

Prepared for



**OLA Energy Kenya Limited** OiLibya Plaza, Muthaiga Road Nairobi, Kenya

#### Prepared by



**Kurrent Technologies Ltd** Hass Plaza, 4th Floor, Lower Hill Road, Upper Hill

Signature page

## Environmental and Social Impact Assessment Study Report (SR) for the Expansion of OLA Energy LPG Marine Terminal in Shimanzi, Mombasa County.

Prepared for:

**OLA Energy Kenya Limited** 

OiLibya Plaza, Muthaiga Road P.O. BOX 64900 0620 Nairobi, Kenya Tel: +254 20 362200 / 3622300 Email: <u>ken.info@olaenergy.com</u> Website: <u>https://olaenergy.com</u>

Prepared by: Kurrent Technologies Ltd. Hass Plaza, 4<sup>th</sup> Floor, Lower Hill Road, P. O. Box 16989 – 00620 Nairobi, Kenya Tel : (+254) 20 273 0310/3222 E-mail: info@kurrent.co.ke

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Compiled by:

Reviewed by:

Jandhi

Mr. Sanjay Gandhi NEMA Lead Expert – Registration No. 0119

Approved by:

M. Duycmin

**Ms Millicent Onyonyi** General Manager, OLA Energy Kenya RHA

**Eng. James Mwangi** NEMA Lead Expert – Registration No.

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**Executive Summary** 

## **Executive summary**

### Introduction

OLA Energy Kenya (OEKE, the "Proponent") intends to expand its 510 MT Liquid Petroleum Gas (LPG) depot at Shimanzi, Mombasa to a marine LPG terminal with a capacity of 14,500 MT (the "Project"). The proposed terminal will consist of 6 mounded LPG spheres with a total water capacity of 30,000m<sup>3</sup>, 4 truck loading facilities, 6 Rail Tank Carrier (RTC) facilities and a delivery line of 14 inches from Shimanzi Oil Terminal (SOT) and later to Kipevu Oil Terminal (KOT).

OLA Energy is one of the leading downstream petroleum companies in Africa with operations in 17 countries comprising of over 1,200 service stations, 8 blending plants over 60 fuel terminals and presence in over 50 Airports. The proposed expansion of the LPG terminal will be undertaken by OLA Energy Kenya with the support of OLA Energy Operations Headquarters in Dubai and OLA Holdings Ltd. OLA Energy Kenya has engaged Kurrent Technologies Ltd to undertake Front End Engineering Design (FEED), prepare tender documents, acquire construction permits including Environmental Impact Assessment (EIA) license and undertake the tendering process. The project will be implemented through an Engineering, Procurement and Construction (EPC) contractor. As part of the Environmental and Social Impact Assessment (ESIA) process, Kurrent Technologies Ltd prepared and submitted the Terms of Reference (TOR) for the ESIA which was approved by the National Environment Management Authority (NEMA) on 17<sup>th</sup> August, 2020. Subsequently, this ESIA Study Report (SR) is being undertaken for submission to NEMA.

This ESIA study has been undertaken based on available information and data out of which a SR has been prepared for submission to NEMA for consideration. An appraisal of the current baseline status of the project area and the anticipated impacts, mitigation measures as well as development of an environmental and social management plan (ESMP) is the focus of the assignment.

### **Overview of the proposed project**

The proposed project will be located at OLA Energy's site along Kismayu Road off Makande Road in Shimanzi area, Mombasa County (the "Site"). The Site's coordinates are Latitude 4° 2'26.20"S and Longitude 39°38'51.35"E. The proposed project site's immediate neighbours include Makupa Transit shade CFS, Total GAPCO Terminal 1, Kenya Ports Authority (KPA) Estate, Solvochem East Africa, East African Terminals, OLA Energy Terminal and AA Transporters as shown in Figure 1-1

The project will be established on three plots of land leased from KPA with a total area of 5.8 ha. The site has several existing structures that will be decommissioned, dismantled, and demolished to create adequate space for the proposed project. The structures include:

- 2 decommissioned tanks to be dismantled and demolished
- An LPG filling plant, 8 bullet tanks and associated pipelines and fittings to be dismantled and relocated to other OEKE's sites within the country
- Office building, weigh bridge office, switch room, ablution block and security house to be demolished
- Substructures including foundations, utilities ducts, underground water tank to be demolished
- Weighbridge to be dismantled for re-use

- Meter Gauge Railway (MGR) siding to be dismantled and relocated.
- Masonry walls to be demolished

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Figure 1-1: Google map image showing the location of the proposed Project

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In summary, the proposed project will involve construction of the following components

- an approximately 600m long access road from Kismayu road
- 6 mounded LPG sphere tanks with a total capacity of 14500MT and the associated pipelines
- 4 truck loading racks
- 6 Rail Tank Carriers (RTC) loading bays
- A 3.5km, 14-inch delivery line from SOT and from the proposed KOT2 Common User Manifold (CUM)
- Firefighting water tank (2500m<sup>3</sup>), pump house and pipe network
- Weigh bridge for trucks
- Administration, utility, and security buildings

The operation phase of the project will include the following activities

- Receiving LPG from vessels at both SOT and KOT (Via the proposed Common User Manifold)
- Storage of LPG in the six LPG mounded spheres
- Trucks and Rail wagons loading and
- Facility maintenance activities
- Safety, fire protection and emergency response
- Traffic Management

### **Overview of the Project Area Baseline**

Project area social baseline	• The project will be situated at Shimanzi, Railways sub-location, Railways Location, in Shimanzi/Ganjoni ward, Mvita Sub-County, Mombasa County. Railways Location has one sub-location namely, Railways Sub-location.
	• The general project area is the wider Mombasa County, which covers an area of 219.9 Km2 excluding 65 Km2 of water mass which is 200 nautical miles inside the Indian Ocean. The County is located in the coastal region of Kenya and it is one of the 47 counties covering an area of 219.9 Km2. The County lies between longitudes 390 34' East and 390 46' East and latitude 30 56' South and 40 10' South of the Equator. It borders Kwale County to the South West and Kilifi County to the North and the Indian Ocean to the East.
	• Administratively, the County is divided into six sub-counties namely: Mvita, Nyali, Changamwe, Jomvu, Kisauni, and Likoni and thirty county assembly wards. These are further sub-divided into 30 locations and 47 sub-locations. Politically, the county has 30 wards: Changamwe (5 wards), Jomvu (3 wards), Likoni (5 wards), Kisauni (7 wards), Mvita (5 wards), Nyali (5 wards)
	• The project area is located in the Shimanzi industrial zone in Mombasa Island (city) characterized by Oil storage terminals,

	<ul> <li>warehouses, and container freight stations (CFS) and the vessel docking zone within the KPA jurisdiction. Other businesses include warehousing for chemicals, go downs, and offices. Additionally, the residential area consists of the KPA and Kenya Railways Estates. There are small scale traders operating small shops within the two estates and small-scale vendors of food and clothing within the project area.</li> <li>There are 7 villages within Railways sub-location namely: Shimanzi KPA village (adjacent to the project site)</li> <li>Shimanzi Railways village (adjacent to the project site)</li> <li>Makande 49 village</li> <li>High Level village</li> </ul>
	<ul> <li>The proposed project site is approximately 4 Hectares, which was leased from KPA.</li> </ul>
Project area Physical and Bio physical baseline	• The project area slopes northwards towards Indian ocean and the highest point is 20m above sea level (asl) on the south west of the site.
	<ul> <li>The soil in the project area ranges from Luvisols to acrisols characterized by brownish sandy to yellowish clay from 0-1m, yellow brownish silt clay to clayey sand from 1-2 m and dark brownish clayey silt with coral limestone fragments from 2-3m.</li> </ul>
	<ul> <li>Geologically, the project area is characterized by coral limestone and lagoonal deposit.</li> </ul>
	• The project site is near the ocean and has a storm drain channel and culverts from shimanzi road area transecting through the site. It was also observed that the land slopes gently westward along Makande road where some surface runoff water flows into Indian Ocean via the rail track drainage and some end up in the site. The right of way (ROW) for the pipeline to SOT slopes southwards towards the port while the ROW for the KOT line is a slope from the Kipevu mainland towards Indian Ocean.
	<ul> <li>Mombasa is in seismic area VI on Mercalli scale, 5.4 on Richter scale),</li> </ul>
	<ul> <li>Mombasa has a tropical climate with warm and cool seasons with an average temperature of 26.7 °C   80.0 °F and average precipitation of 1196 mm   47.1 inch.</li> </ul>
	• The ambient noise levels at the proposed development site and its environ was between 57.3dB(A) and 67.1dB(A) during the day, and 47.5 - 52.8 during the evening.
	<ul> <li>The proposed project will be established in Mombasa's Industrial Area and there is no significant natural terrestrial or aquatic</li> </ul>

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ecosystem existing within the area. Therefore, Biophysical environment will not be significantly impacted by the proposed project. There are only few trees (approximately 10) and shrubs as well as grass cover that will be cleared from the site during construction. The trees include coconut, palm and Neem trees. The proponent intends to replace the tree during operation of the
project.

### Legal and regulatory framework

The following legal and regulatory framework are applicable to the proposed project:

- The Constitution of Kenya, 2010
- Kenya Vision 2030
- Policy Framework
- National Energy and Petroleum Policy 2015
- National Environmental Policy, 2013
- National Gender Policy (2011)
- Occupational Safety and Health Policy (2012)
- Workplace Policy on HIV/AIDS (2007)
- National Environment Action Plan (NEAP) 2007
- National Climate Change Action Plan (NCCAP) 2018-2022
  - Legislative Framework
- $\circ$  The Petroleum Act, 2019 and the subsidiary legislations
- The Energy Act 2019
- County Governments Act, 2012
- Physical and Land Use Planning Act, 2019
- o Environment Management and Coordination Act, 1999 and the subsidiary legislations
- The Occupational Safety and Health Act (OSHA), 2007 and the subsidiary legislations
- The Water Act 2016
- Public Health Act (Cap. 242)
- People Living with Disability Act, 2012
- The Sexual Offences Act, 2014
- $_{\odot}$   $\,$  The HIV And AIDS Prevention and Control Act, 2006
- Occupiers Liability Act (Cap. 34)
- $\circ$   $\,$  Children Act No. 8 of 2001  $\,$
- The Employment Act, 2007
- $\circ$   $\,$  Cities and Urban Areas Act 2012  $\,$
- Public Roads and Roads of Access Act, Revised 2012 (Cap 399)

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- The Kenya Roads Act, 2007
  - International Conventions, Treaties and Agreements
- o The African Charter on Human and Peoples Rights
- International Covenant on Economic, Social and Cultural rights, 1966 and International Covenant on Civil and Political Rights 1966.
  - International Finance Corporation (IFC) General Environment, Health and Safety (EHS) Guidelines
  - IFC Performance Standards for environmental and Social sustainability
- Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.
- Performance Standard 2: Labour and Working Conditions.
- Performance Standard 3: Resource Efficiency and Pollution Prevention
- Performance Standard 4: Community Health, Safety, and Security.

### **Project Alternatives**

Location Alternatives	The project site was selected based on the following
	• The land is already leased to OEKE and there is an existing LPG plant. Therefore, there will be no land acquisition processes leading to displacement of people and livelihood
	• The available land is prime for such projects and under utilized
	<ul> <li>The location is zoned as an industrial area with established petroleum and vegetable oil facilities and the operation of the proposed project can mutually benefit from the existence of the other facilities.</li> </ul>
	• The location is near Shimanzi Oil Terminal which is the Common User Terminal for LPG in the country
Technology	The Feasibility study considered the following alternatives
Alternatives	• Bullet tanks/cigars alternative - the alternative would have resulted to terminal with less than 60% of the planned capacity. The option also posed greater fire and explosion risk with potential of affecting other neighbouring facilities.
	• Mounded Bullet tanks - The alternative had less fire and explosion risk and required less safety distance, but it was dropped since it achieved 70% of the planned terminal storage capacity due to the required large surface area for the bullets and the limited storage space of each bullet (3500m3).
	<ul> <li>Mounded sphere technology has been preferred to mounded cigars/bullets due to its performance in terms of ratio storage volume/ land surface and its better seismic risk resistance. The advantage of this mounded sphere technology lies in the support technology. The sphere will be supported by a steel ring welded to the sphere which is itself supported by a concrete ring, this will</li> </ul>

	increase the resistance to related vertical and horizontal accelerations in case of seismic activity. This technology has been developed in the last decade by Shell and Total with success in many countries in the world and in Africa, examples are France, Senegal, Morocco, Tunis, La Martinique, Tahiti, Benin. Shell has been a leader in the development of this technology
Design and Layout Alternatives	• Design alternatives for the proposed project were considered in the decision analysis where various layouts for the mounded spheres tanks and loading facilities were considered. OEKE engaged an experienced consortium of engineers to undertake the front-end engineering design (FEED) for the proposed project. OEKE settled for a layout with a storage capacity of 14500 MT comprising of 6 mounded spheres and Rail Wagon and Trucks loading facilities.
Delivery Pipe Alternatives	<ul> <li>The following pipe alternatives were considered</li> <li>Pipeline route from CUM utilizing Port Road reserve to Changamwe round about and then to Kibarani and across Makupa Creek to the project site was dropped because it was 3 times longer and there was no existing ROW.</li> <li>Route from CUM to Mombasa Sewer Company, then along the MGR to the existing ROW for the Kenya Pipeline Company (KPC) spur line was shorter but abandoned because of the safety considerations and acquisition of the ROW within Kenya Railways Corporation's (KRC) land</li> <li>Route from CUM to the ROW for the KPC spur line to SOT was considered. The alternative consists of an existing ROW with an LPG and multi product pipeline</li> </ul>
Do Nothing Alternative	The 'do-nothing' alternative is the option of not establishing the proposed LPG Marine Terminal project at the identified site at Shimanzi in Mombasa. This alternative would result in no environmental and social impacts in the project area. The 'do-nothing' alternative will not assist the Kenyan Government in reaching its targets for use of LPG as a source of Energy. Subsequently, the do-nothing alternative is not a preferred alternative and has not been assessed in this ESIA.

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## **Overview of the Stakeholder views identified during ESIA**

Subject	Issue	Response
Community health and safety	Whether the mounded LPG storage tanks will ensure that residents are safe from inhaled gas and in the event of an explosion	<ul> <li>The mounded technology proposed by OLA is one of the safest and has been used in developed countries</li> <li>The sphere tanks holding LPG will be encased in a concrete wall with sand surrounding the immediate metallic tank.</li> </ul>
		• In the event of fire the spherical tanks, being protected by 1m of sand and armored concrete sarcophagus eliminate any risk of implosion or fire, thereby limiting any possibility of fire outbreaks to the nearest tanks, communities, and business establishments
		• The mounding technology allows for reduced safety distance (the distance between 2 tanks) hence the proponent is able to utilize a small piece of land to construct tanks with larger storage capacities as compared to the bullet technology.
Traffic and movement patterns	Whether there is a plan to manage traffic that will result from construction activities	• The contractors will undertake public awareness programs in consultations with the community to identify areas of particular risk and approaches to reduce risk. This is expected to include awareness programs along roads leading to the site targeting frequent users on traffic dangers.
		• The Project Contractor will develop a Traffic management plan for the construction phase of the project
		• The contractor will prepare a detailed plan for signage along the Construction Area to facilitate traffic movement, provide directions to various components of the Works, and provide safety advice and warnings.
Employment	Whether the Proponent will employ locals.	• The proponent is committed in ensuring effective local content in terms of sourcing of skilled, semi-skilled labour.
Skill EnhancementWhether there will be skill enhancement at the LPG facility to enable the employees secure jobs in similar developments once the plant has been decommissioned		• The setting up of the LPG plant will require highly skilled, skilled semi- skilled and unskilled labour. The unskilled have to be supervised by the skilled personnel, however, the unskilled will be presented with an opportunity to learn from the skilled as they work together.
		• The proponent will train LPG operators on plant operation and safety as outlined in their program

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Subject	Issue	Response
Impacts on air quality	How the dust generated from construction will be managed	• The contractor will implement dust suppression measures including, sprinkling water, undertaking excavation works when its less windy, use of road signage, dust traps and speed reduction as appropriate and applicable.
		• The contractor will regularly engage the neighbouring business establishments whenever activities that are likely to cause nuisance or disturbance are planned.
Corporate Social Responsibilit y (CSR)	Request for adequate street lighting in the area and upgrade of the Shimanzi Railways dispensary	• CSR activities will be determined in consultation with community members and will take into account the greatest area of challenge to the people.
Contractor Management	How the proponent will manage the Contractor and ensure they honour the agreements especially with the local communities and	<ul> <li>The Construction activities will be managed by a HSE Officer to ensure recommendations made in the ESIA are implemented by the EPC Contractor.</li> <li>Additionally, the Proponent will hire a Community Liaison Officer from the community who will handle</li> </ul>
	residents	grievances related to the project and ensure that they are addressed appropriately.

### **Quantitative Risk Assessment**

The methodology for QRA included identification of the major hazards, a cause analysis, a consequence analysis and an estimation of the individual risks and societal risk. This was followed by comparing the risks with international criteria for acceptability and by reviewing suitability of emergency measures and organisational aspects. Finally, measures were proposed to reduce or eliminate the risk, where not tolerable.

The hazards that were identified as potentially serious were the release of LPG from the bursting of pipes, vessels, loading arms and hoses. An ignition of a vapour cloud would result in fires and explosions with serious effects extending some distance across the site boundary.

Through the QRA, it was confirmed that the combined individual risks (for employees and for the public) are tolerable. Societal risks are low and can also be regarded as tolerable. Risks that are tolerable should be reduced where practical and cost effective; otherwise, it may be accepted as "as low as reasonably practicable" (ALARP).

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## Summary of the Impacts Assessment

Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
Employment	Availability of employment Opportunities	Low positive	• Develop and implement a Human Resource Management (HRM) Plan that is aligned to the Employment Act of 2007, IFC Performance Standard (PS) 2 on Labor and Working Conditions. The HRM plan will include:	Medium positive
			<ul> <li>Training and capacity building, equity and equal access to opportunities, rights, and protection of workers.</li> </ul>	
			<ul> <li>Prioritize the local community/residents in the allocation of job opportunities.</li> </ul>	
			<ul> <li>Ensure job advertisements are made through mediums easily accessible to the local community and residents (Chief's notice boards, CLO's, local radio)</li> </ul>	
			<ul> <li>Ensure recruitment process promotes gender equality</li> </ul>	
			<ul> <li>Develop a Workforce Recruitment and Training Strategy that will focus on assisting unemployed and vulnerable persons access training and employment opportunities in the project</li> </ul>	
			<ul> <li>Develop and institutionalize a company Gender Policy to ensure equal allocation of employment and business opportunities to men and women, and where necessary, apply affirmative actions to bridge gender gaps that may exist</li> </ul>	
			<ul> <li>Give priority to women and youth owned enterprises during allocation of procurement tenders</li> </ul>	

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			<ul> <li>Provide timely and accessible information to the local community on the job opportunities that will be available, the qualifications required and the timelines.</li> </ul>	
Economic Development	Enhanced economic growth	Low positive	• Establish a communication and information strategy to manage expectations and target local service providers	Medium positive
			• Establish a policy for sourcing of supplies from local service providers, prioritizing from Mombasa County to the rest of the Country, before resorting to importation	
			• CSR programme established will promote and support economic empowerment initiatives for the local community	
			• Minimize to the extent possible, production costs, subsequently lowering electricity cost nationwide	
			<ul> <li>Remit all applicable taxes to the local and national Government, as per legal provisions</li> </ul>	
Skills Development	Transfer of skills	Low positive	• Initiate a capacity building program affordable to the local communities to enable them to benefit from the available economic opportunities	Low positive
			• Communicate the skill requirements to the local community prior to construction and operational phases through easily accessible mediums such as CLOs, community noticeboards, local radio, etc.	
Safety (workers and community)	Fire and Explosion hazards	Medium Negative	• As indicated by the OEKE's safety health and environmental management (SHEM) (contractor management system), OEKE will engage a contractor with a well-developed EHS management system and with reputable experience in Oil and Gas. The main contractors will be required to have a fire policy, EPRA approval, full time EHS officer with adequate firefighting	Low positive

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating Mitigatio	after n
			training, well trained workers, and comprehensive and site-specific ERP among others.		
			• A recognized process of hazard identification and analysis (such as a HAZCON) should be undertaken before construction of the proposed terminal to ensure that potential fire hazards during construction process are well identified and adequate control measures are put in place. Some of the control measure to prevent fire and explosion hazards include:		
			<ul> <li>Consulting with the other pipeline owners i.e., KPC and KPRL to understand the location and operation details of the pipelines.</li> </ul>		
			<ul> <li>Mapping the pipeline route by identifying all the hazardous and sensitive areas, identifying appropriate and safe laydown area for the pipeline construction and movement routes for the equipment and human traffic to avoid damaging the operational pipeline.</li> </ul>		
			<ul> <li>Developing and implementing site specific construction safety procedures for the activities within the ROW. The procedures should include site access, Job Safety Analysis machine/equipment safety, hot works, fire risk prevention, ERP and firefighting training, among others.</li> </ul>		
			<ul> <li>Monitoring the presence of petroleum fumes and LPG before and throughout the hot work processes along the ROW and within the Tank farm area.</li> </ul>		
			<ul> <li>Use of appropriate signage.</li> </ul>		
			<ul> <li>Ensuring that there is an effective and efficient firefighting system together with a trained Emergency Response Team</li> </ul>		
			<ul> <li>OEKE will inform the other Shimanzi Terminal Users through their monthly meetings of the proposed construction work and keep them updated of the construction plans. All the activities along the ROW will</li> </ul>		

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			be effectively coordinated to ensure immediate evacuation of the product from the pipeline in case of pipe interference during construction. The team will be able to activate mutual ERP in case of any emergency during construction.	
			<ul> <li>Adherence to existing laws and regulations including:</li> </ul>	
			i. Occupational Safety and Health Act, 2007 (OSHA, 2007)	
			ii. L.N 59: Factories and other Places of Work (Fire Risk Reduction) Rules, 2007	
Labour and working conditions	Unfair dismissals by the contractor and subcontractors	Medium Negative	• The Project Contractor will develop and implement a documented HR management system comprising the attributes mentioned above for the construction phase.	Low Negative
	Workplace discrimination		• The Project Contractor and sub-contractors will ensure that every employee	
	Poor working conditions		working at the project site is provided with appropriate and adequate PPE	
	Employment of underage workers		<ul> <li>All Project employees will be provided with induction in human resources policies, employment conditions and associated requirements, which shall include a sexual harassment policy which complies with the Employment Act</li> </ul>	
	Long working hours and poor pay		• The Project Contractor will establish a comprehensive worker grievance mechanism	
	Delays in payment		• All employees will receive a copy of their employment agreement, which will, at a minimum, address the following: job title, job duties, remuneration period and amounts, labor conditions, employment duration and the conditions for hiring and layoff.	

Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			• The Project Contractor will document and communicate working conditions and terms of employment to all workers directly contracted by both local and expatriate companies	
			<ul> <li>OEKE will conduct appropriate monitoring and inspections to ensure worker safety including tracking rates of injury, occupational diseases, lost days, and number of work-related fatalities.</li> </ul>	
			• The Project Contractor will ensure that the subcontractors have an appropriate E&S Management system in place.	
			• The Project Contractor will monitor the performance of the sub-contractors and ensuring that the subcontracted workforce has access to the grievance mechanism.	
			• The Project Contractor will ensure provision of guidance on the detrimental effects of drug and alcohol abuse, the risk and concerns relating to HIV/AIDS and other health risk-related activities.	
			<ul> <li>Residents will be made aware of rules governing worker-community interaction regulations and the consequences of workers breaking such rules.</li> </ul>	
			• The Project Contractor will reasonably limit worker movements outside the project Site and within the community with the aim of limiting interactions between construction workers and the local communities.	
			• The Project Contractor will ensure provision of key facilities and services within the project Site in order to minimize worker's needs to exit the Site.	
			• OEKE's HR Policies will be included the Project Contractor's contract to address any gaps that may exist in informal employment	

Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
Soil	Contamination of soil due poor waste management and through accidental spills of oil as a result of field refueling, onsite storage of fuel/oil and fugitive spills due to leaks	Medium Negative	<ul> <li>Ensuring that the site has adequate sanitary waste disposal facilities and waste bins</li> <li>Storing Waste/used oil generated from generators and construction machinery and equipment on paved surface in a secure location at the project site.</li> <li>The waste oil to be handled by licensed waste handler at frequent intervals.</li> <li>Controlling and reducing at source the production of wastes and hazardous waste</li> <li>Adherence to existing laws and regulations including L.N 121: Environment Management and Coordination (Waste Management) Regulations, 2006</li> </ul>	Low Negative
Water Quality	Contamination of the surface runoff from the site due to poor waste management, fugitive spills on the soils and soils contaminated by construction chemicals. Contamination of subsurface water due to poor management of sanitary waste	Medium Negative	<ul> <li>Ensuring that the site has adequate sanitary waste disposal facilities and waste bins.</li> <li>Storing Waste/used oil generated from generators and construction machinery and equipment on paved surface in a secure location at the project site.</li> <li>The waste oil to be handled by licensed waste handler at frequent intervals.</li> <li>Controlling and reducing at source the production of wastes and hazardous waste</li> <li>Adherence to existing laws and regulations including L.N 121: Environment Management and Coordination (Waste Management) Regulations, 2006</li> </ul>	Low Negative

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
Air Quality	Generation of dust during site clearance, excavation, back filling and hauling operations along with transportation activities	Medium negative	<ul> <li>Developing a site-specific air quality pollution prevention plan based on IFC PS 3, L.N 34 of EMCA 1999 and on the finding of impacts assessment of the ESIA report.</li> <li>Protecting all soil stockpiles subject to wind erosion using a barrier, windscreen or grass cover. Enforcing speed limits to a maximum of 30km/h to reduce the amount of dust generated by the trucks. Use of dust suppression methods such as periodic watering of access roads and other construction areas to minimize generation of dust.</li> </ul>	Low negative
	Emission of VOCs	Low negative	<ul> <li>Use of well-maintained equipment to minimize the emissions during construction</li> <li>Adherence to existing laws and regulations including L.N 34: Environment Management and Coordination (Air Quality) Regulations, 2014</li> </ul>	Low negative
Community safety	Fire and Explosion	Medium Negative	<ul> <li>Engage contractors with a well-developed EHS management system and with reputable experience in Oil and Gas.</li> <li>Ensure that all the construction activities are well planned, the potential fire hazards identified and managed before undertaking the activities at the site through well supervised PTW system. The ESIA established that OEKE has a robust PTW system.</li> <li>Monitoring the presence of petroleum fumes before undertaking the hot work processes along the ROW and within the tank farm area</li> <li>All the activities along the ROW will be effectively coordinated to ensure evacuation of the product from the pipeline when high risk activities like welding are being undertaken. The team will be in a position to activate mutual ERP in case of any emergency during construction.</li> </ul>	Low Negative

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			<ul> <li>ensure that there is an effective and efficient firefighting system together with an adequately trained Emergency Response Team</li> </ul>	
			• Adherence to existing laws and regulations including OSHA, 2007 and L.N 59: Factories and other Places of Work (Fire Risk Reduction) Rules, 2007	
Workers Health and safety	Impacts on Workers Health and Safety	Medium negative	• Developing and implementing an Occupational Safety and Health (OSH) Management System which is in alignment with OSHA, 2007; Directorate of Occupational Safety and Health Services (DOSHS); and the IFC General EHS Guidelines	Low negative
			• complying with all applicable legislative requirements of the OSHA, 2007 legislation throughout the construction phase of the project i.e., registration of the workplace, establishment of the Health and Safety Committee (HSC) etc.	
			<ul> <li>Conducting an occupational safety and health risk assessment for construction phase activities in accordance with the requirements of OSHA, 2007; IFC PS 1; and International Organization for Standardization (ISO) 31000:2018</li> </ul>	
			• Ensuring that there is an effective and efficient firefighting system together with an adequately trained Emergency Response Team	
			• Developing and implementing a S&H training program for all workers employed during the construction phase of the project.	
			• Ensuring that all construction machines and equipment are in good working conditions and to manufacturer's specifications to prevent occupational hazards.	

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			• Appointing a trained health and safety team for the duration of the construction work.	
			<ul> <li>Training workers on basic firefighting and emergency first aid</li> </ul>	
			<ul> <li>Providing workers with appropriate personal protective equipment (PPE) and maintain a register indicating the issuance, control and use of the same</li> </ul>	
			• The Project Contractor will develop and implement a documented HR management system comprising the attributes mentioned above for the construction phase.	
			• The Project Contractor and sub-contractors will ensure that every employee working at the project site is provided with appropriate and adequate PPE and	
			<ul> <li>Conduct appropriate monitoring and inspections to ensure worker safety including tracking rates of injury, occupational diseases, lost days, and number of work-related fatalities.</li> </ul>	
			• The Project Contractor will ensure that the subcontractors have an appropriate Environment and Social Management System (ESMS) in place.	
			• Ensure provision of guidance on the detrimental effects of drug and alcohol abuse, the risk and concerns relating to HIV/AIDS and other health risk-related activities.	
			• Compliance with COVID -19 workplace and public health guidelines by DOSHS and Ministry of Health (MOH) respectively	
Traffic	Increased traffic leading to traffic accidents and congestion	High negative	• Creating and implementing awareness programs along roads leading to the site targeting frequent users on traffic dangers.	Low negative

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			• Developing and implementing traffic management plan for the construction phase of the project to control the number of trucks visiting the site and ensure safety	
			<ul> <li>Use of signage along the construction area to facilitate traffic movement, provide directions to various components of the works, and provide safety advice and warnings.</li> </ul>	
			<ul> <li>The Contractor should provide temporary road signs and notices to indicate ongoing works;</li> </ul>	
			<ul> <li>The site Engineer and Contractor should choose traffic routes to reduce the impact in the neighborhood avoiding, as far as practical any sensitive areas;</li> </ul>	
			• The site Engineer and the contractor should ensure that traffic calming and speed control measures are put in place in consultation with the relevant authorities e.g., the traffic police and the Mombasa county traffic control department. The contractor should:	
			<ul> <li>Introduce segregated pedestrian walkways;</li> </ul>	
			$\circ$ Introduce speed limits particularly in the residential areas;	
			<ul> <li>Ensure there is reduced need for reversing vehicles, by introducing a one-way system;</li> </ul>	
			$_{\odot}$ Use a qualified banksman to control deliveries and reversing vehicles;	
			<ul> <li>Clearly designate loading/off-loading areas.</li> </ul>	
			<ul> <li>The Project Contractor will regularly inspect the access roads conditions and whenever necessary, promptly repair damages related to construction traffic</li> </ul>	
			• Abnormal loads will be timed to avoid times when traffic volumes are likely to be higher e.g., start and end of school holidays, long weekends, etc.	

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
Noise Quality	Increased noise during construction affecting workers and neighbours	Medium Negative	<ul> <li>For noise mitigation, the Project Contractor will ensure that the construction plant and equipment is always well maintained</li> <li>All loud and sudden noises will be avoided wherever possible and fixed noise sources shall be located at least 50m away from the site boundary.</li> <li>The Project Contractor will limit the construction times preferably to daylight</li> </ul>	Low Negative
			<ul> <li>hours and only in exceptional cases will they work beyond daylight hours</li> <li>Temporary noise barriers shall be provided surrounding the high noise generating construction equipment. The personnel involved in high noise generating activities shall be provided with personal protective devices to minimize their exposure to high noise levels.</li> </ul>	
Employment	Influx of workers	Low Negative	<ul> <li>A 'locals first' policy is to be advertised for construction employment opportunities, especially for semi and low-skilled job categories. Enhance employment opportunities for the immediate locals at the area</li> <li>Develop and implement a transparent recruitment process prioritizing the local community and communicate the same through the local administration/ Chiefs' office</li> <li>Facilitate small and medium enterprise (SME) development in the local</li> </ul>	Low Negative
Security	Impacts on security	Low Negative	<ul> <li>communities and surrounding region.</li> <li>Develop a security management plan encompassing the following: Controlled access and exit from the construction site, established screening at the security check points and formal identification system for construction workers.</li> </ul>	Low Negative

Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating a Mitigation	fter
			• Using the UN Voluntary Principles on Security and Human Rights as a guide, the Proponent will:		
			<ul> <li>Undertake a Risk Assessment to identify the potential security risks to the plant i.e., social, political or economic risks</li> </ul>		
			$_{\odot}$ Be guided by the principles therein on the conduct of private security		
			• OEKE should also include the said principles as contractual provisions in agreements with private security providers		
			• OEKE should consult and monitor private security providers to ensure they provide security in a manner consistent with the outlined principles		
			• OEKE should review the background of private security they intend to employ		
			• OEKE should consult with other Companies and civil society organizations regarding experiences with private security i.e., information about unlawful activity and abuses committed by private security providers.		
			• Develop guidelines for social conduct in and around the construction site targeting the following: drugs and substance abuse including alcohol and prostitution.		
	Impacts on gender	Medium negative	• Ensure all operations are aligned to the provisions of the Kenya National Gender Policy (2011)	Low Negati	ive
			• Ensure active participation of women and vulnerable stakeholder groups in planning and implementing community development initiatives		
			• Initiate or support civic education and public sensitization programs on key gender concerns: early marriages, drug abuse, education, sexual harassment etc.		

Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			• Prioritize educational support to children from female headed households, high-achieving female students, and those pursuing technical/engineering courses and leadership training programs for women and female youth	
Operation P	Phase			
Business and investment opportunities	Availability of business and investment opportunity	Low Positive	<ul> <li>Promote the local suppliers in order to boost their financial base;</li> <li>Inform the community in advance of the required materials and supplies needed and that meet the required specifications</li> </ul>	Medium Positive
Transport	Traffic congestion leading to disruption of the movement along Makande and Kismayu Roads Increased road accidents Obstruction of the road reserve leading to accidents	Medium Negative	<ul> <li>OEKE will develop a Traffic Management Plan under ESMS for the proposed facility. The plan will be based on a comprehensive risk assessment and a hazard and operability study (HAZOP). It will include the following among others requirements of the Traffic Act (Cap 403), vehicles movement to and out of the facility, signage, protection and PPEs, safe crossings and pedestrian zones, roles and responsibility and training and understanding</li> <li>OEKE will constitute a transport safety team to ensure implementation of the Traffic Management Plan that will be represented in HSC of the facility</li> <li>OEKE is in consultation with the nearby VIVO Energy to acquire 10 parking spaces from their yard for the LPG trucks to queue awaiting loading. The location is proximal to the facility, easily accessible and has an adequate room for truck turning. Additionally, OEKE plans to acquire more trucks parking spaces at Dakawou Transport Services located 6km from the project site at Changamwe.</li> <li>OEKE will develop and implement a product loading plan which will have clear truck validation and queuing procedures before a truck can report to the facility to avoid truck parking along the existing roads.</li> </ul>	Low negative

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
Waste Management	Soil pollution from sanitary waste Release of the LPG during operation Generation of the dust by the trucks visiting the site during operation	Low Negative	<ul> <li>The project will be designed to effectively drain the uncontaminated surface run-off from the site to the existing storm water drains and to connect the facility to the to the proposed sewer system for Mombasa.</li> <li>Should the sewer system not be available during the operation of the project, a septic tank system will be installed to manage the sanitary waste.</li> <li>OEKE will develop and implement a site-specific waste management plan based on IFC PS3 and LN 120 and LN 121 of EMCA.</li> </ul>	Low Negative
Air Quality	Emission of VOCs from the exhaust of the trucks and locomotives Release of the LPG during operation Generation of the dust by the trucks visiting the site during operation	Low Negative	<ul> <li>Designing the facility in accordance with international and Kenyan standards to ensure no product loss during receiving, piping, storage and loading</li> <li>Development and implementation of air pollution control plan based on IFC PS 3 and LN 34 of EMCA with an effective air pollution sources identification, control, monitoring and training</li> <li>Ensuring no idle running of truck and locomotive engines within the site</li> <li>Proper housekeeping and paving or tarmacking of the surfaces to avoid generation of the dust by the trucks during operation</li> </ul>	Low Negative
Community and Workers safety	Fire and Explosion Hazards	High Negative	<ul> <li>Implement a permit to work clearance system for maintenance and a management of change for modifications.</li> <li>Compile registers of all pressure vessels (spheres), relief valves, piping, loading hoses and arms, interlock and trips, flame and explosion proof electrical equipment.</li> <li>Set up schedules for inspecting and testing of all pressure vessels (spheres), relief valves, piping, loading hoses and arms, interlock and trips, flame and trips, flame and explosion proof electrical equipment.</li> </ul>	Low Negative

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Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating afte Mitigation
			<ul> <li>Put in place a system to prevent unauthorized override or defeats of alarms, interlock and trips.</li> </ul>	
			• Institute formal training of all operating personnel with pass out for competency.	
			<ul> <li>Set up refresher training, accident recall and major hazard awareness training for operating personnel, as well as the public.</li> </ul>	
			<ul> <li>Implement formal investigation of accidents, incidents and near misses with recording documentation.</li> </ul>	
			• Operating, technical and training manuals as well as formal standard Piping and Instrumentation (P & I) diagrams for the plant should be compiled. This information should be updated whenever any change takes place, as it is essential for proper operation and identification of valves, piping, equipment and instrumentation for maintenance. Accidents originating from, e.g., modifications or operations based on inadequate information will thus be avoided.	
			• The condition of rail and road tanker loading hoses should be regularly inspected to ensure that deterioration is detected early, thus preventing their unexpected rupture.	
			<ul> <li>Provide emergency isolation on the sphere outlet piping and the pump via a leak detector system.</li> </ul>	
			• Provide fire protection systems on the pump and road and rail filling gantries	
			• All project designs must be signed by a professional engineer registered in Kenya in accordance with the Professional Engineers Act, who takes responsibility for suitable designs	

Aspect	Potential Impacts	Rating	Proposed mitigation measures	Rating after Mitigation
			• Adherence to the provisions of the Occupational Safety and Health Act (No. 15 of 2007), and subsidiary legislation, particularly in respect of measures required to reduce the risk of fire in workplaces and their environs.	

