili – Liquica. Underground conduit should be constructed in at the road side to carry the overflow of flood water and re-route to the river system.

Figure. 7.7 Elevated Project site from Existing Ground Surface and reroute canal

The engineering work should eliminate the flooding from the overland flow and overflow from riverine flooding into the project area.

Coastal sea wall

The coastal inundation would also be an issue to be considered. The tidal measurement data indicated that the coastal water due to ocean current can reach up to the elevation around 3 m above mean sea level. The topographic survey of project site indicated that the average floor level is range from 4.5 m at the lower site to the 7.5 m at the upper side of the project area. The grading and improvement of existing ground surface will become around 8.5 m. With this level, the fuel storage facility should be free from coastal flooding, even at the very extreme high tide. However, the construction of seawall protection would be necessary to help break the wave and reduce the impacts of coastal flood to project facility in the long run.

7.3.1.2 Non-technical Mitigation of Flooding Impacts

Non-technical approach of flooding mitigation measures means any soft infrastructure that will help in mitigation the risk that the technical could not cover. The non-technical approach consist of data collection for flood forecasting during the emergency response system and river maintenance program to remove the debris in the river so the flow capacity of the river will be maintained according the design capacity.

Rainfall Measurement for flood Protection System

Auto weather station should be established by the project owner with the local authority in order to provide the long-term automatic meteorological data for flooding forecasting in the future due to heavy rainstorm in the upland catchment system.

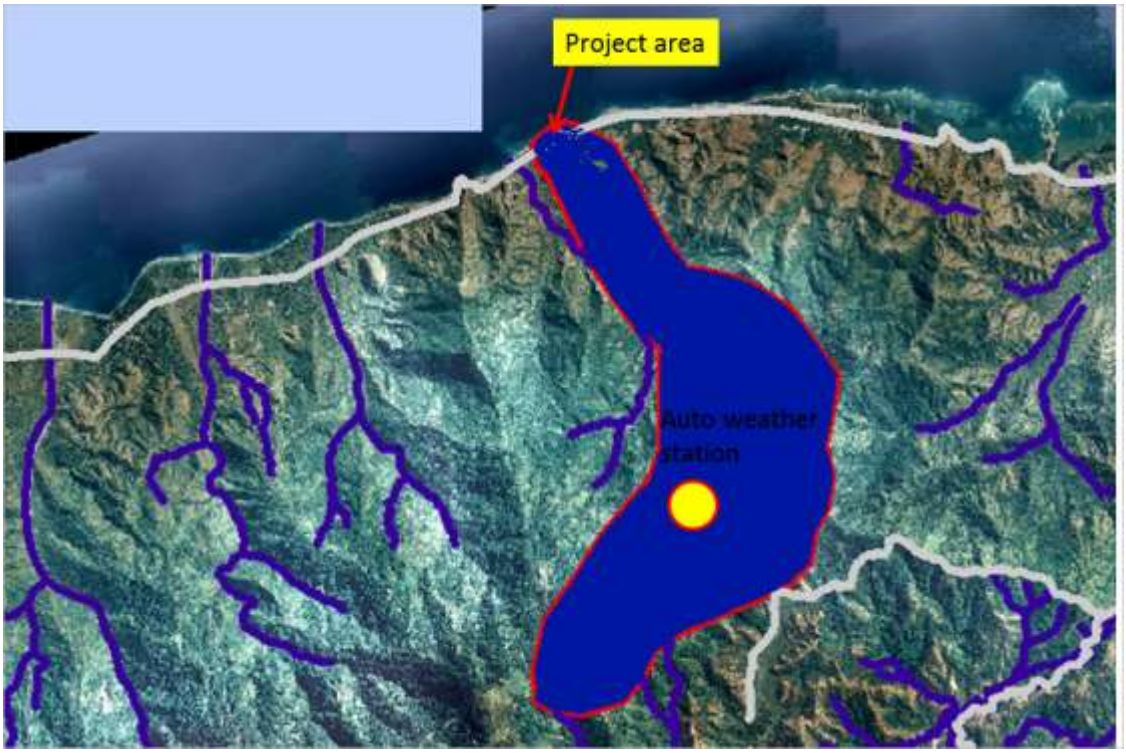

Figure. 7.8 Proposed Auto weather Station in Upland Catchment System

Flood Emergency Response Plan

The rainfall frequency greater 50 –year will produce flood water flow that can create a disaster in the project area and surrounding. Under this extreme condition, the flood protection infrastructure shall not be able to accommodate this high flow. The event should be considered as an emergency condition, which should be responded by the emergency team. Using the information of rainfall measurement data, it is possible to predict this type of emergency. The preparation of the emergency response plan should be established to response the emergency situation during the project operation.

Tidal Level measurement

Establishment of tidal level measurement is important in order to monitor tidal level so the data can be used to predict any future potential coastal flooding.

River Maintenance program

River maintenance program is an important non-technical mitigation measures that should be done every year, especially before the rainfall event or during the dry season. The objective of the cleaning of the river section is to ensure that the river has full capacity in carrying the flood water. The maintenance work should be done regularly by monitoring to know the actual condition of the river and based on the actual condition the river cleaning cam be conducted. The target of cleaning and maintenance is once a year and ensure the river capacity is 50 –years flood flow.

7.3.2 Mitigation of Oil Spill Impacts

Oil spill as defined in the EIS document could occur in both minor and major scales. The minor spill usually occurs in the fuel storage area during the transfer of fuel from one point to the next, which should be mitigated. The major spill on the other hand, is an emergency event, which cause a bulk volume of fuel could spill out during the unloading of fuel in the jetty to fuel storage system.

7.3.2.1 Mitigation Measures of Minor Oil Spill

The minor oil spill comes from the fuel leaking during the fuel transfer from fuel storage tank to the loading system prior to the transferring to the fuel truck of costumer. The spill would normally pollute with the ground surface area, which is impermeable. The flash of water or storm water would wash the pollutant built in the impermeable surface and wastewaters will eventually entering the marine water body. The mitigation measures to solve the oil spill problem are to minimize/prevent the leaking or spill by various non-technical and technical approaches.

Prevention of Minor Oil spill

The spill can be prevented by implementing the proper standard operating procedure to avoid the operational error, proper design to prevent the spill by eliminating the equipment failure, and well trained operator to operate correctly according to standard operating procedures.

Minimization of Impact of Minor Oil spill

When the spill already occurs in the land surface, the wastewater should be treated in the oil-water separator to separate the oil from the water. The oil that is captured in the oil will be treated prior to the disposal. While the wastewater that already has no oil or minimum concentration of oil can be discharged into the receiving water body/marine water body.

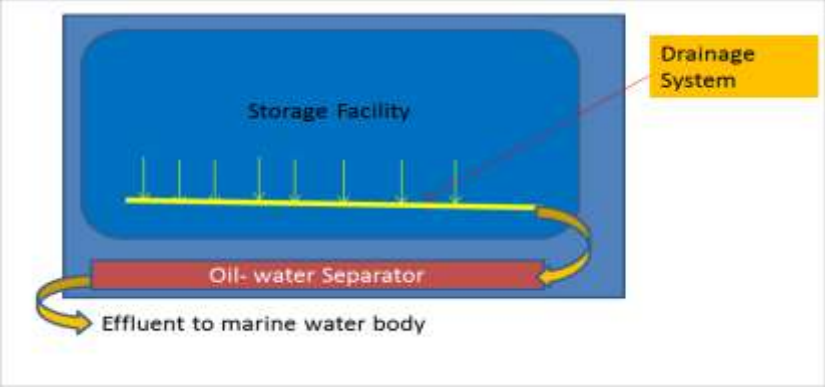

Figure. 7.9 Concept Design of Oil- Water Separator

Detail engineering design of oil-water separator, including the proposed capacity of treatment w should be part of the design and engineering works. It is expected the oil-water separator will be able to retain most of the oil and only release the water. The principle of oil-water separator is based on the density difference between the oil and water. The water has higher density than the oil and therefore, the bottom product of the separator is the water and while oil layer is on the top of the separator, which will be removed by the operation team.

7.3.2.2 Mitigation Measures of Major Spill

Major oil spill means the spill that involves the large volume of fuel during the transfer fuel from jetty to the fuel storage tanks. It was assumed that the incident of major oil spill could occur in jetty and failure of piping system that cause major leak in the pipe that cause the oil spill.

- Oil spill in the jetty, with the whole tanker with the total capacity of oil 5000 KL
- In the pipe, with the spill scenarios of 2 hour, with the total volume of 720 KL oil spill

Both scenarios applied to the gasoline and diesel fuels. The modeling of fate transport from the point of origin without any mitigation measures, with the result of coastal marine water being polluted and oil would reach the beach and coastal area such as in mangrove, wetland, fishery spot, and recreational beach point. The mitigation measures of major oil spill consist of technical, non-technical, and contingency plan

Major Oil Spill Prevention

As has already being presented in the EIS that, the spill may occur in the jetty during the unloading by boat tanker to the fuel storage tank. It is also possible failure in the pipe during the transfer of fuel from jetty to storage tank. When spill occur, the fuel will flow in to the marine water body and polluted the marine aquatic system. The coverage area that potentially polluted by the oil spill, as has been presented could cover the most of the north shore Liquica and Dili. Once the oil spill occurs, the mitigation of the impacts would be costly. Therefore, it is better and cost effective to prevent the fuel from spill into the marine water body.

- Design and construction of pipe with high standard requirement in the industry (Refers to API or other petrochemical industry standard). By having the high standard design and construction with the very well understanding of the operating system, it is hope that the failure of the equipment or pipe to convey the fuel from jetty to the storage tank will be prevented. It is also advise that

periodic inspection would also be necessary to detect earlier if there is any rupture in the pipe or failure that need to be repaired/replaced prior to the operation of the piping system

- Proper operating system of fuel unloading from the jetty to the storage tank and check all the valve and connection and control system prior to unloading to ensure that all involve component work correctly to prevent the failure
- Proper data collection of seawater (tidal, wave, wind speed, and direction, and ocean current) to ensure the smooth and safety operation of the fuel tanker.
- Establish proper communication protocol between operation of jetty and storage tank to ensure effective implementation

However, an extreme condition or event can cause accident that causes the spill of fuel from the fuel tanker during the operation of unloading fuel. In case the major oil spill, the mitigation measures is described in the following sub-section.

Major Oil Spill Mitigation Measures

The mitigation measures in this case refer to what need to be done immediately after the incident of oil spill. Since the spill is large and the impacted area is large (cover most of north coast of Liquica), the event is considered as an emergency event, which should response with emergency response system.

The minimization spill impact means to limit the spill dispersion and movement from the point of spill, which is in jetty and around the piping connection from jetty to the storage tank. By doing so, the oil shall stay in one place to be clean up or pump by the emergency response team.. The control and minimize the impacts of spill consist of mechanical containment, recovery system, clean up equipment. The following flow diagram process of the oil spill containment and recovery of spill oil in the marine water body.

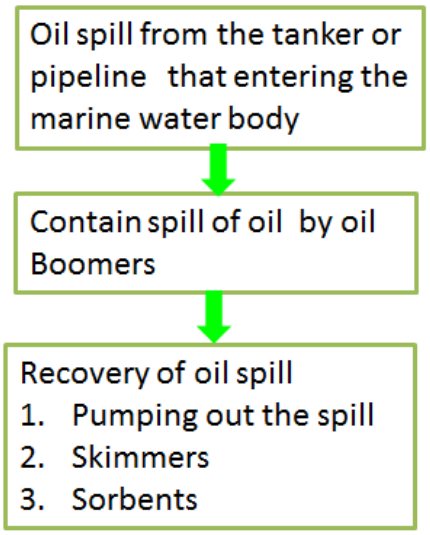

Figure. 7. 10 General Flow Diagram of Oil spill Minimization

The purpose of containment is the block the spill of oil so that the oil will be concentrated in one area and the spill of oil can be removed by pumped it out and suck up to separate the oil from marine water. By taking out the majority of oil in the marine water, the impact of the spill is expected to be minimum. The research and other experience indicated that the above process can recovery 80% of the oil that spill in the marine aquatic environment.

However, other counter measures should be taken in case this method does not work out well due to various such as strong wind, ocean current is very high, in order to minimize the impacts of oil spill. These counter include following methods (EPA, 2007).

- Dispersing agents
- Biological agents
- In-situ burning

The purpose of using the chemical agent is to neutralize the oil product into other small chemical element so that the oil in the impacted area would be cleaned by more natural process and the spill of will not reach the shoreline or coastal area. The chemical method however, involve the toxicity risk of chemical its self that may affect the environment. The other counter measured that naturally effective in cleaning up the area impacted by the oil spill would be to add the biological agent in the impacted area. Essentially the biological agents are the nutrient and microorganism add to spill area in order to help decompose the chemical element of the oil and breakdown into the smaller chemical compound that is not harm to the marine ecosystem. However, the biological process takes a long time, while the transport of spill oil would reach the coastal area and impacted the sensitive area such as mangrove, coral, and fisheries, as identified above. In this case, cleaning up the coastal area that impacted by the oil pollutant would be needed.

However, all these methods are subject to weather condition such as wind and tidal level. Therefore, it may be possible that the spill could move away from the point spill and polluted the coastal area. In case the shoreline cleaning could be necessary to mitigate the impacts of oil spill in the coastal area

Oil Spill Management Equipment

The emergency oil spill management with the end result to minimize the impact of spill to the target area, required not only competent field team, but also modern equipment to response to the spill. The following list provides the most common use of oil spill response equipment use to minimize the spread of the spill and recovery of the spilled oil.

1. Oil Boomer
2. Oil Skimmer
3. Pump
4. Chemical sorbent

Coastal Cleaning

Failure of the above mentioned mitigation measures could cause catastrophic impacts, where the oil/fuel will be transported by the ocean current and wind to the coastal area. The modeling of the fate transport of fuel (Diesel fuel and gasoline) from point of spill to the coastal area indicated that coastal area range from 5 -40 KM could be affected by the spill. The severity of the spill in the coastal area, as has presented in the EIS and in appendix 3, indicated that coastal cleaning up is necessary to remove all the debris and bottom sediment contamination. Depending on the season, the clean-up coverage of shoreline could be range from 5 to 40 KM in total length.

- Biological process – bio-remediation
- Physical process of cleaning up
- Disposal of oil and debris

The following map shows the total area of intervention of shoreline cleaning up as a consequence of oil spill under the worst case scenario of fuel terminal operation in Lauhata.

Figure. 7.11 Clean-up Area Identification of Oil Spill Response Plan

Biological process of cleaning up of shoreline is simply the natural process, which take many years to remove all the contaminant from the area of impacted. The this biological process should be accelerate by the natural process such as evaporation and oxidation which help to remove some the volatile organic compound that normally more harmful to the environment.
The physical process of cleaning up the shoreline is a more tangible and personnel involve in the process. With the map of area of cleaning as presented in the above map, the personnel (clean up tam) and logistic should be prepared to help the clean up the impacted area. Methods used to physically clean oil from shorelines include the following:

- Wiping with absorbent materials
- Pressure washing
- Raking or bulldozing

Figure. 7.12 Example of Oil Spill Cleaning of Shoreline

Before physical cleaning methods are used, booms made of absorbent material are often set up in the water along the edge of the bank. Booms prevent oil released during bank cleanup activities from returning to the water and contain the oil so that it can be skimmed from the water for proper disposal. The debris and other liquid waste from oil spill that already collected should be disposed in the proper area. The most efficient way to handle this waste is to dispose in the landfill area or burning the soil that already contaminated.

Damage compensation and Recovery System

The major spill in the marine water body will affect the ecosystem of the marine life, including the coastal area, which is related to the coastal community whose livelihood depends on the coastal resources. The major oil spill shall affect the coastal resources:

- Salt production
- Fishery
- Mangrove
- Wetland
- Eco-tourism and recreational activities such as watching marine mammal
- Aquaculture production
- Damaged Coral and decrease the fish production in the long-run

If the major spill should occur and affect the above mentioned coastal resources, the compensation due to the economic and social loss will need to be made. The technicality on how to execute this plan will need to be re-evaluating after the spill occurs.

7.3.3 Mitigation of Fire Hazard Impacts

Fire hazard is the most tangible and dangerous impact associate with the fuel terminal system, as fuel, especially gasoline is highly flammable. The information presented in the EIS, regarding the main causes of fire in various fuel terminals, would helpful to design the action plans that are necessary to prevent the fire, minimize the fire impacts, and recovery from the fire hazard area/condition. The following figure, as already presented in EIS, regarding the factor that cause fire in many fuel terminal system around the world.