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### Conclusions

The impacts due to the project range from high to low, are site specific and has reversible impacts on the microenvironment of the project site owing to the construction and operation activities. The most pertinent issues identified during the ESIA, are fire risk, traffic and labour and working conditions impacts. A Quantitative Risk Assessment (QRA) was carried out, which is a requirement under the OSHA 2007 to implement the project.

It may be concluded that the proposed marine LPG terminal and associated infrastructures are unlikely to result in permanently damaging environmental and social impacts if the proposed mitigation measures proposed in this study are adequately implemented in all phases of the project. The potential for positive socio-economic benefits can be realized if the enhancement measures are put in place. Based on the findings of the ESIA engagements with Lead Agencies, County Government Departments, Local Administrations, community representatives and residents living in the project area, there was no objection to the proposed project.

The Environmental Management Plan in this report has proposed several management measures to mitigate identified impacts and to enhance identified positive benefits of the proposed project.

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List of Acronyms

#### **List of Acronyms**

Acronym	Definition	
AGO	Automotive Gas Oil	
AGOL	Africa Gas & Oil Limited	
AIDS	Acquired Immune Deficiency Syndrome	
ALARP	As low As Reasonably Practicable	
AOI	Area of Influence	
ссти	Closed-circuit television	
CFS	Container Freight Station	
CFS	Container Freight Stations	
CSR	Corporate Social Responsibility	
СИМ	Common User Manifold	
DWT	Deadweight tonnage	
EMCA	Environment Management and Coordination Act	
EPC	Engineering, Procurement and Construction	
EPRA	Energy and Petroleum Regulatory Authority	
ESIA	Environmental and Social Impact Assessment	
ESS	Environmental and Social Sustainability	
FEED	Front-End Engineering Design	
FGD	Focus Group Discussion	
GACC	Global Alliance for Clean Cookstoves	
GM	Grievance Mechanism	
GOK	Government of Kenya	
HIV	Human Immunodeficiency Virus	
IFC	International Finance Corporation	
IRR	Issues and Response Report	
кп	Key Informant Interview	
KNBS	Kenya National Bureau of Statistics	
кот	Kipevu Oil Terminal	
КРС	Kenya Pipeline Corporation	
KPRL	Kenya Petroleum Refinery Limited	

List of Acronyms

Acronym	Definition
KPRL	Kenya Pipeline Refineries Limited
KRA	Kenya Revenue Authority
KTL	Kurrent Technologies Limited
LN	Legal Notice
LPG	Liquefied Petroleum Gas
MGR	Meter Gauge Railway
MOE	Ministry of Energy
NEMA	National Environment Management Authority
NOCK	National Oil Corporation of Kenya
ΟΕΚΕ	OLA Energy Kenya Limited
OSHA	Occupational Health and Safety Act
PPE	Personal Protective Equipment
PPP.	Public Private Partnership
QRA	Quantitative Risk Assessment
RTC	Rail Tank Carriers
RTC	Rail Tank Carriers
SBM	Single Buoy Mooring
SEP	Stakeholder Engagement Plan
SGR	Standard Gauge Railway
SIA	Social Impact Assessment
SOT	Shimanzi Oil Terminal
STI	Sexually Transmitted Infection
USA	United States of America

## **1.1** Overview of the Petroleum sub-sector in Kenya

The petroleum sector in Kenya is organized into three sections: the upstream, mid-stream and downstream. The upstream section involves the process of exploration, development and production of crude oil and natural gas. The mid-stream section revolves around storage, refining and transportation of crude oil into consumable petroleum products whereas in the downstream section, refined products are made available to the consumers through supply and distribution, for example at petrol stations (KPC, 2017).

Upstream- Kenya has four (4) petroleum exploration basin and these are: Lamu Basin, Anza Basin, Mandera Basin and Tertiary Rift Basin. Oil and gas exploration in the country began in 1956 and the breakthrough came in March 2012 with the discovery well –Ngamia 1 Well, in Lokichar Basin in Turkana County. (KPC, 2017). Following the exploration success of Lokichar basin, the government and oil exploration firms started an Early Oil Production Scheme (EOPS) where crude is extracted, processed, and then trucked to Kenya Petroleum Refineries in Mombasa.

Midstream –Initially crude oil was imported to Kenya via Kipevu Oil Terminal (KOT) and Shimanzi Oil Terminal (SOT) to Kenya Petroleum Refineries. However, the Refineries stopped operations in September 2013. Currently, the main midstream activities in Kenya includes transportation of crude oil from Lokichar to Mombasa and exportation of the same using vessels via KOT.

Downstream Petroleum- Involves distribution and marketing of petroleum products by oil marketing companies. The distributing infrastructure includes white oil pipelines, depots, terminals, and service stations. The main petroleum products in Kenya include Automotive Gas Oil (AGO), Premium Motor Spirits (PMS), Illuminating Kerosene (IK) and Liquefied Petroleum Gas (LPG). The leading oil marketers in Kenya are VIVO Energy (operating shell service stations), Total, Rubis Energy (Acquired Kenol Kobil and Gulf Energy in 2019), OLA Energy and National Oil Corporation of Kenya (NOCK).

According to Energy and Petroleum Regulatory Authority The downstream supply chain in Kenya is supported by the following critical infrastructure (Energy and Petroleum Regulatory Authority, 2019)Petroleum Receipt and back-loading jetties:

- Kipevu Oil Jetty (KOT) located at Kipevu area, Mombasa County and handles large petroleum vessels. Product is then transferred to the government owned Kipevu Oil Storage Facility (KOSF).
- Shimanzi Oil Terminal (SOT) used for importation of petroleum by small vessels.
- Mbaraki which is a privately owned facility.
- Africa Gas & Oil Limited (AGOL): This is a dedicated LPG facility built under concessionary terms from the Kenya Ports Authority. It is connected to a common user manifold. The only storage depot connected to it is the AGOL mainland facility.

- Kisumu Oil Jetty This is located on the shores of Lake Victoria and is used for the exportation of petroleum products to the countries bordering the lake and into the Eastern DRC and South Sudan.
- Petroleum storage tanks: Kenya's total storage capacity is over 1,500,000,000 litres spread out across the country. Over 700,000,000 litres of this is operated by the Kenya Pipeline Company as primary and intermediate storage.
- Petroleum pipelines: The pipeline system consists of trunk lines and distribution lines from Mombasa running through Nairobi to the Western Kenya towns of Nakuru, Eldoret and Kisumu totaling to about 1,804km.
- Retail networks: Kenya has over 2,762 retail stations. The stations are classified as Tier 1, 2, 3 and 4 depending on land area, services offered and storage capacity.

### **1.1.1 LPG Import and Storage**

Kenya imports all its LPG requirements following the closure of the Kenya Petroleum Refineries (KPRL) in 2013. LPG is mainly imported from Iran, Mozambique, Qatar, USA and Russia as shown below

Country	Percentage 2016 Import Volumes
Iran	27%
Mozambique	22%
Qatar	13%
USA	13%
Russia	10%
Algeria	4%
Mauritius	3%
Oman	2%
UAE	1%
Tanzania	1%
Others	4%

#### Table 1-1: The 2016 LPG import sources to Kenya

(Source: Kenya Revenue Authority)

Although the imports are mainly through the port of Mombasa, information from Kenya Revenue Authority indicates that there is a growth of imports from Tanzania into the country via road. In 2017, the imports from Tanzania were 6.24% with this figure expected to have gone higher in 2018/19 as legal compliance on imports declaration has improved.

The LPG import facilities are located in Mombasa and comprises of the following

Introduction

- AGOL Facilities-The AGOL imports LPG via a Single Buoy Mooring Jetty (SBM) owned by Kenya Ports Authority (KPA) but operated by AGOL. The anchorage is situated in Port Reitz west of KOT and has draft of 11.3 meters of water. The anchorage/discharge fees payable to KPA is about US\$22 per ton. The KPA discharge pipeline terminates at the shore where a Common User Manifold is situated for pipeline connection by marketers. AGOL pipeline connects to a storage capacity of 20,500 MT with sufficient capacity for truck loading. The terminal is located adjacent to the SGR but is currently not connected to the rail system.
- SOT Facilities: -The Shimanzi Oil Terminal (SOT) is a common user jetty owned by KPA and can accept tankers of up to 30,000 MT DWT. However, the combined onshore LPG import storage capacity at SOT is about 960 MT (owned by marketing companies). When complimented by other connected storage at Changamwe (Hashi with 350MT, and Kenya Petroleum Refineries Limited (KPRL) with 1,250 MT, the maximum total available capacity that can receive imports at SOT is about 2,610MT.

MOMBASA IMPORT STORAGE		
COMPANY	STORAGE CAPACITY (M.T.)	Import facility
AGOL	20,500	AGOL
LIBYA OIL	200	SOT
SHELL	520	SOT
TOTAL	240	SOT
HASHI	400	Connected to SOT
KPRL	1,250	Connected to SOT
TOTAL	23,110	

#### Table 1-2: Summary of Mombasa LPG Import facilities

(Source: PIEA& Various industry sources)

- New Kipevu Oil Terminal (KOT) KPA is constructing a new petroleum jetty at Kipevu area of the port. The jetty will include a dedicated LPG receiving pipeline (24-inch diameter) with a common user manifold for importers to connect to. There is an existing pipeline wayleave from this jetty that connects to the KPRL facility at Changamwe.
- Proposed LPG Import Storage Facility at KPRL The government had planned that KPC constructs a 24-inch pipeline from the new jetty at KOT to the KPRL site together with a 20,000 MT LPG common user import storage facility (that was to be enhanced to 50,000 MT in future). However, this plan appears to have changed whereby the government now appears to prefer a PPP investment between the government owned KPRL and a private investor. The modalities for such a plan have however not been articulated.
- The PPP project would essentially involve a common user LPG import receiving and storage facility, with truck loading facilities and potential for connection to SGR for transportation inland. The project revenues would accrue from a tariff approved by the regulator, EPRA. The proposed project by OLA Energy is a PPP.

Introduction

### 1.1.2 LPG distribution in Kenya

Nearly 90% of Kenya LPG demands and all export demand are located inland, and these must be transported to inland secondary storage facilities.

- Road: -Transportation of LPG from Mombasa import facilities to the storage depots inland is currently 100% by road. All the import storage facilities in Mombasa load trucks apart from KPRL, which acts as a temporary storage for LPG transfers to the marketers' depots at SOT and Changamwe.
- Rail: Although the old meter gauge railway (MGR) from Mombasa to Nairobi is no longer serviceable, there are plans to revive Nanyuki-Nairobi railway by KRC for oil marketers to transport petroleum products using railway line. Additionally, there is a government policy being implanted for the oil marketers to use the new Standard Gauge Rail (SGR) for all imported cargo haulage between Mombasa and Nairobi.

The main petroleum (including LPG) inland storage depots have historically been at Nairobi, Nakuru, Eldoret and Kisumu. However, other newer and significant LPG demand centres have emerged, and new LPG storage and filling facilities have come up in these areas. These are investments by the newer and smaller market entrants, and these have significantly improved LPG distribution capacity, economics, and consumer access filling is now nearer the LPG demand centres.

About 70% of LPG marketed in Kenya is used in the retail household segment, mainly in cylinders. The balance 30% is used in institutions (hotels, restaurants, schools, hospitals etc.) and for industrial manufacturing and is mostly in bulk. The cylinders in the retail market comprise of 1kg, 3kg, 6kg and 13kg. The 6kg and 13kg account for about 95% of all the cylinders in the market, with the 6kg mostly used by the lower income segment.

## **1.2** Motivation for the Project

According to a Kenya Market research by Global Alliance for Clean Cookstoves (GACC), 87% of Kenyans use solid fuels as their primary fuel source for cooking while 5% use kerosene as a primary fuel. The heavy reliance on inefficient traditional biomass sources exacerbates forest degradation and climate change, and has detrimental impacts on health and poverty in Kenya. (Clean cooking alliance, 2013) .The research further indicates that

- Over 15,000 Kenyans die annually due to exposure to household air pollution from burning solid fuels
- >40% of childhood deaths are related to respiratory illness due to exposure to kerosene, wood and charcoal smoke
- Average Kenyan household of 4 family members emits 1.2 tons of CO<sub>2</sub> per year
- Kenya has experienced regional deforestation and degradation, with an overall 5% decline in its forest area since 1990

To deal with the problem, Kenya's government set a long-term goal of having 42 percent of households adopt clean cooking fuels. The goal was embedded in Kenya's Vision 2030 Second Medium-Term Plan (2013–17) in alignment with the SE4All country action agenda. Liquefied petroleum gas (LPG) was to contribute 35 percent, biofuels 5 percent, and electricity 2 percent. Additionally, the Government of Kenya through the Energy Policy

(2014) is committed to enhance consumption of LPG, being an environmentally friendly and economic modern fuel by: -

- Constructing import handling, storage, and distribution facilities.
- Providing fiscal incentives on LPG and related appliances; and
- Encouraging private sector investment in additional capacity for handling and storage of LPG.

The key policy drivers are both environmental and health concerns. Increased use of LPG will reduce use of biomass (wood and charcoal) fuels and will reduce harmful indoor emissions (which cause respiratory diseases) from both biomass and kerosene use in domestic heating and cooking.

Government policies and strategies have therefore focused on increased availability and affordability of LPG, with special attention to LPG supply chain infrastructure, and enhanced regulatory systems to ensure fair market competition.

The Ministry of Petroleum and Mining held a National Stakeholders Forum in May 2016 which made the following key recommendation to reform the LPG sector and increase LPG availability and affordability:

i) To increase the overall LPG per capita consumption to 15 kg by 2030. In 2019 the per capita demand stood at about 5.1 Kg (244,000 MT demand over a population of 47.6 Million). The share of household energy attributed to firewood and charcoal currently stands at 79% with LPG share at about 1.0%.



Figure 1-1: Household Energy Consumption -2018

(Source: Economic Survey 2019)

- ii) To enhance LPG supply chain and infrastructure including:
  - a. Increase imports storage from 20,00MT in the medium term to 50,000MT in the longer term;
  - b. Preferably the new import storage capacity should be licensed and operated as common user facilities;
  - c. Target joint LPG importation by all marketers though an Open Tender System (OTS);

- d. Construct and commission a dedicated LPG import line at the new petroleum jetty in Mombasa;
- e. Increase inland storage at Nairobi, Nakuru, Kisumu, Eldoret and Sagana; and
- f. Increased use of rail transportation for primary transportation of LPG.
- iii) Implement Effective LPG regulations to ensure fair market competition and a high level of safety compliance.
- iv) To encourage development of reticulated LPG systems for gated communities

The demand of LPG in the retail market has largely been constrained due to affordability and accessibility of LPG. The major cause for this has been lack of adequate LPG infrastructure and expensive imports. However, if most of the above Government strategies are implemented, LPG will be more accessible and affordable. OLA energy intends to contribute positively to the Government's LPG strategy by expanding their 550MT LPG terminal at Shimanzi area in Mombasa County. The terminal is intended to enhance the country's storage capacity by erecting mounded sphere tanks with a total capacity of 14,500 metric tonnes, increasing product receipt flow rate from SOT (and in future KOT) thus reducing the demurrage cost and connecting to the rail system which will enhance distribution of the LPG within the country.

## **1.3 Project Background**

OLA Energy is one of the leading downstream petroleum companies with operations in 17 African countries comprising of over 1,200 service stations, 8 blending plants over 60 fuel terminals and presence in over 50 Airports. The firm operations Headquarters are in Dubai which oversees the operations of the 17 consolidated subsidiaries in Africa.

OLA Energy started operations in Kenya in 1956 as Standard Vacuum Oil which later changed to ESSO East Africa in 1962. In 1967 ESSO East Africa became ESSO Standard Kenya and later ESSO Kenya Ltd in 1985. In 1996 Esso Kenya was acquired by Mobil Oil and Mobil Oil Kenya was formed in 1997 which operated up to 2006 when it was acquired by Tamoil Africa and traded in Kenya as Tamoil Kenya Ltd, later the following year (2007) Tamoil changed the brand name to Oil Libya and finally to Oil Libya Africa (OLA) Energy Kenya Limited in 2018.

OLA Energy Kenya Limited is among the top five companies in downstream petroleum sector in Kenya and they own and operate terminals, depots, and service stations all over the country. The following is a summary of OLA energy operations in Kenya

OLA Facility	Location	Details
Fuel Depot	Mombasa, Shimanzi area	With a capacity of 550 MT and connected to Shimanzi Oil Terminal
	Nairobi, Industrial area	Connected to KPC, pump station 10
	Eldoret	Not operational

OLA Facility	Location	Details
LPG storage plant	Shimanzi Mombasa	550 MT with a filling plant
	Nairobi Industrial area	100Mt with a filling plant
	Eldoret	100MT with a filling plant
Lubes warehouse	Mombasa, Shimanzi	a blending plant and a warehouse
	Nairobi	warehouse
	Eldoret	warehouse
Service stations	Located in all major urban areas and along major highways	At the time of this study there were 96 service stations in Kenya run by the dealers

The proposed expansion of the LPG terminal will be undertaken by OLA Energy Kenya with the support of OLA Energy Operations Headquarters in Dubai and OLA Holdings Ltd. OLA Energy Kenya has engaged Kurrent Technologies Ltd to undertake Front End Engineering Design (FEED), prepare tender documents, acquire construction permits including EIA license and undertake tendering process. The project will be implemented through an Engineering, Procurement and Construction (EPC) contractor.

## **1.4** Approach of the ESIA Processes

## **1.4.1** Summary of the ESIA process

In April 2019, the Cabinet Secretary for Environment and Forestry on the advice of National Environment and Management Authority (NEMA) amended the second schedule of the Environmental Management Act, 1999. The amendment was through LN 31 on classification of projects (low, medium and high risk) and LN 32 on undertaking the ESIA for low and medium risk projects. The proposed project is a high-risk project.

NEMA issued a public notice dated March 2020 on processing of Environmental Impact Assessment Reports. The notice stated that for high-risk projects, the ESIA Study shall be conducted in accordance with the general environmental impact assessment guidelines as provided by Part III of the Environmental (Impact Assessment and Audit) Regulations, 2003. The guidelines require an ESIA Terms of Reference to be prepared and submitted to NEMA for approval after which an ESIA study is undertaken and Study Report submitted to NEMA.

This ESIA has been undertaken based on available information and data out of which a study report (SR) has been prepared for submission to the NEMA for consideration. An appraisal of the current baseline status of the project area and the anticipated impacts, mitigation measures as well as development of an environmental and social management plan is the focus of the assignment.

The ESIA work comprise of specialist environmental studies which are targeted to the potential significant impacts likely to be experienced as a result of the proposed

development. Each topic is included as a separate section in the main body of this ESIA Study report or included as an appendix.

Kurrent Technologies Ltd prepared and submitted the TOR for the ESIA which was approved by NEMA on 17th August 2020 and is currently carrying out the ESIA study.

## **1.5 Report Structure**

The structure of the ESIA Study is summarized below.

Volume 1: ESIA Study

- Section 1: Introduction
- Section 2: Description of the Project
- Section 3: Assumptions and Limitations
- Section 4: Project Alternatives
- Section 5: Legal and regulatory framework
- Section 6: Social and Environmental baseline Information
- Section 7: Stakeholder Engagement Process
- Section 8: Impact Assessment Methodology
- Section 9: Impact Assessment
- Section 10: Cumulative Impact Assessment
- Section 11: Environmental and Social management Plan
- Section 12: Conclusion
- Section 13: References

Volume II: Appendices

# 2 Description of the project

## 2.1 Location of the project

The proposed project will be located at the OLA Energy's site along Kismayu Road off Makande Road in Shimanzi area, Mombasa County. The general site coordinates are Latitude 4° 2'26.20"S and Longitude 39°38'51.35"E. The proposed project site immediate neighbours include Makupa Transit shade CFS, Total GAPCO Terminal 1, KPA Estate, Solvochem East Africa, East African Terminals, OLA Energy Terminal and AA Transporters as shown in Figure 2-1and Figure 2-2

The project will be established on three plots of land leased by OEKE from Kenya ports authority and the plot details are as follows

Plot Number	Area in Ha
Block 1/318	0.407
Block 1/109	1.932
Block 1/253	3.47

# 2.2 Project Components

The proposed project will consist of LPG intake pipelines from both SOT and the proposed KOT's Common User Manifold, storage tanks, loading facilities, weigh bridge and control room/office. The LPG will be delivered to the site by ship and transferred into storage spheres and later loaded into trucks and RTCs for distribution with Kenya and other countries.

The project activities will comprise of Front-End Engineering Design (FEED), tendering, dismantling and disposal of existing bush tanks, site preparations, construction, commissioning and operation of mounded tank LPG terminal and its associated infrastructure. A local contractor and EPC contractor will be identified and engaged to undertake the construction work which is estimated to take 18 months.

In summary the proposed project will consists of the following components

- an approximately 600m long and access road from Kismayu road
- 6 mounded LPG sphere tanks with a total capacity of 14500MT and the associated pipelines
- 4 truck loading racks
- 6 Rail Tank Carriers (RTC) loading bays
- 12-inch delivery line from SOT and from the proposed KOT's common user Manifold
- Firefighting water tank (2500m<sup>3</sup>), pump house and pipe network

- Weigh bridge for trucks
- Administration, utility and security buildings

#### Figure 2-1: Google Earth Image showing the Project site and a Pipeline route to KOT



Description of the project





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Description of the project



Figure 2-3: Computer Rendered Image of the proposed project showing the project components

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Description of the project





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Description of the project

## 2.3 Study Area and Area of Influence (AoI) for the ESIA

The study area for this Environmental Social Impact Assessment (ESIA) is shown in Figure 2-4 above. The study area is generally 3 km radius from the project site to the furthest end and 1km to the shortest end and is within Shimanzi KPA and Shimanzi Railways villages.

The ESIA study area is mainly associated with areas that could be affected by the potential impacts that could arise from the project site's activities.

The Area of Influence (AOI) for the SIA covers 120 km radius to Malindi subcounty and Mazeras from project site and includes:

 a) Source of construction materials such as ballast, stone, cement etc.; Construction materials may be sourced from as far as Marafa in Malindi sub county and Mazeras. Subsequently, for the purposes of this SIA study, the project area of influence is shown in Figure 2-5 below



Figure 2-5: Project area of influence (AOI)

# 2.4 Decommissioning of the existing structures

## 2.4.1 Existing structures

As indicated in section 2.1 above, the proposed project will be established on three parcels of land with a total area of 5.8 ha and leased from KPA. The site has several existing structures that will be decommissioned, dismantled, and demolished to create adequate space for the proposed project. The following are the pictures of the existing structures.

Figure 2-6: Decommissioned Bush tanks



Figure 2-8: LPG Plant pipe network







Figure 2-9: Pipeline to SOT



Description of the project



Figure 2-12: Office building





Figure 2-13: Weigh bridge



## 2.4.2 Dismantling and Demolition process

OEKE plans to decommission and demolish the existing LPG plant, dismantle and demolish the bush tanks and the associated structures to create a space for the proposed marine LPG terminal. The following is a description of the dismantling and demolition process to be undertaken.

### 2.4.2.1 Structure and equipment

The LPG plant will be decommissioned where LPG receiving, storage and cylinder filling activities will be stopped. Equipment like generator, filling equipment, firefighting equipment, electrical equipment, valves and metering units will be removed from the site. The bush tanks, bullets tanks and pipes will be dismantled, while concrete substructures and superstructures will be demolished.

### 2.4.2.2 Piping

Surface pipelines will be back-flushed with water to their respective tanks or vessels. Air may be pumped into pipelines to flush residual fluids and to maintain pipeline atmospheres below 25 percent of the LEL. Connections, manifolds, and valves will be removed to expose the lines to the atmosphere. Pipelines, saddles, cribbing, vent pipes, and related appurtenances associated with the facility will be removed in manageable sections. Cutting

#### Description of the project

will be completed with oxy-acetylene torches or hydraulic pincers. The materials removed will be stored on site in a designated area(s) or sorted in bins based on material types, as required by the recycling/disposal facilities. Caution will be exercised, and containment measures employed, to products remaining in the lines prior to removal. Where surface piping extends underground, the piping will be excavated approximately 10 to 20 feet along the run to a depth of not greater than 2.5 feet. The pipe will be removed at a joint, or cut, as appropriate. If the surface piping extends underground and exits within 30 feet of that point, the piping may be cut at the exit point and pulled for removal, as practical. Some underground pipelines may be removed if it is determined to be more practical and cost effective than grouting in place. Pipeline excavation will remain open and marked with a barricade to allow for later grouting.

#### 2.4.2.3 LPG Bullets and Bush tanks

OEKE will cease all the operations of the LPG plant which include receiving, storage and filling of the cylinder. The bullet tanks will then be drained by a competent person by fully opening the drain valve and taking care that to prevent escape of the LPG to the surrounding. The pipe will then be purged using inert gas or water all the way from SOT to the depot until the LPG content is reduced to less than 4%. Continuous monitoring of the LPG will be done at the site to ensure that no flammable vapours are generated. The bullets and the associated pipelines will be isolated from any process or equipment, by disconnecting and removing adjoining pipework. The bullet tanks will then be unmounted from the tanks saddles and then transported to other OEKE sites for further use.



Figure 2-14: A typical image of an LPG bullet tank being dismantled

Access way will be made to the bush tanks for the construction equipment. The tank interiors will be steam cleaned or pressure washed, as necessary. Any residual fluids will be removed by vacuum truck and transported to a NEMA designated and County permitted disposal/recycling facility. Tank atmosphere will be monitored with an LEL meter. The tanks will be opened utilizing oxy-acetylene torches and cut into manageable sizes utilizing mechanical pincers, with LEL readings verified by the PM/SSO, or a designated

#### Description of the project

representative. Tank atmosphere monitoring with the LEL will continue until interiors are exposed.

The tanks will be collapsed inward, within the existing footprint to minimize impact to the surrounding area. Excavators will remove and place the scrap into dump or end-dump trucks for transport to the on-site metal stockpiled for later disposal. Excavator and truck movement will be minimized to limit impact within and outside of the tank farm.



#### Figure 2-15: A typical image of a tank being dismantled

#### 2.4.2.4 Filling plant and buildings

The filling plant will be demolished using a combination of hand tools and an excavator or a loader fitted with various attachments like excavator buckets, boom-mounted hydraulic percussion breakers and pusher arm equipment for demolition work. The structure will be pushed over in stages by a horizontal force from the machine. An arm will be fitted to the lower boom instead of a bucket. The arm will be extended forward against the facing wall and the force of the excavator pressing forward will provide the required push.

For safe demolition process, the contractor will:

- Ensure that the site has been secured safely to prevent unintentional entry by unauthorized personnel during demolition;
- Work from outside the building, and will not allow entry into the building while plant is wrecking the building.
- Be sure that the operator has been trained in the work, or is being instructed by a trained person.
- Use hand demolition to get the building to a level where pushing can start.
- Separate the building from any attached buildings using hand methods.
- Make sure that debris does not build up too high against the walls: this may push the wall onto the machine.

#### 2.4.2.5 Railway siding

The contractor will identify all the underground services near the railway siding and excavate to expose all the railway sleepers and the connections. The steel rail and timber sleepers /connections will be unbolted and dismantled. The railway materials will be reused and the worn-out materials will be surrendered to Kenya railways in Mombasa.

#### 2.4.2.6 Inspection chambers

The existing storm water drainage inspection chambers and the corresponding drainage system will be demolished and disposed of in a suitable and approved location.

#### 2.4.2.7 Weighbridge and Miscellaneous Material Removal

Weigh bridge, concrete foundation and support pads will be broken into manageable size pieces using a backhoe-mounted hoe ram and stockpiled on site for later disposal. Remaining debris will be collected and sorted into corresponding stockpiles.

#### 2.4.2.8 Transportation

Truckloads for metal recycling are estimated based on a maximum truck bed size of 8 feet wide by 40 feet long by 8 feet high and a net load of 21 tons. Low bed trucks and tippers will be used to transport the waste from the site. Appropriate transport management will be required to effectively and safely manage movements of trucks in and out of the site.

## 2.5 **Overview of the construction activities**

The proposed project is one of its kind in the country and will be implemented largely by a qualified EPC contractor. Demolition, site preparation and construction of general buildings will be undertaken by a qualified local contractor. At the time of this study, detailed engineering design for the project had not been done. Therefore, the information in this subsection is based on the details from, pre-feasibility study and FEED for the project and desktop study on construction processes of similar projects.

### 2.5.1.1 Construction of the Site Access

After demolition activities, the local contractor will construct a 4.5m wide and 600 m long access road connecting the proposed terminal site with Kismayu Road. The construction of the road will involve cut and fill activities using an excavator, sub grading of gravel, laying of a hardcore, filling with graded crashed stones and concrete paving or tarmacking. The road will have a drainage connected to the site drain for the surface runoff.

### 2.5.1.2 Site clearance and Mobilization

Site preparation activities will include removal of the vegetation and topsoil up to a depth of 150mm. Approximately 2 Ha of vegetation consisting of mainly grass and shrubs will be cleared from the bush tank area and approximately 60,000m<sup>3</sup> of top soil will be removed. This work would include the use of, diesel powered equipment such as scrapers, bulldozers, dump trucks, and front-end loaders. The site preparation work would provide necessary grading for the site structures during construction.

Site mobilization activities would include the delivery and setup of site office, stores, equipment yard and installation of construction utilities (water, power and sanitary facilities) and security facilities (guardhouse, CCTV cameras etc.). Sufficient site facilities to cater for approximately 150 workers will be mobilized to the site and site clearance.

Earth and rock materials would be used during site preparation and throughout the construction process. The potential offsite borrow area for sand will most likely be Marafa in Malindi, gravel and aggregate materials will be sourced from Mazeras area. The earth and rock materials would likely be transported to the place of use by trucks.

Description of the project



Figure 2-16: a typical image of soil stripping during site preparations

### 2.5.1.3 Ground levelling and retaining walls

Ground leveling is the process of modifying the surface relief by smoothening it. It will be achieved at the project site by cut and fill where soil will be excavated and spread from higher elevations to lower elevations then flattened and compacted. The entire construction area will be levelled to the required level before any excavation work. Where the access road will be located, a layer of gravel (approximately 300mm) will be laid on the surface followed by layer of hardcore (approximately 300mm) to achieve the load bearing capacity. Earth moving equipment including excavators, bulldozers, tippers, and graders will be used as will as survey equipment will be used to achieve the required ground levels.

A retaining wall will be constructed around the project site to provide a damping layer to the existing soil embankment and surrounding substructures from the vibration effects during construction. The height of the retaining walls will vary from a maximum of 6m to minimum of 2m and will have an average thickness of 400mm. The construction of the retaining wall will involve use of Excavators, backhoes and concrete mixers and manual activities.

Description of the project



Figure 2-17: Typical grading of a construction site

#### 2.5.1.4 Construction of the substructures

The substructures are the lower part of a buildings that are built to support superstructures.

The substructures in the proposed project will include:

- Deep foundation -The mounded tanks will require deep foundation to ensure structure stability based on the soil condition of the area. Piles will be drilled to provide deep foundation of the tanks. During the FEED of the project, it was estimated that piles will be drilled to a depth of 12m.
- Shallow foundation-This will be the foundation for the retaining wall, buildings, loading structures and piping structures. It is estimated that the foundation will go to a maximum depth of 2.4m.

#### 2.5.1.5 Construction of the Superstructures.

Superstructures in construction are the structures above the ground, in the case of the proposed project they include

### 2.5.1.5.1 Storage Tanks

Six mounded spheres with a total capacity of 30,000M<sup>3</sup> (equivalent to 14,500 MT) will be erected. The spheres will be mounted on a concrete ring support and will have double walls an internal diameter of 17.89m and an external diameter of 18.01 m. The thickness of the inner plates will be determined during detailed design by the EPC. The space between the two walls will be fitted with leak detectors. The outer shell will be used to protect the sphere from mounding weight and rust. The thickness of the outer wall will be determined by the EPC.

The spheres, which will be fabricated at the site, will involve sizable assembly and welding activities which will require use of lifting plants and welding equipment.

Description of the project





The six tanks will have a concrete cylindrical mound with a diameter of 20.7 m and a height of 21.5m. The outer wall of the mound will be made from reinforced concrete and will have a thickness of 0.35m while the inner wall will be used as a sphere support and will have a thickness of 0.60 m. The space between the mound and the sphere will be filled with sand, it is estimated that each tank will require 8000 MT of sand. (the total amount of sand required to fill the mound for the six tanks is estimated to be 48000 MT). The sand will be delivered to the site by 20T trucks while the concrete will be mixed either at the site by establishing a mixing plant or from Cement factories within Mombasa and delivered to the site by 20MT concrete ready-mix trucks.

Description of the project



Figure 2-19: Typical construction of reinforced concrete mounded wall

Each of the storage tanks will be fitted with the following

- Flanged inlet and outlet connections.
- Flanged manholes (with mechanical handling facilities) on the top and the bottom of the tank.
- Internal piping for liquid inlet.
- Motorised valves (air driven) on all main inlet and outlet connections.
- Excess flow valves and backpressure check valves on main liquid inlet and outlet connections.
- Internal Whessoe type valve on product outlet nozzle
- Pressure relief facilities with 100% spare capacity to enable testing and removal of a valve whilst the tank remains operational. Mechanical handling facilities are required for these valves.
- Automated tank gauging system (with averaging temperature recording).
- Independent high and high-high level alarm systems
- Pressure transmitter at bottom and top of the spheres of tank

Description of the project

- Stilling wells for tank gauging, in accordance with the requirements of the equipment/system suppliers.
- Water draw off connection with valve, piping and drain pot

#### 2.5.1.5.2 Pumping and loading facilities

Pump shed composing of a steel frame will be erected adjacent to the tank farm. The shed will be 20m long, 7.8m wide and 3m high and will have corrugated iron sheets roof. According the FEED of the proposed project, 6 pumps and 2 compressors will be installed in the pump shed.

Four loading bays will be installed; one equipped with a vapour and a liquid arm (for loading and unloading operations), three equipped only with a liquid arm (for loading operations only). Gas, fire detectors and emergency shut down (ESD) button will be installed at the pumping area.

An area for 6 RTC with 3 loading arms equipped with a vapour and a liquid arm (for loading and unloading operations), will be installed in the area, to have the capacity to load/unload 3 RTC at the same time.

According to the basis of design for the proposed project, there will be 1 pump for each loading bay plus 1 spare pump capable of serving any loading bay. A loading pump for RTCs loading will also be located in the pumps shed. The compressors will be used for truck unloading, vapour transferring and, exceptionally, to decompress trucks if needed. The compressors can be also used for tank decommissioning.