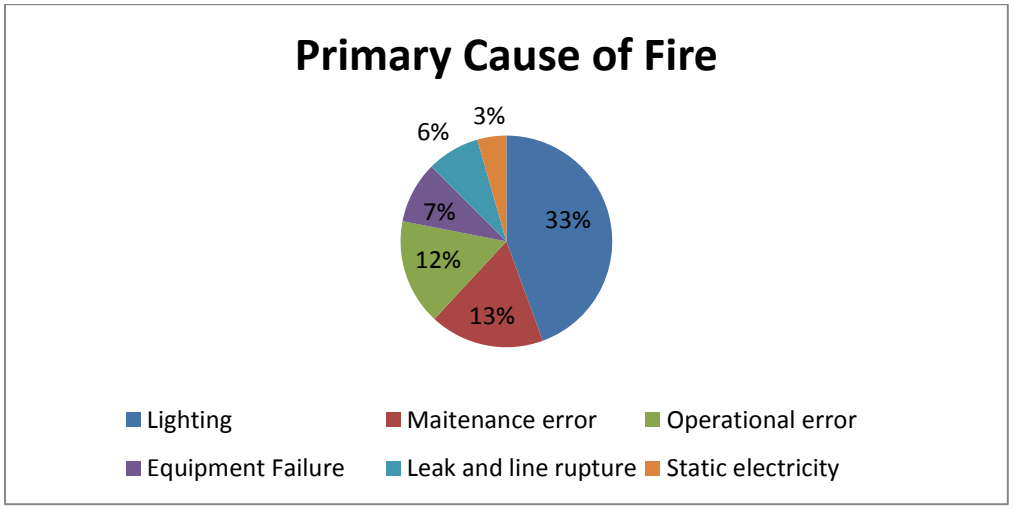

Figure. 7.13 Contributing factor to Fire Hazard

Considering the contributing factors, as presented in the figure above, many actions, which is non-technical approach can be used to prevent the fire hazard during the operation of the fuel storage terminal. Many of these factors are related to two conditions:

- Ignition
- Fuel

The oxygen is always presence in open air so any time the fuel, ignition and oxygen come together, the fire would occur.

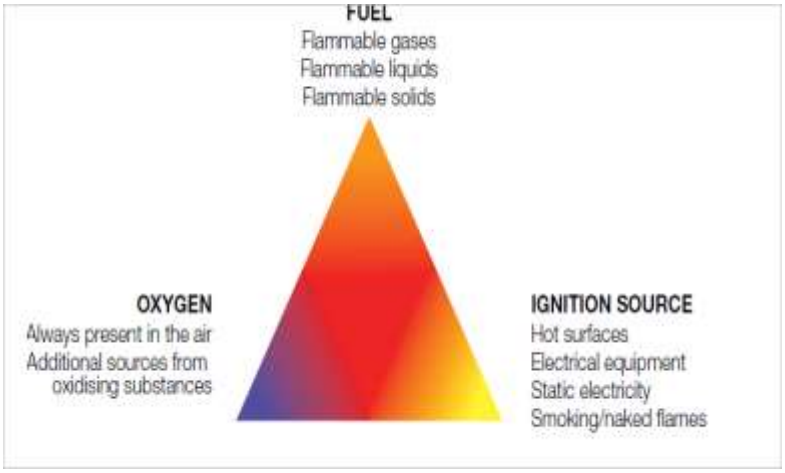

Figure. 7.14 Triangle Fire principle

7.3.3.1 Fire Prevention

As presented, arlier that, three important elements should presence at the same time to produce the fire, which are oxygen, fuel, and ignition. The present oxygen can not be controlled, as the most of the important component of the faiclity will be constructed to be at the open air. Then, what need to be done to prevent the fire hazard from hazard are:

1. Eliminate or minimzie the fuel leak throuhgout the proceee work flow from loading/unloading the jetty , piping system, valves, pumps, storage, loading and unloaidn bay, fuel dispencer, and fuel delivery tankers
2. Control or minimize the ignition of the fire, as the ignition will start to burn the fuel

With the controling and minmizing the above two factors that cause the fire, the risk of fire, could be eliminated.

Minimize of Eliminate the Fuel Leak

The preventive action to minimize ro eliminate the fire hazard means things that must be done in order to prevent fire hazard from happening. Fuel leak can elimiated or minimized if it is properly understood the where the common area or part of the system that usually leaks:
Very common part of the fuel storage that often, leak te fuel out of the system and cause the fire are including the following:

- Pipe (rusted and leak)
- Valve that already corroded or rusted
- Tank (rupture)
- Pumps
- Dispencer, operation error
- Pipe connection

The leaks of fuel from the mentioned parts can be minimized or eliminated if the following measures shall be taken:

- Proper design and contrcution of the component of system with hihg standard with proper material selection according to the best industry (API,ASME,ASCE, AFPA)
- Regular inspection and maitenance of all the component of the fuel terminal system, particularly, the asses the corrosion, as the project is the coastal area that prone to corrossion
- Developed standard opeating system and required all the employees to have proper training and understanding of the process prior to involve in the operating of the system
- Training and communication of the staff/operator to eliminate the error of operating system
- Proper grounding of all the electrical equipment

Control or Eliminate the Ignition of Fire

The source of ignition could be coming from natural process such as lighting, high tempeaure, or man made, source such as irresponsible smoking near the leak fuel area, and other that potentially start the fire in the area where the petroleum product, especially gasoline leaks out.

- High tempetature
- Lighting

- Smoking
- Bushes fire
- Vandalism (people put fire on purpose)

This cause of ignition of fire can be minimized or eliminated by the following mitigation measures:

- Proper grouding of all the electrical system
- Compaign of non-smoking area within the proposed project area (or smoking area is highy regulated)
- Developed buffer zone near the perimeter fence to eliminate the potential bushes fire from the surrounding area, especially during prolong dry season. This buffer zone should always be green and wetted
- Automatic control of the tempetaure of fuel and apply the proper cooling system
- Take the precaution measure, to control the vandalis people (put the CCTV to control for instance

By controlling the ignition and fuel leaking, the fire hazard should be prevented. However, it is always possible that the fire could occur beyond what could be anticipated. In this case, if the fire already occur, the mitigation measured by minimize the impacts of the fire to the property would be the action that need to be done.

7.3.3.2 Fire Impacts Minimization

Managing fire means how to kill the fire and minimize the impact to the people, to the system of operating, and to the surrouding enviroment. In order to manage the fire impacts, the facility will need the fire management system which include, equipment, procedure, well trained team, communication internal and external, and other which are disscused below:

Emergency Fire Response System

Beside the adequate fire equipment as mentioned above, the procedure of handling the fire hazard system during the condition of emergency is also equally important. The procedure is like the software to run the system or execute the program to achieve the objective of fire management system, which is killing the fire.

The procedure of emergency response system for every operating system should be developed to response the event and therefore, the response system/procedure will be depending on the type of event or emergency situation. According to NFPA, there are three steps/tiers, response plan to be in placed to response the condition:

- Tier1 – emergency with the small scale
- Tiers 2 – emergency event that is large such as that internal team is not able to response, required external (national level)
- Tires 3 – emergency event that is very large that even the national level cannot response the condition/event. In this case, regional or international help may be required. For instance, large fuel spill, that required intervention from various international agencies

The operational procedure for each emergency scale should be developed by the project owner and training the necessary team to be familiar with the event.

Well trained fire fighter team

The project owner should have fire bridge team, who is highly trained in fire management system to prevent and minimize the fire hazard impacts. The team should develop the necessary skill required to handle the emergency fire system. The type of fire emergency that can be handled by the fire brigade team, including what are the personnel, should be presented in the detail fire emergency plan.

Emergency Exit Route Map

The emergency exit route map, is needed in case of emergency route or evaculation. The project onwer will provde the Detailed Engineering Design (DED),which include also on the layout of fire hazaard management plant and evaculation route map

7.3.3.3 Fire Equipment Requirement

Fire equipment system is necessary to response to the fire event. Without the fire equipment, it will be difficult to kill the fire. Fire equipment is the last thing that should be made available inside the facility, such as fuel storage system that is proven to be prone to the fire hazard risk.

- Fire alarm system to be installed in every key point that suspect would generate fire, so that anytime when there is fire hazard, the alarm shall go on
- Water sprinkler system design and layout. The water
- Foam system design
- Fire truck
- Fire water
- Fire hydrant
- High speed of pump to pump the water
- Foam tank

All this emergencies equipment should be installed according to the standard, as required by best industries standard with high standard quality (NFPA: 11, 13, 15, 20, and 72). The design engineer of this development facility should design the in detail all these fire equipment system, including the location and technical specification, as well as the proper design capacity.

7.3.3.4 Fire Team Requirement

Professional firefighter team need to be established by the project owner in order to fight the fire and minimize the loss and protect the property.

7.3.3.5 Fire Contingency Planning

Fire contingency management plan should be designed in order to response to the unexpected fire (usually large) in the facility. The emergency response planning for fire management can be found in the chapter 12.

7.3.4 Mitigation of Groundwater Impacts

The groundwater utilization by the project should affect both quantity and quality, which need to be mitigated in order minimize large impact in the aquifer and above the ground surface. The mitigation measure of groundwater quantity, would be minimize the pumping of groundwater via monitoring of groundwater level

- Limit or regulate the groundwater utilization
- Limit or eliminate the oil spill in the ground surface that could entering the groundwater body
- Monitoring of groundwater quantity and quality
- Observe and monitor the oil spill in the ground surface and act accordingly if there is any spill
- Top soil remediation in case oil spill in the ground surface, where the spill entering the soil layer
- Groundwater remediation if there is any groundwater contamination

Further discussion on the soil remediation and groundwater remediation from the oil spill pollution area presented as followed:

Soil Remediation Techniques

When the soil is already polluted by the oil spill, then part of the soil that is polluted must be taken and store in the special storage to stop the transport process from reaching the groundwater level. Type of soil remediation could be very simple as thermal remediation to the complicated bio-remediation.

Method of Remediation	How
Thermal	Contaminant soil is heating up the higher temperature to let the organic hydrocarbon evaporate. Burning the contaminate soil could also be part of soil remediation. After the contaminant already removed, soil can be stored back to the original place.
Encapsulation	The principle of encapsulation is like an adding certain chemical into the soil that is already contaminated to stop the flow further down.
Bio-Remediation	This technique is to apply the bio-logical process in the removal of the oil in the soil surface. The biological process normally takes longer time and it may not work for current soil condition that has very permeability rate

Groundwater Remediation from Pollutant

If the groundwater is contaminant by the spill in the soil surface, then the only remediation way is to pump out the groundwater and treat them. The groundwater remediation is very expensive and most of the time the result is not effective as the volume of the water to be treated is so huge. Therefore, in situ treatment would be applied.

7.3.5 Mitigation of Air Quality Impacts

As presented that the main air quality issue related to the operational of fuel storage terminal is related to the emission of VOCs, which is originated mainly from the gasoline product. The best management practice in mitigating the impacts of VoCs as described earlier should be composed by technical and non-technical method. These two method should complement to each other in order to achieved the best outcome.

Table 7.4. Option of Mitigation Measures to minimize the VoCs

Method of Mitigation	Mitigation Options	How to Implement/
Technical	Maintaining stable tank pressure and vapor space	• Coordinating filling and withdrawal schedules, and implementing vapor balancing between tanks (a process whereby vapor displaced during filling activities is transferred to the vapor space of the tank being emptied or to other containment in preparation for vapor recovery); • Reducing breathing losses by using white or other reflective color paints with low heat absorption properties on exteriors of storage tanks for lighter distillates (e.g. gasoline, ethanol, and methanol) or by insulating tanks. The potential for visual impacts from tank colors should be considered;
	Secondary emission control - if the VoC loss is high	• Vapor condensing • Install vapor recovery unit • Catalytic oxidizer • Vapor combustion unit • Gas absorption unit
	Minimize vapor loss during the process of fuel/gasoline transfer	• Apply Gasoline supply and return system • Apply vapor recovery hoses and vapor tight truck or other in the loading and unloading gasoline
	Use of bottom loading truck / rail car filling system	Bottom tank loading resulted minimum vapor loss
Non-Technical	Tree planting	Near perimeter of the fence and green zone in the project area
	Proper SOP	• Tank operation • Loading and loading in Jetty • Loading and unloading procedure in Loading bay • Pump and valve operation and control system
	Periodic maintenance system	• Follow properly the maintenance schedule as recommended by the designer • Implement Periodic inspection (annual) to

		all the system and equipment to ensure that they all working property according the design and operation manual
	OHS	PPE

7.3.6 Mitigation of Traffic Impacts

The long-term traffic at the National road Dili – Liquica is expected to increase with higher percentage, given the condition, that most of logistic related industry will be concentrated in Liquica area. Moreover, the connection to Indonesian border through Batugede has also played a significant role in increasing the traffic volume of Dili – Liquica road from time to time. The impacts as presented chapter is expected and required mitigation measures to response any future traffic hazard/impacts.

The mitigation measure of traffic impact during the operation of fuel terminal facility includes:

- Dedicated person to direct the traffic in and out, as well as watch the oncoming traffic
- Potentially required to install traffic light to regulate the traffic
- Installation of traffic signage and limit the vehicular speed in and out the facility
- Required only authorize personnel can drive the vehicular
- Government of Timor – Leste to upgrade the national road of Dili – Liquica

7.3.7 Mitigation Measure of Solid Waste Impacts

Although the solid quantity resulted by the operation of the fuel storage terminal would be small, compares to the total volume produced by the whole Liquica urban area, the managing the impacts of solid waste would be needed. Especially, the hazardous solid waste produced by the operation of the facility is required to be treated prior to the disposal.

The mitigation measures of general solid waste can be achieved by the implementation of the concept of 3 RD (Reduced, Recycle, Re-use and Disposal). During the operation the company should provide the two type of waste collection:

- Recycle material/waste
- Non-Recyclable

To accommodate this solution the project owner will construct the waste bin to collect the solid waste within the facility. The recyclable material should be sent to agency to recyclable the waste and while the non-recycle material should be collected and dispose into Tibar Dumpsite area. The hazardous waste need to be treated prior to the disposal. As currently, designated treatment site/area for the hazmat waste, the project owner will have its own hazardous waste treatment. The simple treatment that commonly adopted is to let the liquid evaporate and burn the solid material.

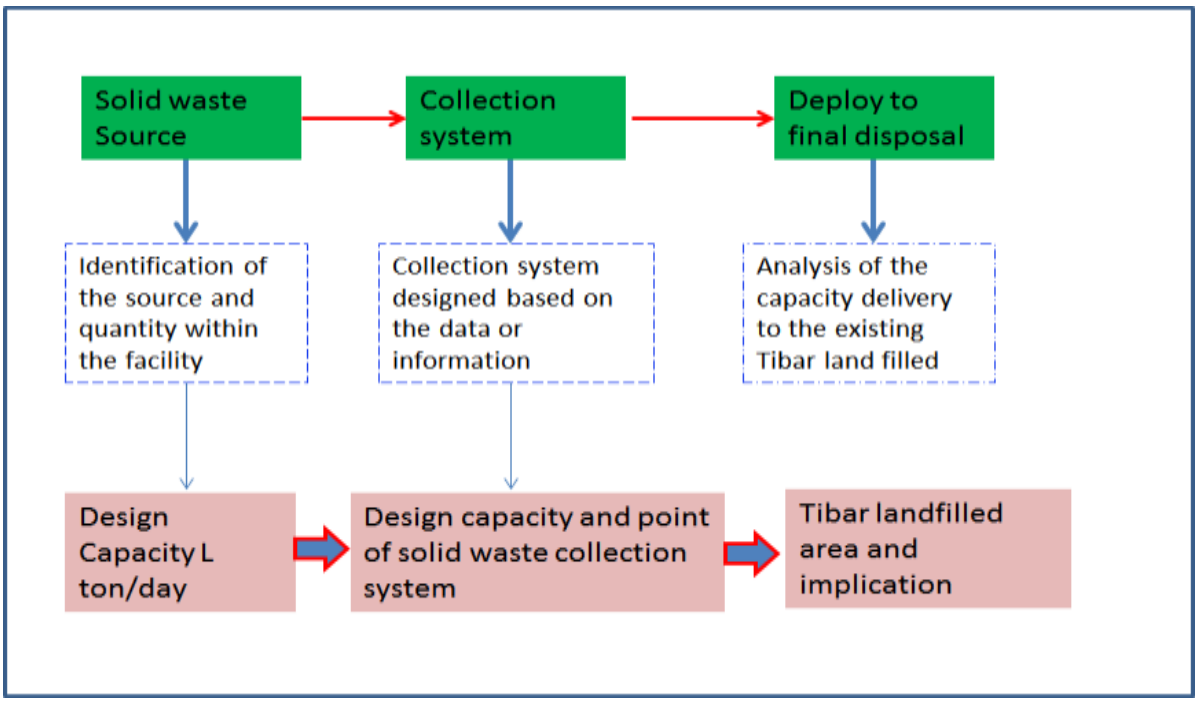

Figure. 7.15 Process and Method of Solid Waste Management

Figure. 7.16 General Solid Waste Collection and Disposal System

The solid waste can be disposed in landfilled area or private landfill should be developed by the project owner. The hazardous solid waste that produced from the fuel storage system, particularly from the bottom tank, after 5 –years of operation need to be taking out and required the proper treatment and prior to disposal in the designated area.

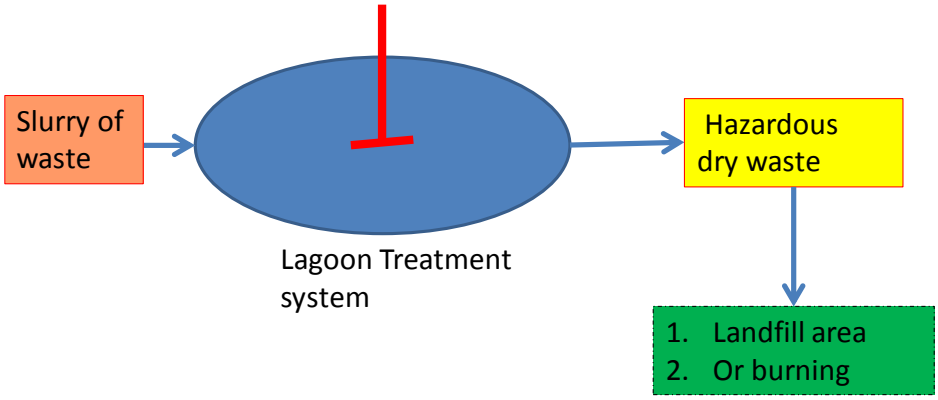

Figure. 7.17 Process Treatment of Hazardous Material

The process treatment of hazardous solid waste is described as followed:

- The waste collected from the fuel storage tank and oil-water separator it stored in the lagoon treatment system
- Liquid and solid will be separated by the natural evaporation process.
- Once the water already completely evaporate, then solid waste can be collected for reuse material or disposal by burning the solid part, which assumed to be the petroleum product

7.3.8 Mitigation of Climate Change Impacts

The climate change impacts to the project development would be expected from sea level rise and more frequency rain with high intensity that potentially produce the flood flow that could affect the operation of the fuel storage terminal.

Considering the potential impact of climate change and coastal inundation, the design of the facility should consider these above factors.

- Adaptation measures such as elevated floor design and coastal wall protection (already described in the flooding section)
- Monitoring of the tide and adjust the operation of the fuel loading and unloading
- Frequently cooling the storage tank to minimize the vapor loss by controlling temperature inside the tank
- Improve the temperature monitoring system in the storage tank and adjust the water cooling system (adaptation program)

These mitigation measures should help the facility to operate continuously without facing any major issue related to the environmental, health, and safety.

7.3.9 Mitigation of Risk related to Occupational, Health and Safety

Global Oil Terminal, LDA is a dedicated company that has a responsibility in ensuring the health and safety of the workers for sustainable operation in storing and distribution of the petroleum product in Timor – Leste. The safety and health are the first concern that should become the responsibility of the company and workers by taking necessary measure to prevent the risk, minimizing or eliminating the risk associate to the work or project execution. Similar to the construction phase, the impact of the project to the occupational health and safety should be managed according the following hierarchy:

- Eliminating the risk/hazard
- Controlling the hazard
- Minimizing the hazard
- Providing the proper personnel protective equipment (PPE) for the last resort to protect the workers from unnecessary injuries or accidents.

Further detail information on how the propose fuel terminal facility should be design and operated to comply with the best industry standard in order to minimize the hard or risk associate with the OHS are presented as followed:

- Proper design and operation system will lead to the minimization of various unnecessary acicent related to the executing of the work.
- The incident related to the occupational would also be reduced by having a proper communication procedure (protocol) within the project area and training of the staff involve in every part of the work would need to ensure that everyone understand the role and responsibility in doing their part to contribute to the better outcome
- Many important physical, chemical, biological hazards can be minimized by better understanding of the hazard itself and design the workspace to eliminate or minimize the incident related to the physical, chemical and biological hazards.
- Last but not least is using the proper personnel protective equipment (PPE) in executing the specific work to minimize the personal risk during the execution of the work.

Detail information on each hazard and action to be taken are presented in annex 13, which was summarized from IFC Guideline on the occupational health and safety

7.3.10 Mitigation of Risk to Community Health and Safety

Community health and safety issue during the operation of the proposed fuel storage terminal, would be proportional the major impacts that could affect the occupational health and safety within the proposed development facility.

- Groundwater availability
- Traffic safety
- Fire and explosion within the fuel storage that cause the domino effect
- Major oil spill that polluted the coastal and damaged various marine resources

These above could be prevent, minimize and or compensate (if it occurs)

Table. 7.5 Mitigation measures of Community and Health and Safety

Community Health and Safety Mitigation Measures - Operation Phase		
Area of Concern	Action to taken	Objective
Groundwater availability	• Apply water conservation • Measure the water utilization • Provide help to the community, especially during the prolong dry season • Monitor the groundwater depletion	To ensure the groundwater sustainability and ensure the availability for people and the project
Traffic Safety	• Provide proper traffic signage and dedicated person in the project to redirect the traffic • Apply proper speed limit within the project area (suggested 10 KM/h) • only proper license could operate the certain vehicular	To minimize the impact of accident related to the transportation
Large fire and explosion within the fuel storage and cause larger domino effect	• Evacuate the people or community within the radius of 50 meter from the project boundary • Provide public announcement regarding the accident • Provide the same evacuation route of the emergency	To minimize the hazard impact to the community and public
Major Oil spill that polluted the coastal and damaged various marine resource	• Informed the community about the potential hazards of oil spill • Informed the fishermen regarding the impact area so to limit the fish catching that already contaminated by the pollutant • Provide the proper signage to the area/beach that already polluted to limit the public access to the water that already polluted	To avoid the impact of oil spill to the public and community members

7.4 Mitigation of Impacts during the Construction of Phase 1 B

The mitigation of impacts during the construction of phase 1 B, mainly related the work execution of phase 1 B facility installation.

- Occupational Health and Safety
- Traffic Impacts management
- Noise and Vibration
- The air quality management and monitoring

The mitigation of these mentioned impacts should be same like in the phase 1 A construction activity.

7.5 Mitigation of Impacts during the Operation of Phase 1 A and Phase 1 B

The operation of phase 1 A and Phase 1 B, would be similar to the operation of phase 1 A, except the total volume of fuel that stored within the fuel terminal facility would be double in the phase 1 A and B together.

In term of mitigation measures of the impacts, especially the fire hazard, the resource resources need to mitigated the major fire event under the operation of phase 1 A and B would be larger than the phase 1 A.

7.6 Mitigation of Impacts during the Decommissioning Phase (1 A and 1B)

The decommission phase of the project implementation is an unexpected as the project owner is highly committed to stay on the business as long as possible. In case, the projects need to be decommissioning due to some extreme event that force the project owner to shut down permanently the operation of the fuel storage system, the mitigation measures of the expected impacts would be necessary.

- Occupational Health and Safety (OHS) related physical activities
- OHS related to biological and chemical exposures
- Dust and air quality issue
- Noise and vibration from the activity of removing the project
- Social and economic impacts such ad loosing opportunity and employment

The above mentioned impacts are only temporary that can be mitigated during the duration of decommissioning activities. Furthermore, the economic and social lost my be need be compensated properly until a new opportunity arrives.
Any commissioning works need to submit new or updated document of environmental impact statement (EIS) to accommodate any change in nature requirement or any regulation change. At this stage, the impacts of social, economic and financial can be project.
In general the impacts and mitigation measures are similar to the construction phase, except that may be a major socio-economic impacts that need to be mitigated by the project owner and the government of Timor – Leste.

Table 7.6. Impacts and Mitigation Measure during the Decommission phase

Impact Assessed and Mitigation Measure during Decommissioning phase			
Impacts	Area of Coverage	Particular concern	Mitigation Measure
Occupational Health and Safety	People who work inside the facility	• Work related electricity • Exposure to heat • Exposure to the dust and particular matter • Risk injury related to accident (vehicle, heavy duty equipment,	• Proper training prior to executing the certain work. Certain special work such as electrical work should be done by person who has certified training related to electrical work • Using the proper PPE (eye, nose, ear, protection system) • Supervisor to control the

		etc) • Risk of death	worker to follow proper working procedures • Temporary medical help in the project site to provide help in case accident • Dedicate team to response the emergency in the field • Evacuate as soon as possible to the nearest help center or hospital • Proper compensation to the death
Traffic disturbance	• Vehicular get in and out of construction area • Vehicle taking the demolished or dismantled material	• Traffic accident • Temporary congestion • Loss of life	• Assign dedicated person to watch and direct the traffic related to construction activity • Response team to help resolve the traffic accident • Proper traffic signal and speed limit • Only license/authorize personel would allow to operate the machinery/vehicles
Demolition of storage tank	Chemical hazard such as gas that trapped inside the storage tank	• Cause health hazard • Potentially cause death	• Authorize and trained people to dismantled the storage system • Using proper PPE
Noise	Within the project area up to 50 meter radius	• Disturb the convenience of the community • To big noise could potentially cause the health hazard	• Use the PPE (ear protection equipment) within the project area • Schedule the construction activity only during the day time • Apply noise barrier in the perimeter fence
Vibration	Within the radius of 100 m	• Potential collapse of old Aipelo prison • Structural crack of the building within the radius of 50 m	• Monitor the vibration level from the source of vibration and further distance away from the source to know the vibration level • Apply some safer technique of foundation work that produce minimum vibration • Apply PPE for the worker within the project area during the execution of work
Social Impacts	loss of opportunity and job	• 30 people will loss the job and income • Project owner will loss the economic	• Proper compensation and transition program • Transfer the workers to other similar facility

		opportunity • Fuel supply will be impacted and potentially the price will increase	• Find other alternative busies modality
Economic Impacts	Loss of source of income	• No tax payment to the government • Loss of revenue from the project owner • No social corporate responsibility to the local people	• Required a new business modality • Government to diversify the economic into other sector

8. GOVERNING PARAMETERS

Managing the environmental impacts in order to achieve the environmental sustainability can be done with two approaches:

- Control and limit the impacts or pollutant discharge from the facility to the receiving environment ; or
- Establishing the ambient environmental quality based on the natural capacity of environment to assimilate or accept the waste, while the overall quality is acceptable to human, ecology and other risks

In many cases, these two approaches should be combined in order to achieve the best result, which means that limiting or control the value of pollutant that can be discharged by a facility to the receiving environment, while at the same time, the ambient environmental quality should evaluated or managed or updated.

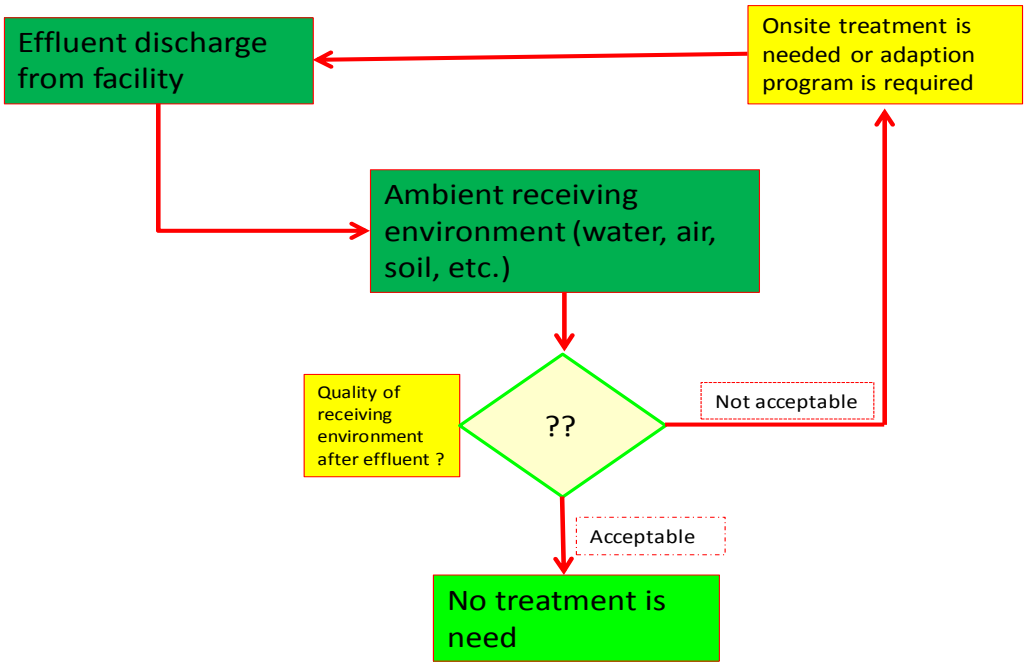

Figure 8.1 How these two approaches are related and complement to each other

Further information on these two approaches and limiting value for specific environmental parameters, as well as the ambient environmental quality standards related to the proposed development project are presented as followed.

8.1 Emissions

Emission or discharge of undesirable chemical or particulate matter that coming from the propose development facility could enter to surrounding recipient environmental and cause the disturbance of the

existing environment. The value of measureable parameter should be set based on the existing law or best practice in the proposed relevant industry. Common practice in other developed countries such as United stated of America (USA) regulated the point source pollution by limiting the quality of effluent, while the emission from diffuse source is regulated based on the quality of ambient. However, this arrangement was based on best practice for many years and found that pollutant from point's source such as factory has contributed major pollution to the water body if no limit on the effluent discharges quality. In addition, the quality of point source can be easily measured or treated by a treatment technology.

The pollution from non-point source (NPS), or known as diffuse source is difficult to be controlled at the discharge point, as the point of discharge is not defined or difficult to be defined. The sediment load from overflow for instance is considered as non-point source pollution, which only be managed with the quality at the receiving water body.

8.1.1 Air Quality Emission from Facility

The emission from facility shows the quality of various pollutants coming from the sources. Ideally the facility would try to control all the emission of the pollutant to air. The component of pollutant during the project implementation of the proposed development consists of the following:

- PM (2.5 and 10)
- CO_2
- NO_2
- Methane
- VOCs
- SO_2

This list of emission gases and particulate matter come from the project development and background value that exist in nature. The mission of the above mentioned gases and particulate matter is difficult to be measured from the sources, as the nature of the pollutant with is highly diffuse and very small in quantity that enter the ambient air. The emission of the above gas from the factory or facility should be limit in order to control the air quality.

8.1.2 Pollutant from Facility to Water

Emission to the water means the pollutant in the liquid form that could be possible entering the waterbody from the project facility.

- Wastewater from the facility
- Storm water runoff
- Oil spill

The parameter that becomes a main concern or quality evaluation and indicators are measured in the following:

- BOD
- COD
- PH
- TPH
- Pb
- Heavy metal
- TSS and sediment load

For time being, no standard yet has established by the Government of Timor – Leste to control or regulate the discharge of effluent of wastewater into the receiving water body. Therefore, the international best practice of parameters limits could be adopted. The following table show the proposed limiting quality discharge of wastewater into the receiving water body.

Table 8.1 Limiting Wastewater effluent Quality Standard (IFC, 2007)

Pollutants	Units	Guideline Value
pH	pH	6 – 9
BOD_5	mg/l	25
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Temperature increase	°C	<3[b]
Total coliform bacteria	MPN[a] / 100 ml	400
Active Ingredients / Antibiotics	To be determined on a case specific basis	

Notes:
[a] MPN = Most Probable Number
[b] At the edge of a scientifically established mixing zone which takes into account ambient water quality, receiving water use, potential receptors and assimilative capacity

The above table indicated that any factory or facility should treat the wastewater from the facility up the above level prior to discharging the effluent into the receiving water body.

8.1.3 Pollutant Emission to Soil

Pollutant that transport to the soil from the project related activity. The main concern of pollutant related to the proposed business development is petroleum derivative product and heavy metal such as lead that normally added into the petroleum product like gasoline. However, government has not established any regulation related to the limit of specific pollutant into the soil. As for the soil quality analysis, as part of the environmental impacts assessment study (EIA), the following parameter were measures.

- TPH
- Pb
- PH
- Mg, K, N

There is no establish criteria on the amount from the facility that is allowable to be entering the soil as it is not practical for any facility to discharge the liquid waste into the soil. The ambient quality of soil

would normally being use to evaluate the status of the soil in relation to the waste loading from any facility.

8.1.4 Noise and Vibration Emission to Surrounding

The noise emission will impact the surrounding receiving environment instantaneously. Therefore, the emission source and ambient of noise would resulted the same impact, except the distance. That means the farer the distance of ambient noise to the source, the less impact would be resulted. Noise level that is acceptable to the human hearing during the day and night times. According to WHO, exposure to noise level at 80 dB an above for the long –term will cause the hearing loss temporarily. Various heavy duty equipment would produce different level of noise that will be emit to the surrounding environment.

- Repeated long-term exposure to sound above 80 dB can lead to permanent damage. Consider using the hearing protection or move to quieter area
- 80 dB: around 5 hours and 30 minutes a day at this level can cause temporary hearing loss. The weekly limits is 40 hours
- 85 dB: Exposure around 1 hour and 45 minutes a day at this this level can cause temporary hearing loss. Weekly limit at this level is 12 hours and 30 minutes
- 90 dB: Around 30 minutes a day at this level can cause temporary hearing loss. The weekly limits is 4 hours
- 95 dB: just 10 minutes a day at this level can cause temporary hearing loss. The limit of weekly exposure at this level is 1 hour and 15 minutes
- 100 dB: Even a few minutes a day at this level can cause temporary hearing loss. Weekly limits is 20 minutes

8.1.5 Solid Waste and Hazardous Waste

The solid waste production by household is main dominant factor to the existing landfill area in Tibar. There, is no limiting amounting that any household or factory should discharge into the landfill area. Similarly, no regulation yet has been established regarding the hazardous waste that shall be discharged by certain industrial facility in Timor – Leste. Although, a company or a business owner should be responsible to treat the waste, there should be any guideline on the level of treatment required prior to entering the landfill area. The following chemical elements are considered hazardous, which are related to the current proposed development project

- Asbestos
- PCB
- Lubricant
- Oil

The governing parameters would be measured in TPH, organic carbon contain, heavy metal.

8.2 Ambient Environmental Quality Standards

The ambient environment quality standards have been established based on the natural ability of certain environment to accept the specific pollutant, without affecting the natural function of the environment. This means that amount of pollutant entering the receiving environment should not cause that specific environment loss its natural function. For instance, quality of water body is usually defined in term of the usability of the relevant water body:

1. Swim-ability

2. Drinkability
3. Fish-ability

The quality of swim-ability for instance defines the quality of water for human being to swim without any health issue. Then the parameters of water body are defined based on this definition of swim ability of water. Similarly, the quality of drinking water is defined, in term of drinkability that does not harm the human health in both short and long-term. Biological, chemical, physical, and radiological indicators are commonly used to regulate the quality of water for various above purposes (drinking, swimming, fishing, etc.). Similarly, the standard of ambient quality of soil, air, and sea water, would also be defined based on the usability of the resources.