#### 2.5.1.5.3 Firefighting system

The following firefighting structures will be constructed/installed

- An 8 inch diameter ring-main fire water network will be supplying water to all the operational areas.
- Three diesel engine driven firewater pumps specified for soft water sand with individual diesel fuel storage for each pump.
- One electrically driven jockey pump will keep the firefighting water network always pressurized to have water immediately available in case of emergency.
- A deluge system will be installed over the four-truck loading/unloading bays, and over the RTC loading/unloading area. It will be designed for a rate of 10,20 l/min/m<sup>2</sup> on loading bay areas.
- A deluge system will also be installed over the pumping station (pumps & compressor area). It will be designed for a rate of 15,10 l/min/m<sup>2</sup> of ground area.
- Manually operated fire hydrants and water cannons (monitors) will be installed in particular locations over the plant (see drawings).
- A water storage tank with a storage capacity of 2,500m<sup>3</sup> will give 4 h autonomy to the installation

#### 2.5.1.5.4 Delivery line from SOT and KOT

A new pipeline will be designed to replace the existing pipeline between SOT and the existing OLA Depot as well as extend to the future tie-in points at the proposed Common User Manifold (CUM) at Kipevu. The pipeline routing exercise was undertaken to assess the existing route to ensure suitability, constructability and safety of the pipeline.

Pipe route from both SOT and KOT has been established during FEED and feasibility studies. A 1km, 12-inch pipeline will be constructed to SOT replacing the existing 4 inch and a similar 2.5km pipeline will be extended to the proposed KPA's Common User Manifold near Kipevu Oil Terminal. The pipelines will use the existing ROW.

During construction minimal clearing of the ROW will be required since there are other existing product lines. Some sections of the pipe will be buried while some will be supported on the ground surface. The pipeline to KOT will cross two roads, railway trucks and the sea where sufficient safety measures will be required especially during construction. The main construction activities for the pipeline will include clearing the ROW, excavating the trenches, establishing the ground pipe support, pipe transport, pipe lifting, stringing and pipe assembly, testing and ground restoration.

#### 2.5.1.5.5 Railway siding

The proposed project will involve relocating the existing meter gauge railway siding from the current location towards the proposed location of the Rail Track Car loading facility. The relocation activities will be including establishing a strong foundation, ballasting and alignment of the path, laying the sleepers and rail and installing the required rail control and safety components.

#### 2.5.1.5.6 Auxiliary Buildings and weigh bridge

The following buildings will be constructed to support the operation of the proposed terminal:

- Administration building
- Water pump house
- Generator room
- Canteen
- Security office
- Weigh bridge

#### 2.5.1.5.7 Utilities installations

Facilities for the following utilities will be installed at the site:

- Power installation
- Instrumentation
- Water supply
- Site drainage
- Service manholes

#### 2.5.1.6 Construction Waste management

During construction of the proposed project, waste will mainly be produced from dismantling and decommissioning of the existing structures and land clearing activities. The waste includes LPG bullet tanks, LPG filling plant, pipes and associated fittings, dismantled metal plates, electric cables, concrete and masonry stones, reinforcement rods, vegetation waste, human waste, construction material packaging, domestic and office waste.

Wastes generated during construction activities would be recycled to the extent practical. Any non-recycled wastes would be collected and disposed of at the onsite solid waste disposal facility or transported to a NEMA or County approved disposal facility, as

applicable. The different types of wastes will be transported using waste handlers that are licensed by NEMA.

#### 2.5.1.7 Safety, fire protection and emergency response

Shimanzi area where the proposed project will be located is characterized by depots and terminals for Petroleum oil, vegetable oil and petrochemicals most of which are highly flammable. The EPC and the local contractors will be required to have comprehensive EHS management systems that will be aligned with OEKE's to ensure effective and proactivity in incidents prevention at Shimanzi. OEKE will be required to retain continuous consultation with other Shimanzi Terminal Users in-order to collectively plan for the construction activities that can potentially affect other operators within the area.

- During the construction phase, the Contractor will comply with all applicable requirements of the Occupational Safety and Health Act 2007 (OSHA) and its subsidiary legislation especially Legal Notice 40 of 1984 titled "The Building Operations and Works of Engineering Construction (BOWEC) Rules".
- Employees and contractors would be required to report all safety-related incidents, including accidents or injuries, to a designated project representative. Corrective action would be taken as necessary based on the nature of the reported incident.
- On fire safety and as a minimum, the contractor will comply with all applicable requirements of Legal Notice 59 of 2007 titled "The Factories and Other Places of Work (Fire Risk Reduction) Rules.
- Employees and contractors would be advised of their responsibilities under the above regulation and be required to report any project-related fire to a designated project representative. If a project-related fire were to occur, immediate actions would be taken by the contractor to respond to the fire.
- Contingency planning contacts would include the contractor's construction manager, the County OSH officer, and the local County fire department.

## 2.6 Operation phase

## 2.6.1 Terminal Operation

The proposed project is a bulk LPG terminal which will receive product from the LPG vessels docking at both SOT and the proposed KOT. The terminal will be designed to handle issuing vessels with a capacity up to 30,000MT. For the vessels at SOT, the product will be pumped through the 12-inch pipeline directly to the terminal, but for the vessels at KOT the product will go through KPA's Beach Valve Station (BVS) and Common User Manifold (CUM) where OLA and other Oil Marketers will tie-in to receive the product. The product will be stored in the mounded tanks and there will be facilities to load the product to the 4 trucks and 6 rail wagons at a go.

### 2.6.1.1 LPG Storage

The terminal will be designed to allow these operations:

- Receiving product from the ship at SOT and KOT
- Loading the trucks and rail wagons
- Unloading the trucks and wagons (limited operation)

- Transferring product (liquid and vapour) between tanks
- Recirculating product in the same tank, for product mixing

Pressure design of the spheres is 15 bars and all the LPG system will be rated for propane use. The compressors will be used for truck unloading, vapour transferring and, exceptionally, to decompress trucks if needed.



Figure 2-20: Typical mounded spheres for LPG storage

### 2.6.1.2 LPG loading

Four pumps will be used for trucks loading, they will be designed to load 1 truck in approximately 45 min with a flow rate of 60 m3/h. One pump will be designed to load 1 rail wagon in approximately 45 min and will have a flow rate of 100 m3/h. There will be a spare pump designed for trucks loading and RTC loading with a flow rate of 100 m3/h. Automatic sequences in the loading management system will control the start-up of the pumps and the operation of the loading flow rates. Loading pumps will be centrifugal. Truck loading pumps will be directed to a common manifold but RTC loading pump will not be connected to the common manifold.

The compressor will be used for unloading a truck and RTC, they will be designed to unload 1 truck of 24 tons in about 40 minutes. The gas compressor will transfer LPG vapour from the vapour phase of the storage vessel and pressurize the truck to be unloaded. The increase of pressure in the truck will cause the liquid LPG to be transferred from the truck to the storage vessel. The outlet flow rate will be about 80 m3/h. Compressors will also be used for transfer of product in vapour phase between tanks, when required. The compressor will be installed in the pumping area.

The loading facilities will be designed for semi-automatic functioning with the intervention of a terminal loading operator to minimize human error. Gas, fire detectors and ESD button will be installed in pumping area.

Description of the project



Figure 2-21: Typical truck loading shed for LPG

Figure 2-22: Typical Rail Tank Carrier


### 2.6.1.3 Traffic Management

The terminal will have the capacity accommodate eight trucks at a go where four will be loading, 2 clearing with the tax and logistic office and the remaining 2 at the loading queue. OLA energy will apply on-call truck management system where trucks visiting the terminal will be parked at the common parking yard for Shimanzi Oil users and controlled number of trucks will be cleared for loading to avoid road congestion along Shimanzi Road and Kismayu Road.



### Figure 2-23: Truck traffic at Kismayu Road, near the project site

### 2.6.1.4 Noise

All LPG pipeline facilities for this project will be designed to the requirements of ISO 15664: 2001 E. All machinery and other noise emitters will comply with exposure limits of the workforce and a weighted basis as per the standard. The following measures will be implemented to prevent operational noise from affecting third party receptors.

- Rotating machinery All rotating machinery is purchased against a noise data sheet which will be required to specify a noise level of 85 dB(A) at a distance of 1m from the machinery (L.N. 25: Noise Prevention and Control Rules, 2005). If this level cannot be met then the noise level will be mitigated through the installation of a local acoustic enclosure or housing the equipment in a suitable building.
- Transport and other equipment should the project site require the regular use of road transport; special measures will be implemented to control traffic movements to regular working (daylight) hours. Where considered necessary, the site will be screened by artificial constructions with suitable coverings. Remedial measures will include the use of buildings or acoustic enclosures. Where individual items of equipment or operations cannot meet the stringent

requirements of the open plant design, the noise shall be mitigated by use of silencers, acoustic enclosures, buildings or screening. The overall noise specification at the facility fence shall not be exceeded under any circumstances.

 Personnel Protection - The following noise limits shall apply indoors in order to keep any disturbance of normal working activities within acceptable proportions. All facilities are to be designed to limit an unprotected operator to a maximum of 85 dB(A) 8-hour average weighted exposure. Where the noise level exceeds this limit, relevant areas must be restricted. The most stringent noise limits shall be determined by the requirements of Kenyan national or local regulations. In the absence of such regulations, the requirements of ISO 11690/1 and other relevant international standards shall be mandated. The final applicable noise limits shall be stated in the project design

### 2.6.1.5 Electricity requirements

Kenya Power and Lighting Company (KPLC) will supply the required electricity directly via a transmission line. This line will supply power to on-site facilities, including the feed pumps, the CUM and control room. The total electricity requirement is will be determined during the detailed engineering design phase of the project however provision will be made with KPLC for electrical infrastructure being of standard size.

### 2.6.1.6 Sewage, waste, and storm water runoff

During operation, sewerage and waste will be dealt with in accordance with the LN 121, LN 120 of EMCA and county councils of Mombasa by-laws. The truck and wagon loading areas will be provided with a closed system drain where the water will be treated prior to release.

### 2.6.1.7 Security management

Due to the high value and hazards of the product being stored, security measures will be stringent during the operation of the LPG storage facility. On-site security of the premises will be engaged to maximize safety.

### 2.6.1.8 Staffing requirements

Job opportunities will be generated through the operation of the LPG storage facility. Both skilled and unskilled labor will be required in technical fields as well as in terminal operations and management. There will be fewer jobs in the operational phase than the construction phase, but employment will be long-term. The terminal will be manned by a minimum of 25 people, some of whom will be managerial and administrative staff. There will also be a dedicated maintenance team for the LPG pipelines and other associated infrastructure. Local people will be employed wherever possible.

## 2.6.2 Automation and Safety

### 2.6.2.1 Automation

Besides the management of product reception and movements, the automation of the proposed project operation will be limited to the sequences managed by the control system:

- Start-up of the pumps and compressors during truck loading / unloading,
- Control of loaded quantities with pre-setting of load size,

Most of the operations will be done manually such as aligning system valves, connecting the loading arms, etc. Electrical interlocks will be provided to ensure safe operations. Alarms and trips (equipment stopping, etc.) will also secure the critical operations.

### 2.6.2.2 Safety

- The proposed terminal shall be designed with respect to International and Kenyan standards for LPG in order to facilitate safe and efficient operation, ensure the security of people, equipment and the environment and handle emergency cases.
- The lay-out of the main operations areas have been studied for ease of operation and maintenance.
- Access areas will be as free of obstacles as is practical. The plot area is enough to provide this level of access as well as escape ways in case of emergency.
- Fire and gas detectors will be installed in the main operations areas. Fire detectors will be of the Infra-Red type.
- Emergency Shut Down (ESD) facilities will be provided to ensure plant integrity.
- Safety control of the plant will be ensured by the safety PLC.
- Emergency Shut Down buttons will be provided at critical locations trough out the terminal and in the control room:
- Depending on the location of the emergency occurrence, the control room operator will be able to control the deluge system, activating the deluge valves.

### 2.6.3 Maintenance

Maintenance of the terminal will be required to comply with the general requirements of the National Fire Protection Association (NFPA 58) for maintaining the mechanical integrity of an LPG bulk plant through maintenance procedures and maintenance manuals.

The main maintenance activities for the proposed terminal will include

- General maintenance of the pumps which include greasing and lubrication, changing the gaskets
- General maintenance of the electrical equipment and applications
- Corrosion control through painting, coating and testing of the cathodic protection
- Signage and marking of the roads, gangways and parking area
- General plumbing work

All the maintenance work will require a Permit to Work (PTW) with a comprehensive job safety analysis (JSA) which will identify, assess and put in place appropriate control measures for all the potential risk associated with the maintenance activity. Used oil and lubricants will be handled by a NEMA licensed waste handler.

### 2.6.3.1 Maintenance Manuals

Maintenance procedures provided by equipment vendors, industrial codes and persons or organizations knowledgeable about the process will be used as the basis for maintenance procedure manuals for the related equipment. Maintenance manuals will include routine inspection and preventative maintenance procedures and schedules.

# 2.7 Decommissioning phase

It is envisaged that the mounded tanks and pipeline will be operational for a minimum of 50 and 30 years respectively and it is likely that this period will be extended.

According to the requirements by NEMA for decommissioning, the proponent will be required to carry out a decommissioning audit and present a detailed decommissioning indicating the following

- Decommissioning timelines
- Identification and Management of Environmental impacts associated with the decommissioning
- Identification and Management of health and safety issues associated with the decommissioning
- Decommissioning waste management plan
- Site restoration plan

There are currently no specific stipulated requirements for decommissioning under the EMCA for projects. However, it would be prudent for the Proponent to set aside funds for the rehabilitation of the LPG storage facility and associated infrastructure. The funds if provided will cover:

- The decommissioning and final closure of the operation.
- Post closure management of residual and latent environmental impacts.

The funds should be reviewed annually to ensure that the value of the fund reflects the prevailing inflationary environment, changes to environmental legislation, new technologies for rehabilitation and, if necessary, unforeseen residual impacts. This will ensure that the financial provision remains sufficient to cover costs in the event of the above occurrences at any stage during the life of the project.

# 2.8 **Project Design Standards**

# 2.8.1 LPG storage

- KS 1938-3 2012 Handling, storage and distribution of liquefied petroleum gas in domestic, commercial and industrial installations Code of practice
- API 2510 Design and Construction of LPG Installations
- NFPA 58 Liquefied Petroleum Gas Code
- EN 13445 Design, fabrication, and inspection Unfired Pressure Vessels
- British standard PD 5500-2003. Specification for unfired fusion welded pressure vessels

## 2.8.2 Firefighting Systems

• NFPA 13 Standard for the Installation of Sprinkler Systems

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- NFPA 14 Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems
- NFPA 15: Standard for Water Spray Fixed Systems for Fire Protection
- NFPA 20 Standard for the Installation of Stationary Pumps for Fire Protection
- API 650 Welded Steel Tanks
- API 2510 Design and construction of LPG Installations

# 2.8.3 Electrical Installations

- NFPA 70 National Electrical Code
- NFPA 77 Recommended Practice on Static Electricity
- IEC Codes

## 2.8.4 Piping

- ANSI B.31.3 Chemical plant and petroleum refinery piping
- ANSI B.31.4 Liquid petroleum transportation piping systems
- ANSI B.16.5 Pipe Flanges and Flanged Fittings

## 2.8.5 Civil works

- EN 1990 Eurocode: Basis of Structural Design
- EN 1991 Eurocode 1: Actions on structures
- EN 1992 Eurocode 2: Design of concrete structures
- EN 1993 Eurocode 3: Design of steel structures
- EN 1994 Eurocode 4: Design of composite steel and concrete structures
- EN 1995 Eurocode 5: Design of timber structures
- EN 1996 Eurocode 6: Design of masonry structures
- EN 1997 Eurocode 7: Geotechnical design
- EN 1998 Eurocode 8: Design of structures for earthquake resistance

Legal and regulatory framework

# 3 Legal and regulatory framework

This section provides the policy, legislative and regulatory framework to which the proposed project should comply. National regulations are discussed along with IFC performance standards and international conventions to which Kenya is a party. Kenya champions sustainable development and recognizes the need for sustainable environment. This is in line with the Millennium Development Goals and Vision 2030. The Environmental Management and Coordination Act (EMCA) was enacted in 1999 as the core law in environmental management and guidelines.

Kenya's environmental policy and legislation are scattered in a multiplicity of resource and sector-specific laws and policy papers. The institutions and departments that deal with environmental issues are equally numerous. Sector-specific laws are deficient in that they are characterized by fragmented and uncoordinated sectorial legal regimes that are developed to facilitate resource allocation and to deal with environmentally adverse effects of resource exploitation.

# 3.1 The Constitution of Kenya, 2010

The Constitution of Kenya is the supreme law of the land. Article 26 lists the right to life as one of the fundamental rights an individual is entitled to. The right to life guaranteed by the Constitution is interpreted to include the right to a clean and healthy environment. Article 42 provides that every person has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures.

Article 69 of the Constitution requires the Government of Kenya to, among other things: ensure sustainable exploitation, utilisation, management and conservation of the environment and natural resources, and ensure the equitable sharing of the accruing benefits; encourage public participation in the management, protection and conservation of the environment; establish systems of environmental impact assessment, environmental audit and monitoring of the environment; eliminate processes and activities that are likely to endanger the environment; and utilise the environment and natural resources for the benefit of the people of Kenya.

The process of formulating Energy and Petroleum policy entailed comprehensive audits of the Sessional Paper No. 4 of 2004, Energy Act 2006, sector laws, by-laws and regulations, other policies, administrative procedures, government guidelines and circulars relating to energy

The passing of The Constitution of Kenya in 2010 also altered the governance structure of the country thereby necessitating the review of the Petroleum sector framework. This led to the review of the Energy and Petroleum Policy (Sessional Paper No. 4 of 2004), Energy Act 2006, Energy sector laws, by-laws and regulations, other policies, administrative procedures, government guidelines and circulars relating to Petroleum and Energy culminating in the Petroleum Act 2019

Legal and regulatory framework

# 3.2 Kenya Vision 2030

This is the current national development blueprint for the period 2008 to 2030. The objective of Vision 2030 is to transform Kenya into a middle-income country with a consistent annual growth of "10 % by the year 2030". One of the aims of the vision is to make Kenya a nation that has a clean, secure, and sustainable environment by 2030. This will be achieved through promoting environmental conservation to better support the economic pillar. Improving pollution and waste management through the application of the right economic incentives in development initiatives has also been raised as being critical to Vision 2030. The blueprint identified Energy as one of the infrastructural enablers of the three pillars. The level and intensity of commercial energy use is a key indicator of the degree of economic growth and development and Kenya is expected to use more energy in the commercial sector on the road to Vision 2030.

The blueprint identified limited supply and inadequate distribution of the of the LPG in the remote parts of the country as the main challenges facing the sub-sector. To address the above challenges, the blueprint identified key LPG projects to be implemented from 2012 which includes:

- Construction of 6,000 tonne common user LPG import handling facility in Mombasa through public – private partnership. This is expected to increase parcel sizes imported thus reducing freight costs and making LPG cheaper to Kenyans.
- Construction of 2,000 tonne common user LPG handling facility in Nairobi. With increased storage space, supply sources will increase thus competitively priced LPG can be obtained.

*Application:* The proposed expansion of the LPG facility is a private development project that is aimed at increasing the storage and import handling capacity of Mombasa and subsequently enhanced distribution of the LPG within the country as a result of stable supply of LPG as stipulated in the vision 2030 of the Republic of Kenya.

# **3.3 Policy Framework**

# 3.3.1 National Energy and Petroleum Policy 2015

The energy and petroleum sector has been guided by the policy set out in Sessional Paper No. 4 of 2004 and governed by a number of statutes, principally the Energy Act, No. 12 of 2006, the Geothermal Resources Act No. 12, of 1982 and the Petroleum (Exploration and Production) Act, Cap 308 which was recently repealed and replaced by the Petroleum Act (No. 2 of 2019). The overall objective of the energy and petroleum policy is to ensure sustainable, adequate, affordable, competitive, secure and reliable supply of energy to meet national and county needs at least cost, while protecting and conserving the environment.

Through the Energy and Petroleum Policy, the Government will ensure that there are strategic petroleum reserves in the country. Increased use of LPG shall be encouraged with a view to eliminate the use of kerosene, charcoal and firewood in households.

According to the Policy the average consumption of petroleum products in Kenya has been increasing over the years. To ensure security of supply of petroleum products, the Government will facilitate construction of adequate import and off-loading, storage

distribution and fuel dispensing facilities through public private partnerships as appropriate. The Government shall:

- Explore and adopt all viable financing options from local and international sources for cost effective utilization of all its energy resources, and in so doing shall endeavor to maintain a competitive fiscal investment climate in the country.
- Support Public Private Partnerships in the development, operation and maintenance of energy and petroleum infrastructure and delivery systems.

*Application:* OLA Energy intends to expand their LPG facility at Mombasa from 550MT to 14500MT which will increase the storage capacity and enhance distribution of the LPG within the country as proposed in the energy and Petroleum Policy. Additionally, increased storage capacity will lead to lower cost of LPG which is one of the key objectives of the Energy and Petroleum Policy.

# 3.3.2 National Environmental Policy, 2013

The National Environmental Policy proposes a broad range of measures and actions responding to key environmental issues and challenges. It seeks to provide the framework for an integrated approach to planning and sustainable management of natural resources in the country. It recognizes the various vulnerable ecosystems and proposes various policy measures not only to mainstream sound environmental management practices in all sectors of society throughout the country but also recommends strong institutional and governance measures to support the achievement of the desired objectives and goal.

One of the objectives of the policy is to promote and support research and capacity development as well as use of innovative environmental management tools such as incentives, disincentives, total economic valuation, indicators of sustainable development, Strategic Environmental Assessments (SEAs), Environmental and Social Impact Assessments (ESIAs), Environmental Audits (EA) and Payment for Environmental Services (PES).

# 3.3.3 National Gender Policy (2011)

The overall goal of this Policy is to mainstream gender concerns in the national development process in order to improve the social, legal/civic, economic and cultural conditions of women, men, girls and boys in Kenya.

The policy aims at ensuring gender equality and women's empowerment and mainstreaming of needs and concerns of women, men, girls and boys in all sectors of development in the country so that they can participate and benefit equally from development initiatives.

*Application*: This policy would especially apply to the recruitment of construction labour for the proposed project, where women should have equal opportunity as men for available jobs. This policy also requires provision of a work environment that is safe and conducive to women and men, considering gender-disaggregated differences and vulnerabilities. This for example applies to onsite workers' sanitation facilities, where women should have separate facilities from men.

# 3.3.4 Occupational Safety and Health Policy (2012)

This policy and all related regulations aim at safeguarding the safety, health and welfare at work of all persons working in a given workplace. In addition to full compliance to all the stipulated legislation under this policy, the EPC contractor shall:

- Integrate, into the Company's operations, systems and procedures that ensure a safe working environment that is without risks to health
- Develop and implement a comprehensive internal occupation safety and health policy
- Carry out appropriate risk assessments in relation to the safety and health of persons employed and, on the basis of these results, adopt preventive and protective measures
- Ensure insurance for and compensation of employees on work related injuries and diseases contracted in the course of employment and for connected purposes as stipulated under the Work Injury Compensation Benefit Act 2007.

# 3.3.5 Workplace Policy on HIV/AIDS (2007)

The main objective of this Policy is to provide a framework to address HIV and AIDS in the workplace. The principles that guide the Policy are in accordance with international conventions, national laws, policies, guidelines and regulations. They include recognition of HIV/AIDS as a workplace issue; Non-discrimination; Gender equality, Safety and Health work Environment, Workplace ethics and Confidentiality.

*Application*: The requirements of this policy are expected to be fulfilled by all contractors and their subcontractors, especially in regard to having an internal company HIV Policy and worker sensitization initiatives. This policy is of paramount relevance to the project as the implementation of the proposed power plant during the construction and operations is expected to spur substantial in-migration into the project area by people seeking employment opportunities. This, coupled with the expected economic growth, increased financial spending power and disruption of social / cultural norms may result in predisposing factors associated with the spread of HIV/AIDS such as prostitution and adultery.

# 3.3.6 National Environment Action Plan (NEAP) 2007

The NEAP provides a framework for the implementation of the Environment Policy and realization of the National Millennium Development Goals and Vision 2030. It outlines methods to combat climate change including mitigation and adaptation, improving intersectoral coordination, mainstreaming sustainable land management into national planning, policy and legal frameworks and undertaking research on the impact of climate change on environmental, social and economic sectors.

# 3.3.7 National Climate Change Action Plan (NCCAP) 2018-2022

The NCAAP presents detailed actions that Kenya will embark on to address climate change, during the 2018-2022 medium-term planning period. It envisions a low carbon climate resilient development pathway for Kenya.

Under NCAAP, LPG is seen as a source of clean energy for purposes of cooking. It is proposed as a clean alternative cooking fuel which will protect the environment and the health of citizens.

*Application:* The Project will have the positive impact of making clean LPG energy more readily available within Kenya. The Proponent must ensure that throughout the construction and operation of the Proposed Project, emission of greenhouse gases is avoided.

# 3.4 County Level Policy and Planning

# 3.4.1 Mombasa County Integrated Development Plan (2018-2022)

In September 2015 UN member countries adopted the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals. As part of implementing the SDGs, the Government of Kenya published and launched its Road Map to achieving SDGs. The Road Map envisages a partnership with all stakeholders as well as building capacity for devolved governments to implement the SDGs. The domestication and integration of the SDGs are embedded in Medium Term Plans and County Integrated Development Plans.

# 3.5 Legislative Framework

# 3.5.1 Environment Management and Coordination Act, 1999

The proposed expansion of the LPG depot is subject to the requirements of Legal Notice 101 of 2003: The Environmental (Impact Assessment and Audit) Regulations, 2003 (ESIA/EA Regulations) published in terms of Section 58 of the Environmental Management and Coordination Act, 1999 (EMCA) and amended in 2015. This section provides a brief overview of the ESIA Regulations and their application to the project.

EMCA is the national Act that provides for the authorization of certain controlled activities listed in the Second Schedule of the Act. In terms of Section 58 of the EMCA, the potential impact on the environment associated with these listed activities must be considered, investigated, assessed and reported to the NEMA. The NEMA is the competent authority that may issue an ESIA License for the proposed project in consultation with other lead agencies.

The need to comply with the requirements of the ESIA/EA Regulations ensures that decision-makers are provided the opportunity to consider the potential environmental impacts of a project early in the project development process, and assess whether adverse environmental impacts can be avoided, minimized or mitigated to acceptable levels. Comprehensive independent environmental studies are required to be undertaken in accordance with the EMCA and the ESIA/EA Regulations to provide NEMA and other lead

agencies with sufficient information in order for an informed decision to be taken regarding the project.

An ESIA is an effective planning and decision-making tool. It allows the potential environmental and social consequences resulting from a technical facility during its establishment and its operation to be identified and appropriately managed. It provides the opportunity for the developer to be forewarned of potential environmental and social issues and allows for resolution of the issue(s) reported in the ESIA report as well as for dialogue with stakeholders.

# 3.5.2 Legal Notice 150 of 2016 Replacement of the Second Schedule of EMCA

In April 2019 the Cabinet Secretary for Environment and Forestry on the advice of National Environment Authority amended the second schedule of the Environmental Management Act, 1999. The amendment was through LN 31 of 2019 on classification of projects (low, medium and high risk). Additionally, LN 32 of 2019 effected an amendment to the ESIA Regulations prescribing requirements on the ESIA for low and medium risk projects. The proposed project is a high-risk project.

NEMA issued a public notice dated March 2020 on processing of Environmental Impact Assessment Reports. The notice stated that for high-risk projects, Environmental Impact Assessment Study shall be conducted in accordance with the general environmental impact assessment guidelines and sector environmental impact assessment guidelines as provided for in Part III of the Environmental (Impact Assessment and Audit) Regulations, 2003. These EIA/EA regulations require an ESIA Terms of Reference to be prepared and submitted to NEMA for approval after which an ESIA study is undertaken and Study Report (SR) submitted to NEMA.

*Application:* An environmental impact assessment study must be undertaken in respect of the Proposed Project, and the study must comply with the guidelines applicable to highrisk projects. To this end, Kurrent Technologies Ltd prepared and submitted the TOR for the ESIA which was approved by NEMA on 17<sup>th</sup> August 2020 and is currently carrying out the ESIA study.

# 3.5.3 Environmental Management and Coordination (Noise and Excessive Vibration Pollution Control) Regulations, 2009

These regulations prohibit any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered:

- Time of the day;
- Proximity to residential area;
- Whether the noise is recurrent, intermittent or constant;
- The level and intensity of the noise;
- Whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,

• Whether the noise is subject to be controlled without unreasonable effort or expense to the person making the noise.

*Application:* The Proposed Project is within the vicinity of a residential area, hence control of environmental noise is crucial. The developers of the Proposed Project shall observe policy and regulatory requirements with respect to noise and shall take any necessary measures to comply with the provisions of the Regulations.

## 3.5.4 Environmental Management and Coordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulation, 2009

The Objectives of these Regulations include-

- to provide for the conservation and sustainable use of wetlands and their resources in Kenya;
- to promote the integration of sustainable use of resources in wetlands into the local and national management of natural resources for socio-economic development;
- to ensure the conservation of water catchments and the control of floods;
- to ensure the sustainable use of wetlands for ecological and aesthetic purposes for the common good of all citizens;
- to ensure the protection of wetlands as habitats for species of fauna and flora;
- provide a framework for public participation in the management of wetlands;
- to enhance education research and related activities; and
- to prevent and control pollution and siltation.

*Application:* The Proposed Project site is a seashore area in close proximity to the Indian Ocean. The Proponent shall comply with the provisions of the above regulations in-order to preserve the surrounding seashore ecosystem.

# 3.5.5 The Petroleum Act, 2019

The Petroleum Act, 2019 came into effect on 28 March 2019, repealing the Petroleum (Exploration and Production) Act, Chapter 308 Laws of Kenya which entered into force in 1984. The Petroleum Act was enacted to consolidate into one statute the laws relating to petroleum operations which includes revenue sharing, local content, transparency, accountability, licensing, setting the scene for growth of petroleum sector, permitting requirements and establishment of National Upstream Petroleum Advisory Committee and Energy and Petroleum Regulatory Authority (EPRA).

The following is a summary of the sections that are relevant to the proposed project

- Part IX, Section 74. (1) A person who wishes to—
  - undertake refining, importation, export, bulk storage or transportation of petroleum crude or products must have a valid licence issued by the Authority;

- sell petroleum in bulk to another person for the purpose of export or for retail sale in Kenya must have a valid licence issued by the Authority;
- use a vehicle for the purpose of transporting petroleum in bulk shall have a valid petroleum permit in respect of that vehicle issued by the Authority; and
- drive a vehicle, or engage a driver, for the purpose of transporting petroleum in bulk by tanker shall ensure that such driver is certified for that purpose by the Authority. –
- Part IX, Section 75. The licensing authority shall in granting or rejecting an application for a licence or permit take into consideration the social and cultural impacts, the need to protect environment, OSHA requirements, compliance to applicable Kenyan standards, location of the project, economic and financial benefits of the project, cost an financing arrangements, ability of the applicant to operate in a manner designed to protect the health and safety of the users, the technical and financial capacity of the applicant, where applicable the proposed tariff offered and any other matter that the licensing authority may consider likely to have a bearing on the undertaking.
- Part IX, section 79: The application for a license or permit holder shall be accompanied by an environmental liability policy as may be prescribed by the authority
- Part IX, Section 80. (1) A licensee or permit holder shall cause to be displayed within the premises, the license or permit, or a certified copy.
- Part IX, Section 86. A person who intends to construct a pipeline, bulk storage facility, [....] or designated parking space for petroleum tankers shall, before commencing such construction apply in writing to the licensing authority for a permit to do so. The permit shall specify the name and address of the proposed facility, be accompanied by the registration documents of the owner, detailed layout plans and specification from a professional engineer, project location, pipeline route, type and capacity of the facility and be accompanied by an environmental and social impact assessment licence.
- Part IX, Section 92: (1) A person who offers for sale in Kenya or transports or stores petroleum meant for use in Kenya shall ensure that the specifications of such petroleum conforms to the relevant Kenya Standard, but where no such standard exists, the relevant international standards approved by the Kenya Bureau of Standards: Provided that no person shall divert to sell in Kenya, goods destined for other markets.
- Part IX 97. (1) A person engaged in petroleum business shall comply with the applicable environmental, health and safety laws.

*Application:* OLA energy will be required to adhere to the following requirements of the Petroleum Act:

- Apply for a construction permit from EPRA before commencement of the construction work. The application should specify the name and address of the proposed facility, be accompanied by the registration documents of the owner, detailed layout plans, design specifications and standards from a professional engineer, project location, pipeline route, type and capacity of the facility and be accompanied by an environmental and social impact assessment licence.
- Apply for an operating license to import, for bulk storage and distribution of the LPG. The application should contain an environmental liability policy, ESIA

license, demonstrate compliance to OSHA requirements, applicable Kenyan standards, location of the project, economic and financial benefits of the project, cost and financing arrangements, ability of the applicant to operate in a manner designed to protect the health and safety of the users, and the technical and financial capacity of the applicant.

- OLA will be expected to ensure that the specifications of the proposed project conform to the relevant Kenya Standard, but where no such standard exists, the relevant international standards approved by the Kenya Bureau of Standards
- Display the Permit within the premises
- Comply with applicable environmental, health and safety laws during the operation which include:
  - $\circ$   $\,$  EMCA 1999, including the updated Act of 2015 and the subsidiary legislation
  - OSHA 2007 and the subsidiary legislation
  - Work Injury Benefits Act (WIBA), No. 13 of 2007 and subsidiary legislation.

# 3.5.6 The Petroleum (Liquefied Petroleum Gas) Regulations, 2019

The regulations were passed in 2019 to promote the use of LPG at the domestic front as a clean fuel in a bid to curb health and environmental hazards associated with use of traditional cooking fuels such as biomass and kerosene. The regulations require all gas retailers to register their businesses, to obtain valid licenses from EPRA or its licensing agents and the LPG business location to be specific to the authorized cylinder brands only

In summary the following sections are applicable to the proposed project.

An application for a construction permit for a bulk liquefied petroleum gas storage facility or a gas reticulation system shall specify the following — (a) exact location of the storage site and easements for any pipelines and incidental infrastructure including land registration number; (b) capacity of the storage facility or gas reticulation system; (c) scope of the project; and (d) grade of product to be stored.

OLA energy will be required to be in possession of valid operating license as required by Regulation 4: (A person shall not undertake liquefied petroleum gas business except in accordance with the terms and conditions of a valid licence issued by the Authority or its licensing agents). The license application should be submitted together with

- o registration documents of the applicant
- identification documents of the applicant including those of its directors and partners
- feasibility study of the project which shall contain a financial model indicating the project financing costs, operations and maintenance costs and projected sales
- copy of title deed in the name of the applicant or a duly registered lease whose term shall not be less than five years
- an environmental impact assessment licence from the National Environment Management Authority

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- development permission from the relevant County Government; (g) evidence of compliance with the Physical Planning Act
- detailed layout plan that complies with the Kenya Standard and approved by the relevant County Government
- detailed design drawings of the liquefied petroleum gas storage facility certified by a professional engineer in the mechanical field
- detailed design drawings for the liquefied petroleum gas storage facility's tank saddles, drainage and gas traps certified by a professional engineer in the civil or structural field; and
- detailed designs for the firefighting system certified by a professional engineer in the mechanical field and a fire safety auditor which shall contain detailed calculations to prove the adequacy of the design

# 3.5.7 The Occupational Safety and Health Act (OSHA), 2007

Before any premises are occupied, or used as a workplace, a certificate of registration must be obtained from the Director of Occupational Safety and Health Services. The Act provides for the health, safety, and welfare for employees at workplaces. This shall be considered at the construction, implementation, and decommissioning phases of the project.

### Health:

The premises must be kept clean. Premises must not be overcrowded. The circulation of fresh air must secure adequate ventilation of workrooms. There must be sufficient and suitable lighting in every part of the premise in which persons are working or passing. There should also be sufficient and suitable sanitary conveniences separate for each sex, must be provided subject to conformity with any standards prescribed by rules. Food and drinks should not be partaken in dangerous places or workrooms. Provision of suitable protective clothing and appliances including where necessary, suitable gloves, footwear, goggles, gas masks, and head covering, and maintained for the use of workers in any process involving expose to wet or to any injurious or offensive substances.