8.2.1 Ambient Water

The ambient water quality standard in Timor – Leste has not being established, except the drinking water quality standard that has already adopted from WHO standard. Practice in other countries, especially in the United States of America (USA), has defined the ambient water quality based on the function of the water body.

- Drinking water source (water body)
- Fishing water Source
- Swimming water body
- Water for irrigation

The ambient quantity and quality would need to be regulated in order reduce the risk and ensure the sustainability to the natural environment.

8.2.1.1 Drinking Water

Ground water utilization in Timor – Leste is currently not regulated in term of the volume that can be extracted. In The future, just like in any other region, the control of government over the rate of utilization needs to be regulated in order to ensure the sustainability of its utilization. The groundwater level of utilization normally regulated against the rate of recharge from rainfall volume. The estimation of recharge and the sustainable yield of groundwater need to be established and the government would set the regulation to extract less volume than the theoretical volume of recharge rate. The groundwater quality on the other hand, measured in term of drinkability, which means that the governing parameters are the drinking water quality standard, which in Timor – Leste, WHO standard has adopted.

Table 8.2. Parameters of Water Quality

No	Paramter	Unit	WHO/Timor - Leste Guideline	Testing Method
			Physical	
1	PH		6.5-8.5	PH meter
2	E. Conductivity	mc/cm	NS	Conductivity meter
3	TSS	mg/L	50	Gravimentry
4	TDS	mg/L	1000	Gravimentry
5	Salinity	ppt	0.25	Conductivity meter
6	Temperature	C	Natural	Conductivity meter
7	Turbidity	NTU	5 NTU	Turbidity meter
			Chemical	
1	NH3 -N	mg/L	1.5	Spectrophotometer
2	NO3-N	mg/L	10	Spectrophotometer
3	NO2-N	mg/L	1	Spectrophotometer
4	Fe	mg/L	0.3	Spectrophotometer
5	Mn	mg/L	0.5	Spectrophotometer
6	Flouride	mg/L	1.5	Spectrophotometer
7	Cl2	mg/L	0.5	compactor
8	Ca.Hardness	mg/L	NS	Titration
9	Arsenic	mg/L	0.01	compactor
	Total hardness	mg/L	200	Titration
10	Total alkalinity	mg/L	NS	Titration
11	Sulphate	mg/L	250	Spectrophotometer
			Biological	
1	Total Coliform	CFU/100 mL	0	Membrane Filtration
2	E. Coli	CFU/100 mL	0	Membrane Filtration

8.2.1.2 Marine Water Body

Ecological quality, such as marine water body, is also an important ambient water body that need to be taking into consideration, especially, ensure the ecological balance in term of biodiversity of the ecological environment.

The governing parameters of marine water body and related ecological indicator would be done with the following parameters:

- BOD
- DO
- NO_3 (eutrophication)
- Index of Bio-diversity

8.2.2 Ambient to Air Quality

The measurement of these mentioned gases emission is usually done in the ambient, which show the quality of air that will affect the human health. The limiting value of ambient air quality standard, has already being recommended by WHO to be adopted in Timor – Leste.

Table 8.3 (Revisited); Limit of Ambient Air quality Standard in Timor – Leste

Parameter	**Average Period**	**Guideline Value (µg/m^3)**
Sulfur dioxide (SO_2)	24-hour	20
	10 minute	500
Nitrogen dioxide (NO_2)	1-year	40
	1-hour	200
PM_{10}	1-year	20
	24-hour	50
$PM_{2.5}$	1-year	10
	24-hour	25
Ozone	8-hour daily maximum	100

8.2.3 Soil Quality

The ambient quality of soil could be measured for any parameters, depending on the type of potential pollution that may affect the soil quality. For the current fuel terminal operation, the soil quality would be assessed against the following parameters.

- Total Petroleum Hydrocarbon (TPH)
- PH
- Pb
- Mn

However, no standard parameters have been approved and adopted in Timor – Leste.

8.2.4 Land stability

The soil stability in relation to the foundation work and potential subsidence are important parameters to be assessed during the preparatory study of the project development.

- Sulfate contain and Chlorine contain in soil
- PH
- Standard Penetration Test (SPT)
- Soil Permeability
- Soil Compaction

These factors were investigated as part of the soil study to provide basic information for the land stability analysis prior to the site development.

8.3 Occupational Health and Safety Standards

The governing parameters to measure the success of the implementation of the occupational health safety measures would to compare the safety parameters indicators. The following table, provide the indicator of the OHS government parameters.

Table 8.4. OHS Performance Indicator

Safety parameters and indicators		
Parameters	1. Fatal accidents	Fatalities, own staff and contractor personnel
	2. Accidents resulting in permanent disability	Permanent disabilities, own staff
	3. Accidents resulting in absence from work	Accidents, own staff and contractor personnel
	4. Lost days	Absence due to an accident, own staff in calendar days
	5. Workforce	Expressed in Full-Time Equivalents (FTE)
Performance indicators	1. Accident frequency	Own staff, number of accidents resulting in absence from work per 100 FTE
	2. Accident severity	Own staff, lost days from work per 100 FTE

9. MONITORING PROGRAM

Effective implementation of the environmental management plan should be monitored by the relevant agency involve in the project implementation. The objective of monitoring program is to ensure the effective implementation of EMP in achieving the objective of environmental protection on one hand and realize the overall project objective. Especially, to ensure the following objectives:

- To measure the impacts that occur during project construction, operation, and decommissioning, closure and post-closure for non-permanent project;
- To ensure compliance with legal requirements and corporate commitments;
- To determine the effectiveness of mitigation measures and other environmental or social protection measures, such as enhancement measures;
- To determine the accuracy of impact predictions;
- To facilitate impact management by warning of unanticipated impacts.

Further detail on the monitoring program of each impact, frequency, location, and responsible agency is elaborated in the following sections.

9.1 Monitoring Program during the Construction Phase 1 A

The parameters to be monitored during the implementation of the environmental mitigation program for the phase 1 A, including the following:

- Air quality parameters
- Accident rate and complaint
- Turbidity of marine water
- Traffic accident rate
- Noise level monitoring

Further detail of this monitoring program and the frequency, as well as the location of the monitoring is presented in the following table.

Table 9.1 Proposed Monitoring Program during the Construction Phase of Project Implementation

Impacts	Parameters/instrument	Location	Frequency of Monitoring	Responsible agency	Inspection Agency /reviewer of report
Air quality - Ambient	CO_2, CO_2, NO_2, PM (multi equipment)	Two location (inside the project site and within the community center	Once during construction of phase 1 A	Project Owner and reported to ANPM	• DNCPEI • ANPM
Marine Water	Turbidity (handheld turbidity meter)	• Near out of River • In jetty	Taking grad sample after the rain or after the rain, insert the turbidity meter to measure the turbidity of marine water	Project owner with report	ANPM, MAF, and DNCPEI
OHS	• Accident recording • Compliance using PPE	Within the project area	Daily basis	Project owner and provide the report to relevant agency	ANPM, SEFOPE, Bombeiros
Noise and Vibration	Noise Level (Handheld Noise meter)	• Inside the project area • Project Boundary	During the time when suspect noise level increase (heavy duty equipment fully operated)	Project owner conduct the monitoring and provide the daily record	ANPM, local community leader,
Traffic Disruption	Traffic count and record any traffic accident	Dili – Liquica road (at the Junction of Aipelu – Bazarte – Liquica)	Daily Record	Project owner	DNTTP, ANPM, local Police authority

9.2 Monitoring Program during the Operation of Phase 1 A

Table 9.2. Proposed Monitoring Program of Implementation EMP during the operation of Phase 1 A

Impacts	Parameters/instrument	Location	Frequency of Monitoring	Responsible agency	Inspection Agency /reviewer of report
Air quality - Ambient	CO_2, CO_2, NO_2, PM (multi equipment)	Two location (inside the project site and within the community center	Once during construction of phase 1 A	Project Owner and reported to ANPM	• DNCPEI • ANPM
Marine Water	Turbidity (handheld turbidity meter)	• Near out of River • In jetty	Taking grad sample after the rain or after the rain, insert the turbidity meter to measure the turbidity of marine water	Project owner with report	ANPM, MAF, and DNCPEI
OHS	• Accident recording • Compliance using PPE	Within the project area	Daily basis	Project owner and provide the report to relevant agency	ANPM, SEFOPE, Bombeiros
Noise and Vibration	Noise Level (Handheld Noise meter)	• Inside the project area • Project Boundary	During the time when suspect noise level increase (heavy duty equipment fully operated)	Project owner conduct the monitoring and provide the daily record	ANPM, local community leader,
Traffic Disruption	Traffic count and record any traffic accident	Dili – Liquica road (at the Junction of Aipelu – Bazarte – Liquica)	Daily Record	Project owner	DNTTP, ANPM, local Police authority
VOCs	Online – instrumentation	• Inlet and outlet of each storage tank • Unloading bay (filling station) online • From jetty to the tank (flow rate)	• Real time (for the tank) • During the operation	Project owner	ANPM, DNCPEI, and other agencies (depending on the request)
Flooding	Direct observation and rainfall station	River/by the bridge Rainfall station at upland catchment	Real time for rainfall Flood water (whenever the heavy rain)	Project owner	ALGIS and National Meteorological service
Oil spill	• Marine water quality measurement – automatic probe • Visual	• Jetty • Pipeline • Containment area	• Once every two week during unloading in jetty • Grab sample after the unloading in jetty • After any major spill	Project owner	Inspected by ANPM after the major oil spill

	inspection • TPH – in the oil –water separator				
Fire hazard impacts	Incident record	Within the project area	Any fire event	Project owner, Bombeiros, Local Police, and health	Bombeiros, ANPM, PNTL
Groundwater quality and Quantity	• TPH • Water level • Pb and organic carbon compound	Monitoring well inside the project location	After any major event and any report from the nearby community regarding the drawdown of groundwater	Project owner	MPW – DNCQA ANPM
Solid waste – including hazmat	Record of solid waste delivery	In the project area	Every month	Project owner	Liquica Municipality
Community Health and Safety	If any complaint from community regarding the water and any hazard	Project area to surrounding in Lauhata	After any event	Project owner	Local Authority
Climate Change	Record of tidal measurement an coastal flooding				

9.3 Monitoring Program during the Construction Phase 1 B

Table 9.3: Proposed Monitoring Program of EMP Implementation during the Construction of Phase 1 B

Impacts	Parameters/instrument	Location	Frequency of Monitoring	Responsible agency	Inspection Agency /reviewer of report
Air quality - Ambient	CO_2, CO_2, NO_2, PM (multi equipment)	Two location (inside the project site and within the community center	Once during construction of phase 1 BA	Project Owner and reported to ANPM	• DNCPEI • ANPM
Marine Water	Turbidity (handheld turbidity meter)	• Near out of River • In jetty	Taking grad sample after the rain or after the rain, insert the turbidity meter to measure the turbidity of marine water	Project owner with report	ANPM, MAF, and DNCPEI
OHS	• Accident recording • Compliance using PPE	Within the project area	Daily basis	Project owner and provide the report to relevant agency	ANPM, SEFOPE, Bombeiros
Noise and Vibration	Noise Level (Handheld Noise meter)	• Inside the project area • Project Boundary	During the time when suspect noise level increase (heavy duty equipment fully operated)	Project owner conduct the monitoring and provide the daily record	ANPM, local community leader,
Traffic Disruption	Traffic count and record any traffic accident	Dili – Liquica road (at the Junction of Aipelu – Bazarte – Liquica)	Daily Record	Project owner	DNTTP, ANPM, local Police authority

9.4 Monitoring Program during the Operation of Phase 1 A and B

Table 9.4 Proposed Monitoring Program for EMP Implementation during the Operation of Phase 1 A and B

Impacts	Parameters/instrument	Location	Frequency of Monitoring	Responsible agency	Inspection Agency /reviewer of report
Air quality - Ambient	CO_2, CO_2, NO_2, PM (multi equipment)	Two location (inside the project site and within the community center	Once during construction of phase 1 A	Project Owner and reported to ANPM	• DNCPEI • ANPM
Marine Water	Turbidity (handheld turbidity meter)	• Near out of River • In jetty	Taking grad sample after the rain or after the rain, insert the turbidity meter to measure the turbidity of marine water	Project owner with report	ANPM, MAF, and DNCPEI
OHS	• Accident recording • Compliance using PPE	Within the project area	Daily basis	Project owner and provide the report to relevant agency	ANPM, SEFOPE, Bombeiros
Noise and Vibration	Noise Level (Handheld Noise meter)	• Inside the project area • Project Boundary	During the time when suspect noise level increase (heavy duty equipment fully operated)	Project owner conduct the monitoring and provide the daily record	ANPM, local community leader,
Traffic Disruption	Traffic count and record any traffic accident	Dili – Liquica road (at the Junction of Aipelu – Bazarte – Liquica)	Daily Record	Project owner	DNTTP, ANPM, local Police authority
VOCs	Online – instrumentation	• Inlet and outlet of each storage tank • Unloading bay (filling station) online • From jetty to the tank (flow rate)	• Real time (for the tank) • During the operation	Project owner	ANPM, DNCPEI, and other agencies (depending on the request)
Flooding	Direct observation and rainfall station	River/by the bridge Rainfall station at upland catchment	Real time for rainfall Flood water (whenever the heavy rain)	Project owner	ALGIS and National Meteorological service
Oil spill	• Marine water quality measurement – automatic probe • Visual	• Jetty • Pipeline • Containment area	• Once every two week during unloading in jetty • Grab sample after the unloading in jetty • After any major spill	Project owner	Inspected by ANPM after the major oil spill

	inspection • TPH – in the oil –water separator				
Fire hazard impacts	Incident record	Within the project area	Any fire event	Project owner, Bombeiros, Local Police, and health	Bombeiros, ANPM, PNTL
Groundwater quality and Quantity	• TPH • Water level • Pb and organic carbon compound	Monitoring well inside the project location	After any major event and any report from the nearby community regarding the drawdown of groundwater	Project owner	MPW – DNCQA ANPM
Solid waste – including hazmat	Record of solid waste delivery	In the project area	Every month	Project owner	Liquica Municipality
Community Health and Safety	If any complaint from community regarding the water and any hazard	Project area to surrounding in Lauhata	After any event	Project owner	Local Authority
Climate Change	Record of tidal measurement an coastal flooding	Existing river and Coastal area	Any Major event	Project owner	Local authority and Ministry of Public Works

9.5 Monitoring Program during Decommission of Phase 1 A and B

Table 9.5 Proposed Monitoring Program of EMP during Decommission Phase A and B

Impacts	Parameters/instrument	Location	Frequency of Monitoring	Responsible agency	Inspection Agency /reviewer of report
Air quality - Ambient	CO_2, CO_2, NO_2, PM (multi equipment)	Two location (inside the project site and within the community center	Once during dismantling of major equipment	Project Owner and reported to ANPM	• DNCPEI • ANPM
Marine Water	Turbidity (handheld turbidity meter)	• Near out of River • In jetty	Taking grad sample after the rain or after the rain, insert the turbidity meter to measure the turbidity of marine water	Project owner with report	ANPM, MAF, and DNCPEI
OHS	• Accident recording • Compliance using PPE	Within the project area	Daily basis	Project owner and provide the report to relevant agency	ANPM, SEFOPE, Bombeiros
Noise and Vibration	Noise Level (Handheld Noise meter)	• Inside the project area • Project Boundary	During the time when suspect noise level increase (heavy duty equipment fully operated)	Project owner conduct the monitoring and provide the daily record	ANPM, local community leader,
Traffic Disruption	Traffic count and record any traffic accident	Dili – Liquica road (at the Junction of Aipelu – Bazarte – Liquica)	Daily Record	Project owner	DNTTP, ANPM, local Police authority
Social Impacts	Number of workers who will be laid off	Liquica and Timor – Leste	After the decision on decommissioning	Project owner	MSS
Economic Impacts	National level	National and Municipio level	After the decision on decommissioning	Project owner	

10.REPORTING REQUIREMENT

All the monitoring activities should be coordinated with relevant government agencies to ensure that the parameters being collected meet regulatory requirement in place for that particular set of parameters. After data have been collected, they should be submitted to relevant authority as previously noted in the above tables.

At a minimum, the reporting should cover:

- Internal monitoring and inspection
- Incident, accident and emergency reporting (oil spill, fire event, etc.)
- Air quality report
- Marine quality report
- Groundwater quantity and quality reports
- Solid waste Collection and Disposal
- Training programs

The types of report, including formatting and reporting frequency should be coordinated with relevant authority. Per Environmental Licensing rules, however, the environmental license of the project is only valid for one year and should be renewed every year by reporting on an updated EMP. Therefore, at a minimum, once a year reporting should be required. The following table presents the reporting requirement, frequency and agency that will review the report.

Table 10.1 Frequency Reporting Requirement

No	Type of Report	Frequency Monitoring and Report	Agency Responsible
1	Oil spill	Online (sensor online of piping system) - Report should be done every month to be able to audit the water consumption	1. Global Oil Terminal management 2. Ministry of Public Works (DNSA – water supply)
2	Groundwater quality report	After any major oil/fuel spill or once a year. The grab sample should be taken to the laboratory	1. Global Oil Terminal management 2. Directorate National of water quality and control (DNCQA)
4	Wastewater discharge	Report should be done at least every 6 months but regular inspection should be conducted every day	1. Global Oil Terminal management 2. Ministry of Health 3. Ministry of Public Works (Directorate National of Basic Sanitation)
5	Solid waste	Monthly report and annual report but the data collection would be	- Global Oil Terminal management

		conducted on the daily basis	- Liquica Municipal administration
6	Air quality	Every six month – the measurement and monitoring will conducted at least once in 1 year	1. Global Oil Terminal management 2. ANPM 3. DNCPEI 4. MOH
7	Ambient Water quality (sea water)	Report should be submitted every six month to DNCPEI	1. Global Oil Terminal management 2. DNCPEI 3. ANPM 4. MAF
8	Incident rate	Every six month with monitoring every day	1. ANPM 2. MoH 3. SEPFOPE
9	Complaint rate (grievance)	Every six month	• Global Oil Terminal management and committee • Local authority in Liquica
10	OHS standard	Every six month but monitoring in a daily basis	1. Global Oil Terminal management 2. MoH 3. SEPFOPE 4. Local police department
11	Community health and Safety	Every six month	1. Global Oil Terminal management 2. MoH

11.RESPONSABILITIES FOR MITIGATION AND MONITORING

Global Oil Terminal LDA is the responsible entity in the development of this proposed project, including the project planning which include preparatory study, detail engineering design, construction, and undertake the operation and maintenance of the project. Therefore, the responsibility of the implementation and monitoring of the Environmental management Plan (EMP) done by the project owner. However, it other third parties should also involve in the mitigation and particularly the monitoring program to ensure the effective implementation of the EMP..

As previously noted in Section 3.2 Relevant Institutional Aspects, the following agencies within the government (Table 12.1) are responsible for environmental, social and economic safeguarding from impacts generated by the project.

Table 11.1. Relevant Institutions and Their Responsibilities

No	Responsibility	Relevant Institutes
1	Environment and Nature Protection (Terrestrial)	Ministry of Commerce, Industry, and Environment (MCIA)
		Ministry of Agriculture, Forestry and Fisheries (MAF)
2	Marine and Coastal Environment	Ministry of Agriculture, Forestry and Fisheries (MAF)
3	Public and Worker's Health and Safety	Ministry of Health
4	Fire hazard and emergency situation	National Directorate for Civil Protection
5	Labor related problem	State Secretary for Labor Protection and Training (SEPFOPE)
6	Wastewater quality control and standards	Ministry of Public Works and Communication – Directorate of Basic Sanitation
7	Groundwater Monitoring program	Ministry of Public Works and Communication – Directorate of Water Quality Control
8	Activities related to Oil and Gas Industries	ANPM and MPRM

Coordination between project proponent and these institutions should happen right in the operational and decommissioning phases.

11.1 Construction of Fuel Terminal Facility

The project owner to submit the report on the mitigation measures implemented during the construction phase and monitoring result for internal purpose and submitted to the to the relevant government agencies, whenever required/asked.

11.2 Operation and Maintenance of Facility

- ANPM: to report mitigation and monitoring measures in place for mitigation of environmental impacts during Operation and Maintenance. To coordinate on evaluating the effectiveness of previous mitigation measures implemented during the operation. Effective mitigation measures should be continued while those that are not effective should be adjusted.
- DNCQA (Ministry of Public Works) to cross check the monitoring result of the groundwater quality within the project facility and the company to report quality regularly to DNCQA, especially after a major incident of fuel spill and major leak with major fuel spill.
- Civil Protection: in coordination with ANPM, conduct initial testing of firefighting equipment, implement fire drill and coordinate on evaluation of emergency preparedness and evacuation plans.
- SEPFOPE: coordinate on workers' health and safety issue including the need to wear workplace protection and the kind of workplace protection needs to be provided for this type of work. Also coordinate on contract preparation and other labor-related issues.

MSS, MOP, Civil Protection, and SEPFOPE: as a large fuel storage system in Timor Leste that could have a risk of significant industrial accident to occur in the complex, such as fire. Therefore, a large scale emergency preparedness plan should be prepared, especially the external plan by Timor - Leste

11.3 Decommissioning Phase

- Global Oil Terminal LDA, will propose to MoJ that the facility will be permanently shut down or decommission to elsewhere and therefore the land will be transferred to the government of Timor Leste.
- Report to ANPM regarding mitigation and monitoring measures in place for mitigation of environmental impacts during the decommissioning phase. To coordinate on evaluating the effectiveness of previous mitigation measures implemented during deactivation. Effective mitigation measures should be continued while those that are not effective should be adjusted. To coordinate for inspection during decommissioning process.
- SEPFOPE: coordinate on workers' that already unemployed and actively coordinate with other agencies to help issue. In addition to this role, the SEPFOE to also ensure that proper unemployed compensation will be given by project owner to worker
- MSS to provide certain assistance to the worker who are affected by the closing of the project activity

12.EMERGENCY MANAGEMENT PLANS

Emergency condition is defined as any event that affects the project execution during the project implementation (Construction and Operation) and force the project to stop operate normally. The objective of the emergency planning is to address the major risk that would normally at the very small probability of occurrence but if it does happen the impact would be significant and catastrophic. Potential process and non-process associate risk that should trigger the emergency condition that need and emergency response plan.

12.1 Purpose of Emergency Planning

The primary goals of emergency response planning

- To provide clear lines of authority and communication during the incident and crisis event
- To provide a means by which trained people and resources are available to those managing the incident event
- Possible emergency events that have been identified for this
- rescuing people and treating the injury, as well as safeguarding other
- Minimizing the damage of property and environment
- Controlling the incident, removing the hazard, preventing escalation
- Maintaining the welfare of personnel involve in controlling the occurrence
- Identify the causality
- Informing and assisting relatives
- Informing the news media
- Informing the collaboration with the authority and emergency service
- Preserving the record

Emergency response planning for the proposed development project was developed by classifying the scale of event into 3 levels, as followed:

Tier 1 - Emergency event: Tier 1 emergency level is considered small scale event that the emergency response team inside the facility would be able to handle in controlling the situation and bring back to the normal operating condition. Example of this type of event is small fire in the pump, which can be handled or kill by team inside team.

Tier 2 - Emergency event: The event is much bigger than the capacity of local emergency response team inside the facility and therefore need an external assistance from the national level or office in Dili

Tier 3 – Emergency event: The type of event that is considered very large that both the emergency response team inside the facility and the external help from National Level, such as National Emergency Response System would not able to control the situation. In this case global assistance would be required to help handle the condition.

The protocol of emergency response system needs to be developed by an organization so that clear communication on the situation to better response to the emergency event.

12.2 Emergency Response Plan during the Construction

During the construction, certain emergency event could occur, which related to the construction of the fuel storage facility. Emergency event during the construction phase of the project implementation should be minor and primarily related to the execution of physical works/activity

- Incident (injury) or medical emergency
- Natural Disaster (flooding, typhoon)
- Terrorist attack

The above mentioned emergency event is considered small and can be handled internally by the project owner, who must form the emergency response team or procedure to follow in case an emergency situation. The dedicated emergency team may not be necessary, considering the low risk, and also the construction activity is only temporary and therefore the ad hoc team could be established in a event of emergency. However, there should be a line of coordination between the project owner, contractor, and local as well as national authority to keep updates the event and response accordingly.

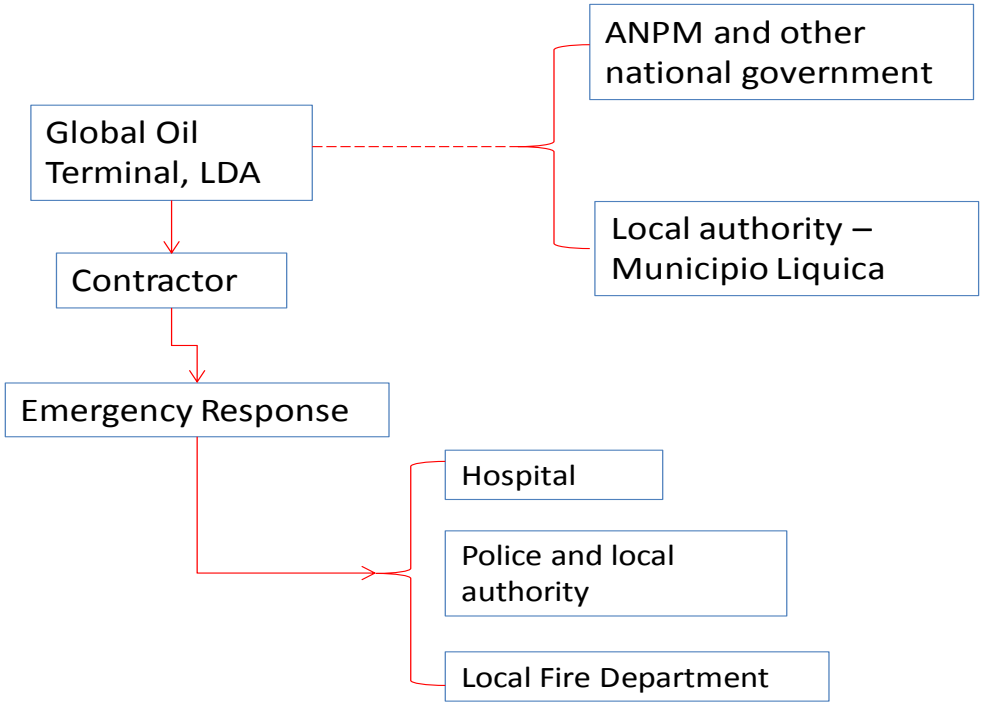

Figure 12.1 . Line of Coordination of Emergency Event in the Field and Local Authority

12.2.1 Medical Related Emergency

Inside the construction camp, the first aid (provide the medical assistance) should always be available, as part of best practice in the construction activity. The field engineer is responsible in responding the emergency situation.

- Field engineer or chief of construction camp site to evaluate the situation to determine the level of emergency or medical injury. Assign the project personnel to be in charge of emergency response
- If emergency is major, then stop/suspended the project activity ad response the emergency
- Provide assistance with the first aid and call the medical emergency service or if it is too long, evacuate the victim to the nearest clinic, which is in Liquica. If the clinic is closed, then evaluate the victim to designated clinic in Dili
- Report preparation of the emergency event and submit to the relevant authority
- Restore the construction activity

12.2.2 Natural Disaster Emergency

Natural disaster such as flooding due to heavy rain, particularly, high river flow that cause overflow I the existing river could considered as an emergency event that required immediate response, as the flood water can affect the life and property inside the construction camp.

12.2.3 Terrorist attack

Vandalism or terrorist attack could be possible cause of an emergency; as such kind of action could interrupt the execution of the contraction activity. Several steps could be taken in order to response the terrorist action in the project area during the construction period.

- The contractor to stop the activity and negotiate with the person/terrorist to understand the issue
- Inform the local Police regarding the attack if possible
- Inform to the Global office to coordinate with the relevant Government agencies
- Resolve the situation
- Prepare the report regarding the attack and submit to the relevant agencies
- Restore the situation and recommence the construction activity

12.3 Emergency Response Plan during the Operation of Oil Terminal

Emergency event during the operation of the oil terminal facility can a significant issue, related to the following type:

- Fire hazard
- Oil spill
- Medical
- Exposure to the poisonous gases
- Explosion
- Natural disaster (flooding, typhoon, tsunami, etc.)
- Terrorist attack

Among the above type of potential emergency event, fire and oil spill hazard, would be considered as a highest risk of emergency. Other type of emergency could be small, where the response could be minor and easily controlled in the site. While emergency response organization during the construction and decommission phase is temporary that formed based need, the emergency response organization during the operation is more permanent.

In order to response the emergency, the emergency response plan team should become part of the organization, resources need, and procedure to start. The following organization chart of the emergency response system was prepared to response the probable emergency event that may occur in relation of the current proposed business development (Oil terminal operation). For oil terminal facility, the fire and major oil spill events could be considered as major emergency event that could affect the life, property, and environment. Therefore, the following organization chart has been prepared with the intention to response the fire and oil spill response system.

12.3.1 Organizational Structure

The organization structure within Global Oil Terminal can be seen from the following figure and the duty of each sub-ordinate is describe in the following sections.

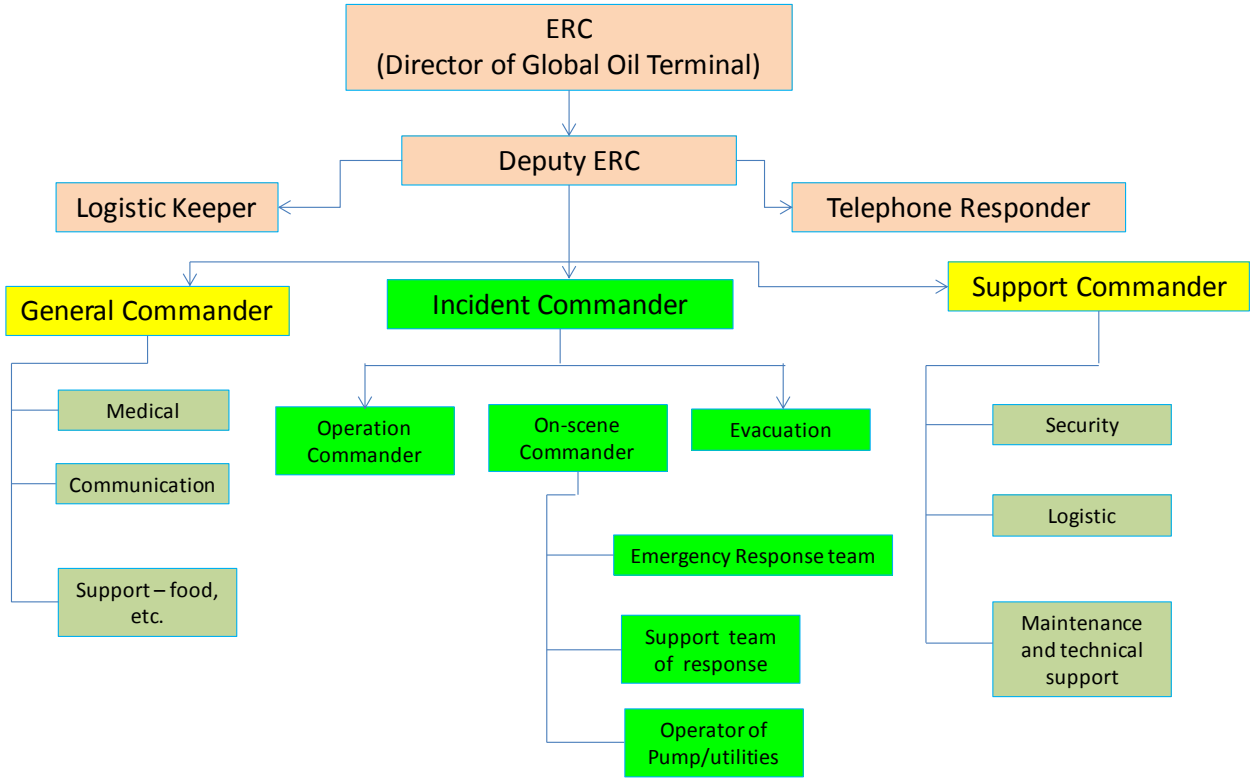

Figure 12.2 . General Organization Structure of Emergency Response System

Emergency Response Commander (ERC) is a top management of the Global Oil Terminal, who take the highest responsibility of all the operation and global oil terminal in Timor – Leste. TH EC delegates the competence of emergency response system to deputy Emergency Response Commander (ERC) to be in charge of overall emergency response management system within the organization.

Deputy ERC - Deputy ERC taking overall responsibility of emergency response system to coordinate and communicate with relevant external and internal resources in making decision on the response plan and execution of the plan. Deputy ERC has a competence to declare the emergency situation and stop the emergency (recovery) and report to ERC

Incident Commander (IC) – commander or leader, who is in charge of emergency response system on the site, including the coordination work and mobilization of the resources to response and control the emergency situation,. Under the direct leadership of IC, the actual response team shall response any emergency event

On- Scene Commander – (OSC) will lead the field team which composed by the fire brigade and oil spill response team who have already been trained in order to response emergency response event (fire and oil spill).

Operation Commander -

Evacuation Team

12.3.2 Procedure of Emergency Response

The response procedure is required by the organization as presented in the prior section to make a proper response action, including the personnel mobilization and controlled the emergency event. The procedure or protocol is variable from one event to the next. The following sub-sections provide the procedure to response the fire and oil spill responses system, which are considered likely. The principal procedure of emergency response system is similar to one emergency event to the other. The only difference will be the team and resources needed. The following figure provides the general principle of emergency response procedure for the related proposed development project.