### Safety:

During construction, fencing of premises and dangerous parts of other machinery is mandatory. Training and supervision of inexperienced workers, protection of eyes with goggles or effective screens must be provided in certain specified processes. Floors, passages, gangways, stairs, and ladders must be soundly constructed and properly maintained and handrails must be provided for stairs. Special precaution against gassing is laid down for work in confined spaces where persons are liable to overcome by dangerous fumes.

Adequate and suitable means for extinguishing fire must be provided in addition to adequate means of escape in case of fire must be provided. Employees must additionally be provided with Personal Protective Equipment (PPE) that shall be used at all times when working.

The act requires the occupier to carry out appropriate risk assessments in relation to the safety and health of persons employed and on the basis of these results adopt preventive and protective measures to ensure that under all conditions of their intended use all chemicals, machinery equipment, tools and processes under the control of the occupier are safe and without risk to health and comply with the requirement of the health

provisions in the Act. The risk assessment report shall be sent to the Occupational safety and Health Officer in Mombasa.

### Welfare:

An adequate supply of both quantity and quality of wholesome drinking water must be provided. Maintenance of suitable washing facilities, accommodation for clothing not worn during working hours must be provided. Sitting facilities for all female workers whose work is done while standing should be provided to enable them take advantage of any opportunity for resting. Every premise shall be provided with maintenance, readily accessible means for extinguishing fire and person trained in the correct use of such means shall be present during all working periods. Regular individual examination or surveys of health conditions of industrial medicine and hygiene must be performed and the cost will be met by the employer. This will ensure that the examination can take place without any loss of earnings for the employees and if possible, within normal working hours. The Act (OSH) provides for development and maintenance of an effective programme for collection, compilation and analysis of occupational safety. This will ensure that health statistics, which shall cover injuries and illness including disabling during working hours, are well kept.

In view of this, an environmental management plan (EMP) should be put in place and implemented by the developer of the Proposed Project in conformity to this Act.

## 3.5.8 Work Injury Benefits Act, 2007

This Act provides for compensation to employees for work-related injuries and diseases contracted in the course of their employment and for connected purposes.

The applicable sections of this Act are as follows:

- Section 8: All workplaces to be registered with the Director of Occupational Safety and Health Services.
- Section 10: An employee who is disabled as a result of an accident is entitled to compensation.
- Section 12: Accidents arising as a result of trainings or drills are deemed to have arisen from employee's employment.
- Section 21: Employer is to be notified of an accident by the employee or somebody else on behalf of the employee.
- Section 38: An employee who contracts a disease specified in the second schedule as a result of his service to the company shall be entitled to compensation.
- Section 41: Notification of occupational disease shall be done by an employee.
- Section 45: The Employer shall provide and maintain first aid equipment.
- Section 46: Responsibility of the employer to make conveyance arrangements of injured workers if situations require such.

The Contractors and the proponent will be required to adhere to the requirements of this Act during construction and operation, respectively.

# 3.5.9 The Water Act 2016

This Act intends to provide for the regulations, management and development of water resources, water, sewage services and for other purposes. According to the Act, a water resource means any lake, pond, swamp, marsh, stream, watercourse, estuary, aquifer, artesian basin or other body of flowing or standing water, whether above or below the ground, and includes sea water and transboundary waters within the territorial jurisdiction of Kenya.

In summary the following sections of the Act are relevant to the Proposed Project

- Section 100. (1) A person shall not supply water in bulk to a water services
  provider without a license issued by the Regulatory Board. (2) A water service
  provider may enter into an agreement with any other licensee or water services
  provider on terms and conditions to be approved by the Regulatory Board (a)
  for the supply of water in bulk for a specific period; or (b) where the supply is
  to be given by a water services provider, either within or outside the area of
  service of that water services provider.
- Section 143. (1) A person shall not, without authority conferred under this Act

   (a) willfully obstruct, interfere with, divert or obstruct water from any
   watercourse or any water resource, or negligently allow any such obstruction,
   interference, diversion or abstraction; or (b) throw, convey, cause or permit to
   be thrown or conveyed, any rubbish, dirt, refuse, effluent, trade waste or other
   offensive matter or thing into or near to any water resource in such manner as
   to cause, or be likely to cause, pollution of the water resource.

*Application:* The acts restricts the contractor or the developer from engaging water supply service providers that are not registered by the County Council of Mombasa and the Water Services Regulatory Board. During construction, OLA energy is required to ensure that there is no dumping of the construction waste in the nearby Indian Ocean.

# 3.5.10 County Governments Act, 2012

The Act provides an overall framework for county governments to perform their transferred powers, functions, and responsibilities to deliver services. This includes:

- Ensuring effective citizen participation in the development of policies, development plans, service deliveries, and performance management (including monitoring) within the county;
- Establishing mechanisms to facilitate public communications and access to information;
- Developing grievance redress mechanisms so that citizens' concerns and complaints are recorded and addressed; and
- Ensuring protection and promotion of the interests and rights of minorities, marginalized groups and their access to relevant information;

Functions and powers of County Governments according to Part 2 (Fourth Schedule) and Articles 185 (2), 186 (1) and 187 (2) of the Constitution of Kenya, 2010 include Agriculture; County health services; Control of air pollution, noise pollution, other public nuisances; Trade development and regulations; County planning and development, including Electricity and gas reticulation and energy regulation; Implementation of specific national

government policies on natural resources and environmental conservation; Firefighting services and disaster management, among others.

Under the County Government Act, Mombasa County Government is responsible for planning and development of the County with regard to: facilitation of the development of a well-balanced system of settlements; ensuring productive use of land, water and other resources for economic and social development; ecological conservation and the achievement and maintenance of a tree cover of at least ten per cent of the land.

*Application*: OLA Energy and the EPC will comply with Mombasa County legislations as well as complement the County's efforts with regard to the above functions.

Among other things, the County Governments Act requires each County in the country to develop a 5-year County Integrated Development Plan (CIDP).

# 3.5.11 Public Health Act (Cap. 242)

Part IX, section 115, of the Act states that no person/institution shall cause to exist on its premises any nuisance or other condition liable to be injurious or dangerous to human health. Section 116 requires that Local Authorities take all lawful, necessary, and reasonably practicable measures to maintain their jurisdiction clean and sanitary to prevent occurrence of nuisance or condition liable to be injurious or dangerous to human health. Such nuisance or conditions are defined under section 118 and include nuisances caused by accumulation of stones, timber or other materials or refuse which in the opinion of the medical officer of health is likely to harbor rats or other vermin.

Part IV-A: General provisions of the Act deal with the prevention and suppression of infectious diseases and certain sections of this part will be applicable to the project.

The proponent must observe guidelines set by this Act though the ESMP.

*Application*: This Act is applicable to on site management of construction waste, sewage and domestic waste during construction and operation of the terminal to prevent environmental contamination leading to public health issues. It has been estimated that two hundred or more employees will be working on site and as a result:

- Adequate sanitary facilities need to be put in place that shall be cleaned and maintained regularly.
- After consultation and identification with the County Public Health Department on the dominant diseases present in the area and the impact this facility may potentially have, a plan needs to be put in place addressing how to monitor and curb them.
- The plan shall additionally include procedures for the prevention and suppression of infectious diseases.
- Food that will be handled and cooked on the premises shall be done so in suitable conditions and locations, by employees that possess food handling certificates.

The proponent must ensure that they comply with the conditions set under this act to avoid the initiation and spread of various diseases and, to avoid putting a strain on local resources.

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## 3.5.12 Physical and Land Use Planning Act, 2019

The Physical and Land Use Act of 2019 replaced the Physical Planning Act of 1996. The Act established the procedure required to develop, process and implement several physical and land use development plans. These include, the National, Inter-County, County and Local Physical and Land Use Development Plans. The Physical and Land Use Act of 2019, amongst other issues, addresses matters of development control with respect to development permission and their applications, decision making and communication, development fees, commencement and completion of constructions, prohibition of licenses, preservation of heritage sites and exemptions.

*Application* The proponent is required to attain development permission from the County Planning Authority, prior to which they shall submit documents, plans and other particulars prescribed by the executive committee. In most cases, mechanical, civil and electrical plans, access routes, written consent of other property owners where development may take place and credentials of the individual/s preparing the required documents shall be submitted. Furthermore, the public must be informed of the proposed development and their questions and concerns be addressed by the proponent.

# 3.5.13 Occupiers Liability Act (Cap. 34)

Under Common Law, an occupier of premises owes to a duty to visitors in respect of danger and risk due to the state of the premises or to things omitted or attributes an affliction on his/her health to a toxic material in the premises.

*Application:* The Proponent shall endeavour to ensure that the management of health and safety issues is of high priority during the operational phase of the project and shall ensure that measures are put in place to avoid safety hazards at the project site.

## 3.5.14 The Employment Act, 2007

The Act provides for general terms and conditions of employment in Kenya and applies to both domestic and foreign contracts of employment. It is the relevant legislation that harmonizes relationships between employees and employers, protects workers' interests and welfare, and safeguards their occupational health and safety through:

- a) Prohibition against discrimination of any employee or prospective employees (on race, colour, language, religion etc.);
- b) Prohibition of sexual harassment;
- c) Making a provision on contract of services; and
- d) Stipulating rights and duties in employment including weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc.

*Application:* For the 18 months of project construction (and subsequent operation and maintenance), this Act will govern management of the labour force hired. The Act also applies in regard to occupational safety of project staff.

# 3.5.15 People Living with Disability Act, 2012

This Act of Parliament provides for the rights and rehabilitation of persons with disabilities; to achieve equalization of opportunities for persons with disabilities; to establish the National Council for Persons with Disabilities. Part III of the act outlines the rights and privileges of persons with disabilities. Section 12 on employment states that: No person shall deny a person with a disability access to opportunities for suitable employment. ii) A qualified employee with a disability shall be subject to the same terms and conditions of employment and the same compensation, privileges, benefits, fringe benefits, incentives, or allowances as qualified able-bodied employees. iii) An employee with a disability shall be entitled to exemption from tax on all income accruing from his employment. Section 15 on discrimination of employment states that: (1) Subject to subsection (2), no employer shall discriminate against a person with a disability in relation to (a) the advertisement of employment. (b) the recruitment for employment. (c) the creation, classification, or abolition of posts. (d) the determination or allocation of wages, salaries, pensions, accommodation, leave or other such benefits. (e) the choice of persons for posts, training, advancement, apprenticeships, transfer, promotion, or retrenchment the provision of facilities related to or connected with employment; or many other matters related to employment. (2) Notwithstanding subsection (1), an employer shall be deemed not to have discriminated against a person with a disability if (a) the act or omission alleged to constitute the discrimination was not wholly or mainly attributable to the disability of the said person; (b) the disability in question was a relevant consideration in relation to the particular requirements of the type of employment concerned.

## The Sexual Offences Act, 2014

This Act protects people and employees from any unwanted sexual attention or advances by staff members. This act ensures the safety of women, children and men from any sexual offences which include: rape, defilement, indecent acts.

*Application:* This law will govern the code of conduct of the Contractor's and Sub-Contractor's staff and provide repercussions of any wrongdoing.

# 3.5.16 The HIV And AIDS Prevention and Control Act, 2006

This Act provides measures for the prevention, management and control of HIV and AIDS, to provide for the protection and promotion of public health and for the appropriate treatment, counseling, support and care of persons infected or at risk of HIV and AIDS infection, and for connected purposes.

*Application:* This Act will ensure that the Contractor and Sub-contractors make provision for VCT services for employees and locals, as well as promotes public awareness. This will go a long way in ensuring stigmatization of HIV and AIDS is reduced as well as managed during the construction period.

# 3.5.17 Cities and Urban Areas Act 2012

This act identifies Mombasa as a city due to its integrated urban area. The city is under the jurisdiction of boards which carry out the duties of the County Government. The various boards within the city are charged with: a) exercise executive authority as delegated by the county executive; b) ensure provision of services to its residents; c) impose such fees, levies and charges as may be authorised by the county government for

delivery of services by the municipality or the city; d) promote constitutional values and principles; e) ensure the implementation and compliance with policies formulated by both the national and county government; f) make by-laws or make recommendations for issues to be included in by-laws; g) ensure participation of the residents in decision making, its activities and programmes in accordance with the Schedule to the Act; and h) exercise such other powers as may be delegated by the county executive committee.

*Application:* This Act identifies the importance of consulting with the county council and its departments for the proposed project in order to get opinions and recommendations for the successful implementation of the project. In addition, the County Council will be part of the operation of the proposed project, as well as being a key stakeholder in the resettlement of PAPs.

# 3.5.18 Public Roads and Roads of Access Act, Revised 2012 (Cap 399)

Sections 8 and 9 of the Act provides for the dedication, conservation or alignment of public travel lines including construction of access roads adjacent to lands from the nearest part of a public road. Sections 10 and 11 allows for notices to be served on the adjacent landowners seeking permission to construct the respective roads.

# 3.5.19 The Kenya Roads Act, 2007

The Act provides for the establishment of three independent Road Authorities, namely:

Kenya National Highways Authority (KeNHA), Kenya Rural Roads Authority (KeRRA), and Kenya Urban Roads Authority (KURA).

## 3.5.20 Children Act No. 8 of 2001

States that every child shall be protected from economic exploitation and any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development.

# **3.6** International Conventions, Treaties and Agreements

Kenya has ratified and domesticated several international conventions and treaties for the protection of the environment. The proposed project will comply with the requirements of the various conventions, treaties and agreements that Kenya has ratified. Table 3 gives the status of environmental treaties ratified by Kenya.

Legal and regulatory framework

Торіс	Treaty	Date Treaty entered into force	Date of ratification/ accession in Kenya
Climate change and the ozone layer	United Nations Framework Convention on Climate Change (UNFCCC)	21/03/1994	30/08/1994
	Kyoto Protocol to the United Nations Framework Convention on Climate Change	16/02/2005	25/02/2005
	Vienna Convention for the Protection of the Ozone Layer	22/09/1988	09/11/1988
	Montreal Protocol on Substances that Deplete the Ozone Layer	01/01/1989	09/11/1988
Energy	Statute of the International Renewable Energy Agency (IRENA)	26/01/2009	08/07/2010
	Convention of the African Energy Commission	11/06/2001	13/12/2006
Waste management and pollution	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	05/05/1992	01/06/2000
	Convention on Persistent Organic Pollutants (POPs)	17/05/2005	24/09/2004

Table 3-1: Summary	v of the ar	plicable	International	Conventions	and treaties
		pilleabie			

# 3.6.1 The African Charter on Human and Peoples Rights

The African Charter on Human and Peoples Rights (ACHPR) is the African continent human rights charter, which came into force on  $21^{st}$  October 1986 in Nairobi and was ratified by Kenya on  $23^{rd}$  January 1992.

The ACHPR recognises and protects the collective rights of people, including "the unquestionable and inalienable rights to self- determination (article 20(1) and "social and cultural development (article 22(1))

Article 24 of the ACHPR provides that all peoples shall have the right to a general satisfactory environment favourable to their development. Additionally, Article 16 confers on each individual the right to the best attainable state of physical and mental health.

*Application:* The Proposed Project should be implemented in such a way that preserves the social and cultural life of the surrounding community, and avoids works that may negatively impact the environment or health of people within the vicinity of the Project site.

# 3.6.2 International Covenant on Economic, Social and Cultural rights, 1966 and International Covenant on Civil and Political Rights 1966.

These recognise the economic, social and cultural rights, including rights to selfdetermination, health and education, political and civil rights, including right to selfdetermination, to life freedom of religion speech and assembly. Kenya acceded to these laws on the  $1^{st}$  of May 1972.

*Application:* The Proposed Project should be implemented in such a way that preserves the social and cultural life of the surrounding community.

# 3.7 International safeguards and policies

In addition to the Kenyan regulatory framework, the project should be designed, constructed, operated and decommissioned in accordance with Good International Industry Practices (GIIP) on EHS. One set of standards that several multi-national corporations follow for sustainability are the International Finance Corporation (IFC) Environmental and Social (E&S) standards. While they are not mandatory in Kenya, it would be advisable for OLA Energy to incorporate them wherever practical. A description of the applicable IFC EHS Guidelines is given below.

# 3.7.1 International Finance Corporation (IFC) General Environment, Health and Safety (EHS) Guidelines

The EHS guidelines are technical reference documents with general and industry-specific examples of Good International Industry Practice (GIIP). The EHS guidelines contain the performance levels and measures that are generally considered achievable in new facilities by existing technology at reasonable costs.

The applicability of the EHS guidelines should be tailored to the hazards and risks established for each project based on the results of an environmental assessment in which site-specific variables, such as host country context, assimilative capacity of the environment, and other project factors, are taken into account.

When host country regulations differ from the levels and measures presented in the EHS guidelines, projects are expected to achieve whichever is more stringent.

The General EHS Guidelines are organized under the following categories:

- Environmental
- Occupational Health and Safety
- Community Health and Safety
- Construction and Decommissioning

Legal and regulatory framework

## 3.7.2 IFC Performance Standards

IFC's Sustainability Framework articulates the strategic commitment to sustainable development and is an integral part of IFC's approach to risk management. The Performance Standards provide standard guidance on how to identify risks and impacts and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the developer in relation to project-level activities.

In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the Performance Standards to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation in order to achieve its overall development objectives. Other financial institutions may also apply the Performance Standards.

For the proposed project, the applicable IFC performance standards include:

# **3.7.2.1** Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts.

PS 1 highlights the importance of managing environmental and social performance throughout the life of a project by developing and implementing an effective Environmental and Social Management System (ESMS). It provides guidelines on the contents and process of developing an effective ESMS.

### **Requirement: Policy**

The proponent will develop an EHS policy which will demonstrate the commitment to comply with the Kenyan laws and other international applicable standards like IFC's during all the phases of the project. All the contractors engaged by the proponent during construction, operation and decommissioning will be required, through contractual agreements to adhere to the proponent's EHS policy.

### **Requirement: Identification of Risks and Impacts**

This study report is part of the environmental and social impacts assessment that will be used to identify, assess and propose mitigation measures for the environmental and social impacts in accordance with Kenyan requirements and IFC standards during construction, operation and decommissioning of the proposed project.

The ESIA study will include the following specialized studies in order to comprehensively capture all the relevant issues and benefits associated with the project.

- Quantitative Risk Assessment (QRA)- A QRA will be undertaken to determine the acceptability of risks in relation to the proposed LPG terminal. As part of the QRA, the Consultant will calculate the annualized societal risk to neighboring populations resulting from significant events emanating from, demolition of existing structures and construction and operation of the proposed LPG terminal. The Consultant will endeavor to gather information of the surrounding business establishments and KPA residential estate to calculate the societal risk. The Consultant will conduct a comprehensive review and analysis of the existing OLA Energy's EHS policies, procedures and work instructions related to risk and disaster management and business continuity
- The Noise Quality Study will be undertaken in order to identify, categorize and analyze noise associated with the proposed Project and the resulting impacts to

the project environment. All sensitive receptor points, with regards to the proposed project will be identified and mapped. The study will evaluate the potential impact of the project activities on the local noise climate from construction noise associated with the Project, normal power plant operating conditions and, emergency operating conditions associated with the project.

- A Hydrological impact assessment will be undertaken to identify potential hydrological issues associated with project on the area
- A Geophysical impacts assessment will be undertaken to identify potential impacts associated with the project activities
- A Social Impact Assessment study will be undertaken to identify potential social risks and benefits and recommend mitigation measures for the former. Impacts as identified during construction and operation phase of the project have been highlighted in chapter 10 of this SR. Chapter 11 defines the framework for the Social Management Plan for the proposed project with the following plans to be formulated:
  - Stakeholder Engagement Plan
  - Grievance Redress Mechanism

This ESIA has an ESMP that contains a comprehensive plan on how to mitigate or enhance the identified negative and positive impacts.

Additionally, the proponent will be required to maintain a formal process of identifying additional project related E&S risks in accordance with Kenyan regulations and good international industry practice (GIIP) for all phases of the projects.

### **Requirements: Management Programs**

The proponent will develop specific Environmental and Social management programs and standards to ensure complete planning and implementation of all aspects related to EHS. Some of the management plans will include:

- Emergency Response plan
- Construction safety plan
- Electrical safety plan
- Fire and explosion safety plan
- Transport management plan
- Waste management plan
- Soil erosion control plan
- Stakeholders engagement plan

### **Requirements: Organizational Capacity and competency**

The Proponent, in collaboration with appropriate and relevant third parties, will establish maintain, and strengthen as necessary an organizational structure that defines roles, responsibilities in association with the project. EHS and social manager(s) should be part of the line managers responsible for offering Environmental and social support. Subsequently the proponent will be required to engage competent supervisors.

### **Requirements: Emergency preparedness and response**

The proponent will be required to develop an emergency preparedness and response plan and procedures for the proposed project construction and operation based on the

identified risks and impacts. The plan will take into consideration all the applicable emergency scenarios i.e., medical, road transport accidents, landslides, Fire and explosion, community protest and security incidents. The Emergency Preparedness and response plant will have detailed emergency response and incident management plans to be implemented to mitigate, control and recover from credible emergency scenarios.

### **Requirements: Monitoring and review**

The proponent will be required to develop and maintain a dynamic mechanism of monitoring the performance of the EHS monitoring system. The mechanisms will include,

- Statutory Environmental Audits
- Internal inspections
- Regular management review meetings;
- Review of the aspects and impacts register;
- Legal compliance audits and updating of the legal register;
- Incident and accident reporting;
- Addressing external complaints

### **Requirements: Stakeholder Analysis and Engagement Plan**

The Proponent will develop and implement a Stakeholder Engagement Plan that is scaled to the project risks and impacts and will be tailored to the characteristics and interests of the affected communities.

A Stakeholder Engagement Plan (SEP) will be prepared to illustrate how stakeholder identification and analysis was carried out, the engagement activities that were carried out during the scoping and ESIA phases and those that are to be carried out throughout the construction and operations phase and communication mediums and strategy for those engagements.

The SEP will be an attachment to the Social Impact Assessment report.

### **Requirements: Consultation and Participation**

For projects with potentially significant adverse impacts on affected communities, the client will conduct an Informed Consultation and Participation (ICP) process that will build upon the steps outlined below in Consultation with the Affected Communities to ensure their informed participation.

Effective consultation is a two-way process that should:

- begin early in the process of identification of environmental and social risks and impacts and continue on an ongoing basis as risks and impacts arise;
- be based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information which is in a culturally appropriate local language(s) and format and is understandable to affected communities;
- focus inclusive engagement on those directly affected as opposed to those not directly affected;
- be free of external manipulation, interference, coercion, or intimidation;
- enable meaningful participation, where applicable; and be documented.

*Application:* Formal and informal consultations were carried out with the neighbouring community through a baraza set up which was conducted in Kiswahili language. The members of the community were provided with information on the proposed project and the ESIA study and were given an opportunity to give their comments, concerns/issues and ask project related questions which were responded to by the local Project Developer and the ESIA consultants in attendance. The discussions of the baraza meeting were minuted and are an attachment to this report.

Additionally, other individuals and organizations with an influence, interest or expertise to offer to the project, though not directly involved or affected by the Project (secondary stakeholders) were consulted through one-on-one meetings i.e., Local administration, NEMA, Department of Gender, Youth and Social Services, Department of Land and Physical Planning etc.

During the ESIA phase more consultations will be undertaken by the proponent with the affected person/communities and other stakeholder groups through one-on-one meetings and barazas.

A project Communication plan which contains a database of stakeholders to be consulted and the communication strategies and frequency to be used based on their level of influence and interest has been developed. The communication plan was used and will continue being used to guide the consultation process during the ESIA phase.

### **Requirements: Disclosure of Information**

The client will provide affected communities with access to relevant information on: (i) the purpose, nature, and scale of the project; (ii) the duration of proposed project activities; (iii) any risks to and potential impacts on such communities and relevant mitigation measures; (iv) the envisaged stakeholder engagement process; and (v) the grievance mechanism.

*Application:* Before commencing the stakeholder dialogue, pertinent project information was prepared for disclosure. The following information was disclosed to the stakeholders:

- Project Description (Details on the project site, project components, project activities and project duration)
- The ESIA Process;
- Environmental and Social legislative framework;
- The Public Participation processes
- Potential environmental and social impacts for the different phases of the project

#### **Requirements: Grievance Mechanism**

Where there are affected communities, the Proponent will establish a grievance mechanism to receive and facilitate resolution of affected communities' concerns and grievances about the client's environmental and social performance.

*Application:* A Community Grievance Mechanism procedure will be prepared that will allow stakeholders to raise questions or concerns with the Company on project related issues and have them addressed in a prompt and respectful manner. The Grievance Mechanism will be independent of employee related grievances.

#### **Requirements: On-Going Reporting to Affected Communities**

The proponent will provide periodic reports to the affected communities that describe progress with implementation of the project action plans on issues that involve ongoing

risk to or impacts on affected communities and on issues that the consultation process or grievance mechanism have identified as a concern to those communities.

Through the Stakeholder Engagement Plan (SEP) and the Grievance Mechanism (GM), the proponent will continuously engage the affected communities and disclose pertinent project information.

### Applicability- PS 1 is APPLICABLE for the project

### **3.7.2.2** Performance Standard 2: Labour and Working Conditions.

PS 2 stresses on labour management as a key component in any project. It offers guidelines in relation to employment creation and income generation in a manner that protects the rights of the workers.

The following are the applicable requirements of PS 2:

### **Requirements: Working Conditions and Management of Worker Relationship**

The EPC will develop and implement Human Resource Policies and Procedures that will be used to guide labour recruitment and management. These policies and procedures include but are not limited to:

- Employee Handbook
- Recruitment Procedures
- Job Procedures
- Worker Grievance Mechanism Procedure
- Termination and Retrenchment Policies
- Harassment Policy
- Disciplinary Policy
- Health and Safety Policy

The EPC will provide workers with documented information that is clear and understandable, regarding their rights under the Kenyan Employment Act, 2007.

The Proponent shall put in place measures to ensure:

- Prevention of child labour, forced labour, and discrimination.
- Freedom of association and collective bargaining are provided.
- Wages, work hours and other benefits shall be as per the National labour and employment laws.

The EPC will be required to provide reasonable working conditions and terms of employment for both direct and contracted workers through contractor agreements which are to be provided. Construction Contractor should ensure that Terms of employment include wages and benefits, wage deductions, hours of work, breaks, rest days, overtime arrangements, and overtime compensation, medical insurance, pension, and leave for illness, vacation, maternity, or holiday are to be communicated to workers clearly.

### Requirements: Workers' Organizations

OLA Energy and by extension the EPC will not restrict workers from developing alternative mechanisms to express their grievances and protect their rights regarding working conditions and terms of employment.

The proponent will not discourage workers from forming or joining a workers' organization or discriminate or retaliate against workers who attempt to form or join workers' organizations.

### **Requirements: Non-Discrimination and Equal Opportunity**

The proponent will not discriminate with respect to any aspects of the employment relationship, such as recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment, access to training, job assignment, and promotion, termination of employment or retirement, and disciplinary practices.

The proponent should take appropriate measures to prevent any discriminatory treatment of migrant workers. Measures to prevent and not endorse any harassment, including sexual harassment or psychological mistreatment within the workplace will also be undertaken.

### **Requirements: Retrenchment**

The proponent should make certain that all workers receive notice of dismissal and severance payments mandated by law and collective agreements in a timely manner.

The proponent should conduct proper consultations with the workers before the retrenchment, if any. Selection criteria for those to be laid off should be objective, fair, and transparent. The retrenchment should not be based on personal characteristics unrelated to inherent job requirements.

### **Requirements: Grievance Mechanism**

The proponent will provide a grievance mechanism for workers (and their organizations, where they exist) to raise workplace concerns.

In providing a grievance mechanism through which workers may raise workplace concerns. The proponent should ensure that matters are brought to management's attention and addressed expeditiously. The Proponent needs to also document all grievances and follow up on any corrective actions.

#### **Requirements: Protecting the Work Force**

The Proponent/Contractor will not employ children in any manner that is economically exploitative or is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral, or social development.

The proponent should ensure that the Contractor employs no child labour (as defined in IFC PS2) or forced labour during construction and operation phase of the project. The developers should also exercise diligence with regard to key contractors and subcontractors so that they do not knowingly benefit from practices that lead to bonded or indentured status of workers.

### **Requirements: Occupational Health and Safety**

The proposed project will engage approximately 100 unskilled workers from the neighborhood and approximately 50 semi-skilled and skilled workers from within and outside the country. The developer will provide a safe and healthy work environment, taking into account inherent risks associated with weir construction in big rivers, tunneling, working on steep areas, transportation of abnormal loads, hot works, installation of high voltage equipment, erection of transmission line and operation of the power station. The proponent will take steps to prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, as far as reasonably practicable, the causes of hazards. In a manner consistent with good international industry practice, as reflected in various internationally recognized sources including the World Bank Group

Environmental, Health and Safety Guidelines, the developer will address areas that include the (i) identification of potential hazards to workers, particularly those that may be lifethreatening; (ii) provision of preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) training of workers; (iv) documentation and reporting of occupational accidents, diseases, and incidents; and (v) emergency prevention, preparedness, and response arrangements.

### **Requirements: Workers Engaged by Third Parties**

The Proponent will establish policies and procedures for managing and monitoring the performance of such third-party employers in relation to the requirements of this Performance Standard.

It is envisaged local, national and international contractors will be engaged by the proponent. These Contractors will be required to formally align their EHS systems with proponents. In regard to this, the Proponent should develop and implement procedures to manage and monitor performance of third parties.

### **Applicability- PS 2 is APPLICABLE for the project**

### 3.7.2.3 Performance Standard 3: Resource Efficiency and Pollution Prevention

Performance Standard 3 recognizes that increased economic activity and urbanization often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels.

It is envisaged that the construction of the proposed project will potentially lead to the following

- Significant use of water, energy and local construction materials
- Increased air pollution (from stationary and vehicular emissions and particulate matter generation),
- Generation of Green House Gases from construction equipment
- Generation of excavated spoil, sanitary waste, some hazardous waste and other general wastes
- Exposure to Hazardous cementing chemicals and used oil
- Increased environmental noise and ground vibration

The proponent will be required to develop and ensure implementation of the following project and site-specific plans in accordance to Kenyan laws and IFC requirements;

- Energy, water and natural resources (local construction materials) conservation
- Environmental and occupational air quality monitoring and pollution control
- GHG monitoring and control
- Waste management plans
- Hazardous materials management
- Excess noise and vibration control

### Applicability- PS 3 is APPLICABLE for the project

### 3.7.2.4 Performance Standard 4: Community Health, Safety, and Security.

This performance standard stresses the protection of the affected people from the project activities. Any developer should identify the risks the project poses to the community and mitigate them.

*Application:* The Proposed Project will involve importation, storage and truck loading of LPG gas which poses fire safety risks to the neighboring Oil facilities and KPA estate. The potential occupational hazards arising from the project activities and the impacts on health & safety of the affected community has been identified and assessed in the SIA study report.

# Requirements: Community Health and Safety and Community Exposure to Disease

Community health and safety considerations should be addressed through a process of environmental and social risks and impacts identification resulting in an Action Plan for disclosure to project Affected Communities.

The proponent is required to address Community health and safety associated with the construction and operation phases of the project.

The Proponent should ensure that the surface water drainage system during operation phase is not poorly designed and there is no creation of construction pits and depressions that can have potentially adverse impacts on adjacent local communities.

### Requirements: Infrastructure and Equipment Design and Safety

For all projects with risks to workers and the public, the client should also build its internal capacity to monitor engineering and fire safety of its operations, including periodic monitoring and internal audits.

The proponent will ensure that the recommended safety requirements for bulk storage of LPG are factored in the design.

### **Requirements: Hazardous Materials Management and Safety**

The proposed project will involve handling and storage of LPG which is a Highly flammable material. The Proponent will use approved engineering designs to ensure safe receiving, storage, and truck loading of the LPG. Mounded tanks will be constructed to minimize potential explosion, fire detectors and leak detectors will be installed and LPG approved pipe network will be put in place.

### **Requirements: Emergency Preparedness and Response**

The Proponent will develop an Emergency Response Plan to respond effectively to emergency situations. This shall be in collaboration with the other Shimanzi Oil Terminal Users, Kenya Ports Authority, Kenya Navy and the County Council of Mombasa.

### Applicability- PS 4 is APPLICABLE for the project

**PS 1, 2, 3 4,** have been considered applicable to this ESIA Study based on the environmental and social issues that are likely to arise from the proposed project. The above performance standards while not being mandatory provide the proponent with guidance on how to identify risks and impacts and, how to avoid, mitigate, and manage risks in all phases of the project implementation.

Social and Environmental baseline information

# 4 Social and Environmental baseline information

This section provides an environmental and socio-economic profile of project-affected area with the objective of understanding the bio physical, physical, demographic trends and economic performance of the area.

The proposed project will be located in one administrative area. The smallest administrative area in the Country is the village headed by a village elder under the authority and supervision of the Location Chief/ Assistant Chief.

The proposed development, particularly the LPG plant and the Pipeline will fall under the KPA area of jurisdiction. Even though the project area is an industrial zone, the local administration still take lead in coordination of community related issues and security arrangements.

The project will be situated in Shimanzi, Railways sub-location, Railways Location, in Shimanzi/Ganjoni ward, Mvita Sub-County, Mombasa County. Railways location has one sub-location namely; Railways sub-location. Further, the sub-location is divided into 7 villages namely:

- Shimanzi KPA village (adjacent to the project site)
- Shimanzi Railways village (adjacent to the project site)
- Makande 49 village
- Mwangeka Village
- High Level village
- Labour compound village
- Railway Mosque village

In this respect, the Railways sub-location forms the study area in the ESIA study.

# 4.1 Mombasa County Profile

This section provides a brief overview of the socio-economic characteristics of the general Mombasa County as a whole while the subsequent sections will focus specifically on the project area/local area (Railways Sub location) and the study area (Shimanzi KPA village and Shimanzi Kenya Railways villages) respectively.

County level information was mainly obtained from the *Mombasa County Integrated Development Plan 2018-2022*).

## 4.1.1 Geographic context

Mombasa County is located in the coastal region of Kenya. It is one of the 47 counties covering an area of 219.9  $\text{Km}^2$  excluding 65  $\text{Km}^2$  of water mass which is 200 nautical miles inside the Indian Ocean. The County lies between longitudes 39<sup>o</sup> 34' East and 39° 46" East and latitude 3°

56' South and  $4^{\circ}$  10' South of the Equator. It borders Kwale County to the South West and Kilifi County to the North and the Indian Ocean to the East.

Social and Environmental baseline information

# 4.1.2 Administrative Units

Mombasa County is located in the coastal region of Kenya. It is one of the 47 counties covering an area of 219.9  $\text{Km}^2$  excluding 65  $\text{Km}^2$  of water mass which is 200 nautical miles inside the Indian Ocean. The County lies between longitudes 39<sup>o</sup> 34' East and 39° 46" East and latitude 3°

56' South and 4° 10' South of the Equator. It borders Kwale County to the South West and Kilifi County to the North and the Indian Ocean to the East.

Administratively, the County is divided into six sub-counties namely: Mvita, Nyali, Changamwe, Jomvu, Kisauni, and Likoni and thirty county assembly wards. These are further sub-divided into 30 locations and 47 sub-locations as shown in the table below.

Sub-County	Divisions	Locations	Sub- Locations	Villages	Population
Changamwe	1	4	10	58	131,882
Jomvu	1	3	7	65	163,415
Kisauni	3	6	9	200	291,930
Nyali	2	4	8	55	216,577
Likoni	2	6	9	145	250,358
Mvita	1	7	14	134	154,171
Total	10	30	57	657	1208,333

Table 4-1: Population statistics of Mombasa County

Kisauni Sub County has the highest number of villages (200) while Nyali Subcounty has the least (55).

Politically, the county has 30 wards: Changamwe (5 wards), Jomvu (3 wards), Likoni (5 wards), Kisauni (7 wards), Mvita (5 wards), Nyali (5 wards)

The proposed project falls within the Mvita sub-county as shown in figure 14 below.