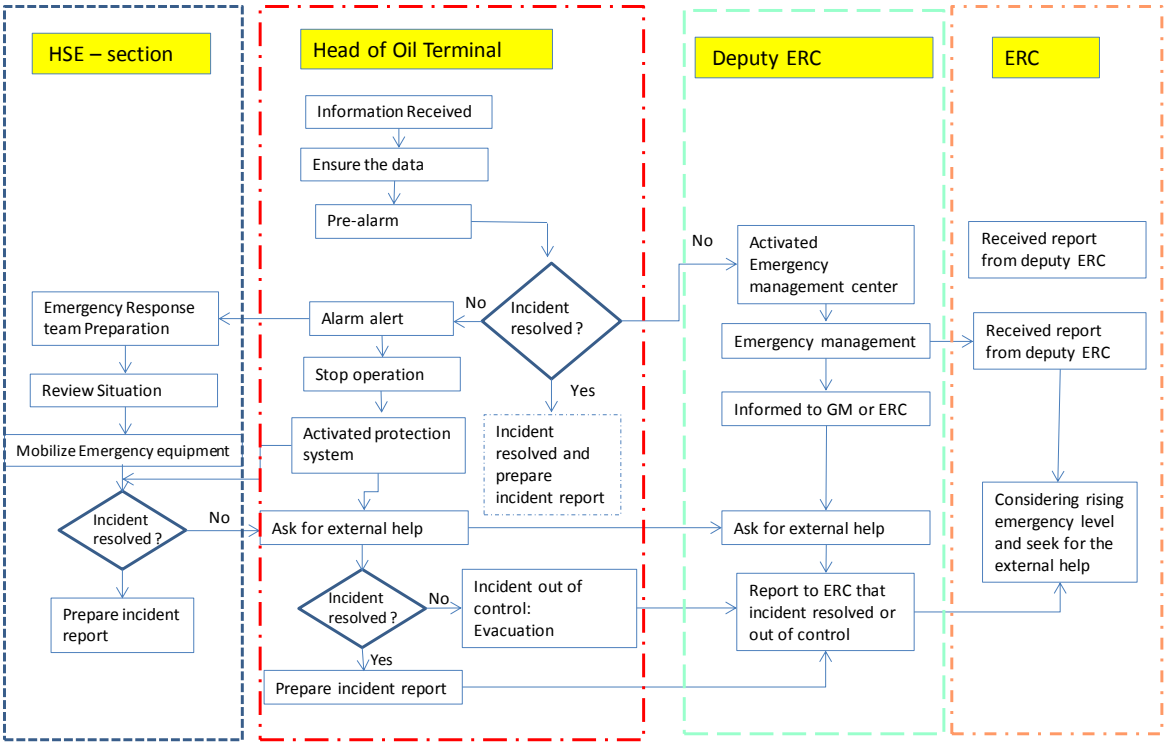

Figure. 12.3 General Flow Chart of the Emergency Response System in the Global Oil Terminal

This above figure could be easily customized into the specific response event such as fire, oil spill, natural disaster, or manmade attack.

1. Information of the emergency received by a personnel inside the facility and the emergency event or information should be verified
2. Turn the pre-alarm and evaluate the situation
3. Stop all the operation system and evaluate the nature and level of incident
4. If incident is small and that can be handled and controlled, then prepare the incident report
5. At the same time, the emergency response team should be prepared and activation the protection system
6. Review the situation and mobilize the equipment and team to fight the incident
7. If the incident/emergency has solved, then prepare the emergency response report to be submitted to the ERC
8. If emergency can be solved by the internal emergency response team, then asked for the external help
9. Is with external help, the incident already solved?
10. If incident out of control, then evacuation plan should be implemented
11. Report and update the result to ERC

The simple flow chart of the emergency response procedure, HSE section and Oil Terminal, lead the site emergency response team to fight the actual incident or emergency response system. While, at the same time, the Deputy ERC and ERC, lease or communicate with the external and internal emergencies response system, regarding the progress of response system, if the external help would be required and seek how to mobilize the external help, in case the internal team cannot control the emergency situation.

Fire response

Procedure and flow chart of fire incident would be similar to the above flow chart, except that the customization shall be done to adjust to the actual location of the fire incident. Area or location where potential fire incident can happens:

- Storage Tank
- Fire along Pipeline
- Fire in the loading bay (truck tanker)

The response procedure can use the same flow chart, except the target operation will be focused in the above three location. Given the volume of fuel involve, the fire incident in the storage tanks or yard will resulted larger fire hazard. In this case the, the procedure to response would be similar, except that resource mobilize to response the fire incident in the storage tanks will be much larger than the other.

Spill Response

Similar flow chart can be applied to the emergency due to oil spill during the operation of the fuel terminal system. The spill could potentially occur the following points, as already identified in the impact assessment part:

- Spill in water body (marine water) at Jetty
- Spill in the ground surface
- Spill in the storage tank

Spill in the coastal water, especially in the jetty, that potentially involve, the spill of large volume of the fuel, could potentially cause a catastrophic disaster, which may be very difficult for the internal emergency response team to response. Under the worst-case scenario of major oil spill, external help such, as from the regional office of Global Oil Terminal in Singapore could be asked.

Other Incident Respond

Other event could also cause the emergency situation that interrupt the operational of fuel storage system, which require the emergency response system.

- Emergency event due to natural disaster such as flooding, typhoon, earthquake, and tsunami
- Emergency event due to manmade action such as vandalism and terrorist attack

Though the scale and impact would be small, similar approach of procedure can be used to response the incident.

12.3.3 Emergency Preparedness

Emergency preparedness and awareness building in oil terminal operation system is considered an important step to be taken in order to prepare prior to any incident event.

- Understanding the emergency type and plan through the socializing the emergency response plan within the storage facility and surrounding area of Suco Lauhata
- Understanding the evacuation route
- Emergency drill/simulation event 6 months

12.3.4 Emergency Recovery

The emergency recovery system is necessary after evaluation of the emergency response report submitted by the field team to ERC. Based on the report on the type of emergency done by the relevant officer to the head of emergency and send the report to emergency response commander. The report should become a basis to conduct an investigation to find out the cause of emergency and provide r recommendation on any action required to prevent or avoid the similar type of emergency situation in the future.

As the situation has already fully controlled, the ERC, can declare that the emergency phase has already recover. Depending on the type of emergency in which part of the fuel storage system, the ERC can restart/commence the operation again, while further investigation can continued to find the fact and cause of emergency event.

13.DECOMISSIONING PLAN

Decommissioning means that the project facility will be taking out permanently by the project owner. The decommissioning work includes, dismantling the facility, demolishing and disposal of fuel terminal facility including fuel storage tank, pipe, office building, and other supporting infrastructure. Moreover, the decommissioning also deals with various liabilities with various parties including the contractual obligation, as well as the compensation to the employees who will be laid off as a result of decommissioning of the project.

There should various reasons for the fuel terminal to stop the operation of the facility and decommission the business:

- From the perspective of project own, the project should be decommissioned or stop if the business modality in the proposed project location is no longer justifiable commercially and economically to be continued. Then, the project need to be decommissioned.
- The project owner or the fuel terminal, due to operation, has already caused damaged to the valuable environmental and natural resources in the project location and surrounding area. The competent authority should provide an evidence and proof that damaged has been contributed by the project.
- Any external forces that may force the project to stop and project owner fail to rehabilitate or continue the project. In this case, the project need to be discontinued and force to be decommissioned.

However, as for the environmental licensing purpose, the decommission plan, is proposed to cover the following important steps to be taken in order to permanently taking out the whole facility in Lauhata, in case in the future, there shall a decommission phase. Note that, prior to dismantling the project facility, it would be necessary to update the EMP, depending on the regulatory requirement.

13.1 Legal Framework and Notification

There is no established regulation related to decommission of the project development. However, taking the similar reference, on how the project start, which begun by proposing to the relevant agencies, such as ANPM, regarding the desire of project owner to construct the fuel terminal system in Lauhata. Whenever, the project owner, would like to stop the business, then the project owner will notify the relevant government authority on the intention to decommissioning the facility. The relevant authority should study the proposed and received the plan and study also the residual obligation that the project owner should comply prior with the dismantling of the facility.

- Trade and Invest
- ANPM
- Approval from COM
- Environmental Authority

Prior to the approval of the termination of the operation of the proposed facility, the project owner is obliged to assess the environmental condition, as it will be during the decommissions phase. The assessment should include but not limited to:

- State of soil quality to know if there shall be any pollution as a consequence of the operation of the fuel storage system an compare to the baseline data
- Water and Groundwater Assessment and any contamination from hazardous material as a result of the oil spill and compare to the baseline data
- Marine ecological study include the coral, mangrove, fisheries, and marine water quality to check is there any issue related to the operation of the fuel terminal facility, compare with the baseline data
- Air quality assessment study and data collection to measure the PM, NO2, CO2, SO2, and VOC to know the level of air quality as it is by the end of the project life cycle and compare with the baseline information or data
- Surface water quality assessment)

If there it shall be detected that there is any environmental issue (Damaged or quality degradation) by the operational of the fuel terminal, the project owner is obliged to take necessary remediation in order to improve the quality of environment (Soil, groundwater, surface water, marine ecology) and bring back to the quality prior to the project development.

13.2 Environmental Issue to be considered

During the decommission phase, as described earlier, involve some physical work of dismantling the facility, which subject to the environmental hazard:

- Noise and Vibration
- Soil erosion
- Air quality
- Hazardous Material releases (petroleum based products, such as lubricant, hydraulic fluid, PCB, oil, etc.)
- Solid waste (Release from non-hazardous material such as scrap and cement building material
- Exposure to the occupational health and safety hazards (injury during manual handling, slips, falls, work at height, work in confined space and excavation)

In addition to the above environmental issues to be considered, the project owner is responsible for the following three important key activities:

- Implementation of execution of decommission plan
- The project owner should remedy the environmental condition of the site, according to the future plan of the project site utilization.
- Environmental monitoring and reporting, as defined in the document of environmental management plan (EMP)

Moreover, there are socio-economic impacts that need to be considered prior to dismantling of the project operation.

13.3 Social Issue to be considered

Social impact related to decommission of the project will be related to number of people who will be laid off after the dismantling of the facility.

- Unemployment
- No SCR to no given back to the community

13.4 Obligation of Project Owner after Decommission the Facility

Depending on the requirement from the Government of Timor – Leste, regarding the future use of the project site, the project owner has a responsibility to dismantle the entire facility and convert the land into the original (empty). The transfer to the government or any other legal holder of the land should be conducted with the knowledge from the government agency that responsible for the land and property.

14.CAPACITY DEVELOPMENT AND TRAINING

Training is essential for ensuring that the provisions of the EMP are implemented efficiently and effectively. Training needs should be identified based on the existing and available capacity of the site and project personnel (including the proponent, contractors and subcontractors) to undertake the required management actions and monitoring activities. A training program should be presented in this section of the EMP. The training program should be developed and delivered by suitably qualified personnel, in a language and medium understood by workers or employees.

Since the proposed project development is a new one, which require the training of personnel responsible in each section of the project implementation. Considering the new storage facility and depending on the personnel of the operator, the following training program should be done as part of the training and development program prior to the operation of the fuel storage facility.

- Operation of fuel storage system
- Safety Operation System
- Fire hazard management system Training (send people or team or ask the expert to come an train the team on the site)
- Occupational Health and Safety Training
- Hazardous Material Training program
- ISO training system

GLOBAL Oil Terminal, LDA, as an international company, is highly committed to sustainability in doing the business and one of the important factors to enhance the concept of sustainability is the development of local engagement through various programs. The first step towards achieving this objective is to train local operators on managing the fuel storage facility as well as the administration on the support system.

1. Engagement of competent international staff and operators

At the initial stage of the operation of fuel storage terminal, where the capacity of the local staff is limited, the competent and experience international staff and operator will take over the operation of the fuel storage facility. Gradually, overtime, the knowledge and technical skills will be transferred to local staff to take over the operation in the long-run. To achieve this long-term vision and objective, the local training program in both formal and on the job training will be required.

2. Training of Local Operator and New staff

Around 40 employees are from local Timorese and they all have already gone through proper training program required by Global Oil Terminal, LDA, prior to full engagement in the working environment. The training composed of the technical know-how and administration issue related to the company vison and direction in doing business.

3. Training of Laboratory Staff

Laboratory equipment and instrumentation are very important and integral part of the processing to ensure the quality and quantity of fuel delivering, storing, and distribution of fuel in Timor Leste. The operator of any instrument and laboratory equipment will require proper training prior to handover the full responsibility. GLOBAL FUEL TERMINAL, LDA is committed to train the technician and staff of laboratory to operate any necessary instrument and laboratory to support the operational of the facility. Particularly, laboratory should support the following environmental and operation issue:

- To measures the emission from the fuel storage facility
- To measure the groundwater and marine water quality
- Measurement of soil quality

Training program such as sending the staff to the oversea similar facility would help cut the time requirement.

4. Training of Hazardous and Safety Standard

Training of the hazardous material and safety standard is a requirement for all the workers who perform a specific work under certain hazardous condition. The occupational health and safety will require short term training in order to make all the workers be informed on the occupational health and safety standard to be followed. This type of training will also be required for the visitor to at least be informed before entering the facility and utilized proper self-protection equipment.

- During the construction phase, the worker or staff should trained prior to the executing of the job including the occupational health and safety
- Training to handle the hazardous waste
- Training of the operator of fuel storage facility
- Other relevant technical training to support the successful operation of the fuel terminal

5. Training on Environmental Monitoring Program

The Global Oil Terminal, must create the Heath, Safety, and Environment unit under the organigram of the organization to overseeing the health, safety, and environment related to the operational of the fuel storage terminal. Other task also include the monitoring the EMP and training program would also require training program, in the basic environmental issue and method of monitoring program. The objective is to get familiar of the parameters of the environmental monitoring program that will help him/her in the implementation.

6. Fire management Training

Fire hazard is the single most important incident that normally occurs in the facility that stored and distributes the flammable hazardous material. Therefore, continue training of the fire management system would be done by the company every year to ensure that the internal team has a capacity in understanding the hazard and able to handle the emergency situation.

7. Training on the emergency response planning and preparedness

Emergency response planning and preparedness should be continue, as a routine basis and in the Global Fuel Terminal, especially to all the employees to get a better understanding the their nature of job and bear mind all the time regarding the emergency and contribute to the useful operation of the fuel terminal. The training should include the theory or manual on the emergency type and response system, how to act in case of emergency, how to save the life, etc.

15.PUBLIC CONSULTATION AND INFROMATION DISCLOSURE

15.1 Purpose of consultation

The public consultation and stakeholder engagement is very important component of the preparation of environmental management plan (EMP). The purpose of public consultation is to engage the public and relevant agencies include the government and NOGs in the preparation of EMP document, so that they will be well informed the project development, especially knowing the expected impacts and mitigation measures. The consultation has also an objective to inform the government official, especially, who involve in making a decision regarding the project development. By having public consultation in the preparation of the EMP, as regulated by the law (decree law 5/2011 and Diploma Ministerial, 47/2017), it is expected the implementation of the EP will be ensured.

15.2 Methodology and Approach

The methodology of public consultation, as stipulated the law, indicated that minimum two times consultation should be conducted.

- Consultation of the Scope of Environmental Impact Assessment Study
- Consultation on the result of the study (EIS and EMP)

In addition this above formal consultation, it is also important to conduct the community consultation, especially people who are affected by the project development.

15.3 Consultation Activities

The consultation activity carried out as part of the EIA study consists of two with different target of audience. The community consultation was conducted in the project location, where the affected people and local authority were invited to discuss about the project and scope of environmental impacts assessment study. Similarly, the public consultation was also conducted in order to inform the public and government agencies regarding the project and scope of environmental study.

Further detail of the consultations activates are presented in the following section.

15.3.1 Public Consultation on the Scoping Study

The consultation consist of community consultation, as part of socialization program at the community level and the also consultation with the government level, where the relevant government agencies were invited to ask their opinion on the scope of the study, from each relevant agencies.
This first community consultation for the ToR was held in Lauhata nearby project site on June 22, 2019. Around 30 people, who represented community leader, youth, and communities members who are affected by the project due their houses that very close to the project site? The following tables shows the community concern related to the project, based on the consultation of the first time in Lauhata.

Table 15.1 List of Concern of Community Members in the Aldeia Raukasa

No	Name	Concern/Questions	Respond/Future Follow up
1	Sr. Daniel do Santos: Chief of the Suco of Lauhata	The represent the local leader and the community provide the support for this investment as it will create opportunity for local and bring the revenue for the country as well	The project owner is so happy to hear the support from the local leader and it will give the moral support to the company to continue mobilize the project in the site
2	Sr. Jose do Santos Bareto: Ex Chief the Suco and also the land owner	He raised the concern regarding changing the land use change from the previous arrangement, which was not for fuel storage and distribution. He is asking about the status of his right, as the land owner	The project owner respond that the his right with the Timor Cement, who is the primary holder of the use of this parcel of land would remain the same and any change would be subject to the negotiation between him and Cement Timor, SA. For this part, there will be a follow up meeting between the land owner and the land use right holder (renter)
3	Sr. Gilberto das Silva: Land owner and youth representative	He is happy and support the project but the status of the land use need to be cleared.	
4	Sr. Faustino Xavier- Chief of Aldeia	We support the investment and support the construction. The problem with the land (if any) will be solved with dialogue that involve the local leader	The recommendation will be considered
5	Sr. Filomeno Bareto: Chief of Aldeia Raukasa	He raised the concern related to the impact during the construction and operation, specially related to the public health issue	The study of environmental Impacts assessment will provide the recommendation of the method to minimize the risk to the impacts that will arise from the project during the construction and operation. The result of the study will be presented again in the next meeting
6	Dominggoes Gonsalves Soares: Community members	He raised the concern related to the public health issue, like from VOCs and how to mitigate this impact	
7	Chief Suco:	Local leader will help solving some of remaining issue	
8	Sr. Filomeno Bareto: Chief of Aldeia Raukasa	He raised the concern about the evacuation plan in case of emergency	The study will recommend the emergency response plan and include the evacuation plan and map
9	Sr. Gilberto das Silva: Land owner and youth representative	Asking about the study of river flow and recommend the company to elevate the floor level and river protection to minimize the impact	This is exactly part of the study of EIA to identify the flooding problem and what need to be done in redcuing the flood risk from the river

Figure 12.1. First Consultation to the Community Members in Aldeia Raukasa, Suco Lauhata

15.3.2 Community Consultation on the Scope of Study

In addition to consultation with community members, a separate consultation was conducted with public agencies, especially those that are involved directly in the project, as the regulatory agencies shall involve in the project monitoring to ensure compliance of the project implementation to already established regulations.