Social and Environmental baseline information



Figure 4-1: Simplified Political Map of Mombasa County showing the project location

# 4.1.3 Population size and composition

Population distribution and settlement patterns is mainly influenced by availability of essential social and physical amenities and infrastructure development such as roads, housing, water, and electricity. Other factors that influence settlement patterns include accessibility to employment opportunities and security. Mombasa city in Mombasa county has better developed infrastructure to influence settlement patterns of population. Notably it is important to note that it is the second largest city in Kenya hence attracts attention and focus from the national government as a key economic zone.

According to the 2019 population and housing census, Mombasa County has a population of 1,208,333 persons disaggregated as 610,257 males, 598,046 females and 30 intersex. The population growth rate in the county is estimated at 2.2 per cent against the national average of 2.6 per cent. Mombasa county has an average household size of 3.1 compared

Social and Environmental baseline information

to the national household size of 3.9. Mvita sub-county has the highest averaged household size at 3.8 compared to Changamwe sub-county which has the lowest average household size at 2.8. Additionally, over 63 per cent of the population is below 30 years, indicating a youthful population which is more productive and thus the need to consider them in development activities.

### 4.1.3.1 **Population Density and Distribution**

According to the Kenya Population and Housing Census 2019, the County has a population density of 5,495 persons per Km<sup>2</sup>. This is a marked increase from a population density of 4,086 persons per Km<sup>2</sup> in 2009 as result of high population growth and the increased numbers of people seeking employment opportunities in the manufacturing, Port of Mombasa, Kenya Ferry Services, Container Freight Terminals, service and processing industries, go downs and hotels in the coastal area. According the Mombasa County CIDP 2018, highly populated areas are in Miritini, Migadini Majengo, Bamburi, Port Reitz, Mishomoroni, Bombolulu, Mikindani, Jomvu, and Bangladesh, among others. The County has various settlement schemes namely Mwembelegeza, Mwakirunge, Vyemani, Bububu-A, Shika-Adabu, Jomvu Kuu, and Majaoni.

There are also sparsely populated areas in the outskirts of the County. These include Mwangala, Mwakirunge-Maunguja, Mreroni and the Mkupe Jetty area. These areas are characterized by least developed infrastructure such as road network, electricity, and inadequate water supply. Education and health facilities are few in these areas making the inhabitants highly prone to poverty and disease incidences.

The high population densities in Mvita, Changamwe and Nyali are attributed to proximity to vital infrastructure such as roads, water, electricity and employment opportunities due to the presence of industries like the Export Processing Zones, CFS, Port of Mombasa and International Airport. Kisauni (1,829 persons/Km<sup>2</sup>), Jomvu (3,537 persons/Km<sup>2</sup>) and Likoni (4,039 persons/Km<sup>2</sup>) are the least densely populated sub-counties. This implies that Changamwe, Nyali and Mvita require more resources to match the demand for social amenities. Low densities in Likoni and Kisauni can be attributed to inadequate social amenities and poor road network.

Kisauni Sub-county has the highest population accounting for 21 per cent of the County's population. This is attributed to low-cost housing and ease of access to most parts of the county from the sub-county. Jomvu sub-county has the lowest population which is attributed to fewer settlements and poor infrastructure compared to the other sub-counties.

Notably, there are landless people in the county most of whom live in the city 's slums of Mishomoroni, Junda and Kisumu ndogo in Kisauni Subcounty; Shika-Adabu and Ngomeni in Likoni Sub-county and Bangladesh in Changamwe Sub-county.

## 4.1.4 **Poverty Levels and Inequalities**

According to the County poverty index, 23.6per cent of the population is living in extreme poverty conditions. The majority live-in low-cost housing and city slums e.g., Mishomoroni, Junda and Kisumu ndogo in Kisauni Subcounty; Shika-Adabu and Ngomeni in Likoni Subcounty and Bangladesh in Changamwe Sub-county.

Under employment and unemployment in Mombasa county coupled with underperforming national economy has forced the majority of the population to live in the slums which are mainly characterized by limited access to social amenities, dilapidated health care facilities and health seeking practices, inadequate supply of water and access to sanitation and poor consumption of technology. Social and Environmental baseline information

### 4.1.5 Education

Mombasa County has insufficient educational facilities against a high population. The literacy rate of 57 per cent and literacy level is expected to increase as a result of the educational programs e.g., the Free Primary Education Programme, the Subsidized Secondary Education Programme, adult literacy programmes along with numerous initiatives like bursary schemes from the CDFs, LATF and Government.

*Pre-School Education:* There are 770 ECDE centres within the county, 85 public and 685 private centres with a total enrolment of 47,867 students and 1,714 teachers. The rate of enrolment is likely to increase given the positive impact of the Free Primary Education programme.

*Primary Education:* There are a total of 645 primary schools (95 public and 550 private) in the county with an enrolment of 70,345 students in public and 76,301 in private. Teacher-pupil ratio in public primary schools stands at 1:41 which compares with the recommended ratio of 1:40. The number of private academies in the county is also high with over half of all school going pupils attending private schools.

*Secondary Education:* There are 35 public secondary schools with a student population of 14,576 and a teacher population of 423. The teacher pupil ratio is 1:41. There are 64 private schools mainly funded by religious organizations. Shimo La Tewa High School in Kisauni Sub-county and Mama Ngina Girls in Mvita Sub-county are the notable national schools in the county.

*Tertiary Education:* There are several tertiary educational institutions. These include Mombasa Industrial Training Centre, Kenya Medical Training College in Mombasa and Port Reitz, Kenya School of Government, Mombasa branch, four youth polytechnics, Mombasa Technical Training Institute and Shanzu Teachers Training College. Universities in Mombasa county include: Technical University of Mombasa, satellite campuses of University of Nairobi, Kenyatta University, Jomo Kenyatta University of Agriculture and Technology and Moi University, Daystar University, Kenya Methodist University and Mt. Kenya University. Additionally, there is one research institution, Kenya Marine and Fisheries Research Institute (KEMFRI). Plans are underway to improve infrastructure and increase staffing in the polytechnics across the county. This is expected to enhance enrolment and offer quality courses in the institutions.

## 4.1.6 Housing

In the county, 65.6 per cent of all houses are stone walled while those made of brick walls stand at 7.5 per cent. Corrugated roofing accounts for 84.5 per cent of all roofing materials while tiles make up 9.7 per cent of all the houses in the county. Most of the mud walled houses are found in the slum areas where they are temporarily built. In these areas, land ownership is not guaranteed as most of the residents do not legally own land and the ones, they live on are owned by absentee landlords. 64.5% of the flooring is by cement, 8.1% is earthen and 9.3% is tiled.

According to the KNBS 2018 poverty and housing survey, 10.6% of residents in Mombasa county live in bungalows, 12.6% live in flats, 0.4% live in maisonettes, 69.3% live in Swahili houses, 1.7% live in shanties, 4.0% live in Landhi.

Seven in every ten households in urban areas live in rented dwellings compared to about one in every ten households in rural areas in Kenya (KNBS 2018). Mombasa county has a
high proportion of households (82.2%) who live in rented dwellings. Only 11.7% of the population in in their own houses.

### 4.1.7 Health services and facilities

According to the Mombasa CIDP 2018, there is a significant presence of health facilities in Mombasa County. These include: Coast Level Five Hospital - a referral facility serving the coast region, Tudor, and Port Reitz level four hospitals. These are further complemented by 15 private hospitals, 4 nursing homes, 9 health clinics of which 2 are public and 7 privately owned. There are 27 dispensaries out of which 25 are public and 2 are private. Notable, private hospitals include the Aga Khan Hospital, the Mombasa Hospital and Pandya Memorial Hospital. Additionally, there are 106 private clinics, some specializing on particular ailments while others are general clinics.

The most prevalent diseases in Mombasa County are malaria, which accounts for 48 per cent followed by flu and other ailments accounting for 18.7 per cent while stomachaches account for 5.2 per cent and respiratory infections of which upper respiratory infections account for 0.7 per cent and lower respiratory infections account for 3.3 per cent cumulatively accounting for 4.1 per cent. Diarrhea is also rampant and accounts for 2.3 per cent of all disease incidences in the county.

The Public Health and Sanitation sub-sector has been able to train Community Health Workers in all the sub-counties to assist households in maintaining good health status and sanitation.

Immunization Coverage: According to KNBS 2017, Immunization coverage in the county stands at 74 surpassing the national average of 63 per cent. This is attributed to the high number of deliveries attended to by trained personnel. However, efforts are being put in place to raise the number of deliveries attended to by trained personnel as opposed to Traditional Birth Attendants (TBAs). The construction of additional health facilities under the ESP programme, the Local Authority Transfer Fund and local Sub-county Development Funds has enhanced accessibility of immunization services and this is expected to raise the coverage.

Mombasa County has HIV prevalence of 5.6 0% which is higher than the national prevalence of 4.8% (KENPHIA 2018 estimates). Statistics indicate that more women than men are living with HIV and AIDS. Youth between the ages of 15-34 years in are mostly impacted. The National Aids Control Council 2017 estimated that 54,670 people currently live with HIV/AIDS 6,870 of whom are women and children, however the prevalence of rate within Mombasa Island is 3% which is lower than that of the other subcounties within Mombasa (NACC 2017).

## 4.1.8 Gender and Social Protection

Women constitute 49 per cent of the county population. Despite women population, many of them do not own assets and land thereby limiting access to credit facilities due to lack of collateral to secure loans. This minimizes opportunities for economic development that would eventually reduce poverty.

Gender based violence is one of the most widespread and socially tolerated forms of human rights violations, cutting across nationality, race, class, ethnicity, and religion. It is a major source of inequality in Kenya today.

Gender based violence is of great concern in Mombasa County. It is mainly attributed to the consumption of drugs and substance abuse as well as high unemployment levels. This has led to men neglecting their duties and responsibilities. Over the years there has been an increase in cases of domestic violence, which led to the establishment of gender-based violence and recovery centre at the Coast General Hospital (formerly Coast General Hospital)

Drugs and substance abuse and neglect of domestic responsibilities is attributed to causes of gender violence at the sub-county and ward level.

Forms of gender-based violation that are likely to occur within the workplace is sexual harassment/violence where the men demand for sexual favors in exchange for a job opportunity. The County is in the process of developing a Gender Policy that will be aligned to the National Gender Policy.

There are 15,576 persons aged 65 years and above in Mombasa County, Additionally, 0.9 percent of the total county's population are orphans. Social protection is very crucial in planning for the vulnerable in society. Mombasa County, through the Department of Education and Children have constructed 8 ECDE centres across the 6 sub-counties and have provided the milk feeding program to the children from ECDE level up to class 3 for improved nutritional care and retention rate. Through collaboration with the social departments in the County, a social protection policy is being developed to ensure equal opportunity for the vulnerable in Mombasa County.

### Vulnerable Groups

Article 21 (3) of Bill of Rights under the Constitution of Kenya 2010, recognizes vulnerable persons to include women, older members of society, persons with disabilities, children, youth, members of minority communities, and members of particular ethnic, religious or cultural communities. The Constitution provides for the recognition, protection and safeguarding of the rights of these communities in the social, political, and economic life of Kenya (Article 56). Among the identifiable marginalized people within the project area include old members of the society (retirees) and the widowed.

*The widows and single mothers*: The widows and single mothers in the project area become the head of the household either once the spouse is deceased or separated and have to fend for the family. In some cases, they have no stable source of income leading to poverty.

*The elderly:* The elderly in the project area are unable to work and depend on well-wishers and government stipend for daily bread. Most of them are left by their children who have moved to other parts of the county and country to look for opportunities.

The challenges faced by the vulnerable people include;

- Lack of involvement in public participation and decision making in matters affecting the community; and
- Discrimination during recruitment for jobs by potential employers.

They rely on the County Government for assistance; however, they rarely get any support. Some of the aid previously received by the vulnerable group is the Older Persons Cash Transfer Plan undertaken by the national government and implemented by the local administration through the county commissioner's office and the chief. It is important to note that the county has 7.3% orphanhood who remain vulnerable.

### 4.1.9 Water and Sanitation

Access to safe water and good sanitation is key to population health. Use of unsafe water sources coupled with poor sanitation contribute to high disease burden.

**Water Resources and Supply:** Water supply in the County is mainly undertaken by the Mombasa Water and Sewage Company (MOWASCO). Water utilized in the county is mainly from Mzima Springs in Taita Taveta County, Marere, and Sabaki/Baricho in Kilifi County and Tiwi Boreholes in Kwale County. This supply only meets 65 per cent of the county water demand. Most residents, therefore, rely on borehole water that is potentially contaminated hence unsafe for drinking and cooking. According to the CIDP 2018, 73.9 per cent of the county population has access to safe water (piped water).

Additionally, there are 452 shallow wells, 3 permanent springs, 4 water pans found in the rural areas of the county and several boreholes operated by private investors, NGOs, and local CBO's. To meet the water demand, these sources are further complemented by the piped water from Mzima springs, Marere, Sabaki/Baricho and Tiwi Boreholes.

The average distance from the water source is estimated at 0.1km compared to the national average of 1.2km. This is attributable to the smaller geographical size of the county and multiple water sources in the coast region.

**Sanitation**: Sanitation coverage in the county is 71 per cent. Some of the efforts being put in place to enhance sanitation coverage include the community strategy where the Ministry of Health is establishing community units supervised by community health workers to address sanitation, hygiene and health issues as well as enhancing the water and sanitation access in the county.

Sanitation services are not as widely spread as the water supply services. Only Mombasa West Mainland and Island are served by sewerage services, with the Kipevu treatment works serving Mombasa West Mainland and Kizingo Treatment works serving Mombasa Island. The Kipevu Treatment plant is not fully functional with some of the mechanized components being out of service. The Kizingo Treatment plant is not working all together, which has led to several illegal connections to the storm water network. These illegal connections are responsible for raw sewage being discharged into the Indian Ocean via the existing storm water outlets, which has led to pollution of the Indian Ocean and hence a negative impact on the ocean biodiversity, thus necessitating the improvements on the storm water outlets to counteract this pollution.

## 4.1.10 Land Use and Agriculture (Crop, Livestock, Fish Production)

Land ownership is critical to socio-economic development and primary production. However, land ownership in the County remains contentious. Most of the residents do not legally own the land they use for cultivation and livestock keeping. Mombasa county experiences high incidences of landlessness thus leading to many squatters. However, efforts are being made to correct the imbalance and boost economic activities on land by issuance of title deeds.

Notably, a sizeable number of people living in the peri-urban areas of the county practice subsistence small scale farming and rear different types of livestock.

The main crops cultivated in the county include maize, millet, sorghum cassava, cucurbits family and vegetables. These are most preferred due to their resistance to diseases and pests.

According to the Mombasa CIDP 2018, the total acreage under food crops is approximately 400 ha while the total acreage under cash crops is 500 ha. Additionally, 340 ha of land is utilized for forestry. Mombasa has low agricultural production, hence most of the food consumed is imported. This has resulted in high cost of food and other agricultural products especially to the low-income earners.

The average farm sizes for small scale farming are 2.5ha which is smaller compared to the county population hence most of the food is imported from other counties and countries to bridge the food gaps.

The county is served by a cereal storage facility (National Cereals and Produce Board (NCPB) located in Changamwe Sub-county. This is further supplemented by private storage facilities such as the grain bulk handling facilities, private stores owned by individual businessmen and farmers who use traditional storage methods.

The main livestock bred in the county include; goats, sheep, cattle, chicken and other poultry. However, livestock breeding is on a small scale hence the Kenya Meat Commission's abattoir largely on supply of animals from other counties for slaughter.

The county has 65km<sup>2</sup> of open water and access to 40km of the Exclusive Ecological Zone (EEZ)- a high potential fishing ground. The main types of fish found in Mombasa include: rabbit fish, scavenger, snappers, parrot fish, surgeon fish as well as sharks, lobsters and prawns. The county has 14 fish landing sites some of which face the risk of encroachment by human activities.

### 4.1.11 Trade, Industry and Tourism

A significant number of industries are spread across sectors of the economy within the county. These include: the service industry where shipping lines, ship repair and servicing yards, container freight stations, transport, clearing and forwarding firms and grain bulk handling occur. Additionally, there are several manufacturing industries such as export processing (apparel) companies, oil refineries (both edible and petroleum), glassware, flour mills and car assembly plants. These industries offer employment and business opportunities to residents. Mvita, Kisauni and Changamwe sub-counties host majority of these industries.

There are several tourist attractions and world heritage sites in Mombasa County namely; the historic Fort Jesus Museum-a UNESCO World Heritage site, the Likoni Ferry Services, and the Elephant Tusks along Moi Avenue, Old Port building, the white sandy beaches, Mombasa Marine Park, Haller Park and Butterfly Pavilion.

The main species of wildlife found in the private nature trails operated by the Bamburi Cement Factory are buffaloes, wildebeests, giraffes, hippopotamus, tortoise and multiple species of birds and butterflies.

According to the Mombasa county CIDP 2018, there are over 430 beach and tour operator firms that provide various tourist-related services. There are approximately 201 registered hotels and lodges with a total bed capacity of about 8,000 beds and an average annually bed occupancy of 64 per cent. However, hotel and cottage occupancy and sustainability of the tour operator firms are dependent on number of tourists visiting the coastal region and the season.

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### 4.1.12 Transport and Roads Network

According the CIDP 2018, the county has a total of 257.17 kms of bitumen surface roads, 127 kms of gravel surface roads and 91.29 kms of earth surface roads. The main classified roads include: Mombasa Nairobi highway, Mombasa - Malindi road and Likoni - Lunga Road. These roads are maintained by the national government through the established respective road authorities namely: Kenya Urban Roads Authority (KURA), the Kenya National Highways Authority (KeNHA) and Kenya Rural Roads Authority (KeRRA). The County Roads Committee and private sector oversight maintenance of county government roads.

There are key bridges linking the Island with the mainland and other coastal areas; namely Nyali and Mtwapa bridges. The Likoni Ferry links the Island to Likoni and subsequently to Kwale and Tanzania through the Lunga-Lunga Border. The Kenya Ferry Services (KFS) operates more than 7 ferries with an estimated capacity to carry over 250,000 people and over 5,000 vehicles per day across the Likoni channel.

There is a total of 10 kilometres of railway line and associated three railway stations within Mombasa County. The Standard Gauge Railway (SGR) runs parallel to the Uganda Railway originally built before independence. Notably, the SGR is continually upgraded and modernized to handle increased number of commuters and cargo. Under the East African Railway Master Plan, the Mombasa–Nairobi SGR is envisaged to enhance linkages between Kenya and other Eastern Africa countries that are constructing other standard gauge railways.

The port of Mombasa act as a key resource and the gateway to the East and Central African region, to meet the region 's export and import needs. The county has an International Airport which handles both domestic and international flights. The airport is therefore a critical installation aimed at enhancing promotion of tourism and investment opportunities in the county and the coast region.

## 4.1.13 Energy

In Kenya, Liquefied Petroleum Gas (LPG) is used by 13.4 per cent of the households as the main source of energy for cooking (KNBS 2018). According to the Mombasa county CIDP 2018, majority (53.6 per cent) of the population use paraffin as the main source of energy for cooking while 30 per cent use charcoal, firewood (8.8 per cent), LPG (4.7 per cent) and electricity (1.7 percent). With regards to lighting, 51.5 and 47.5 percent of the population use paraffin and electricity for lighting, respectively. Notably, nearly all health facilities and secondary schools in the county are connected to electricity.

### 4.1.14 Markets and Urban Centers

The larger Mombasa county is majorly urban and home to Mombasa City which is the second largest city in Kenya. Kongowea market in Jomvu Sub-county is one of the largest wholesale and retail fresh produce markets in Kenya. Nonetheless, there are physical planning challenges due to the proliferation of slums, lack of a well-planned sewerage system, lack of effective solid waste management system/unplanned waste disposal points and other infrastructural facilities within the city and the county.

Other key markets in Mombasa county include Mwembe Tayari fresh produce market and Marikiti retail market. There are several major supermarkets (Naivas, Tuskys etc.) and shopping malls within the city which provide convenient shopping to the residents.

### 4.1.15 Information, Communications and Technology

Mombasa county has a developed ICT infrastructure (mobile telephony and internet services). According to the CIDP 2018, there are seven registered post offices and one sub post office with the average distance to the post office being 5km. However, post office is losing its market share with the emerging communication technology. According to the CIDP 2018, the county has approximately 247 cyber cafes, most of which are concentrated in the central business sub-county of Mvita.

There are 18 registered courier service providers. These include DHL, Nation courier, Wells Fargo among others. Mobile telephone coverage stands at 95 per cent with major telecommunication providers, including Safaricom, Airtel, and Telecom, having a strong presence within the county. The use of mobile phones has resulted in diminished utilization of landlines.

### 4.1.16 Financial Institutions, Banks, SACCOs and Micro Finance Institutions

Mombasa county has a strong representation of financial institutions and banks in Kenya. Other financial institutions include the Central Bank of Kenya Mombasa branch, outlets of forex services, mobile banking (M-pesa outlets) etc.

The major banks having a strong presence in Mombasa County with 38 fully fledged branches include Kenya Commercial Bank, National Bank, Cooperative Bank, Barclays, Standard Chartered, NIC Bank, Chase Bank, Post Bank, Equity Bank and Family Bank.

Microfinance institutions with strong presence in Mombasa include Kenya Women Finance Trust, Rafiki, SMEP, Faulu Kenya, and Real People microfinance.

The county has a strong presence of the insurance industry with 18 companies and several agents operating fully within the County.

The county has a number of SACCOs, building societies and numerous investment groups popularly known as 'Chamas' which are used by members as resource mobilization vehicles. Most of these institutions serve a large section of the population with substantial clientele.

## 4.2 **Project area social baseline**

The proposed project will be located in one administrative area. The smallest administrative area in the Country is the village headed by a village elder/headman under the authority and supervision of the Location Chief/ Assistant Chief.

The proposed development, particularly the LPG plant and the Pipeline will fall under the KPA area of jurisdiction. Even though the project area is an industrial zone, the local administration still take lead in coordination of community related issues and security arrangements.

The project will be situated within Railways sub-location, Railways Location, in Shimanzi/Ganjoni ward, Mvita Sub-County, Mombasa County. Railways location has one sub-location namely, Railways sub-location. Further, the sub-location is divided into 7 villages namely:

- Shimanzi KPA village (adjacent to the project site)
- Shimanzi Railways village (adjacent to the project site)
- Makande 49 village
- Mwangeka Village
- High Level village
- Labour compound village
- Railway Mosque village

In this respect, the Railways sub-location forms the study area in the ESIA study.

Below is a map showing the administrative areas that will be affected at the sub location level:

## 4.2.1 Density and Distribution

The table below shows the population densities and distribution of the areas that will potentially be affected by the proposed LPG plant project. (Kenya National Bureau of Statistics, 2019)

# Table 4-2: Population Distribution of Project Affected Administrative Areas (Kenya National<br/>Bureau of Statistics, 2019)

Area	Total	Male	Female	Households Total	Land Area (sq. km)	Density (Persons per sq.km)
Mombasa County	1208,333	610,257	598,046	376,422	220	5,495
Mvita Sub-County	154,171	75,565	78,601	38,995	15	10,543
Railways Location	5, 952	3,066	2,886	1,634	3.3	1, 817
Railways Sub- location	5, 952	3,066	2,886	1,634	3.3	1, 817

## 4.2.2 Health Facilities

The health facilities that were found in the project area include the Kenya Railways Dispensary and the Kenya Ports Authority clinic that mainly serve the residents.

Kenya Railways Dispensary, a Government health facility, is the main health facility in the project area and is located approximately 1km away from the project's site. Its majorly serves the Kenya railways estate residents, and to a large extent Shimanzi and Ganjoni

residents. Additionally, residents of Kibarani and Tudor also get their services from the dispensary. The dispensary has 1 clinical officer, 2 nurses, 1 laboratory technician, 1 HIV testing and counselling officer, 1 outreach officer who links the facility to the community

The range of medical services offered at the dispensary include; general outpatient services, maternity services, preventive and promotional services (Antenatal and Postnatal services, Child welfare, immunization, family planning and Health Education), HIV/STD screening, TB clinic and laboratory services. The dispensary also offers treatment to minor injuries e.g., stitching.

The common ailments treated at the hospital include:

- Malaria
- Dengue fever
- Chikungunya
- Pneumonia
- TB
- Gastrointestinal Tract Infections
- Rare cases of skin injuries

On average, the dispensary receives 20-40 patients daily mostly from Kibarani, Shimanzi, Tudor, Ganjoni and Kenya Railways Estate. Medical cases that cannot be handled by the dispensary are usually referred to the Coast General Hospital.

Notable challenges faced by the dispensary are; lack of funds for operation and maintenance, lack of ambulance services for effective referral and emergency support, lack security fence, repair and expansion (the dispensary has adequate plot of land).

The Kenya Ports Authority clinic which is within the project area only serves the KPA staff and their families and not the public in Shimanzi.

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Figure 4-2: Sign-post for the Kenya Railways



Figure 4-3: The Kenya Railways Dispensary



### 4.2.3 Education

Shimanzi is classified as an industrial zone therefore educational institutions are not found in the project area. However, there are few schools close to the project area that serve students from Kenya Railways and KPA estate as well as the nearby estates outside the defined project area. These are Makande primary school- a government school and Little Angel Adonai Academy-privately owned which offers lower primary level of education.





Figure 4-5:Little Angels Adonai Academy



## 4.2.4 Water Sources

Access to safe water and good sanitation are crucial to having health of a population with reduced disease burden. Use of unsafe water sources coupled with poor sanitation

compromises general health of a population. Universal access to safe water and sanitation remains a key priority of the Government.

The quantity and quality of water affects human welfare though several pathways. Water availability influences the pattern of human settlement and the distribution of various development activities including agriculture and establishment of industries. Water shortages on the other hand often lead to poor or low resource utilization, poor crop yields and food insecurity. Further, water scarcity accentuates poverty by limiting people's access to food and employment opportunities.

The main sources of water in the project area are mainly piped water from Mombasa Water and Sewerage Company (MOWASCO). During the site visit it was noted that there is water rationing especially to the Kenya Railways estate. However, most residents have water storage containers to cover for the times water is not flowing in the taps.

### 4.2.5 Housing and housing conditions

The project area is characterized by permanent housing structures. The main material used for the permanent buildings are concrete blocks/bricks and tiles for roofing.

The project will be located in an industrial urban set up characterized by dense population within the residential estates.

#### Figure 4-6: Permanent Houses at the Kenya Ports Authority Estate

#### Figure 4-7: Permanent Houses at the Kenya Railways Estate



## 4.2.6 Economic activities and Employment

The main economic activity in the area is through employment at the Kenya Ports, Kenya Railways, CFS and industries in Shimanzi and Mombasa in general. Additionally, there are several businesses that are located mostly within the city. Such businesses include barber shops, small restaurants, bars, salons, retail shops that sell fast moving consumer goods, food kiosks and groceries.

Other major employers in the area are the Mombasa county government and the Oil marketers in Shimanzi

Unemployment is high among the youth in the area which can be attributed to lack of employment opportunities.

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### 4.2.7 Energy and Power Supply

The main sources of energy in the area include electricity, charcoal, and kerosene. Businesses and residential buildings are well connected with electricity by Kenya Power. All residential and business establishments in the area have access to electricity.



Figure 4-8: Power Lines within the project area

### 4.2.8 Roads and Transport

The road network within the project area is sufficient and good with few exceptions. The roads within the estates are tarmacked and well paved. However, the Kismayu road through which the project site is accessed is narrow against the potential increase in traffic during construction and operation. Kismayu road is a ring road owned, operated, and maintained by the county government of Mombasa. It is also characterized by dilapidated pavements and poor drainage system. Consultations revealed there have been private sector efforts to maintain the road especially by the oil marketers and business establishments in Shimanzi to enhance traffic flow.

The main road within the project area is the Shimanzi Road which is currently dilapidated and urgently needs repair. Shimanzi road is owned, operated, and maintained by the Kenya Urban Roads Authority (KURA). Consultations revealed that there is no budgetary allocation by KURA to repair the road in the current financial year. Lack of maintenance will compromise traffic flow that is likely to increase during construction and operation.

Another key road in the project area is the Makande road which is also owned, operated, and maintained by Kenya Urban Roads Authority (KURA). During the site visit, there was ongoing tarmacking of the road. This is expected to ease the traffic in the project area.

Most residents in KPA estate use private cars as compared to Kenya railways estate residents who commonly use matatus (14-seater vans used for public transport). The *matatus* ply between Shimanzi and Town centre. Other popular mode of transport is taximode services (use of private cars for public means of transport at a fee) that also

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transport people and goods from one area to another. Other notable modes of public transport are tuk tuks (motorcycles enhanced to serve as taxis) and *Boda* (motorcycles) which are a source of employment to the youth in the area.

The railway network available is exclusively for wagon hauling and transportation of goods to other parts of the country hence are residents do not use the railway for transportation.

Figure 4-9:Well tarmacked Makande road



Figure 4-10: Dilapidated road

Figure 4-11: Tuk Tuk in the project area







## 4.3 Physical Environment of the study area

The project will be located at Shimanzi area in Mombasa county which according to the Mombasa county Plan is zoned as industrial area. The area is characterized by bulk petroleum, cooking fuel and chemical storage facilities and the existing roads are dominated by truck tankers and articulated trailers. The project site is located 100m south of the Indian Ocean.

## 4.3.1 Topography

Mombasa County situated in coastal lowland with extensive flat areas rising gently from 8 meters above sea level to 100 meters above sea level in the west. Generally, Mombasa island where the project will be located has an average elevation of 15m above sea level with the highest point being Ngomani area on the south east of the island at 30m asl.

The project area slopes northwards towards Indian ocean and the highest point is 20m asl on the south west of the site.



## 4.3.2 Soils

The soil types in Mombasa are broadly associated with the geological formations along the physiographic zones. Along the coastal lowlands four soil types predominate.

 On the raised reefs along the shore well-drained, shallow (< 10 cm) to moderately deep, loamy to sandy soils predominate.

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- On unconsolidated deposits in the quaternary sands zone (also referred to as Kilindini sands) are well drained moderately deep to deep, sandy clay loam to sandy clay, underlying 20 to 40 cm loamy medium sand.
- On the Kilindini sands are also found areas with very deep soils of varying drainage conditions and colour, variable consistency, texture, and salinity.
- Also found on the Kilindini sands are well-drained very deep, dark red to strong brown, firm, sandy clay loam to sandy clay, underlying 30 to 60 cm medium sand to loamy sand soils.
- On the coastal uplands, composed of the raised areas in Changamwe and western parts of Kisauni, two soil types are dominant
- Soils developed on unconsolidated sandy deposits in the Magarini formation, composed of sandy to loamy soils. These are well drained, very deep, sandy clay loam to sandy clay, with a topsoil of fine sand to sandy loam.
- Soils developed on shales composed of heavy textured soils constitute the relatively high agricultural potential area in the district. The soils are dominated by well drained to imperfectly drained, shallow to moderately deep, firm to very firm clay, and imperfectly drained deep, very firm clay, with a humic topsoil and a sodic deeper subsoil.



Figure 4-13: Enhanced soil map of the Mombasa area

According to the soil map above, the project has the following types of soils

#### Social and Environmental baseline information

USmb AB Association of well drained to imperfectly drained, shallow to moderately deep, yellowish brown to very dark grey, firm to very firm clay; on dissected parts: eutric CAMBISOLS, partly lithic phase and: imperfectly drained, deep, dark grey to olive grey, very firm clay, with a humic topsoil and a sodic deeper subsoil; on interfluves: verto-luvic PHAEOZEMS, sodic phase; with vertic CAMBISOLS, sodic phase

UTIPDE Well drained, moderately deep to deep, dark red to yellowish red, friable, sandy clay loam to sandy clay, underlying 20 to 40 cm loamy medium sand; in places shallow over coral limestone: ferralo-chromic LUVISOLS to ACRISOLS, with rhodic FERRALSOLS

PcL 2 Well drained, shallow to moderately deep, red to dark reddish brown, friable, rocky, loam to sandy clay loam: LITHOSOLS; with ferralic CAMBISOLS, lithic phase

The following soil characteristics were observed at the site

- 0-1 the soil varies from brownish sandy to yellowish clayey silt with fragments of coral limestone.
- 1-2m the soil varies from yellow brownish silt clay to clayey gravelly sand with fragments of coral limestone.
- 2-3m the soil is dark brownish, slightly clayey silt with gravelly fragments of coral limestone.



### 4.3.3 Physiography and Geology

The coast region is divided into three physiographic units closely related to the three chief groups of sedimentary rocks comprising of

- The Coast Plain, composed of the Pleistocene deposits
- The Foot Plateau, which very nearly coincides with the Jurassic deposits, and
- The Nyika, which is underlain by the Duruma Sandstones in the present area.

Mombasa can be divided into three main physiographic belts, namely, the flat coastal plain, which is 6 kilometres wide, and includes the Island division, Kisauni on the north mainland and Mtongwe to the south. Next, are found the broken, severely dissected and

eroded belt that consists of Jurassic shale overlain in places by residual sandy plateau found in Changamwe division. Finally, there is the undulating plateau of sandstone that is divided from the Jurassic belt by a scarp fault (Munga, 2004).

The rocks in Kwale- Mombasa area largely of sedimentary origin and range in age from Permian (or possibly Upper Carboniferous) to Recent. Three well-marked divisions can be recognized:

- The Duruma Sandstone Series. The Duruma Sandstone Series, which is the Kenya correlative of the Karoo System of South and central Africa, consists of grits, sandstones and shales that have yielded Permain and Triassic fossils, although it is possible that the series ranges downwards to the Upper Carboniferous and upwards to the Lower Jurassic. The series is readily divisible into three broad lithological units with coarse sandstones and grits at the top and bottom of the succession, and finer sandstones and shales in the middle. For the most part the beds were deposited under lacustrine or sub-aerial conditions, the material having been derived from the Basement System rocks further to the west. A marine intercalation in the lower part of the succession is known from evidence obtained in a deep borehole drilled near Maji-ya-Chumvi (Miller, 1952).
- The Upper Mesozoic rocks. The upper Mesozoic rocks consists of limestones and shales with occasional thin sandstones that range apparently without a break from the Bajocian to the Middle Kimmeridgian. Rocks of Neocomian age that appear to be down-faulted against the Kimmeridgian are also present. The upper Mesozoic rocks are all of marine origin.
- The Cainozoic rocks include a Pleistocene coral reef with its associated lagoonal deposits of coral breccia, calcareous sands and beach sands, and a thick series of terrestrial sands and gravels that are probably of Upper Pliocene age.
- Nearer the sea, the land is composed of coral reef of Pleistocene Age that offers excellent drainage. The coral limestone and lagoonal deposit reach a thickness of 100 meters. Along the coastline are to be found beautiful beaches, which together with a variety of coastal resources.

## 4.3.4 Drainage and Hydrology

The major drainage of the coastal area of Kenya follows the general dip towards the eastsouth-east with a secondary trend at right angles where the eastward flow is prevented by the height of the Coast Range. The Tana River rises on the north slopes of Mount Kenya and flows for 500 kilometers through the very arid Northern Frontier Province before entering the Indian Ocean near Kipini. Its flow is dependent on rains in the Highlands but it is a permanent water course and provides water transportation as well as irrigation water for a short distance on the east bank in the Coast Province. The Sabaki (or Galana) River drains the south slopes of Mount Kenya, the north of Kilimanjaro, and the Taita Hills. It is the Athi River of the Nairobi-Machakos area and is the only other major drainage of the eastern half of the Country. As with the Tana, the Sabaki gradient is very low in the coastal area and the yearly flooding supplies great quantities of alluvium along its meandering course.

Mombasa Island where the project will be located has no river and drains towards Indian Ocean. The island is highly urbanized where most of the surfaces are either built up or paved. The main surface drainage is along the roads and open channels constructed along

the roads. For the Shimanzi the land drains northwards towards Makupa creek where the section adjoining the ocean is relatively steep.

The project site is near the ocean and has a storm drain channel and culverts from shimanzi road area transecting through the site. It was also observed the land slopes gently westward along the makande road where some surface runoff water flows into Indian Ocean via the rail track drainage and some end up in the site. The ROW for the pipeline to SOT slopes southwards towards the port while the ROW for the KOT line is generally a slope from the Kipevu mainland towards Indian Ocean.