The first agency stakeholder consultation was conducted on 25 of June 2019, in Hotel Ramelau, where about 10 government agencies from 30 agencies invited attended the consultation meeting. During the meeting, project owner, which was represented by PEC – Consulting, LDA, presented the scope of the environmental impact assessment (EIA) that will be carried out prior to the preparation of the EIS and EMP to be submitted to the ANPM for the license approval. Various government agencies that are relevant to the project such as ANPM, Ministry of Agriculture and Forestry (MAF), Ministry of Public Works (MOP), and other agencies, including the representatives of local authority in Liquica, participated in the workshop of the scoping of the environmental impact assessment study.

The detail of the scope of work presentation can be found in the annex 3- Presentation of the TOR. During the meeting, the following question and concerns were raised:

- Water utilization from the groundwater aquifer and the impact to the local people
- Method of risk mitigation and risk management
- Social corporate responsibility from the company to local community
- Impact of oil spill to the sea and protected zones near project location
- Scope of extended oil spill coverage
- How to manage and mitigate fire risk/hazard
- Waste management during the operation (liquid and solid wastes)
- Design and specifications according the standard best practice

Table 15.2 Summary of the Question and Concern Raised during the presentation of TOR in Hotel Ramelau

No	Name	Concern/Questions	Respond/Future Follow up
1	**Sr. Jose Calderas**. Husi Bombeiros, Secretary of State of Civil Protection	• How to manage the waste oil? • How to minimize the risk from the disaster related to the fuel business operation	The risk assessment and mitigation measured will be studies as part of EIA and waste will be managed according the industrial best practice
2	Sr. Jose Representaive from Administrador Liquica	• Any solution for the cultural sensitivity area? • Method of Piping system from jetty to the storage tank • Groundwater utilization and impact to the community well production • How to protect the fish from the impacts such as oil spill • Recommended to the company to support social program for the local community	All the suggestions are very good and will be elaborated in the EIA study and shall be included in the EIS and EMP report
3	Sr. Nelson de Jesus, Director of Downstream, ANPM	• Ask to clarify the 200 m of study from the slide presentation • Why soil investigation only two points? • Design of all the facility should follow the high standard quality according to API so it will ensure the level of safety in the operation of the facility • ANPM will review the document based on the environmental study prior to granting the license • All the operators of fuel related business must have proper insurance to cover the risk • EIS and EMP should be presented according the phases of project implementation (construction, operation, and decommission) • How to manage the larger fire risk, involves several tanks together	• 200 m radius of oil spill modeling was only tentative but the modeling will have result to show the impact of the oil spill up to which extend • Soil investigation only two points as the site is small and also according to the secondary data of hydro-geologic, the single layer of • All other suggestion will be considered in the preparation of EIS and EMP
4	Sr. Abrao - Climate Change Section, Secretariat of State of Environment	• How to manage the waste • Application of best practice in the other place to this business in managing the risk. Example of using foam method for fire risk management	Waste consist of liquid and solid wastes and they all will be managed internally with the method of oil-water separator (liquid waste) and solid waste will be collected and dispose

Figure 12.2. Stakeholder Consultation at Hotel Ramelau

Similar stakeholder engagement will be conducted again as part of the current study of the environmental impacts assessment (EIA) to discuss the result and finding of the environmental impact assessment (EIA) study

15.3.3 Public Consultation on the Result of Study (EIS and EMP)

This section will be completed after the completion of second public consultation (subject to ANPM approval)

15.3.4 Community Consultation of the Study Result

This section will be finalized after the completion of community consultation.

16.COMPLAINS AND GRIEVANCE MECHANISMS

A Grievance Redress Mechanism (GRM) is a procedure put in place for the purpose of facilitating resolution to complaints by those affected during the project implementation (Construction, Operation, and Decommission) from the development. It should start be in place from the Construction Phase and be institutionalized under the management during the Operational Phase. The GRM requires designation of a person to be the ones receiving any grievance and the preparation of a grievance registry record.

Public in general but especially local/Suco Lauhata population should be made aware of the relevant contact numbers and the designated contact person. This can be done through a public meeting prior to the start of the Construction where the designated person and contact numbers are announced to the public. The designated person should also maintain close working relationship with *chefi de suco* because the experience in Timor Leste shown that in most circumstances local population has a hard time going directly to project owner and prefer to log their complaints to local authority.

The GRM for this project is recommended to implement an easy to understand and transparent process with integrated traditional methods for resolving conflicts and complaints which is basically starting with *chefi de suco* acting as mediator between the complainer and facility management. When this fails to resolve the situation, the complaint should be brought up to the next tier. This different tier of GRM will allow facilitation of resolution to different level of complexities of issues. In addition, as shown in the following table, it is also designed to provide a time-bound mechanism to ensure responds within reasonable amount of time.

Table 16.1 Grievance Redress Mechanism

Stage	Process	Duration (Working Days)
Tier 1	**Route 1**: Affected person submits grievance to *chefi de suco* in person and *chefi de suco* sends to designated person within the facility **Route 2**: Affected person submits grievance directly to designated person within the facility	1 day
	Designated person facilitates to redress grievance within appropriate division and reports back to *chefi de suco* and affected person. Note that reporting back should be coordinated with *chefi de suco* whether or not grievance is logged directly or through *chefi de suco*. This way, any grievance logged into the facility come to be known to local authority.	7 days
If unresolved		
Tier 2	Affected person with knowledge from *chefi de suco* log complaints again through designated person to be brought up to higher management within the facility	Within 5 days from the receipt of decision in Tier 1
	Designated person facilitates for resolution of complaint within higher management and reports back to *chefi de suco* and affected person.	5 days

If unresolved		
Tier 3	Affected person with knowledge of *chefi de suco* log complaint to appropriate authority, be it SEFOPE, Environmental Authority or others.	At a time chosen by the affected person, however, it is better be as soon as possible
	Designated person liaises with appropriate authority to explain previous management decision and facilitates for the solution to complaint	Within time designated by appropriate authority
If unresolved		
Affected person with knowledge of *chefi de suco* can take the matter to the court.		As per judicial system's timeframe

First tier of GRM. Complaint from affected person is logged either directly to designated person within the facility or directly to *chefi de suco* which then contact designated person to log in the complaint to the facility. Designated person then take the complaint to appropriate division within the facility to resolve it. Resolution of the complaints should be done within 7 business days which is then reported back to the affected person and *chefi de suco*. Grievance should be documented with personal details of the person complaining (name, address, id number, date of complaint, nature and exact issue). In the case that the person complaining is requesting anonymity, only the nature and exact issue should be logged. All complaints should be assigned identification number for ease of tracking later on. The grievance log should consist of initial record (containing description of grievance), monitoring record (describing actions taken – including investigation and any corrective measures) and closure sheet, a copy of which will be handed to the complainant after he/she agreed to the resolution and signed-off.

Second tier of GRM. If the complaint is unresolved, it then elevated to the second tier of GRM where designated person takes the complaint to the higher management within the facility for decision. Designated person should be able to explain well the issues at hand and management should be aware that the consequence of not resolving the matter will be the elevation of grievance to government authority. Processes during the second tier should be logged in the monitoring record.

Third tier of GRM. Escalation of the Grievance to the third tier involves taking it to the relevant government authority. Timing of this depends on time convenient to the affected person, however, he/she should be advised to do it as soon as possible and that it should be done with knowledge from *chefi de suco* and designated person. When government authority contact facility owner, designated person should becomes the point of contact which then represent facility owner to meetings conducted by government authority. Designated person should also be the one arranging for any manager to attend the meetings when necessary. During this external process, the designated person should be responsible to maintain minutes of the liaison meetings, noting on all participants involved and important issues raised by a particular person. Any resolution reached during the meetings should be well documented with all parties signed a declaration on the resolution.

Fourth tier of GRM. In the event that a grievance cannot be resolved directly through the first, second and third tiers, affected person can seek alternative redress through the court of law within the legal framework in Timor Leste.

Monitoring and Evaluation. Monitoring measures should be implemented throughout the GRM process consisting of on documentation of cases registered, level or jurisdiction (first, second and third tiers), number of hearings held, decisions made, and the status of pending cases. A database that lists the cases in the process and already decided upon may be prepared with details such as name, ID with unique case serial number, date of notice/registration of grievance, date of hearing, decisions, remarks, actions taken to resolve issues, and status of grievance (i.e., open, closed, pending) and if it is a repeat of a previous grievance. Responsibility for GRM Monitoring should rest with the facility management. The grievance redress mechanism and procedure is depicted in Figure 16.1.

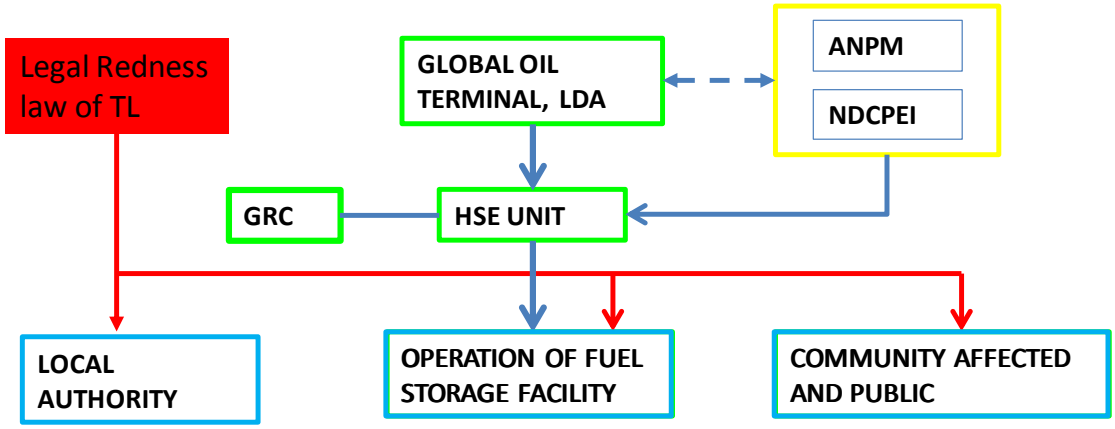

Figure 16.1 - Grievance Redress Mechanism

This CGM may be managed by the proponent/license holder with involvement of local authorities and community leaders. This may be accomplished by setting up a project mediation committee that will meet on a regular basis, or in response to a particular incident. The proponent should indicate how it will manage complaints and grievances in the EMP. Any complaints and grievance mechanism is without prejudice of the rights of any complainant to make a complaint to the environmental or other authorities or to commence proceedings through the courts.

17.WORKPLAN AND IMPLEMENTATION SCHEDULE

The project implementation process follows the project cycle, which traditionally follow the following 5 stages:

- The project planning and design stage
- Procurement and Construction
- Operation and Maintenance
- Decommission Phase

In general, the schedule of project implementation will follow the sequences of the above step of the project cycle. The tentative timeline of project implementation is presented in the following table.

Table 17.1 : Summary of Project Implementation Schedule of Global Oil Terminal Facility

Stage	Year								
	2019	2020	2021	2022	2023	2024	2025	----	2055
Planning and Preparation									
Procurement and Construction									
Operation and Maintenance									
Decommission									???

In the year 2019 -2020, the preparation work for the project implementation that include, design, environmental study, permitting requirement, land issue, and other contractual agreement should be resolved by this stage. Starting the year of 2020, the procurement started (assuming that necessary permit will be granted in the year of 2020). The construction of the proposed development facility will comment at the in the mid-year of 2021 and completed in the 2023. By 2023, the commission test to commence the operation can start and the facility shall come to a full operation by the year of 2024. Assuming that the service life of the proposed development facility is 30 –years and after that the project owner can decide if the operation shall be extended or terminated.

The implementation of EMP will subsequently, follow the above working schedule of project implementation. The following table provides the summary of time table of EMP implementation.

Table 17.2 : Implementation Schedule of EMP throughout Project Lifecycle

Stage of Project	Wok item/EMP Option	Year								
		2020	2021	2022	2023	2024		Stage 1 B		2055
Planning and Design	Follow high standard design GIP (API)									
	Considered Design of High Frequency of Flood Protection									
	Considered high standard safety and design (fire and major accident)									
	Selection of high standard material									
	Safety Operation Manual									
	Training and Development									
Construction of Phase 1 A	Temporary detention basin									
	Air quality minimization Impact									
	OHS									
	Noise and Vibration Mitigation Measures									
	Training and Development									
	PPE									
	Traffic Management									
Operation of Stage 1 A	Flood Protection Infrastructure									
	Establishment of Data collection system									
	Procure and Purchase all the equipment for fire and oil spill management									
	Oil Spill Response system									
	Fire management system									

	Soil pollution prevention and mitigation									
	Solid waste management system									
	Traffic Management									
	Climate change management									
	OHS									
Construction of Phase 1 B	Air quality minimization Impact									
	Traffic Management									
	OHS									
	Noise and Vibration Mitigation Measures									
Operation of Phase 1 A and B	Minimization of oil spill									
	Fire management system									
	Soil pollution prevention and mitigation									
	Solid waste management system									
	Climate change management									
	OHS									

18.COST ESTIMATE

The rough cost estimation of the EMP implementation was done as some of the detail engineering design is not available during the preparation of EMP report. For instance, the cost of mitigation measure of flood protection infrastructure, was estimated for only rough, where the figure of the cost is subject to revision.

18.1 Initial Cost

The initial cost of implementation of EMP consists of study, design, and data collection. The following table shows the initial cost of EMP implementation.

Table 18.1 Initial Cost of Project Development

Cost Item	Amount, $	
Data Collection (Including Soil study, Topographic, etc.)	$	100,000.00
DED	$	300,000.00
EMP/EIS Preparation	$	90,000.00
Total	$	490,000.00

18.2 Cost Estimation of Mitigation Measures

The cost of Environmental mitigation measures consist of technical cost, non-technical cost, and contingency cost, which is presented in the each stage of project implementation. The mitigation cost consists of the capital cost which is needed to establish the system or infrastructure. The operation cost is also needed after the system has already being established. The following sub-section provides the table of costing for each stage of project implementation.

18.2.1 Cost of EMP during Construction of Phase 1 A

Table 18.2 . Cost of EMP during the Construction of Phase 1 A

NO	Cost of EMP during Construction	
	Item	Amount, $
1	Air Quality Mitigation and Monitoring	45,000
2	Marine water quality Protection	15,000
3	Occupational Health and Safety	70000
4	Traffic Management	20000
5	Noise and Vibration	5000
Total		155,000

The above cost was estimated based on the action to be taken in mitigating the respective impact during the construction of phase 1 A.

18.2.2 Cost of EMP during Operation of Phase 1 A

The cost of EMP during the operation of the phase 1 A project implementation, including some major infrastructure (CAPEX) and operating cost. The following table provide the summary of cost estimation of each mitigation measures, including if there is any emergency (spill or fire).

Table 18.3 : Cost of Mitigation Measures during Operation of Phase 1 A

No	Cost of EMP during Operation of Phase 1 A			
	Item	CAPEX	OPEX	Contingency cost
1	Flood Protection and Minimization	1,000,000	70,000	
2	Oil Spill impact mitigation	100,000	50,000	12,500,000
3	Fire Impact Mitigation	200,000	50,000	5,000,000
4	Soil pollution mitigation measures	5000	15,000	100,000
5	Solid waste impact mitigation	25000	5,000	
6	Traffic management system	2000	3,000	
7	Climate change impact			
8	OHS		50000	
9	Community health and Safety		50000	
Total		1,332,000	300,000	17,600,000.00

18.2.3 Cost of EMP during Construction of Phase 1 B

The cost of EMP during the construction of phase 1 B project implementation is substantially small considering the scope of works involve in this stage of project implementation. The following table provide summary of cost estimate of the mitigation measures.

Table 18.4 . EMP Cost Estimate during Construction of Phase 1 B

NO	Cost of EMP during Construction Phase 1 B	
	Item	Amount, $
1	Air quality	15,000
3	Occupational Health and Safety	10000
4	Traffic Management	3000
5	Noise and Vibration	5000
Total		33,000

18.2.4 Cost of EMP during Operation of Phase 1 A and B

Cost same as the operation of phase 1 A, except in case a major fire event.

18.2.5 Cost Decommission of Facility

The cost of EMP during the decommission phase consist of OHS, social compensation due to loss of opportunity, reclamation of the land and monitoring program of the air quality, marine water, coral and other background environmental data to compare the condition prior to the development and at the stage where the project shall be terminated.

Table 18.5 . Cost of EMP during Decommission Phase

NO	Cost of EMP during Decommission phase	
	Item	Amount, $
	Air quality	15,000
	Data collection (to check the soil status, water status, marine water and coral)	100,000
2	Occupational Health and Safety	10000
3	Noise and Vibration	5000
4	Demolition tanks	5000
5	Lad reclamation	50000
6	Social cost	100000
7	Economic loss	
Total		285,000

18.3 Damaged Cost Estimation without Mitigation Measures

The environmental damaged cost estimation was made based on the analysis of information related to potential resources- natural and ecological resources that were identified during the preparation of environmental impacts assessment study:

- Oil spill
- Air quality degradation due to major fire hazard
- Major Fire Hazard

Total the economic loss was estimated to be around $3.5 M

18.4 Total Operation Cost

Total operation cost = Cost Operating for EMP + Normal Operating Cost
Normal operating cost is estimated by taking 10% of the total capital investment, which around $10 M

Therefore, total operating cost =$0.1 M + $0.343 M or $0.443M/year

18.5 Benefit of Project

The proposed development project is a profitable project, where the project owner, after investing above figure of investment, would collect the revenue from the sales of petroleum product. The revenue projection collected by the project owner coming for the sales of the diesel fuel and gasoline. The total revenue, project after the total investment of $10 M of capital investment, would be presented in the following cash flow table.

Table 18.6. Projected Revenue of during the Operation of Fuel Terminal

Year	Diesel	Gasoline	Total Quantity (liters)	Storage Fee
2021	3,200,000.00	1,200,000.00	4,400,000.00	$ 154,000.00
2022	3,680,000.00	1,380,000.00	5,060,000.00	$ 177,100.00
2023	4,232,000.00	1,656,000.00	5,888,000.00	$ 206,080.00
2024	4,866,800.00	1,987,200.00	6,854,000.00	$ 239,890.00
2025	5,596,820.00	2,384,640.00	7,981,460.00	$ 279,351.10
2026	5,764,724.60	2,456,179.20	8,220,903.80	$ 287,731.63
2027	5,937,666.34	2,529,864.58	8,467,530.91	$ 296,363.58
2028	6,115,796.33	2,605,760.51	8,721,556.84	$ 305,254.49
2029	6,299,270.22	2,683,933.33	8,983,203.55	$ 314,412.12
2030	6,488,248.32	2,764,451.33	9,252,699.65	$ 323,844.49

***Calculation: Total Quantity 4,400,000 liters x Storage Fee USD 0.035/liter*

Beside the financial return, as the table show, other economic and social return could also be realized, such as job creation, contribution tax to the national income, and last but not least, enhanced other private investment to operate in Timor – Leste, despite all the political condition.

19.REVIEW OF THE EMP

The project owner is responsible for the implementation of the EMP and any change of the project scope will resulted in the change of the EMP scope and budget requirement. The National Petroleum and Mineral (ANPM) is the main authority mandated by the current regulatory framework to be in charge of reviewing and approve any revision of the document regarding the change of the scope of the work or modality. However, other government line agencies could also be involved, according the importance of their competence relevant to the project and related environment.

20. SUMARIO NAO TEKNIKU

Global Oil Terminal LDA, proposta fasilidade foun ba fornesimentu mina ho total kapasidade kumulativu hamutuk 10,000 m^3, iha total rai hamutuk hetares 1.3 iha Suco Lauhata, Postu adminsitrasaun Bazartete, Municipio Liquica. Projetu nain asegura tiha ona rai pedasu nebe sei uja husi kompania seluk (Cement Timor SA) nebe iha tiha ona direitu atu utiliza rai refere husi Ministerio das Justica. Iha parte seluk, Guverno Timor – Leste, establese tiha ona regulamentu nebe obriga para projeto dezenvolimentu nebe maior no bot tengki halo estudu ambiental no submete resultadu estudu refere ba orgun Guverno nebe relevante hodi hetan lisensa antes hahu konstrusaun ba projeto bot sira. Estudu ambiental nee importante hodi analiza risku nebe probavelmentu sei mosu durante implemetasaun projeto nomos propoin meus hodi minimiza impaktu sira nee. Wainhira, impaktu sira nee bele identifika iha inisiu de projeto, entaun meus para minimiza nee bele planeia kedas, inklui rekusu hira maka tengki aloka para implementa asaun sira nee. Meius ida nee sei redus kustu sira nebe la nesesariu, wainhira laiha planu, hodi responde eventu balun nebe karik akontese. Ba projeto sira nebe liga ba mina no minarais, resultadu estudu ambiental sira nee sei submete ba ANPM hodi hetan aprovasaun molok projeto refere komesa.

Em geral kompenente projeto ida nee atu armajenametu combustivel nomos distributsaun ba kostumer iha skalaun ***retail*** nian, nebe fasilidade nebe sei konstrui hanesan fasparte husi projeto ida nee tomak:

1. Hatama mina iha ponte kais nebe sei halo husi roo/vessel ba tanki mina
2. Tanki bot 4, inklui sistema baseia nebe sufisiente para bele simu mina husi tangka nebe bot liu ona wainhira iha asidente ***(secondary containment***)
3. Loading and unloading system
4. Sitema hasai no hatama mina
5. Kanu/kanalizasaun
6. Sistema gestaun disastru ahi han ruma, inklui bee mos hodi hamate ahi, sprinkler, sistema foam, no seluk tan
7. Fasilidade oficina nebe deseinu tuir padraun saude no seguransa nebe diak hodi nune bele suporta trabailador sira para servisu diak hodi halo suksesu ba projeto ida nee.

Proposta kapasidade deseinu mina nebe tama husi ponte kais no sai husi fornesedor tangka , bele hare iha tabela tuir mai nee.

Tabela : Projeksaun no Propoin Fluxu ba Mina tama no sae husi Proposta Depot Mina iha Lauhata

Tipe Produtu	Fluxu Tama, KL/dia	Fluxu Sai/fan, KL/dia
Gasolina	400	400
Gasoel	400	400

Antes foti desizaun hodi avansa iha investimentu ida nee, projeto nain halo tiha ona estudu ba merkado kona ba suplai no demand ba produtu mina (gasolina no gasoel) iha Timor – Leste no ninia prospektiva ba oin, no kongklui katak, potensial bot tebes ba negosio mina iha Timor – Leste, wainhira iha tangka fornesedor, entaun sei hetan vantagem bot liu hodi eleva ninia benefisio no lukru. Projeto nain mos iha tiha ona esperiensia iha Timor – Leste desde 2014 halao negosio ho modalidade negosio nebe hanesan, maibe ho eskalaun natoon no depot/tanki nebe movel. Kombinasaun esperiensia no estudu analiza

markadu nebe konvensidu, projeto nain desidi hodi realiza investimento ida nee iha parte Liquica, partikularmente iha Suco Lauhata, ba esklaun nebe bot hanesan temi dadauk.

Hare husi aspeitu volume tanki nebe atu konstrui nebe provolta, 10,000 m^3, ida nee konsidera bot, no tuir informasaun nebe iha, proposta ida sei sai depot nebe bot liu duke depot sira nebe iha tiha ona hanesan ETO, Laiara, no PITSA. Tamba ninia eskalaun bot, liu-liu forneses mina nee, hanesan tipu material/kimiku nebe pergozu (Hazardous), entaun ninia presenza iha area ida nee sei hamosu impaktu ambeintal, saude, no seguransa, nebe presiza tama konta. Temi tiha ona iha leten katak, tuir regulamentu nebe em vigor iha Timor – Leste, projeto bot nebe iha impaktu bot presiza halo estudu antes komesa.

Estudu ambiental nebe halo tiha ona ba projeto ida nee kompostu husi reve dokumentu legais no regulamentu sira nebe presiza para kumpri no ninia ligasaun ba projeto ida nee rasik. Enkuadramentu legal sira nee importante no sei kesi metin no fo garantia ba investimentu ida nee ba projeto nain iha parte ida. Nomos iha parte seluk, husi projeto nain bele kumpri hudi nune bele asegura, kualidade ambiental, saude no seguransa, liu-liu durante operasaun iha tinan barak nia laran in Timor – Leste nia teritorio. Estudu mos halo tiha ona mapamentu ba reskursu importante nebe iha, liu-liu iha area branka nebe potensialmentu sei afeita husi projeto ida nee rasik. Inklui halao simulasaun, karik sei iha mina fakar iha ponte kais karik, area nebe afeita nee too iha nebe. Sumario kona ba base de dadus nebe establese tiha ona, hanesan fasparte husi estudu ambiental ida aprezenta tuir mai nee:

- Informasaun kona ba kualidade ar (udara) no baruilu (noise) iha area projeto nee, inklui iha centru komunidade hanesan area nebe simu impaktu
- Estudu kona ba bee iha rai okos, inklui kualidade bee iha rai okos husi perspektiva bee konsumu nian, no husi perpektiva polusaun husi produtu petrokimiku nian
- Base de dadus kona ba kualidade solo (top soil) iha area projeto laran nomos iha fatin nebe besik area nebe bele simu ***cross*** contaminasaun iha future. Parametru nebe sukat mak, ***Total Petroleum Hydrocarbon*** (TPH), no ***lead*** (Pb). Elementu kimiku rua nee, hanesan sasukat ida para hatene, sei karik iha kontaminasaun husi produtu mina ba rai no ambiental seluk
- Sukat no establese base de dadus ba kualidade tasi bee (sukat husi parametru fiziku, kimiku, biologia, nomos indikador ba ekologia) iha fatin 5 nebe provavelmentu sae hanesan referensia ba futura karik iha transporta kontaminasaun ruma husi fasilidade ida nee
- Establese dadus kona ba kualidade sediment iha rai okos (***bottom sediment***) hodi uja hanesan referensia ba futura karik iha kontaminasaun tama tiha ona iha tasi laran, depois de tinan barak, mosu hanesan dopositu ida rai okos iha tasi laran.
- Survey direitamente husi ekipa iha tasi laran (Diving team) hodi observa rekursu saida mak importante iha tasi laran hanesan koral, ikan, budu tasi, no seluk tan.
- Teste kona ba rai husi aspeita fiziku, kimiku, husi rai leten too, 50 meter (kuandu hetan tiha ona fatuk bot mak para). Dadus ida nee importante ba konstrusaun pondasi nomos, selesaun material konstrusaun nebe sei uja hodi sustenta ho seguru ba tinan barak nian

Informasaun sira nebe establese tiha ona nee, laos deit importante para halao analiza ba impaktu ambiental sira nebe halo dadaun nee, maibe mos, importante liu hanesan referensia ba futura hodi gere no monitor kualidade ambiente durante operasaun ba fasilidade ida nee. Komparasaun ba kualidade ambiente iha futura ho dadus referensia ida nee sei fo informasaun kona ba kontribusaun husi projeto ida nee ba kualidade ambiente.

Husi analiza ba impaktu sira nebe posivelmente sei mosu durante implementasaun ba projeto sumariza tuir mai nee, baseia ba eskalaun husi impaktu (Impaktu bot/maior no impaktu kiik ou menor)

- Tamba projeto nee rasik sei lokaliza besik mota sorin, entaun risku boot nebe presiza konsidera no tengki tau atensaun durante halo deseinu no konstrusaun ba projeto nee mak inundasaun husi mota. Liu-liu, husi udan nebe ninia frequencia bot, hanesan dalan ida ba tinan 50 ba leten.

- Kualidade tasi been nebe bele afeitadu husi erosaun husi rai rahun durante konstrusaun, nebe presiza tau matan no atensaun tamba bele estraga coral no fo disturbansia ba biodiversidade iha marina nia laran
- Iha eventu ida nebe la espera, maibe bele akontense, hanesan, mina fakar durante ro hatama mina husi ponte kais. Kuandu, kuantidade mina fakar nee bot, entaun bele fo impaktu ba biodiversidade iha marina nia laran, nomos bele estraga rekursu iha area kosteira hanesan ai paraba, tasi ibun/fatin rekreasi, nomos industria kiik, hansan ikan, masin, no seluk tan.
- Tamba tipu projeto ida nee, fornese combustivel, entaun, kestaun ai han (kebakaran) nee, importante tebes para konsidera iha deseinu no konstrusaun ba fasilidade ida nee. Identifikasaun kona ba parte husi fasilidade nebe sei afeita ahi han, nebe akontense iha fatin barak bele sai hanesan lisaun ou informasaun diak, para bele estuda hodi evita kazu nebe hanesan iha futura.
- Mina fakar iha area fasilidade durante halao operation hanesan transfere mina husi fatin ida ba fatin seluk. Provavelmente, mina fakar sempre iha no presiza meus para halo minimzasaun nomos elimina
- Tamba projeto ida nee rasik sei esplora bee husi rai okos, hodi sustente ninia operasaun, entaun presiza halo analiza kona ba kuantidade no kualidade bee iha rain okos.

Iha mos impaktu nebe ninia eskalaun ladun bot nebe bele minimize iha fatin durante implementasaun ba projeto.

- Baruilu no vibrasaun
- Kualidade ar/udara husi rai rahun nomos gas emisaun nebe mai husi makina nebe uja mina
- Siguransa saude, ambiental, durante execusaun service iha projeto ida nee
- Minimiza foer nebe produze iha area projeto nia laran

Impaktu bot nomos kiik nebe analiza no identifika tiha ona, sei minimiza, hodi nune bele mantein kualidade ambiente nebe hanesan antes projeto nee hahu. Sumario ba asaun nebe importante para implementa antes no durante implementasaun ba projeto mak apresenta tuir mai:

- Impaktu barak nebe temi ona nee, bele minimiza no elimina liu husi deseinu no konstrusaun ba komponente ida-ida, tuir padraun nebe diak iha industria mina nian, nebe konsidera tiha ona padraun nebe ass tebes ba kestaun siguransa, liu-liu ba tangki mina no apoiu fasilidade seluk. ANPM rekomenda tiha ona, para deseinu no konstrusaun ba komponente husi terminal mina nee tuir padraun husi "***American Petroleum Institute***" (API). Iha kodiku lubuk ida nebe presiza konsidera iha deseinu no konstrusaun nebe projeto nain tengki tuir no ANPM sei halo verifikasaun ba deseinu sira nee. Wainhira tuir padraun API ida nee, bele asegura katak, failansu balun hanesan eror iha operasaun, ekipamento nebe eror, liu-liu kausa mina fakar liu husi kebocoran bele elimina ou minimiza. Iha parte seluk ANPM mos rekomenda tiha ona ba kompania sira nebe iha depot mina, para deseinu sira nia gestaun be ahi han ruma, tuir padraun/kodiku husi ***NFPA (National Fire Prevention Association***)
- Mina fakar iha ponte kais ho kuantidade bot nee konsidera hanesan emergensia, nebe ninia impaktu bele minimiza liu husi mitigasaun tekniku hanesan ***oil boomer***, ***skimmer*** , ***absorbent***, nebe sei bele halao husi ekipa tekniku nebe treinadu tiha ona hodi responde emergencia nee ho efisiente no lalais. Iha kasu nebe meius tekniku sira karik faila, entaun, planu kontingensia tengki uja para ajuda minimiza no ***offset*** ninia impaktu sira nee, inklui hamos area branka, re-plante ai paraba nebe hetan estraga, selu kompensasaun, ba komunidade no ema nebe afeitadu
- Risku nebe kiik bele elimina husi deseinu nebe regorozu hanesan ***fire proof*** no ekipa interna nebe treinadu ho ekipamentu nebe sofistikadu hodi gere no hamate incidente sira antes sai bot no fo ameasa.

- Iha kazu, ahi han ba fasilidade nebe labele ona kontrola husi ekipa interna, entaun projeto nain sei komunika husi ekipa esterna, hanesan nasional no ***regional*** para bele hetan ajuda. Iha kazu, depot mina tangki nee ahi han hotu no kria, impaktu nebe fo impaktu seluk (***domino effect***), entaun asuransi maka tengki tama konta tamba eventu ida nee hanesan disastru nebe bot tebes
- Amiasa inundasaun husi mota sei bele minimiza husi servsiu hadia mota no kontrui drainagem nebe adekuadu hodi bele foti bee ho kapasidade bot nebe rezulta husi udan ben nebe frekuensia bot 50 ba leten. Liu ida ina, hanesan emergensia nebe asuransi maka sei tama konta ninia estragus. Iha fasilidade nia laran nos presiza ateru rai too nivel hanesan estrada para udan been labele nalehun no estraga fasilidade durante operasaun
- ***Demand*** ba bee mos husi projeto nee kiik no utilizasaun bee husi rai okos, la kria impaktu nebe siknifikante maibe presiza ***monitor*** no kontrola kuantidade bee nebe supa sai husi rai okos. Kontrola nee importante hodi asegura sustantabilidade ba kuantidade bee iha rai okos ba tempu naruk nian

Avaliasaun impaktu economiku no social hatudu katak, dezenvolvimentu projeto ida nee, sei fornese benefisu ekonomia no social nebe bot ba projeto nain no nasaun no komunidade, tuir kondisaun normal (hanesan laiha acidente ruma nebe sinifikante), tamba projeto refere sei hamosu retornu ekonomia no finaseiro nebe bot ba projeto nain no iha parte seluk kria opportunidade servisu ba juventude nebe nasaun presiza. Iha mos efeitu multiplikador nebe projeto nee rasik bele kria iha lokal husi investimentu bot ida nee, hanesan ***supply chain industry*** seluk .
Iha paste seluk, metodu tekniku nomos gestaun nebe proposta bele uja para gere impaktu ambiental nebe identifika tiha ona, nebe aprezenta tiha ona iha EIS no EMP. Implementasaun ba gestaun ambiental nebe diak bele asegrua katak risku sira nee bele gere no minimiza hodi mantein kualidade ambiental pelumenus hanesan ba kondisaun antes projeto nee komesa. Proposta tekniku no gestaun nee bele lao ho efetivu no efikas, wainhira iha monistorizasaun nebe rigorozu husi projeto nain, nomos liu-liu hetan inspesaun husi parte orgaun guverno nebe relevante no komundade hotu nebe besik fasilidde nee.

Monitorizasaun ba parametru hanesan kuantidade bee husi rai okos nebe supa sai, balansiu material (mina) transfere husi fatin ida ba fatin seluk, kualidade bee rai okos, kualidade bee husi mota, kualidade ar, kualidade tasi been, maka hanesan ***monitoring*** parametrus nebe presiza halo husi tempu ba tempu seluk, hodi nune fornese provas katak, atividade projeto lao seguru no la fo impaktu negative ruma ba ambiente. Importante mos, ba prejeto nain para tau atensaun makas ba seguransa servisu no saude, hodi asegura servisu tuir padraun servisu hodi minimize incidente ba servisu nian

21.ANNEXESS