### 4.3.5 Seismicity

According to Earthquake hazard for Kenya and surrounding countries (OCHA) report, the presence of part of the East African Rift (which runs through the west of Kenya) and the Davie fracture (just south of the Mombasa), means that Kenya is vulnerable to seismic activity and related natural disasters: earthquakes, volcanic eruption and tsunamis.

Kenya faces a relatively low earthquake hazard in comparison to neighbouring countries, with hazard levels highest in the north-west and south-west regions. The cities with the greatest degree of hazard are Nakuru, Eldoret, Kisumu and Kakamega which have a medium degree of seismic hazard (see WHO 2010 for the hazard scale). Nairobi faces a low degree of hazard and Mombasa very low. Mombasa and the rest of the Kenyan coast have a modest degree of tsunami hazard. Kenya has only experienced one recorded tsunami which arose from the Indian Ocean Earthquake of 2004, the impact of which was relatively minor. According to earthquake hazard assessments, the Kenyan coast is vulnerable to 2 meter high waves and water reaching 500 meters inland. It has not been possible to estimate volcanic hazard in this helpdesk report. In terms of overall vulnerability, an earthquake in Kenya is likely to result in more economic loss than in neighbouring Somalia, but at similar levels to other neighbouring countries.

According to seismic hazard assessment report for Kilifi, Mombasa and Kwale Counties Kenya's Indian Ocean coastline is classified as a rifted Atlantic-type continental margin. An examination of seismicity data from 1900 to 2016 reveals a diffuse pattern of seismic events, concentrated mainly in the southern part of the coastal strip, consisting of numerous M3 and M4 events interspersed with M5 and a M6 event. These events have hypocenters ranging from 6 km to 33 km. This pattern is dominant for onshore events but also applies to recorded offshore events. This part of the coastal strip has a bedrock lithology consisting of Jurassic, Triassic, Cretaceous and Tertiary limestone and sandstone beds, which are incised by mainly normal faults that generally trend NE-SW. Juxtaposed on these, are strike-slip faults that have a general NW-SE trend.

Mombasa is located in seismic area (VI on Mercalli scale, 5.4 on Richter scale), the mounded tanks will be designed to resist to this seismic classification. Mounded sphere technology has been preferred to mounded cigars due to its performance in term of better seismic risk resistance.

Social and Environmental baseline information



Figure 4-14: Seismic map of Kenya

## 4.3.6 Climate

The Mombasa lies on 23m above sea level Mombasa has a tropical climate with warm and cool seasons. Mombasa has an average temperature of 26.7 °C | 80.0 °F and average precipitation of 1196 mm | 47.1 inch.

The warm season lasts for 4 months, from December to April, with an average daily temperature of 29°C. The hottest month is March, with an average temperature of 31  $^{\circ}$ C. The cool season lasts for 3 months from June to September with an average daily high temperature below 28°C. The coldest month of the year is August, with a monthly average temperature of 24°C.

Mombasa experiences seasonal variation in monthly rainfall. There are two rainfall seasons i.e., March to June with an average of 150 mm and October to December with a maximum of 70 mm of rainfall. The driest month is February, with 15 mm of rainfall. Most precipitation falls in May, with an average of 302 mm.

https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/mombasa\_ken ya\_186301)

Social and Environmental baseline information



Figure 4-15: Average rainfall and Temperature of Mombasa

The windier part of the year lasts for 5 months, from April to October, with average wind speeds of more than 20 km per hour. The windiest month of the year is July, with an average hourly wind speed of 24 Km per hour. The calmer time of year lasts for 7 months, from October to April. The calmest month is November, with an average hourly wind speed of 14 km per hour.

Social and Environmental baseline information



Figure 4-16: Average wind speed for Mombasa

The dominant wind directions are from the south. See wind rose from Meteoblue (2020) in below and refer to Appendix 3 for details of wind and weather tendencies.



Figure 4-17: Annual wind direction rose for Mombasa, Meteoblue (2020)

On average, Southerly is experienced from March 31 to November 2, with a peak percentage of 100% on July 1, while easterly between November 2 to March 31, with a peak percentage of 64% on January 1.

Social and Environmental baseline information



Figure 4-18: Average wind direction of Mombasa

### 4.3.7 Noise

A baseline noise survey was completed during the field survey in four monitoring points (p1-p4) as shown in the map below. The survey data was gathered to calculate an average daytime and nighttime noise level for each of the four locations.





The relevant noise parameter for the baseline noise survey is LAeq (ie equivalent noise level) which is a unit used to describe outdoor noise such as construction noise and noise from industrial activities. LAFmax is the maximum level with A-weighted frequency response and Fast time constant. LAFmin is the minimum level with A-weighted frequency response and Fast time constant.

#### Social and Environmental baseline information

The survey established that noise levels are generally within environmental exposure and dominated by human activities like trucks movement along Kismayu road, GAPCO terminal activities and port activities.

10:20 am – 11:41 am	Measur	Measured Noise Levels Leg. dB (A)			TLY	Comments	
	LAE min	Lea	LAE max				
P1	37.8	65.6	78.1	3	90	Within OEL	
P2	40.5	64.2	76.9	-		"	
P3	40.5	57.8	66.2	-		"	
P4	46.4	62.7	77.7	25	70	Within Environmental Exposure	

Table 4-	3: Baseline	Noise S	Survey	results
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12:29 am – 1:22 pm	2:29 am – Measured Noise Levels 22 pm Leg dB (A)		No. Of Persons affected	TLV	Comments	
	LAEmin.	Lea	LAEmax			
P1	39.0	63.6	73.8	3	90	Within OEL
P2	41.7	60.7	69.3	-	70	"
P3	42.0	66.2	74.4	-	70	"
P4	46.7	67.4	84.6	25	70	Within Environmental Exposure

3:01 pm – 3:54	Measure Lé	ed Noise g dB (A)	Levels	No. Of Persons affected	TLV	Comments
	LAEmin	Lea	LAEmax			
P1	39.3	65.6	82.1	3	90	Within OEL
P2	43.7	63.6	75.1	-	70	"
P3	43.2	62.8	73.0	-	70	"
P4	48.3	61.2	73.5	25	70	Within Environmental Exposure

5:07 pm – 6:04 pm	Measure Le	ed Noise g dB (A)	Levels	No. Of Persons affected	TLV	Comments
	LAEmin	Lea	LAEmax			
P1	45.2	57.3	75.6	3	90	Within OEL
P2	40.9	56.3	65.9	-	70	"
P3	39.5	57.4	67.9	-	70	"
P4	45.5	67.7	81.9	25	70	Within Environmental Exposure

7:00 pm – 8:09 pm	Measured Noise Levels Leg.dB (A)			No. Of Persons affected	TLY	Comments
	LAEmin	Lea	LAEmax			
P1	37.0	47.6	57.5	3	90	Within OEL
P2	39.5	47.5	61.6	-	70	"
P3	38.1	42.0	49.7	-	70	"
P4	41.9	52.8	66.2	25	70	Within Environmental Exposure

The ambient noise levels at the proposed development site and its environ was between 57.3dB(A) and 67.1dB(A) during the day, and 47.5- 52.8 during the evening.

Social and Environmental baseline information

## 4.4 Bio-physical Environment of the study area

The proposed project will be established in Mombasa's industrial area and there is significant natural terrestrial or aquatic ecosystem existing within the area. Therefore, the biophysical environment will not be significantly impacted by the proposed project.

There are few trees (approximately 10) and shrubs as well as grass cover that will be cleared from the site during construction. The trees include coconut, palm and Neem trees



Figure 4-20: Vegetation in the project area

Stakeholder Engagement Process

## 5 Stakeholder Engagement Process

## 5.1 Introduction

This section discusses the stakeholder engagement activities undertaken by the ESIA team for the proposed LPG plant project in Shimanzi, Mombasa County. It outlines the objectives of undertaking stakeholder consultation and identification of the stakeholders. It further discusses the national and international frameworks for undertaking stakeholder consultation. Subsequently, this section outlines the process followed for undertaking the public meetings and identifies the key issues, concerns, and expectations that the stakeholders raised. Finally, the section concludes by suggesting the next steps following the stakeholder engagement associated with this ESIA Study.

## 5.2 **Objectives of stakeholder consultation**

Stakeholder engagement refers to a process of sharing information and knowledge, seeking to understand the concerns of others and building relationships based on collaboration and partnership. It is a long-term process that requires the building of trust through open dialogue and the delivery of commitments.

The most important objective of stakeholder consultation is to provide sufficient and accessible information to potential Interested and Affected Parties (I&APs) in an objective manner and to provide a platform for constructive participation in the application process thereby assisting I&APs to:

- Gain an understanding of the project, the various components, and the potential impacts (positive and negative).
- Raise issues of concern and suggestions for enhanced benefits and commenting on reasonable alternatives.
- Verify that their issues have been recorded (Stakeholder Engagement Logs) and considered in investigations; and
- Contribute relevant local information and traditional knowledge to the process.

OEKE recognizes that open and transparent communication is essential due to the importance of the activities in which it is engaged and the impact on the local, regional and national economies and individuals.

For the proposed LPG project, OEKE team based in Shimanzi worked together with the ESIA Team in undertaking the stakeholder engagement meetings.

## 5.3 Requirements of Stakeholder Consultation

Stakeholder consultation is required by the Kenyan environmental legislation as well as the International Finance Corporation's (IFC) Performance Standard 1. Each of these requirements is discussed below.

### 5.3.1 National Requirements

At a national level, stakeholder consultation on ESIA studies is embedded within section 58 of Environmental Management Coordination Act of 1999. Rule 17 of Legal Notice 101 titled Environment (Impact Assessment and Audit) Regulations, 2003 calls for Public participation and consultation throughout the impact assessment study.

It requires the Proponent to:

- 1. Seek the views of persons who may be affected by the project in consultation with the Authority (NEMA);
- Publicize the project and its anticipated effects and benefits by erecting posters in strategic public places informing the affected parties and communities of the proposed project;
- Publish a notice on the proposed project for two successive weeks in a newspaper that has a nation-wide circulation and make announcement in both official and local languages in a radio with a nation-wide coverage at least once a week for two consecutive weeks;
- 4. Hold public meetings with the affected parties and communities to explain the project and its effects, and to receive their oral or written comments. Ensure that appropriate notices are sent out at least one week prior to the meetings and that the venue and times of the meetings are convenient for the affected communities and the other concerned parties; and
- ensure, in consultation with the NEMA that a suitably qualified coordinator is appointed to receive and record both oral and written comments and any translations thereof received during all public meetings for onward transmission to NEMA.

Following the submission of the ESIA report to the NEMA, the Authority shall, within fourteen days of receiving the environmental impact assessment study report, invite the public to make oral or written comments on the report upon which, if deemed necessary, the Authority may hold a public hearing.

Additionally, Kenyan Court have held that public participation in environmental issues, at a minimum, entails the following elements:  $^1$ 

i. programme of public participation that accords with the nature of the subject matter. The public participation programme must take

<sup>&</sup>lt;sup>1</sup> See Constitutional Petition No. 305 of 2012: *Mui Coal Basin Local Community & 15 others v Permanent Secretary Ministry of Energy & 17 others;* and *Save Lamu & 5 others v National Environmental Management Authority (NEMA) & Another* [2019] eKLR.

into account both the quantity and quality of the governed to participate in their own governance;

- ii. innovation and malleability depending on the nature of the subject matter, culture, logistical constraints, and other related factors that ensure that the public participation is effective;
- iii. the public participation programme must include access to and dissemination of relevant information;
- iv. those most affected by a policy, legislation or action must have a bigger say in that policy, legislation or action and their views must be more deliberately sought and taken into account; and any clear and intentional attempts to keep out bona fide stakeholders would render the public participation programme ineffective and illegal by definition;
- v. public participation should be conducted while going through the motions or engaging in democratic theatre so as to tick the Constitutional box. All the views received as part of public participation programme should be taken into consideration, in good faith; and
- vi. the right of public participation is not meant to usurp the technical or democratic role of the office holders but to cross-fertilize and enrich their views with the views of those who will be most affected by the decision or policy at hand.

The Proponent will adhere to the above principals in the public participation process.

### 5.3.2 International Requirements

The Kenyan legislation on Public participation is aligned with the IFC's information disclosure and public consultation requirements as specified under Performance Standard 1 on Assessment and Management Assessment and Management of Environmental and Social Risks and Impacts. This requirement calls for OEKE to conduct and provide evidence of meaningful, free, prior and informed consultation with the communities likely to be affected by environmental and potential social impacts, and with all identified local stakeholders.

Stakeholder engagement is an ongoing process that may involve, in varying degrees, the following elements: stakeholder analysis and planning, disclosure and dissemination of information, consultation and participation, grievance mechanism, and ongoing reporting to Affected Communities. The nature, frequency, and level of effort of stakeholder engagement may vary considerably and will be commensurate with the project's risks and adverse impacts, and the project's phase of development.

### 5.3.2.1 Stakeholder Analysis and Engagement Plan

According to IFC performance standard 1, the Proponent is required to develop and implement a Stakeholder Engagement Plan that is scaled to the project risks and impacts and development stage and be tailored to the characteristics and interests of the Affected Communities. The standard requires the pproponent to identify individuals and groups that may be directly and differentially or disproportionately affected by the project because of their disadvantaged or vulnerable status and put in measures so that adverse impacts do not fall disproportionately on them.

A Stakeholder Engagement Plan for this project has been prepared illustrating the engagement activities that were carried out during the ESIA phases and those that will be carried during the construction and operations phase.

### 5.3.2.2 Consultation and Participation

According to IFC performance standard 1, the proponent is required to conduct an Informed Consultation and Participation Process that will result in the Affected Communities' informed participation.

The key principles of effective stakeholder engagement that have been undertaken by OEKE are summarized as follows:

- Providing meaningful information in a format and language that is readily understandable and tailored to the needs of the target stakeholder group(s)
- Providing information in ways and locations that make it easy for stakeholders to access it and that are culturally appropriate
- Two-way dialogue that gives both sides the opportunity to exchange the views and information, to listen and to have their issues heard and addressed
- Inclusiveness in representation of views, including ages, women, and men, vulnerable and/or minority groups
- Processes free of intimidation and coercion
- Clear mechanisms for responding to people's concerns, suggestions, and grievances; and
- Incorporating where appropriate and feasible, feedback into project or program design, and reporting back to stakeholders

### 5.3.2.3 Grievance Mechanism

According to IFC PS 1, where there are affected communities, OEKE is required to establish a grievance mechanism to receive and facilitate resolution of affected communities' concerns and grievances about the client's environmental and social performance.

A Grievance Mechanism procedure has been prepared to allow stakeholders to raise questions or concerns with the proponent and have them addressed in a prompt and respectful manner.

### 5.3.2.4 Ongoing Reporting to Affected Communities

IFC PS 1 requires OEKE to provide periodic reports to the affected communities that describe progress with implementation of the project action plans on issues that involve ongoing risk to or impacts on affected communities and on issues that the consultation process or grievance mechanism have identified as a concern to those communities.

Through the Stakeholder Engagement Plan and the Grievance Mechanism, OEKE will continuously engage the affected communities and disclose pertinent project information.

## 5.4 Stakeholder Identification and Mapping

A comprehensive stakeholder identification and analysis process was conducted where stakeholders were identified and mapped. This formed the foundation for planning and designing of successive stakeholder engagement activities. The stakeholder mapping was done based on the identification of individuals, communities, groups, and institutions who:

- Are most likely to experience at significant levels, the positive and/or negative impacts of the proposed project;
- Have the mandate over the various elements of the project's activities (such as Government ministries and agencies);
- Are considered vulnerable members of the society within the proposed project area; and
- Are considered the projects main supporters and opponents

The stakeholder analysis process sought to prioritize identified stakeholder based on: interest and expectations in relation to the proposed project; required levels of participation for each stakeholder throughout the project lifecycle; degree of influence of each stakeholder group to the direction and success of the proposed project; interrelationships between different stakeholders and the convergence/divergence between their interests and expectations.

For the proposed project, project stakeholders include the following categories of persons or institutions:

- a) Those directly impacted by the project such as people living in villages within the project area. This includes residents of the Kenya Ports Authority and Kenya Railways Estates adjacent to the project site.
- b) Stakeholders that will be affected by the project activities thereby requiring consent to utilize their resources included institutions such as Kenya Ports Authority, Kenya National Highways Authority, Kenya Urban Roads Authority, Kenya Railways Corporation, and Mombasa Water and Sewerage Company (MOWASCO).
- c) Mombasa County Administration at the county, sub county, ward, location, and village level. Specifically, the region affected by this project is Railways sub-location in Railways location, Shimanzi/Ganjoni ward- Mvita Constituency.
- d) Government parastatals such as Energy and Petroleum Regulatory Authority, Kenya Ports Authority, National Environment Management Authority (NEMA), Kenya Forest Service
- e) Community based organizations operating in the project area and its environs
- f) Private sector businesses in the vicinity of the proposed project.
- g) The project proponent-OEKE

## 5.5 Public Consultations

Public engagement and stakeholder consultation are fundamental to an effective environmental and social impact assessment process and for the successful implementation of the proposed expansion of the LPG marine terminal. It serves to promote mutual confidence and trust between the proponent and project stakeholders

Public engagement is an on-going process; for the proposed expansion of the LPG marine terminal, stakeholder consultation was initiated during the scoping phase and will continue throughout the detailed ESIA process, construction, operational phases of the project respectively. The approach to public engagement has been designed to promote meaningful, two-way communications between OEKE and the stakeholders.

The public consultation was focused on engaging community residents (KPA and Railways estate residents, businesses, local/public authorities, community leaders, as well as other individuals or groups that express interest in the project. OEKE is committed to effective and open consultation to ensure that potentially affected members of the public are fully aware of the project and have the opportunity to make their views known. The concerns will help ensure that all the important issues are considered in the environmental assessment.

The public consultation program included:

- Preliminary consultations;
- One on One meetings;
- Public baraza meeting; and
- Focus Group Discussions

It is important to note that stakeholder consultation is an ongoing process and further stakeholder engagement will be conducted as the project progresses. Minutes of the meetings held during the public consultation and digital photographs taken during the meeting are appended the end of this report.

## 5.6 Stakeholder Engagement Activities

### 5.6.1 Preliminary Consultations

The ESIA Team made a reconnaissance visit to the proposed site on June 22<sup>nd</sup>, 2020. The consultants were able to establish the general project site and specifically made a transect walk to the bush tank area, railway line, neighbouring industries, other oil terminals and the proposed administration building site. The Team was accompanied by the OLA terminal manager who had a good knowledge and understanding of the proposed project.

Later, the consultants had a meeting with the County Commissioner of Mombasa, Chief and Assistant Chief of Railways Location and informed them of the proposed project and the ESIA studies to be undertaken. The ESIA team also expressed their intention to conduct public baraza meetings with communities in the project area. The Assistant Chief was well informed on the proposed project site. This involved project site familiarization and identification of potentially affected businesses.

In June 24<sup>th</sup>, 2020, the ESIA Team conducted a meeting with the Assistant Chief and 3 village elders in charge of the potentially affected villages in Railways location (Railways sub-location). The agenda of the meeting was to discuss on:

- Social organization of the local community (demographics of the people they represent).
- Identification of other stakeholder representatives in the Community i.e., NGOs, CBOs etc.
- Areas of challenge within the community.
- Solicitation and guidance on how to carry out community engagement i.e., methods of mobilization and project information dissemination

It was agreed that the public baraza would be held at the Shimanzi Chief's Camp on 20<sup>th</sup> August 2020 with residents from the KPA and Kenya Railways estates.

The County Commissioner was adequately briefed by the Consultants together with the local administration. Mobilization of the attendees was done by the village elders through a). Word of mouth with the assistance of the KPA and Kenya railways estate representatives and Block ambassadors "*mabalozl*", b) Through phone calls and text messages.

Subsequent to the site visit, a kick-off meeting was held with the Proponent on July 5<sup>th</sup>, 2020 to discuss the project activities and the ESIA study for the proposed LPG plant. The consultants were provided with background information of the proposed project and the companies/partners involved in its development, objectives of the project, information on previous stakeholder engagement meetings with relevant National agencies and the agenda for a public baraza meeting scheduled on August 20<sup>th</sup>, 2020.

Additionally, the ESIA team held initial consultations with other stakeholders within the project footprint as highlighted below.

### 5.6.2 Disclosure of the Project Information

Dissemination of project information was done through verbal discussions, diagrammatic presentations, and information documents. The documentation was prepared prior to the meetings with pertinent project information that the Proponent was prepared to disseminate.

In addition, public notices were placed in strategic places within the community i.e. *The Chief's camp, KPA and Kenya Railways estates Notice boards* and at *shops within the estates,* giving people information on the proposed project; it's location, the ESIA requirements and inviting them to contact the Consultants with comments or concerns on the proposed project using the contacts provided in the notice.

### 5.6.3 Stakeholder Engagement Activities during Assessment

### 5.6.3.1 Stakeholder Identification and Analysis

Stakeholders for the project in the assessment were identified mainly for the LPG facility in Shimanzi and included local residents especially those residing in the adjacent KPA and Kenya Railways estates and Key informants and vulnerable groups.

They were grouped into the following categories:

- Lead agencies; Energy and Petroleum Regulatory Authority, National Environment Management Authority, KURA, KeNHA
- Affected communities; the Shimanzi KPA village and Shimanzi Kenya Railways village adjacent to the project site
- Vulnerable Groups; Women
- Parties affected by the access road; Institutions such as Kenya National Highways Authority, Kenya Railways Corporation, Kenya Pipeline Company, Kenya Petroleum and Refineries Limited (KPRL) and KENGEN.

## 5.6.4 Public Baraza Meetings

3 public baraza meetings were held at the Shimanzi Chiefs camp. The first meeting was held on 20<sup>th</sup> August 2020. The second meeting was held on 8<sup>th</sup> October 2020 while the third meeting was held on 10<sup>th</sup> October 2020. The chiefs camp was an ideal venue for the baraza meeting because it was a convenient to control crowds while adhering to the Covid 19 social distance protocols. It was also a common point for majority of the targeted stakeholders.

The public baraza meetings were held with residents from the KPA and Kenya Railways estates in Shimanzi. Residents from the two estates are the only ones that live within the vicinity of the proposed site for the LPG plant and are likely to be impacted most by the project and its activities. The meeting was also attended by the National Government Authority Officers in charge of the area i.e., the Assistant Chief together with the village elders.

The Consultants (a Sociologist and Environmentalist) together with the proponents Engineer were in attendance to provide information to the public and to receive and address comments. The barazas were presented with information on:

- Description of the project (project design and location);
- The requirements of the EMCA for new projects in Kenya;
- The Environmental Assessment Process;
- Baseline environmental studies being undertaken as part of the ESIA; and
- Potential environmental and social impacts associated with the proposed project.

After giving presentations on the proposed project, the stakeholders were provided an opportunity to comment and give views on their perceptions of the proposed project.

The verbal discussions were done in Swahili language as it had been established through the Assistant Chief that the audience would be most comfortable with the Swahili language.

The respondents were able to comment on the project, highlight the potential positive and negative impacts of the project and if they are for or against the project.

All substantive issues raised with the Firm of Experts during the baraza were noted and responded to. The issues were then recorded in an Issues and Response Report.



#### Figure 5-1: Image of Baraza Meeting with the estate residents

### 5.6.4.1 Focus Group Discussion with Business Operators

In consultation with key informants from the community i.e., the Chief, Village elders and members of the public (during the public baraza meeting), business operators were identified.

The FGD was focused on determining how the proposed project would impact on them.

The key views, concerns and requests collated during these consultations are aggregated in section 9 on key stakeholder views and concerns

### 5.6.5 One on One Meetings with Relevant organizations/Lead Agencies and Government departments

During the SR Phase, the following organizations and government departments relevant to the project were identified and consulted:

- The Mombasa County Commissioner (CC);
- National Environmental Management Authority (NEMA);
- Kenya Ports Authority (KPA);
- Kenya Railways Corporation (KRC);
- Kenya National Highways Authority (KeNHA) Coast Region;
- Kenya Urban Roads Authority (KURA) Coast Region;
- Mombasa Water and Sewerage Company (MOWASCO);
- Kenya Electricity Generating Company (KENGEN);
- Kenya Pipeline and Refineries Limited (KPRL);
- Department of Public Health, Mombasa County;
- Department of Infrastructure and public works, Mombasa County;
- Department of Lands, Urban Planning and Housing, Mombasa County; and

• Fire Department, Mombasa County.

Through tele-conversations and visits to the offices of interest, arrangements for consultation meetings were made and the dates, time and venues agreed.

The objectives, dates and locations of the meeting are as highlighted below

The discussions of the meetings were recorded and minuted. Data collected during these meetings has been included in the socio-economic baseline data

Stakeholder Group	Date & time	Engagement Objectives
County Commissioner, Chief, Assistant Chief, Village elders	August 18 <sup>th</sup> , 2020	<ul> <li>Project introduction</li> <li>Obtain information on: <ul> <li>✓ Policies and plans relevant to the project.</li> <li>✓ Developmental activities in the area.</li> </ul> </li> <li>Facilitation and coordination of public participation in the proposed project.</li> <li>Get their views and concerns on the proposed project.</li> </ul>
Land and Physical Planning Department	August 18 <sup>th</sup> , 2020	<ul> <li>Project introduction</li> <li>Obtain information on:         <ul> <li>Land use and future planning for the area;</li> <li>Zoning/zoning maps of the project area;</li> <li>Licensing the project footprint; and</li> </ul> </li> <li>Any other physical planning issues</li> </ul>
KURA Coast Region	August 19 <sup>th</sup> , 2020	<ul> <li>Project introduction</li> <li>Obtain information on:         <ul> <li>Road usage and plans for the area</li> <li>✓ Permits required for road use in the area and during construction</li> </ul> </li> <li>Get their views and concerns on the proposed project.</li> </ul>
KeNHA Coast Region	August 19 <sup>th</sup> , 2020	<ul> <li>Project introduction</li> <li>Obtain information on:</li> <li>✓ Road usage and plans for the area</li> <li>✓ Permits required for road use in the area and during construction</li> <li>Get their views and concerns on the proposed project.</li> </ul>
County National Environment Management Authority (NEMA)	August 20 <sup>th</sup> , 2020	<ul> <li>Introduce the proposed project including, location, project description, and potential environmental and social impacts</li> <li>Obtain information on:</li> </ul>

Table 5-1: Summary of the one-on-one Engagement Objectives

Stakeholder Engagement Process

County Fire Department	August 21 <sup>st</sup> , 2020	<ul> <li>Prevailing environmental issues with the project area/Mombasa County</li> <li>Waste management in Mombasa County and in particular Mvita sub-county</li> <li>Get their views and concerns on the proposed project.</li> <li>Project introduction</li> <li>Obtain information on:</li> </ul>
		<ul> <li>✓ Emergency response policies and plans relevant to the project.</li> <li>Fire stations and community response</li> </ul>
		<ul> <li>Get their views and concerns on the proposed project.</li> </ul>
Public Health Department (Kenya Railways Dispensary Shimanzi)	August 21 <sup>st</sup> , 2020	<ul> <li>Project introduction</li> <li>Obtain information on: <ul> <li>How community health is handled in the area;</li> <li>Public</li> <li>Health issues facing the area;</li> <li>Statistics on morbidity and mortality</li> <li>Medical facilities that serve the project area;</li> <li>Specific laws that are applicable to this project;</li> <li>Permits/licenses that should be obtained;</li> <li>Sanitary facility requirements for this type of plant during construction and operation; and</li> <li>Measures put in place in case of a pandemic.</li> </ul> </li> <li>Get their views and concerns on the proposed project.</li> </ul>
Kenya Ports Authority (KPA)	August 25 <sup>th</sup> , 2020	<ul> <li>Project introduction</li> <li>Give an overview of the ESIA process and studies being undertaken to assess the project potential impacts</li> <li>Obtain information on <ul> <li>✓ KPA policies on restricted area of influence</li> <li>✓ KPA plans for the SOT user members</li> <li>✓ Views of KPA on the project</li> </ul> </li> <li>Conditions of land lease</li> </ul>
Mombasa Water and Sewerage Company (MOWASCO)	August 31 <sup>st</sup> , 2020	<ul> <li>Project introduction: location, project description, Potential impacts and the proposed mitigation measures;</li> <li>Obtain information on:         <ul> <li>✓ The water resources in the project area including; rainfall, surface water and ground water; and</li> <li>✓ The prevailing water issues within the project area.</li> </ul> </li> </ul>

Stakeholder Engagement Process

		• Get their views and concerns on the proposed project.
Kenya Railways Corporation (KRC)	September 4 <sup>th</sup> , 2020	<ul> <li>Project introduction: location, project description, Potential impacts and the proposed mitigation measures;</li> </ul>
		• Get their views and concerns on the proposed project.
KENGEN		Project introduction
	October 6 <sup>th</sup> , 2020	<ul> <li>Give an overview of the ESIA process and studies being undertaken to assess the project potential impacts;</li> </ul>
		• Get their views and concerns on the proposed project.

### 5.6.5.1 Second Public Baraza Meeting

A second public baraza was held at the Shimanzi Chiefs camp on 8<sup>th</sup> October 2020 as indicated earlier. The public baraza meeting was held with residents from the KPA and Kenya Railways estates in Shimanzi. The meeting was attended by a total of 77 residents. As indicated in the first meeting, residents from the two estates are the only ones that live within the vicinity of the proposed site for the LPG plant and are likely to be impacted most by the project and its activities. The meeting was also attended by the National Government Authority Officers in charge of the area i.e., the Assistant Chief together with the village elders.

The Firm of Experts and the Proponent's representatives were in attendance to provide information to the public and to receive and address comments.

Using verbal discussions, the baraza was presented with information on:

- Brief description of the project (update on newly acquired project information)
- The potential positive and negative impacts and subsequently the enhancement measures and mitigation measures, respectively.
- The Grievance Redress Process and expected feedback from the community

Subsequently, the views/concerns/comments from the attendees were collected and responded to.

Discussions were conducted in both Swahili and English languages.

### 5.6.5.2 Focus Group Discussions

FGDs are important when gauging with a particular group of stakeholders on issues related to the project activities. It is used to understand the needs, perceptions, and concerns of the group. The discussion will give space for the members to voice their concerns and suggestions.

Focus group discussions for the assessment phase were carried out with the women and youth leaders. The FGDs were carried out on 8<sup>th</sup> October 2020 immediately after the second baraza meeting was concluded. Structured questionnaires were used to undertake the focus group discussions to elicit their expectations and suggestions for the proposed project.

#### Stakeholder Engagement Process

The discussions were focused the project, their roles in society, economic and empowerment activities, potential opportunities for women and youth and participation in project.



Figure 5-2: FGD with the community leaders

Figure 5-3: FGD with GAPCO CBO youth group



## 5.6.6 Disclosure of the Impact Assessment Findings

Just like dissemination of project information, disclosure of impact assessment findings was done through verbal discussions, diagrammatic presentations, and information documents. The key tool prepared was a presentation flip chart that contained diagrammatic presentation of the project components of the LPG storage facility.

In addition, mobilization for the public disclosure meetings was done in reference to the public posters initially placed in strategic places within the community i.e. *The Chief's camp*
#### Stakeholder Engagement Process

notice board, shops at the KPA and Kenya Railways estates, notice boards at the KPA and Kenya Railways notice boards, giving people information on the proposed project; it's location, the ESIA requirements and inviting them to contact the Consultants with comments or concerns on the proposed project using the contacts provided on the notice. Mobilization for the public disclosure meeting was done by the office of the chief in collaboration with estate representatives "mabalozi", opinion leaders and village elders.

The public baraza and FGDs were conducted in Kiswahili language while the one-on-one meetings were conducted in English. Questions and comments were received and noted down.

Stakeholder Engagement Process



Figure 5-4: Public Baraza during disclosure meeting

Figure 5-5 presentation in meetings



### 5.6.7 Identification and recording issues of concern

During the stakeholder consultations, different views and concerns were expressed by the stakeholders consulted. These views were captured and recorded through meeting minutes and issues and response reports (IRR). Responses to the views and comments were undertaken as part of the detailed environmental and social impact assessment.

Stakeholder Engagement Process

Subject	Issue	Response				
Community health and safety	Whether the mounded LPG storage tanks will ensure that	The mounded technology proposed by OLA is one of the safest and has been used in developed countries				
	from inhaled gas and in the event of an explosion	The sphere tanks holding LPG will be encased in a concrete wall with sand surrounding the immediate metallic tank.				
		In the event of an explosion the tank will sink instead of exploding, thereby limiting any possibility of fire outbreaks to the nearest tanks, communities, and business establishments				
		The mounding technology allows for reduced safety distance (the distance between 2 tanks) hence the proponent is able to utilize a small piece of land to construct tanks with larger storage capacities as compared to the bullet technology.				
Traffic and movement patterns	Whether there is a plan to manage traffic that will result from construction activities	The contractors will undertake public awareness programs in consultations with the community to identify areas of particular risk and approaches to reduce risk. This is expected to include awareness programs along roads leading to the site targeting frequent users on traffic dangers.				
		The Project Contractor will develop a Traffic management plan for the construction phase of the project				
		The contractor will prepare a detailed plan for signage along the Construction Area to facilitate traffic movement, provide directions to various components of the Works, and provide safety advice and warnings.				
Employmen t	Whether the Proponent will employ locals.	The proponent is committed in ensuring effective local content in terms of sourcing of skilled, semi-skilled labour.				
Skill Enhanceme nt	Whether there will be skill enhancement at the LPG facility to enable the employees secure jobs in similar developments once the plant has been decommissioned	The setting up of the LPG plant will require highly skilled, skilled semi- skilled and unskilled labour. The unskilled have to be supervised by the skilled personnel, however, the unskilled will be presented with an opportunity to learn from the skilled as they work together.				

Stakeholder Engagement Process

Subject	Issue	Response			
Impacts on air quality	How the dust generated from construction will be managed	The contractor will implement dust suppression measures including, sprinkling water, undertaking excavation works when its less windy, use of road signage, dust traps and speed reduction as appropriate and applicable			
		The contractor will regularly engage the neighbouring business establishments whenever activities that are likely to cause nuisance or disturbance are planned			
Corporate Social Responsibili ty (CSR)	Request for adequate street lighting in the area and upgrade of the Shimanzi Railways dispensary	CSR activities will be determined in consultation with community members and will take into account the greatest area of challenge to the people.			
Contractor Manageme nt	How the proponent will manage the Contractor and ensure they honour the	The Construction activities will be managed by a HSE Officer to ensure recommendations made in the ESIA are implemented by the EPC Contractor.			
	agreements especially with the local communities and residents	Additionally, the Proponent will hire a Community Liaison Officer from the community who will handle grievances related to the project and ensure that they are addressed appropriately.			

Table 5-2: Key stakeholder views captured during stakeholder consultations

## 5.7 Stakeholder Engagement Plan

The Stakeholder Engagement Plan (SEP) for the proposed project is a dynamic document that will require regular reviews and updates to adapt it to evolving stakeholder needs and project environment. A more detailed SEP has been prepared for this project.

- Section 1: Introduction- This section provides a background to the Stakeholder Engagement Plan and the project including proponent details, project design elements, proposed project site and the possible project impacts.
- Section 2: Project regulatory framework- This section outlines the national and international policies, legislation and best practice standards that will guide the implementation of the SEP.
- Section 3: Stakeholder Engagement Activities- This section highlights the stakeholder engagement activities that have been concluded to date. This comprises of engagement activities conducted prior to as well as during the ESIA phase including stakeholder identification and subsequent information disclosure and consultation.

Stakeholder Engagement Process

- Section 4: Project stakeholders- This section outlines the project stakeholders as identified under local, county, and national levels.
- Section 5: Stakeholder Engagement Program- This section details the stakeholder engagement programme. The proposed SE approach is delineated into 5 levels namely; Inform-Consult-Involve-Collaborate-and Empower
- Section 6: Implementation Plan- Here, the SE implementation plans for the different project phases are outlined. The phases are delineated as ESIA (Scoping, Impact assessment), construction, operation, and decommissioning.
- Section 7: Resources and responsibilities- In this section, responsibilities for the preparation, management, and coordination of this SEP and its integral tasks are discussed.
- Section 8: Grievance Mechanism- This section provides an overview of the Grievance Mechanism (GM)
- Section 9: Monitoring and Reporting- This section provides the monitoring and reporting framework for the SEP
- Section 10: Management Functions- This section defines the proposed core organizational functions and responsibilities. Organizational structure and management functions necessary for the effective implementation of the SEP.
- Section 11: Appendices- provides the appendices.

## 5.8 Grievance Mechanism

OEKE seeks to build strong relationships with stakeholders and manage the impact of its business activities on affected communities. OEKE will aim at minimizing grievances through managing Project impacts and through preemptive community liaison activities designed to anticipate and address potential issues before they become grievances. Nevertheless, it recognizes that complaints about its activities may occur from time to time.

The Community Grievance Procedure will allow stakeholders to raise questions or concerns with the Company and have them addressed in a prompt and respectful manner. The procedure aims to address all complaints received, regardless of whether they stem from real or perceived issues and whether the Grievant/Complainant is named or anonymous. Any stakeholder who considers themselves affected by OEKE's activities will have access to the procedure at no cost. The statutory rights of the Complainant to undertake legal proceedings remain unaffected by participation in the process.

OEKE seeks to foster trust in the process and its outcomes. To this end it will communicate this Procedure in an understandable manner to affected stakeholder groups. Confidentiality will be respected, and the company will take all reasonable steps to protect parties to the process from any kind of retaliation.

The grievance mechanism is focused on communities and other stakeholders and does not incorporate employee–related grievances, which will be addressed through the workers grievance mechanism defined as part of the human resourcing procedures.

The GM is a dynamic document that shall be revised and updated periodically (annually at minimum) based on experience and feedback from stakeholders. A more detailed grievance mechanism procedure has been prepared for this report.

Stakeholder Engagement Process

Given below is a summary of sections in the OEKE GM.

- Section 1: Overview of the Grievance Mechanism- This section highlights the purpose, objectives, scope, and principles of the GM
- Section 2: Roles and responsibilities-This section provides details regarding specific roles, responsibilities and steps that need to be followed by OEKE staff and contractors to manage grievances
- Section 3: Accessibility- This section highlights the strategies that OEKE will employ to ensure there are no barriers to access by stakeholders
- Section 4: Public sensitization campaign- this section highlights the strategies that OEKE will use to run a public sensitization campaign as part of community roll-out for the Grievance Mechanism
- Section 5: Workflow- This section highlights the process flowchart that OEKE will use for receiving, recording, investigating, and resolving a grievance.
- Section 6: Grievance resolution approach- This section highlights the grievance resolution approach that will be used by OEKE
- Section 7: Procedures for resolving complaints- This section highlights the steps that will be used in resolving conflicts which will include; receipt, registration, eligibility screening, acknowledgement, assessment, formulation and close out.
- Section 8: Confidentiality- This section highlights the measures that will be taken to protecting the identity of the Complainant and to handling personal information in accordance with legal requirements.
- Section 9: Grievance Mechanism performance monitoring- This section highlights the methods that will be used to assess the performance of the GM which will include; monitoring and evaluation, key performance indicators, performance reporting
- Section 10: Resource Requirements-This section highlights the resources that will be required to ensure the effective implementation of the GM which will include personnel, infrastructure, system resources and financial resources
- Section 11: Roll out and communication of the Grievance Mechanism- This section highlights how the GM will be rolled out through various programs
- Section 12: Appendices-contains the appendices which include the tracking mechanisms.

Assumptions and Limitations

# 6 Assumptions and Limitations

### 6.1 Assumptions

In undertaking this investigation and compiling the ESIA, the following has been assumed:

- The information provided by the client and the project engineer is accurate and unbiased.
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed project.
- It is assumed that no spoil dumping areas, borrow pits and quarries will be created for this project and sand will not be harvested from the nearby Indian Ocean. It is assumed that existing quarries and borrow pits will be used and that such borrow pits / quarries are in possession of the required environmental authorizations
- It was assumed that the motivation for planning and feasibility study of the project were undertaken by the developer with integrity, and that information provided to date by the project developer was accurate.
- It is assumed that the proposed common user manifold for KOT will be completed on time for the proposed project to connect. Therefore, this ESIA study has considered the delivery line from the proposed CUM at Kipevu.

## 6.2 Limitations

The planning for the proposed project is at the Front-End Engineering Phase and therefore some of the specific details are not available at this stage of the ESIA process. This ESIA process forms a part of the set of feasibility studies and as these studies progress, more information will become available to inform the ESIA process.

This study was done with the information available to the specialist at the time of executing the study, within the available timeframes. The sources consulted are not exhaustive, and additional information which might strengthen arguments, contradict information in this report, and/or identify additional information might exist. The specialist did try to make an evidence-based approach in the compilation of this report and did not intentionally exclude scientific information relevant to the assessment

A limited amount of finalized project details from the project developer means that some of the actual project projections may be higher or lower than estimated in this report.

## 6.3 Gaps in Knowledge

This ESIA identifies and assess the potential environmental impacts associated with the proposed Marine Terminal and associated infrastructure. However, the scope of impacts presented in this report could change, should new information become available during the ESIA Phase. The purpose of this section is therefore to highlight gaps in knowledge when the ESIA study of the project was undertaken.

Assumptions and Limitations

Current gaps in knowledge at the ESIA include the following:

- The final depth of piles foundation, specifications of the mounded sphere tanks, product pumps, fire water pumps and associated pipelines and
- Specific construction details of the proposed project, including detailed engineering drawings and construction specifications.
- The completion date of the Common User Manifold by KPA is not known

Project alternatives

# 7 Project alternatives

Legal Notice 101: Environment Impact Assessment and Audit Regulations, 2003 states that an outline of the main alternatives studied by the Proponent and an indication of the main reasons for the Proponent's choice is required in an Environment Impact Assessment. Furthermore, where alternatives are available which may still allow the objectives of the project to be met, the existing environment should also be detailed.

Subsequently alternatives for the proposed project have been evaluated from the following perspectives:

- Location alternatives what is the best site for a proposed development and any infrastructure associated with it?
- Technology alternatives-are there other available means to achieve the required capacity and lower the risk?
- Design alternatives- are there other means to achieve the same objective?
- Delivery line alternatives what is the best size of the delivery pipe to achieve the required product flow?
- No-go option what are the implications of not proceeding with the project?

# 7.1 Location Alternatives

An alternative of locating the proposed terminal in Nairobi industrial area at OEKE site was considered. The alternative was not feasible as there is no LPG pipeline linking Nairobi to Mombasa and it also requires a temporary storage terminal at Mombasa.

Locating the terminal anywhere else was not considered due to the expensive process of land acquisition and zoning of the area.

OEKE has approximately 5Ha of land at shimanzi, in Mombasa leased from KPA where approximately 2 Ha are utilized by the 510 MT LPG filling and storage facility. The area is zoned as industrial area and there are many established petroleum and vegetable oil storage facilities. The area is also close to Shimanzi Oil Terminal, the main terminal for the vessels supply the county with LPG. Additionally, the area is approximately 2km from the proposed Common User Manifold (CUM) for the New KOT and there is an existing ROW from the CUM location to the site under the Kenya Petroleum Refineries Ltd (KPRL).

OEKE will establish the proposed terminal at Shimanzi, the alternative has the following benefits

- The land is already leased to OEKE and therefore there will be no land acquisition processes leading to displacement of people and livelihood
- The available land is prime for such projects and largely under utilized
- The location is zoned as industrial area with established petroleum and vegetable oil facilities and the operation of the proposed project can mutually benefit from the existence of the other facilities.
- The location is near Shimanzi Oil Terminal which is the only Common User Terminal for LPG in the country
- Technology Alternatives

Project alternatives

### 7.1.1 Bullet tanks/cigars

The option of erecting bullet tanks without mounding was considered. However, due to the constrain of the required horizontal space at the project site and the required safety distances for the bullets, the option would have resulted to terminal with less than 60% of the planned capacity. The option also posed greater fire and explosion risk with potential of affecting other neighbouring facilities.



Figure 7-1: Typical bulk LPG bullets tanks

### 7.1.2 Mounded Bullet Tanks/cigars

The option involved constructing mounded LPG bullets tanks. It was established that option had less fire and explosion risk and required less safety distance, but it was dropped since it achieved 70% of the planned terminal storage capacity due to the required large surface area for the bullets and the limited storage space of each bullet (3500m<sup>3</sup>).

Project alternatives



Figure 7-2: Typical Mounded LPG Bullet tanks

### 7.1.3 Mounded Spheres

Mounded sphere technology has been preferred to mounded cigars/bullets due to its performance in term of ratio storage volume/ land surface and its better seismic risk resistance. Additionally, EEMUA (Engineering Equipment and Materials Users Association) recommend to not go over 3500m3 mounded cigars to avoid differential compaction problems, this will be avoided with mounded sphere.

This technology is based on the same principles as mounded cigars; construction according to international calculation codes; high level of control; extremely high performance of passive protection and cathodic protection. The advantage of this mounded sphere technology lies in the support technology. The sphere will be supported by a steel ring welded to the sphere which is itself supported by a concrete ring, this will increase the resistance to related vertical and horizontal accelerations in case of seismic activity.

The sphere will then be surrounded by a reinforced concrete wall like a sarcophagus filled with sand. The sphere is therefore covered over its entire surface with a least 1m of sand which is retained by the concrete wall.

Other advantages of this technology are the protection against missile, airplane crash in case of proximity with airport and the easiness of maintenance and operation indeed the mounded spheres are independent compared to mounded tanks farm which are next to each other.

The mounded spheres also reduce the visual effect of normal spheres in the neighborhood.

This technology has been developed in the last decade by Shell and Total with success in many countries in the world and in Africa, examples are France, Senegal, Morocco, Tunis, La Martinique, Tahiti, Benin. Shell has been leader in the development of this technology.

Project alternatives



Figure 7-3: Preliminary Design of the proposed storage tank

Figure 7-4:Typical Mounded Spheres



Project alternatives

## 7.2 Design and Layout Alternatives

Design alternatives for the proposed project were considered in the decision analysis where various layout for the mounded spheres tanks and loading facilities were considered. OEKE engaged an experienced consortium of engineers to undertake the front-end engineering design (FEED) for the proposed project. The engineers considered the layout below which has the following specifications

- Storage capacity will be 30,000 M3
- Six mounded spheres in concrete sarcophagus to be located on the expansive northern side of the plot
- The tanks (pressure device) will comply with the KS 1938-3 version 2012: calculation, design and construction compliant with the ASME Section VIII, Divisions I and II code.
- Mombasa being in seismic area (VI on Mercalli scale, 5.4 on Richter scale), the storage and its concrete wall will be calculated to resist to this seismic classification.
- The service pressure will comply with regulation KS 1838-3, either 250 psi or 17.24 bar
- The over thickness corrosion will be 1mm.
- Branch of tanks in lower part (liquid outlet) will be equipped with a manual valve and 2 fail-safe automatic valves. All other branches in upper part will be equipped with a manual valve and a fail-safe automatic valve. They will be operated with compressed air. To limit the number of branches, the upper outlets will be concentrated on manhole plates.
- Note relating to the withdrawal line, one of the automatic valves may be replaced by an internal Whessoe valve (hydraulic).
- The draw-off pipe in the lower part will be constructed in a double jacket between the tank and the 1st automatic valve.
- Instrumentation: pressure, level, high redundant level and temperature will be of the electronic type with direct and remote reading (transmission).
- Passive protection (painting) of mounded tanks will be high-quality specification.
- The cathodic protection of the tanks under the embankment will be imposed current type detailed in a high-quality specification.

Project alternatives





**Project alternatives** 

## 7.3 Delivery Pipe Alternatives

At the inception the project, it was proposed that the existing 4 and 6" delivery line from SOT would be replaced with a 12" pipeline. However, during the project planning it was established that KPA was in the process of relocating KOT and adding LPG infrastructures at the proposed Common User Manifold.

OEKE engaged pipeline Engineers during the FEED of the proposed project and the following options were considered

### 7.3.1 **Pipeline Routing Alternatives**

The proposed new pipeline will be designed to replace the existing pipeline between SOT and the existing OLA Depot as well as extend to the future tie-in points at KOT2. The pipeline routing exercise was undertaken to assess the existing route to ensure suitability, constructability, and safety of the pipeline.

A single route was considered for each pipeline which will be subjected to further refinement after more detailed topographical and geotechnical surveys are done along the route. Further work will include, but may not be limited to:

- Identification of existing sub-surface utilities and services.
- Assessment of constructability along the pipeline route, road, rail and sea crossings
- Determination of adverse sub-surface conditions
- Identification of geo-hazards

### 7.3.2 Pipe Design

This proposed pipeline design methodology has been developed to fully comply with all industry codes and standards. The conceptual design will be subject to review, validation, confirmation and updating during FEED and detail design.

#### 7.3.2.1 Pipe Material

The pipe material was selected in accordance with the applicable codes and standards for onshore process piping developed by The American Society of Mechanical Engineers (ASME B31.3.)

#### 7.3.2.2 Corrosion Allowance

Considering the proximity of the pipeline route to the ocean, and the propensity of buried pipelines to corrode in such environments, a corrosion allowance (CA) of 2mm has been added to the pipe thickness calculation.

This provision will be in lieu of any secondary corrosion control measures, such as cathodic protection systems, and should serve towards safe operation of the system, within the design parameters, for the duration of its design life, estimated at over 30 years.

Project alternatives

#### 7.3.2.3 Pipe Wall Thickness

Determination of pipe wall thicknesses was done for the entire segment of the line. The tolerance for wall thickness should meet criteria provided under Table 9 of API specification 5L. To specify the pipe, the CA to the minimum design thickness and a suitable pipe schedule selected that is equal to or greater than that value.

#### 7.3.2.4 Hydraulic Analysis

The hydraulic study was carried out to:

- Determine the optimal pipe diameter required to receive up to 2,500 m<sup>3</sup>/hr from the proposed CUM.
- Determine the optimal pipe diameter to enable receipt of 15,000 tonnes of product in 36 hours from SOT.
- Simulate the scenarios proposed for receipt from KOT2 at between 800 1500 m<sup>3</sup>/hr.
- Establish the pipeline operating parameters, i.e., MAOP, MOP and OP.
- Simulate the flow rate at the OP.

## 7.4 Do Nothing Alternative

The 'do-nothing' alternative is the option of not establishing the proposed LPG Marine Terminal project at the identified site at Shimanzi in Mombasa. This alternative would result in no environmental and social impacts in the project area.

Whilst this would without doubt result in complete avoidance of impacts, this needs to be balanced with the strategic need for the stable supply of LPG in Kenya.

The demand of LPG in the retail market has largely been constrained due to affordability and accessibility of LPG. The major cause for this has been lack of adequate LPG infrastructure and expensive imports. OLA energy intends to contribute positively to the Government's LPG strategy by expanding their 550MT LPG terminal at Shimanzi area in Mombasa County. The terminal is intended to enhance the country's storage capacity by erecting mounded sphere tanks with a total capacity of 14,500 metric tonnes, increasing product receipt flow rate from SOT (and in future KOT) thus reducing the demurrage cost and connecting to the SGR rail system which will enhance distribution of the LPG within the country.

Through the ongoing feasibility study and Front-End Engineering Design of the project, the economic and technical viability of the proposed project has been established and the proponent proposes to construct the proposed Marine Terminal Project.

The do-nothing alternative will not assist the Kenyan Government in reaching its targets for use of LPG as a source of Energy. Subsequently, the do-nothing alternative is not a preferred alternative and has not been assessed in this ESIA.

Impact Assessment methodology

# 8 Impact Assessment methodology

This section of the ESIA Study presents the potential impacts associated with the proposed Expansion of the LPG terminal at Shimanzi area, Mvita Subcounty, Mombasa County. The purpose of this impact assessment is to assign relative significance to predicted impacts associated with the project, and to determine the manner in which impacts are to be avoided, mitigated or managed. The potentially significant environmental impacts were identified based on the nature of the receiving environment, a review of the proposed activities, and the issues raised in the public participation process.

## 8.1 Proposed project activities

The following activities are associated with the construction, operation and decommissioning of the proposed solar Project:

#### Preconstruction activities

- Topographic survey of the site and the ROW routes for the delivery line
- Geotechnical survey
- Decommissioning of the LPG facility

#### **Construction phase**

- Construction of the site access road
- Construction of the retaining walls
- Dismantling of the LPG bullet tanks
- Demolition of the buildings and foundations
- Site clearing, site preparation, and mobilization.
- Establishment of contractor yard.
- Establishment of laydown areas.
- Construction of foundations and substructures
- Erection of superstructures e.g., columns, sphere support, walling and mound and floors
- Filling of the mounded walls with sand
- Pipeline and fittings connections
- Establishment of Loading gantry, ancillary infrastructure;
- Construction of weighbridge, Office and utility buildings.
- Start-up, commissioning, and testing.

#### **Operational phase**

- LPG delivery from SOT or KOT
- LPG storage

Impact Assessment methodology

- LPG loading to the trucks and Rail cars
- Routine maintenance of equipment and plant; and
- Security of facilities.

#### Decommissioning

- Tender process and awarding of contract for decommissioning and demolition.
- Disassembling equipment and plant.
- Demolition of the mounded walls, buildings and foundations
- Dismantling of the spheres
- Site levelling and filling

## 8.2 Methodology for assessing the impacts

A comprehensive method was used to identify and analyze the potential environmental and social impacts associated with the proposed project. The method focused on the following.

- The types of impact
- Predicts the magnitude
- Probability of occurrence
- Extent of the impact; and
- Determines the overall significance of the impact.

# 8.3 Identification of environmental and social aspects and impacts

The outstanding environmental issues identified as having significance will be assessed using the methodology described below.

First, the issues raised will be described giving consideration to the associated activity and the aspect of that activity that is likely to result in an impact. The nature of the impact will also be described. Once this has been undertaken the significance of the impact can be determined. The following definitions will apply:

- An activity is a distinct process or task undertaken by an organization for which a responsibility can be assigned. Activities also include facilities or pieces of infrastructure that are possessed by an organization.
- An environmental aspect is an element of an organization's activities, products and services which can interact with the natural or human environment. The interaction of an aspect with the environment may result in an impact.
- Environmental and social impacts are the consequences of these aspects on environmental resources or receptors of particular value or sensitivity, for example, disturbance due to noise and health effects due to poorer air quality. Receptors can comprise, but are not limited to, people or human-made systems, such as local residents, communities and social infrastructure, as well as components of the

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biophysical environment such as aquifers, flora and paleontology. Impacts on the environment can lead to changes in existing conditions; the impacts can be direct, indirect or cumulative. Direct impacts refer to changes in environmental components that result from direct cause-effect consequences of interactions between the environment and project activities. Indirect impacts result from cause-effect consequences of interactions between the environment and direct impacts. Cumulative impacts refer to the accumulation of changes to the environment caused by the project and other ongoing or planned human activities.

Aspects and impacts associated with the proposed development have been differentiated into construction and operation phases of the project.

## 8.4 Description of aspects and impacts

The accumulated knowledge and the findings of the environmental investigations form the basis for the prediction of impacts. Once a potential impact has been determined, it is necessary to identify which project activity will cause the impact, the probability of occurrence of the impact, and its magnitude and extent (spatial and temporal). This information is important for evaluating the significance of the impact, and for defining mitigation and monitoring strategies. The aspects and impacts identified will therefore be described according to the definitions below.

### 8.4.1 Extent

The extent for each aspect, receptor and impact will be defined. The geographical coverage (spatial scope) description will take account of the following factors:

- The physical extent/distribution of the aspect, receptor and proposed impact; and
- The nature of the baseline environment within the area of impact.

For example, the impacts of noise are likely to be confined to a smaller geographical area than the impacts of atmospheric emissions, which may be experienced at some distance. The significance of impacts also varies spatially. Many will be significant only within the immediate vicinity of the site or within the surrounding community, whilst others may be significant at a local (project) or regional (district) level.

The extent of the environmental impacts will be rated on the following scale:

Localized (At localized scale i.e., within the project site and the immediate neighboring facilities)					
Study area (A radius of 1km from the project site)					
Regional (Mvita sub county)					
County Level (Mombasa County)					
National (At country level)					

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The **extent** of the social impacts will be rated on the following scale:

Localized	1
Study area	2
Regional	3
County Level	4
National	5

#### 8.4.2 Duration

**Duration** refers to the length of time that the aspect may cause a change either positively or negatively on the environment.

The environmental assessment will distinguish between different time periods by assigning a rating to duration based on the following scale:

Very short (0 – 1 Years)					
Short term (1 – 5 Years)					
Medium term (5 – 15 years)					
Long term (>15 years)					
Permanent					

#### 8.4.3 Magnitude

The **magnitude** of an environmental or social aspect is determined by the degree of change to the baseline condition, and includes consideration of the following factors:

- The reversibility of the impact;
- The sensitivity of the receptor to the stressor;
- The impact duration, its permanency and whether it increases or decreases with time; Whether the aspect is controversial or would set a precedent; and
- The threat to environmental and health standards and objectives.

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The magnitude of each of the environmental impacts will be rated on the following scale

Small (will have no effect on the physical, biological or social environment)				
Minor (will cause a minimal impact on physical, biological or social environment)	2			
Low (will cause a slight impact on the physical, biological or social environment)				
Moderate (will result in a physical, biological or social environment component or process continuing but in a modified way)				
High (physical, biological or social environment or component or process is altered to the extent that they temporarily cease to exist or operate)				
Very high and results in complete destruction of patterns and permanent cessation of the processes				

### 8.4.4 Probability of impact

The **probability** or **frequency** of the impact occurring refers to how often the issue may impact either positively or negatively on the environment. After describing the frequency, the findings will be indicated on the following scale:

Highly improbable (<20% chance of occurring)					
Improbable (20 – 40% chance of occurring)					
Probable (>40% - 70% chance of occurring)					
Highly probable (>70% - 90% chance of occurring)					
Definite (>90% - 100% chance of occurring)					

# 8.5 Method of assessing the significance of impacts

The purpose of impact evaluation is to assign relative significance to predicted impacts associated with the project, and to determine the manner in which impacts are to be avoided, mitigated or managed. The information presented above in terms of identifying and describing the aspects and impacts will be summarized in a tabular form and a significance will be assigned with supporting rational. Significance will be determined before and after mitigation, taking into consideration all the factors described above.

A definition of a "significant impact" for the purposes of the study is: "An impact which, either in isolation or in combination with others, could in the opinion of the specialist, have a material influence on the decision-making process, including the specification of mitigating measures."

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	CONSEQUENCE (Extent + Duration + Magnitude)																				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
۲	1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
ABI	3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
ROB	4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80
Ā	5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100

In order to evaluate the mitigation threshold, the ratings in Table 7-2 are used.

Low	<30	Where this impact would not have a direct influence on the decision to develop in the area
Medium	30-60	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
High	>60	Where the impact must have an influence on the decision process to develop in the area

## 8.6 Mitigation Measures

Measures to avoid, reduce or manage impacts consistent with best practice will be proposed and the effectiveness of such measures assessed in terms of their ability to avoid, remove an impact entirely, render it insignificant or reduce its magnitude.

In assessing the significance of the impact, natural and existing mitigation will be taken into account. Natural and existing mitigation measures are defined as natural conditions, conditions inherent in the project design and existing management measures that alleviate (control, moderate or curb) impacts. In addition, the significance of impacts will be assessed taking into account any mitigation measures that are proposed.

An Environmental and Social Management Plan (ESMP) has been prepared and is provided in this report. This plan specifies the methods and procedures for managing the environmental aspects of the proposed development. Monitoring requirements are also be detailed within the plan, particularly for those environmental aspects that give rise to potentially significant impacts.

## 8.7 Potential impacts associated with the project

The proposed expansion of the LPG terminal at Shimanzi is expected to have both positive and negative impacts on the physical and social environment. In summary the proposed project will involve dismantling of above ground tanks and bullets tanks, demolition of the existing buildings and foundations, construction of the access road, site clearance and levelling, construction of delivery line from SOT and KOT, construction of mounded tanks and associated pipelines, construction of truck and rail loading facilities and construction of office and utility buildings. The main activities during operations include LPG receipt

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from the vessels, LPG storage and trucks and rail car loading, repair and maintenance works.

The sources of impact can be defined as all the activities linked to the above project activities that are likely to have an impact on the physical, biophysical and social environment. The sources of impact are grouped by project phase: pre-construction, construction, operation, and decommissioning phases. Table 6 3 explains these sources of impacts.

Source of impact	Description of the activities
Pre-construction phase	
Engineering survey	Topographic survey, Geotechnical survey, Baseline noise survey and Site assessment activities for the ESIA study
Decommissioning of the existing LPG Facility	Stopping the operations of the LPG bullet tanks and filling plant, removing plants and machinery, removing the LPG cylinders
Construction phase	
Site preparation activities	Site preparation activities including construction of access road, dismantling of the bush tanks and LPG cylinders, demolition of the existing buildings and foundations, clearing of the vegetation and ground levelling
Construction activities	construction of the retaining wall around the site, , excavation works for the delivery line and foundations, foundation and substructures work, erection of the superstructures ( LPG spheres and the associated , pipelines and fittings, concrete mounding, LPG loading structures and walling's),
Transportation and traffic	Road transportation of materials, equipment, and workers to and from the site, including fueling and maintenance of vehicles and machinery
Waste and hazardous materials management	Waste from dismantling and demolition activities, Management and storage of construction waste, hazardous substances and other materials to be removed, including hydrocarbons
Purchase of materials, goods and services	Purchases required for the construction of the terminal and the associated infrastructures
Presence of workers	Workers present at the project site which could lead to added burden on socio-economic and public services in the communities, potential abuse of

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Source of impact	Description of the activities
	local population, including gender based- violence and potential increase in STDs.
Operational phase	
Presence and operation LPG Mounded tanks and associated pipeline, Delivery pipeline and loading facilities	LPG delivery from SOT or KOT, LPG storage, LPG loading to the trucks and Rail cars Presence and operation of facilities.
Maintenance and repairs	Inspection, maintenance and repairs of the modules, inverters and switchyard
Waste and hazardous materials management	Handling operations and storage of hazardous waste used during the operation, including oil used in transformers at substations
Purchase of materials, goods and services	Purchases required for the operation of the substations and the transmission line.
Presence of workers	Employees operating the plant and during maintenance along the line.

## 8.8 Environmental and social components

Determining environmental and social components (ESC) consists of identifying, based on available data, elements of the physical, biological, and socio-economic environment that are likely to be affected by one or more source of impact. The ESC identified for the project are listed in Table 6 4. The ESIA process will focus only on these components.

Comp	onent	Description				
t	Soils	Physical and chemical characteristics of the surface deposits, including vulnerability to erosion.				
ironme	Water	Physical and chemical characteristics of the surface water and groundwater				
ll env	Air quality	Physical and chemical characteristics of the air.				
Physica	Noise, vibrations and electromagnetic fields	Noise, vibrations and EMF levels.				
gical Iment	Terrestrial flora	Terrestrial plant communities, including special-status species				
Biolog environ	Terrestrial fauna	All terrestrial and semi-aquatic animal species and their habitats, including special-status species				

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Comp	onent	Description					
	Avifauna	All bird species and their habitats, including special- status species					
	Employment and economic development	Local and regional economic development, employment					
	Land use	Land uses: fishing, tourism, urban, etc.					
Socio-economic environment	Infrastructure	Electricity and telecommunication networks, public services (health, education), regional and local road network, railroads, etc.					
	Gender aspects	Women living conditions, including women's economic opportunities and gender equity within the communities.					
	Gender Based Violence	An umbrella term for any harmful act that is perpetrated against a person's will, and that is caused by differences in power between people of different genders, i.e., between males and females and people of other gender and sexual identities					
	Communities and social cohesion	Traditional knowledge, social cohesion and vulnerable groups (the poor, youth, women and the elderly).					
	Cultural and archaeological heritage	Religious, cultural or historical sites and structures					
	Safety and public health	Population well-being and health, including Sexually Transmitted Infections (STIs)					

### 8.8.1 Identification of potential environmental and social impacts

The identification of the potential environmental and social impacts was established by an "environmental matrix", in which one axis identifies the project's sources of impacts while the other axis identifies the biophysical and socio-economic components of the project. The matrix on the next page presents these interactions and will be the basis for the impact evaluation

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		ENVIRONMENTAL COMPONENT				SOCIAL COMPONENT													
		Physical Environment			Bic Envi	ologica ronme	al ent	Social Environment											
		Soils	Surface water	Air quality	Noise	Landscape and Visual	Aquatic ecology	Terrestrial ecology		Employment and economic	Land use	Infrastructure	Gender requirements	Gender based violence	Communities and social cohesion	Community health and safety	Workers health and	Cultural Heritage	Transfer of Skills
	CONSTRUCTION PHASE				•	•			•				•					•	
	Site access	N	N	N	N					Р		Ν	Ν	N	N	Ν	Ν		Ρ
SE	Demolition and dismantling activities	N	N	N	N					Р		Ν	Ν	N	N	Ν	Ν		Ρ
РНА	Transport and traffic	N	N	N	N					Р		Ν				Ν	Ν		Ρ
BΥI	Construction activities	N	N	N	Ν					Р		Ν	Ν			Ν	Ν		Ρ
ACT	Waste generation	N	N	N						Р		Ν				Ν	Ν		
MP/	Purchase of goods, materials, and services									Р					N				
OF I	Presence of workers	N	N							Р		Ν	Ν	Ν		Ν	Ν		Ρ
CES	OPERATIONAL PHASE																		
URC	Receiving of the LPG from the Vessel									Р						Ν	Ν		Ρ
SO	Storage of highly flammable LPG									Р		Ρ				Ν	Ν		Ρ
	Loading and offloading of LPG			Ν	Ν					Р		Ν				Ν	Ν		Ρ
	Maintenance and repairs	Ν	N							Р		Ν				Ν	Ν		Ρ

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	ENVIRONMENTAL COMPONENT				SOCIAL COMPONENT													
	Physical Environment			Bi Env	ologica ironme	al ent		Social Environment										
	Soils	Surface water	Air quality	Noise	Landscape and Visual	Aquatic ecology	Terrestrial ecology		Employment and economic	Land use	Infrastructure	Gender requirements	Gender based violence	Communities and social cohesion	Community health and safety	Workers health and	Cultural Heritage	Transfer of Skills
Waste and hazardous materials management	Ν	N	Ν						Р						N	Ν		
Purchase of materials, goods, and services									Р									
Presence of workers	N	N							Р		Ν		Ν	N	N	Ν	Ν	Р
DECOMMISSIONING PHASE																		
Demolition and dismantling activities	N	N	N	N		N			Р		Ν				N	Ν		Р
Waste generation	Ν	N	Ν			Ν			Р		Ν				Ν	Ν		Р
	<b>P</b> =	Positive	Impa	acts, I	I= Ne	gative	Impa	cts										

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# 8.9 Risk Assessment Methodology

The Kenyan Occupational Safety and Health Act, 2007 (OSHA) requires that an Occupier shall carry out "appropriate" safety and health risk assessments and on the basis of these, develop and implement appropriate mitigation measures for protecting the workers. A Quantitative Risk Assessment (QRA) was carried out, which is a requirement under the OSHA to implement the project.

The focus of the assessment is on those hazards leading to injuries or fatalities that can affect the outside public or neighbouring installations. It is therefore not a detailed audit of all the possible risks to plant equipment and operating personnel etc.

The expertise and knowledge of the operating personnel were initially used to determine which events are most likely to be significant and furthermore which of these significant events is likely to affect the outside population and installations. Thereafter all the categories of hazards in each area were evaluated qualitatively and quantitatively to confirm which hazards are major hazards.

General hazards from the storage of large quantities of hazardous materials, such as burns and possible death of personnel, were deemed to be localised and not able to affect the outside public or neighbouring installations, and are hence not considered in detail the risk assessment for this ESIA. Similarly, issues such as ecological, environmental and financial risks within the organisation were not considered.

The methodology followed is summarized as follows:

- Description of the plant, the location, and the meteorological conditions;
- Identification of all the possible categories of hazards, by listing all the materials used in the process with their hazardous properties, and by dividing the plant into sections with consideration of the possible equipment related hazards in each section;
- Selecting in a qualitative manner, the worst incidents within all these categories and then quantifying these;
- Evaluating the consequences of the incidents in order to determine which events were likely to affect only the local plant and which could possibly affect the outside public (potential major hazards);
- Quantification of consequences in detail in terms of toxic cloud movements, explosion damage circles etc.;
- Major hazards with potential consequences which may affect the local plant were not considered further, while the severity of the remaining major hazards was determined and a frequency of occurrence estimated;
- Estimating the risk and comparison with certain acceptability criteria;
- Reviewing emergency procedures in the light of the possible major incidents;
- Drawing of conclusions and proposing recommendations

Assessment of Impacts

# 9 Assessment of Impacts

Potential Environmental and Social Impacts associated with the construction and operation of the proposed project have been identified and assessed in this section. The assessment of the impacts is broadly categorized into

- Positive Impacts, and
- Negative Impacts.

## 9.1 Assessment of positive impacts – construction phase

### 9.1.1 **Potential Impacts on employment**

The proposed expansion of the LPG marine terminal is envisaged to generate direct and indirect employment opportunities for both semi-skilled and unskilled workers. Direct employment includes jobs for constructing the LPG plant during the construction phase. Indirect employment will be realized through increased business opportunities and spurred economic growth both at the local, regional, and national levels through procurement and supply of goods and services required for the project.

Creation of employment opportunities during the construction phase was perceived to be the most important benefit of the project by the residents living in the project area. During stakeholder consultations revealed that the area is characterized by high levels of unemployment.

It is estimated that during the pre-construction and construction phase (for the period of 18 months) approximately 150-200 full-time employment opportunities will be available. In terms of skills requirements, highly skilled or skilled labour such as engineers, project managers, environmentalists, HSE supervisors, LPG technical operations staff, finance and administration and LPG procurement and logistics specialists will constitute about 15% of the workforce, skilled staff e.g. machine operators, fork lifters, drivers, masons, mechanics, scaffolders, concrete workers, draftsmen, emergency medical teams etc. will constitute about 25% of employees while unskilled staff such as cleaners, loaders, traffic marshals, office assistants, form works, security personnel etc. will constitute about 60% of the workforce. Majority of low-skilled and semi-skilled opportunities are likely to be sourced from the local community in the project area. Employment opportunities for the proposed development will peak during the construction phase and significantly decline during the operation.

There will be significant job opportunities for low skilled (construction, security, and maintenance workers) and semi-skilled workers, who can be sourced from the local areas. Construction workers could be sourced from Shimanzi/Ganjoni ward and the neighbouring wards and the larger Mvita sub country which has a high number of unemployed youths. It is be expected that some of the construction workers from outside Shimanzi area would form part of the construction team. Local labour should be sourced from the project area first (KPA and Kenya Railways estates) and if need be, extend the search to the whole Mvita Sub county.

It is likely OEKE will appoint an Engineering, Procurement and Construction (EPC) contractor, who will hire the necessary employees. The EPC contractor will aim to ensure

Assessment of Impacts

gender balance during employment to help empower women in the community. During the baraza meeting held with the communities, the women were encouraged to take advantage of indirect employment opportunities that will arise from the project such as providing catering services to the construction workers and office cleaning services.

Subsequently, the employment opportunities are expected to result in a marked increase in individual/household income and for the communities living near the proposed LPG plant.

Enhancement Status	Extent	Duration	Magnitude	Probability					
Without	Regional	Short term	Moderate	Probable					
ennancement	2	2	5	3					
	Result: (+27)	Low positive							
Enhancement measures	<ul> <li>OEKE will c Shimanzi in immediately</li> </ul>	lirect the Contrac the allocation of neighboring the p	tor to prioritize job opportunities roject.	the residents in especially those					
	<ul> <li>OEKE will a afforded to t available em set required project.</li> </ul>	OEKE will also ensure opportunities for capacity building are afforded to the local residents to enable them to benefit from the available employment opportunities. This includes training in skills set required during the construction and operational phases of the project.							
	<ul> <li>Job advertisements will be made through mediums (KPA and Kenya Railways estate notice boards, Shimanzi chiefs camp notice board, and through village elders and estate representatives "mabalozi") that are easily accessible to the residents living near the proposed project.</li> </ul>								
	• Where possi and nationa appropriate.	ble, expertise will lly before engagir	be sourced localling international ex	y then regionally xperts as will be					
	• The recruiting gender equation	nent and selection Ility and the emplo	n processes will s syment of women	seek to promote where possible.					
	Management     will be inclu     resources pla	t and enhanceme uded in the Proje an and guidelines.	nt measures for lo ect Contractor's la	cal employment bor and human					
	A Communit and econom residents an residents to about the co	<ul> <li>A Community Liaison Officer who understands the socio-politic and economic context should be appointed from amongst the residents and a Grievance Mechanism implemented for the loce residents to express or forward any complaints or grievance about the construction process</li> <li>The Contractor will make effort to promote local businessmen and entrepreneurs in the procurement of goods and services to asso in providing employment opportunities for the residents</li> </ul>							
	The Contract entrepreneu in providing								
	The contract with disabilit elderly durin	or should conside y, women, single v g employment and	r skilled and unski vomen headed hou d hire of service pr	lled people living useholds, and the rovision.					

Assessment of Impacts

Enhancement Status	Extent	Duration	Magnitude	Probability			
With	Regional	Short term	Moderate	Definite			
ennancement	2	5					
	Result: (+45) Medium positive						

### 9.1.2 **Potential impacts on Economic Development**

There are likely to be opportunities for local businesses to supply materials and provide services during the construction phase of the project. The existing local service sector and enterprises will also benefit from the proposed development. Mombasa City in general has businessmen who supply construction materials, own hardware shops, restaurants, accommodation services that can potentially support the construction of the LPG plant. It is important that local service providers are given a fair and equal opportunity during the tendering processes. As rightly perceived by the local communities, this will lead to secondary employment and creation of small supporting businesses.

The total construction capital expenditure associated with the establishment of the 14500 metric tonnes LPG plant and associated infrastructure is estimated to be US\$ 85 million. It is also estimated that between 50% and 60% of the capital expenditure will be spent on local goods and services required for the development of the LPG plant.

The economic multiplier effects from the use of local goods and service opportunities will include, but is not limited to, construction materials and equipment and workforce essentials such as services, safety equipment, ablution, accommodation, transportation, and other goods.

Also, the injection of income into the area in the form of wages will enhance local economy and boost businesses in the area. With increased income comes enhanced purchasing power for goods and services. Maximizing on local labour employment opportunities is likely to have a positive impact on local communities and have downstream impacts on household income, education, and other social aspects.

Increased tax revenue through direct and indirect taxes on goods and services will also stimulate the economic growth.

Enhancement Status	Extent	Duration	Magnitude	Probability				
Without	Regional	Short term	Low	Probable				
ennancement	3	2	3	3				
	Result: (+24) Low positive							
Enhancement measures	<ul> <li>A local procurement policy and guidelines should be adopted by the developer and EPC Contractor to maximize the benefit of the loca human and resources capital</li> </ul>							

Assessment of Impacts

	OEKE will en- goods require opportunities that proper ca to enable t opportunities	goods required for construction purposes, ensure that economic opportunities are available or are created for the local residents and that proper capacity building is afforded to the local communities to enable them to benefit from the available economic opportunities								
	Communication     expectations a	<ul> <li>Communication and information programs will be used to manage expectations and target local service providers</li> </ul>								
	• OEKE and its Project Contractor will, to the extent possible, make deliberate efforts to source for all required supplies from local providers, prioritizing from the region to the rest of the Country before importation.									
	Tender docur local entrepre	• Tender documents will include guidelines for the involvement of local entrepreneurs, businesses, and SMEs from the local sector								
Enhancement Status	Extent	Duration	Magnitude	Probability						
With	National	Short term	Moderate	High						
	4	2	5	4						
	Res	Result: (+44) Medium positive								

### 9.1.3 Transfer of skills

During the construction phase of the project there will be enhanced interaction between the experts and hired locals in their areas of expertise. Such interactions are likely to result skills transfer or enhancement.

During stakeholder engagement meetings, it was revealed that the residents in the area had a range of skill sets in various fields such as driving, operating various machinery equipment, Mechanical skills, Electric skills, Plumbing, Brick laying/Masonry, Carpentry, Warehousing/storekeeping skills, Administrative/clerical skills, Security, and Computer skills. However due to the high unemployment rate in the area, majority of them are not able to utilize these skills. The project will offer opportunities for residents to improve on their skill which will enable them to be more viable for employment in other jobs even after the construction phase of the project.

Assessment of Impacts

Enhancement Status	Extent	Duration	Magnitude	Probability							
Without	Study area	Short term	Minor	Improbable							
ennancement	2	2	2	2							
	Res	Result: (+12) Low positive									
Enhancement measures	OEKE should i     skills transfer	nstitute programs between project e	aimed at promotir experts and the loc	ng and enhancing cal employees.							
	• OEKE should establish a standard requirement for contracted firms to ensure transfer of skills. Such efforts will promote local capacity development and offer viable employment opportunities.										
	• Ensure both general trainings and on-job training for the locals. The trained locals will benefit the project by offering technical services in the areas trained on.										
	• OEKE should envision strong collaboration with local institutions to ensure effective capacity building affordable to the local communities.										
	<ul> <li>In collaboration actors, OEK development</li> </ul>	on with the Count E should cons for local learning i	y government and sider supporting nstitutions as part	l other non-state infrastructural of the CSR.							
	<ul> <li>OEKE and it communicate community pr doing this, OI residents su administrator</li> </ul>	s contractors sho the specific skills/ rior to the constru- EKE should utilize Ich as CLOs, forums, local radio	ould effectively a expertise requiren uction and operat easy to reach m community noti o, etc.	nd continuously nents to the local cional phases. In nediums for local ceboards, local							
Enhancement Status	Extent	Duration	Magnitude	Probability							
With	Study area	Long term	Moderate	Probable							
ennancement	4	4	6	3							
	Res	ult: (+36) Medi	um positive								

Assessment of Impacts

### 9.2 Assessment of Negative impacts –Construction Phase

### 9.2.1 Fire and Explosion Hazards

Community living near the project site includes workers in the neighbouring KPA, depots and terminals, Kenya Ports Authority Estate residents, Kenya Railways Estate residents, truck operators, small business operators and hawkers along the Kismayu and Makande Roads.

An LPG plant that is currently operational will be decommissioned and dismantled. If the LPG gas is not well evacuated, there is a potential of fire and explosion during hot work and grinding activities during dismantling.

The project will involve construction of approximately 4km of product delivery line from both KOT and SOT along a ROW with existing product pipelines for different oil marketers in Mombasa. The proposed pipeline route will most likely be along the KPC's spur line ROW which has other existing pipelines with petroleum fuel and LPG. Use of equipment like backhoe, concrete mixers along the ROW could potential interfere with the pipelines leading to release of product that could cause fire and explosion when in contact with ignition sources like welding and grinding.

Mitigation Status	Extent	Duration	Magnitude	Probability				
Without mitigation	Regional area	Medium term	Moderate	Probable				
	3	5	6	3				
	Result: (-42) Medium negative							
Mitigation measures	<ul> <li>Comme</li> <li>As indicated by the OEKE will engage management syster. The main contract approval, full time trained workers, a others.</li> <li>A recognized proced HAZCON) should be terminal to ensure process are well id place. Some of the hazards include</li> <li>Consulting with the or understand the location</li> <li>Mapping the pipeline</li> </ul>	ents/Mitigation: e OEKE's SHEM ( ge a contractor em and with repu- tors will be requ EHS officer with a and comprehensi ess of hazard ider be undertaken bef e that potential lentified and adec be control measu ther pipeline own on and operation route by identifyi	contractor manager with a well- utable experience ired to have a fin adequate firefightion we and site-spect ntification and and fore construction fire hazards duri quate control mea- re to prevent fire hers i.e., KPC and details of the pip ang all the hazardo	gement system), developed EHS in Oil and Gas. ire policy, EPRA ing training, well ific ERP among alysis (such as a of the proposed ing construction asures are put in e and explosion KPRL to elines. ous and				

#### Assessment of Impacts

	Result: (-12) Low negative								
muyauon	3	2	2	2					
With	Study area	Short	Minor	Improbable					
Mitigation Status	Extent	Duration	Magnitude	Probability					
	L.N 59 Fire Risk R	eduction Rules							
	USHA 2007								
		existing laws and re	egulations including	y					
		wisting laws and w		<b>a</b>					
	<ul> <li>OEKE will inform the other Shimanzi Terminal Users through their monthly meetings of the proposed construction work and keep them updated of the construction plans. All the activities along the ROW will be effectively coordinated to ensure immediate evacuation of the product from the pipeline in case of pipe interference during construction. The team will be in a position to activate mutual ERP in</li> </ul>								
	together with an adequately trained Emergency Response Team								
	Ensuring that there is an effective and efficient firefighting system								
	Use of appropriate signage								
	Monitoring the presence of petroleum fumes and LPG before and throughout the hot work processes along the ROW and within the Tank farm area								
	Developing and in procedures for the include site access works, fire risk pro-	nplementing site s e activities within t s, Job Safety Analy evention, ERP and	pecific construction he ROW. The prov vsis machine/equip firefighting training	n safety cedures should ment safety, hot g among others.					
	pipeline construct human traffic to a	ion and movement avoid damaging the	t routes for the eque operational pipeli	uipment and ne.					

### 9.2.2 Workers' Health and Safety

The proposed LPG project will employ about 150-200 workers during the pre-construction phase, construction phase and operations phase. Most of the unskilled workers will originate from the project area and generally Shimanzi area; these workers will most likely have minimal safety and health (S&H) knowledge, skills, and competencies.

The construction phase will involve several activities, operations and machinery that could injure workers. Potential accidents at site may include but are not limited to fire and explosion, bruises and cuts from hand tools and equipment/machines, traffic accidents from trucks and other earth moving equipment, drowning as the pipe is constructed over Makupa creek, workers struck and injured by falling material, drowning workers falling from heights and electrical accidents etc.

#### Assessment of Impacts

These may be caused by lack of effective workers safety management system, improper use of Personal Protective Equipment (PPE), mechanical faults in equipment or vehicles, health of workers, lack of team coordination, third party interference, among others. Injuries could range from those which are minor to possible loss of life.

Mitigation Status	Extent	Duration	Magnitude	Probability					
Without	Study area	Short	High	Probable					
mugation	2 2 8			3					
	Result: (-36) Medium negative								
Mitigation measures	As indicated OEKE will management The Project O Safety and I Kenyan Occu General EHS following:	<ul> <li>As indicated by the OEKE'S SHEM (contractor management system), OEKE will engage a contractor with a well-developed OHS management system and with reputable experience in Oil and Gas. The Project Contractor will be required to implement the Occupational Safety and Health (OSH) Management System in accordance with Kenyan Occupational Health and Safety legislation, DOSH and the IFC General EHS Guidelines. The OHS management system to include the following:</li> </ul>							
	Well defined Sa management, n	Well defined Safety and Health Responsibilities from the top management, middle level managers/supervisors and other workers.							
	<ul> <li>Organization of Safety and Health during construction to include formation of Health and Safety Committee in accordance with LN 31 of OSHA 2007, OHS representation in the management and qualification of the EHS officer.</li> <li>Implementation of Occupational Safety and Health Policy to include setting of SMART OHS goals, objectives and targets consistent with the OHS policy and embedding it on the JD for all workers, Workers and visitors Induction and Establishing and sustaining formal EHS communication methods</li> </ul>								
	Plan for Performance Monitoring of key activities that can potentia have significant S&H impacts which include daily, weekly, monthly quarterly and annual inspections. The audits and surveys to be planned for includes Safety and Health Audit, Fire Audit, Air qualit noise survey, medical inspections, plant inspections, scaffolding inspection, fire extinguishers inspections among others								
	Occupational Safety and Health Training Programs to include 30 Safety and Health DOSHS Mandatory Training, Industrial First Aic training; Permit to Work; Job Safety Analysis and Basic fire safety among others Occupational Health Programs to include pre-employment medica examination and periodical medicals, compliance to COVID-19 guidelines by DOSHS and MoH, Malaria and HIV awareness.								
	EHS Information System including Permit to work, subcontractors a supplier's management and Emergency Response plan								
#### Assessment of Impacts

	Construction Sa chemical safety	fety to include occ , plant safety, elec	upational safety, ma trical safety, drowni	achine safety, ng and fire safety
	Personal protect of materials, no	tive equipment, ov ise, vibration, ergo	ercrowding, housek momics and welfare	eeping, handling facilities
	• A recognized process of hazard identification and analysis (such as a HAZCON) should be undertaken before construction of the proposed terminal to ensure that potential EHS hazards during construction process are well identified and adequate control measures are put in place.			
Mitigation Status	Extent	Duration	Magnitude	Probability
With	Study area	Short	Minor	Improbable
miligation	3	2	2	2
	Re	esult: (-12) Low	negative	

### 9.2.3 Impacts on Labour and Working Conditions-Human resource

The construction of the proposed project will take approximately 18 months and it is envisaged that approximately 150-200 workers will be engaged during peak construction. The unskilled workforce will largely be sourced from the project i.e., Shimanzi and Mvita sub county who will most likely work under foreign EPC contractor and local subcontractor contractors. It is important that the contractor adheres to labour and working conditions as outline in the Employment Act 2007.

Potential labor and working conditions associated with the proposed project includes:

- Unfair dismissals by the contractor and subcontractors
- Workplace discrimination
- Poor working conditions
- Employment of underage
- Long working hours and poor pay
- Delays in payment

### Assessment of Impacts

Mitigation Status	Extent	Duration	Magnitude	Probability			
Without	Study area	Study area Short High Probable					
mitigation	2 2 8 3						
	Re	esult: (-36) Medi	um negative				
Mitigation measures	The Project ( management the construct	Contractor will dev system comprisir tion phase.	elop and implement ng the attributes me	a documented HR entioned above for			
	The Project employee wo adequate PP	Contractor and so orking at the project E	ub-contractors will t site is provided wi	ensure that every th appropriate and			
	All Project e resources requirements	employees will be policies, employ 5.	e provided with in ment conditions	duction in human and associated			
	The Project     grievance me	Contractor will echanism	establish a comp	orehensive worker			
	<ul> <li>All employee which will, at remuneration duration and</li> </ul>	• All employees will receive a copy of their employment agreement, which will, at a minimum, address the following: job title, job duties, remuneration period and amounts, labor conditions, employment duration and the conditions for hiring and lavoff.					
	The Project conditions ar both local an	• The Project Contractor will document and communicate working conditions and terms of employment to all workers directly contracted both local and expatriate					
	<ul> <li>OEKE will co worker safety lost days, an</li> </ul>	nduct appropriate y including tracking d number of work-	monitoring and ins rates of injury, occ related fatalities.	pections to ensure upational diseases,			
	The Project appropriate B	Contractor will e E&S Management s	ensure that the su system in place.	bcontractors have			
	• The Project contractors a to the grieva	Contractor will m nd ensuring that th nce mechanism.	nonitor the perform ne subcontracted wo	nance of the sub- orkforce has access			
	The Project detrimental e relating to H	Contractor will e effects of drug and IV/AIDS and other	nsure provision of alcohol abuse, the health risk-related	guidance on the risk and concerns activities.			
	Residents wi interaction re such rules.	ll be made aware egulations and th	of rules governing e consequences of	worker-community workers breaking			
	The Project outside the limiting inter communities	Contractor will project Site and w ractions between	reasonably limit w vithin the communit construction worke	orker movements ty with the aim of ers and the local			

#### Assessment of Impacts

	<ul> <li>The Project services with exit the Site.</li> <li>OEKE's HR P to address and the service of the servic</li></ul>	<ul> <li>The Project Contractor will ensure provision of key facilities and services within the project Site in order to minimize worker's needs to exit the Site.</li> <li>OEKE's HR Policies will be included the Project Contractor's contract to address any gaps that may exist in informal employment</li> </ul>			
Mitigation Status	Extent	Duration	Magnitude	Probability	
With	Study area	Short	Minor	Improbable	
mugauon	3	2	2	2	
	Re	esult: (-12) Low	negative		

### 9.2.4 Impacts on traffic

There will be increase of traffic along Makande, Shimanzi and part of Kismayu Road during construction phase of the proposed project. Kismayu Road which is the access road to the project site is located off the busy and narrow Kismayu road which connects to the busy Shimanzi road (main road that serves the terminals and other business establishments characterized by high traffic in the area). Transportation of construction materials, project components and equipment to the proposed site will be by vehicular trucking transport. At the peak of construction work it is envisaged that approximately 40 trucks especially tippers and concrete mixers will visit the site daily. This increase in traffic will potentially create congestion along the road, short term disruptions and safety hazards for current road users.

Increased traffic due to construction vehicles and heavy vehicles could cause disruptions to other oil marketers and users and increase safety hazards. Potential in the use of these roads and transport systems may cause road deterioration and lead to congestion on the Makupa causeway (main road linking the mainland to Mombasa island) as well as Makande road. Currently, road maintenance on Makande road is ongoing. However, Kismayu road which exclusively serves the oil depots and terminals remains dilapidated and in urgent need of maintenance.

The potential influx of construction workers will entail an increase in the human traffic to and from the proposed project site. The increase in the number of construction vehicles, increased public transport vehicles, people/workers and project-related traffic may change the movement patterns of other road users in such a way that their movement patterns are disrupted, and their safety levels are impacted on.

An increase in traffic from the rise in construction vehicles is a safety concern for other road users. Pupils from Makande primary school and Little Angel Adonai academy, located approximately less than 1 km from the project site, use Makande road and the road leading to the KPA estate to go to school. The KPA and KRC estates residents also use the roads to go to Mombasa CBD Township which is 3 kms away.

### Assessment of Impacts

Mitigation Status	Extent	Duration	Magnitude	Probability			
Without	Study area	Short	High	Highly Probable			
mitigation	2 2 9 5						
	Res	sult: (-65) High	negative				
Mitigation measures	<ul> <li>Public awaren with the cor approaches to programs alor on traffic dang</li> </ul>	• Public awareness programs should be developed by the Contractor with the community to identify areas of particular risk and approaches to reduce risk. This is expected to include awareness programs along roads leading to the site targeting frequent users on traffic dangers.					
	The Project Contraction	ontractor will deve on phase of the p	elop a Traffic mana roject	agement plan for			
	• Prepare detailed plan for signage along the Construction Area to facilitate traffic movement, provide directions to various components of the Works, and provide safety advice and warnings. Details regarding maximum permissible vehicular speed on each section of road. All signs will be in both English and Swahili language						
	The Contractor indicate ongoin	or should provide t ing works;	emporary road sig	ns and notices to			
	• The site Engineer and Contractor should choose traffic routes to reduce the impact in the neighborhood avoiding, as far as practical any sensitive areas;						
	• At the project	site traffic, the Co	ntractor should ens	sure that vehicles			
	Only park in desi	gnated parking ar	eas;				
	Don't block pede	strian routes;					
	Don't block traffi	c routes;					
	Obey the speed	limit					
	The site Engi calming and s with the rele Mombasa cou	neer and the con peed control meas evant authorities nty traffic control	tractor should en ures are put in plac e.g., the traffic department. The c	sure that Traffic ce in consultation police and the contractor should			
	Introduce segreg	jated pedestrian w	valkways;				
	Introduce speed	limits particularly	in the residential a	areas;			
	Ensure there is R a one-way system	Reduced need for I m;	reversing vehicles,	by introducing			
	Use a qualified B vehicles;	ANKSMAN to cont	rol deliveries and	reversing			
	Clearly designate	e loading/offloadin	g areas.				

Assessment of Impacts

	The Project conditions an related to con	• The Project Contractor will regularly inspect the access roads conditions and whenever necessary, promptly repair damages related to construction traffic				
	• Abnormal loads will be timed to avoid times when traffic volumes are likely to be higher e.g., start and end of school holidays, long weekends, etc.					
Mitigation Status	Extent	Duration	Magnitude	Probability		
With	Study area	Short	Low	Probable		
muyation	2 2 5 3					
	Res	sult: (-27) Low r	negative			

### 9.2.5 Impacts on gender requirements

Women were observed to be preoccupied with household chores/activities as their husbands seek or are employed in the industries in Mombasa. Additionally, most businesses are run by the males on behalf of the family, thereby relegating women to home caring. They represent a smaller proportion of persons currently employed in professional, technical, and administrative domains, which the proposed project will – to some extent provide. Should this pattern continue, with the onset of the project, it will inevitably lead to an increase in men/women inequality through disproportionate employment of men compared to women.

Additionally, there are women who are the heads of households as a result of death of spouse, divorce, separation and singlehood. These women are among the vulnerable people in the community who are potentially marginalized.

Mitigation Status	Extent	Duration	Magnitude	Probability
Without	Study area	Short	Low	Probable
mugation	2	2	4	3
	Result: (-24) Low negative			
Mitigation measures	<ul> <li>OEKE and Mechanism ( raised by wo speedily add construction</li> <li>The Project (</li> </ul>	EPC contractor w GRM) that incorpo men specifically. T dressing grievand phase without any Contractor will dev	tion: vill implement a C prates gender equal The GRM should inc es raised by wo victimization elop and implement	Grievance Redress ity and grievances clude processes for omen during the t an organizational
	Gender Policy	y that will ensure e	mployment and bus	iness opportunities

### Assessment of Impacts

are accorded to men and women equally, and where necessary, affirmative actions are applied to bridge would be gender gaps.
• Develop and implement an organizational Gender Policy consisting of the following: Safe environment for men and women, gender equity in employment and business opportunities.
Develop and implement a comprehensive company Violence and Sexual Harassment Policy which shall include, among other provisions:
the definition of sexual harassment for purposes of the policy;
a statement that every employee is entitled to employment that is free of sexual harassment;
a statement that the employer shall take steps to ensure that no employee is subjected to sexual harassment;
a statement that the employer shall take such disciplinary measures as the employer deems appropriate against any person under the employer's direction, who subjects any employee to sexual harassment;
a statement explaining how complaints of sexual harassment may be brought to the attention of the employer; and
a statement that the employer will not disclose the name of a complainant or the circumstances related to the complaint to any person except where disclosure is necessary for the purpose of investigating the complaint or taking disciplinary measures in relation thereto.
• The Project Contractor's Human Resource Management System (HRMS) and terms of employment will include an honor code in the contract document
<ul> <li>The Project Contractor will develop and implement a comprehensive Violence and Sexual Harassment Policy and ensure all employees are adequately sensitized on its provisions</li> </ul>
<ul> <li>The local administration will impress upon the Project Contractor that women be given equal opportunities in employment, or provision of catering or hospitality related services for the workers.</li> </ul>
<ul> <li>The Project Contractor will provide a work environment that is safe and conducive to both women and men, considering gender- disaggregated differences and vulnerabilities</li> </ul>
<ul> <li>The Project Contractor will ensure gender considerations in allocating work-shifts, such as avoiding, where necessary, enlisting female workers on night shift if work will be carried out at night</li> </ul>
<ul> <li>The Project Contractor will take into consideration local culture (dressing, family roles and inter-gender interactions) in allocation of roles</li> </ul>
<ul> <li>Wherever women are employed, the Project Contractor shall ensure that separate accommodation and ablution facilities are provided for</li> </ul>

Assessment of Impacts

	women. The Project Contractor will further ensure that these facilities are regularly sanitized to prevent communicable diseases			
Mitigation Status	Extent Duration Magnitude Probability			
With	Study area	Short	Minor	Improbable
mitigation	2	2	2	2
	Result: (-12) Low negative			

### 9.2.6 Impacts on Gender Based Violence

The proposed LPG project will employ individuals from local communities and other parts of Kenya for execution of the project. The majority to be employed during construction phase are likely to be younger males as well as those that are married.

While they are away from their homes, these workers may exhibit inconsistent social behaviors that can potentially lead to sexual harassment of women and girls, exploitative sexual relations and illicit sexual relations with minors (individual below the age of 18 years) from the local community.

Mitigation Status	Extent	Duration	Magnitude	Probability	
Without	Study area	Short	Low	Highly probable	
muyauon	2	2	4	4	
	Re	Result: (-32) Medium negative			
Mitigation measures	<ul> <li>The Project of the workers a community n</li> <li>The Project of that define s based violent will be reported.</li> <li>As a condition Worker Code and including.</li> <li>The Project of to cooperat complaints a</li> </ul>	Contractor will con about refraining from nembers, specifical Contractor will info exual harassment, ce a punishable of ted to the authoritic on of employment, e of Conduct to be g sanctions for non Contractor's HR Ma e with law enfo bout gender-based	tion: duct mandatory aw om unacceptable co lly women. orm their workers a exploitation of chil fence which is pros ies; the Project Contra made a part of emp -compliance (e.g., to inagement System vo preement agencies i violence.	areness raising for induct toward local bout national laws dren, and gender- ecuted, and which ctor will develop a loyment contracts, termination) will include a policy in investigating	

Assessment of Impacts

Mitigation Status	Extent	Duration	Magnitude	Probability
With	Study area	Short	Minor	Improbable
mugauon	2	2	2	2
	Result: (-12) Low negative			

### 9.2.7 Communities and Social Cohesion

The proposed LPG project is expected to provide employment to workers living within the project area. There will be a variety of jobs for unskilled, semi-skilled or skilled workers. It is common to find that the available jobs for local communities are the unskilled type. This implies that the semi-skilled and skilled workers may come from other parts of Kenya or abroad. The influx of such workers who would be paid more than those indigenous to the area could lead to poor social cohesion with the host communities. Further, the migrant workers would put a strain on the existing services and utilities such as the scarce water supplies, food, etc.

The local population will be exposed to different systems of values that may be conflicting with their own, due to the presence of different stakeholders (project managers, contractors, subcontractors, employees and/or consultants). The aforementioned factors could potentially lead to tensions, conflicts with local authorities, as well as draw cleavages between different groups.

The presence of more affluent migrant workers could potentially lead to family conflicts between the female and male spouse where the female spouse is attracted to the migrant worker. This could potentially lead to gender-based violence leading to family break ups with adverse consequences to social cohesion.

Due to the perceived affluence demonstrated by migrant workers to female host community members resulting from better disposable incomes, there is a potential this could lead to the increased spread of STIs due to arranged relationships.

Mitigation Status	Extent	Duration	Magnitude	Probability
Without mitigation	Study area	Medium term	Moderate	Probable
	2	3	6	3
	Result: (-33) Mediu	um negative		
Mitigation measures	• The Project Contra Management Plan a Social Managemen	nts/Mitigation: actor will develop as part of the over t Plan	o and implement rall Construction E	a Labor Influx invironment and

Assessment of Impacts

	<ul> <li>The contractor sha and schools regard</li> </ul>	<ul><li>Iocals.</li><li>The contractor shall undertake meetings with the local community and schools regarding labor influx to prepare them on the influx of</li></ul>		
	non-locals and th measures	non-locals and the likely negative impacts as well as mitigation measures		
	• The Project Contractor will give priority to skilled and semi-skilled jobs to workers living in the vicinity of the project site where construction works are required. This will be managed in consultation with the local administration (Chief and Assistant Chief)			
	• The Project Contractor and OEKE will facilitate small and medium enterprise (SME) development in the local communities and surrounding region where appropriate and as maybe permissible by the project budget.			
	surrounding region the project budget	n where appropria	ate and as maybe	e permissible by
Mitigation Status	surrounding region the project budget	n where appropria	ate and as maybe	e permissible by Probability
Mitigation Status With	surrounding regior the project budget Extent Study area	Duration Short	ate and as maybe Magnitude Minor	Probability Improbable
Mitigation Status With mitigation	surrounding region the project budget Extent Study area 2	Duration Short	Magnitude Minor 2	Probability Improbable 2

# 9.2.8 Impact on Community Health- Social Pathologies, including HIV/AIDS

The significant disposable income among construction workers during construction could encourage transactional and commercial sex work in the area and surrounding estates. Mombasa County is clustered as a high-burden, high-incidence County, with HIV prevalence of 5.6 0% which is higher than the national prevalence of 4.8% (KENPHIA 2018 estimates). If appropriate mitigation measures are not put in place, it is envisaged that there will be an increase in sexually transmitted infections including HIV/AIDS during construction due to continuous interactions between the workers/project staff and project area residents. This is likely to happen due to the separation of people from families and the availability of resources. Increased cases of HIV/AIDS, which would affect both workers and residents, are expected.

During site clearance, vehicular movement in the project site, excavation, and backfilling, it is expected that dust will be generated from these activities which will potentially impact on the neighboring project area residents and business establishments. This could lead to an increase in illnesses of the upper respiratory tract.

Rise of vector borne diseases such as malaria, cholera, typhoid will particularly be caused by immigration of workers into the project area at an unprecedented pace with lack of adequate civic facilities to cater for the increased population.

#### Assessment of Impacts

Vector breeds in all types of polluted domestic water such as drains, ponds and stagnant streams. With the in migrating population, there will be more demand for housing, water, and sanitary services. If the demand is not met, there will be potential poor waste disposal, acute water shortage and poor drainage.

Solid waste, human waste and wastewater will be generated from the construction camps. In addition, there will be other wastes arising from construction activities of the project facilities. Due to lack of a sewerage system these wastes may contribute to the rise of vector borne diseases if proper disposal mechanisms are not put in place.

Mitigation Status	Extent	Duration	Magnitude	Probability
Without	Regional	Permanent	High	Probable
miligation	3	5	8	3
	Re	esult: (-48) Mediu	ım negative	
Mitigation measures	<ul> <li>Construction</li> <li>Special spection need for H HIV/AIDS awawith local hear Railways Distruction of the insecticide-trendoms, and counselling;</li> <li>Provide the insecticide-trendoms, and counselling;</li> <li>Support the healthcare prediment;</li> <li>Establish a construction of the existing or n HIV/AIDS and measures (measures, and counselling areasures, and counselling areasures, and counselling areasures conselling areasures cons</li></ul>	mments/Mitigat ifications in the co IV/AIDS Awareness vareness training pro- ealth organizations, pensary in Shiman o the existing struct workforce with a eated mosquito m id basic testing for Kenya Railways Sk ersonnel, regular su ommunity health p ew local programs wareness, hygiene indoor spraying and control of me nd Testing (VCT) p ng clinics to provide ARVs for vulnerable is subcontractors sh ampaigns and servic ctices and other co egative outcome; in the exception of Id be housed in a co vices like HIV/AIDs	ion: ntract documents siss and sensitization ogram will be as a res Public Health Offici- zi for sustainability ures of the local hea- ccess to primary h- lets, prescriptions, TB, STDs, and HIV- himanzi dispensary for poppy of medical suppro- rograms including p- such as community e and immunization of insecticides, per- osquito larvae), ar- rograms. e VCT services to cor- e community member ould put in place an ces for the construction on the construction on the construction for the construction fo	hould stipulate the n campaigns. The sult of collaboration ers and the Kenya and integration of ilth institutions; nealth care onsite, prophylactics and //AIDS testing and through training of olies and up to date roviding support to health awareness, n, malaria control ersonal protection nd local Voluntary nstruction crew and rs STI and HIV/AIDS on crew to promote rder to reduce this will return to their ith unlimited access ing;

Assessment of Impacts

	<ul> <li>Workers will be inducted on relevant codes of conduct that minimize exposure to risky life styles including unsafe sex practices such a developing workplace HIV/AIDS programs, standards of behavior between employers and employees, positions regarding HIV testing employees benefits, performance management and procedures to b followed to determine medical incapacity and dismissal</li> </ul>			
	<ul> <li>OEKE will include proper drainage channels in the design of the facility and install an interceptor to ensure that the effluent water being released into the environment is clean.</li> </ul>			
	<ul> <li>Dust suppression measures should be implemented such as water sprinkling, dust traps, establishment of bumps, traffic marshals, road signage and monitoring of speeds on a regular basis</li> <li>OEKE and EPC contractor to ensure roads utilized are either maintained in the present condition or upgraded if disturbed due to project activities.</li> </ul>			ed such as water ffic marshals, road
Mitigation Status	Extent	Duration	Magnitude	Probability
With mitigation	Study area	Short	Minor	Probable
-	2	2	2	3
	Result: (-18) Low negative			

Assessment of Impacts

### 9.2.9 Impacts on the physical environment- Construction

#### 9.2.9.1 Soils

The proposed terminal will be located at Shimanzi in Mombasa which is an industrial area adjacent to the port of Mombasa. The area has several Oil depots, manufacturing industries, offices, a residential estate and ports facilities.

The soil in the project area is composed of Clayey Silt, Silty Sand and Silty Clay sandy and clay alluvium which are often known as light soils due to their high proportion of sand and little clay. The sandy-clay soil at the site is easily eroded, has poor soil consistency and poor in achieving slope stabilization. Although the project site slopes gently towards north, it was observed during site visit the northern there is a highly eroded ridge and there is also a steep slope towards Makupa container freight station and Kenya Ports. The above properties of the soil and site topography coupled with the frequent downpours in Mombasa can lead increased soil erosion and collapsing of the slopes during construction

Preparation of the site for the establishment of the Mounded tanks, office and utility buildings will involve dismantling and demolition of the existing facilities, establishment of access road, vegetation clearance, ground levelling, grading and soil compaction to formation levels. The site will be excavated to the required depth and the wanted soil will be removed from the site. Sizable volumes of borrow material, including sand and gravel aggregate, may be required for site grading, but these materials would be obtained from local off-site sources. There is a public storm drain cutting across the site. It is envisaged that soil disturbance will potentially lead to soil erosion and blockage of the public storm drain.

Various diesel earthwork equipment will be used, they include graders, bulldozers, backhoes, excavators, and roller compactors will be used during construction. Storage of fuel, fueling and servicing of the above equipment if done within the site has the potential to pollute soil. Additionally, there will be a lot waste generated during dismantling and demolition activities, construction activities and material storage that could potentially pollute soil in the area.

Presence of approximately 200 workers during construction will require sufficient sanitary facilities to avoid soil contamination from grey and black water.

The soils in project area has high percolation properties but the relatively deep soil profile implies that any contaminant percolating in the soil will not reach the underlying formation.

Aspect	Potential Impact
Soils	Slope failure due to construction activities on the steep slope on the northern side of the site
	Sedimentation of the storm water drain at the site leading to drain blockage
	Contamination of soil due to accidental spills of oil as a result of field refueling, onsite storage of fuel/oil and fugitive spills due to leaks.

The following is a summary of the proposed impacts on soils

Assessment of Impacts

Based on the above, the impact assessment on soils resulting from the construction phase activities is given below.

Mitigation Status	Extent	Duration	Magnitude	Probability
Without	Study area	Short	Low	Probable
muyauon	2	2	4	3
	Result: (-24) Lo	w negative		
Mitigation measures	<ul> <li>Comments/Mitig</li> <li>The engineer structures or plot.</li> <li>The EPC conconstruction activities invoses seasons</li> <li>It was observed measures coproject. The retaining warexcess vibrat construction soil erosion excavations of measures will part of the construction soil erosion excavations of measures will part of the construct or and the EPC the scope implementation.</li> <li>The domestic should be main 1999 and Pu contractor art toilets at the environment, roofed waster.</li> <li>Construct a construct a construct and the environment plastic lined.</li> <li>Waste/used machinery art location at capable of coprovided. The frequent interval area</li> </ul>	pation: ring design should the steep areas tractor should develow plan to the extent olving earth works erved that there a nsidered during the measures include h II around the site tions that can lee of an embankment and supporting using appropriate sill be required to plat detailed engineering . Subsequently the of work and O ion of the same. c and sanitary wast anaged in accorda ublic Health Act 20 ind the EPC should he site, no disch , use of licensed w e storage area and designated, signpo oil generated ind equipment will he the project site. ontaining the 110 ie waste oil will the ervals. Empty fuel designated for sci	d where possible a especially on the nor relop and implement possible that will e are scheduled to a are site specific so the front-end engineer to are revent soil error to prevent soil error to slope failure the sides of the structural support. G anned and budgeted g design by the Lo e EPC should includ LA Energy to er the generated by the nce with LN 120 an D17. In summary the ensure that there are arge of the wast traste handler, have ensure waste segre to stored on paved Appropriate secon percent of the lar to sold to licensed containers will als rap and sold to auth	avoid locating the orthern side of the t a comprehensive nsure construction void heavy rainfall oil erosion control ering design of the construction of the osion and dampen e, backfilling, and system to prevent slopes and deep oing forward these d for and should be cal civil contractor e the measures in nsure the proper workers at the site d LN 121 of EMCA he both Local civil re sufficient mobile e water into the a well-marked and gation. h down bay that is e wash down (e.g., and construction surface in a secure dary containment gest tank is to be waste handler at so be stored at a porized vendors. All

Assessment of Impacts

	packaging material will also be collected at the storage area and sold to scrap dealers.			
	• Control and reduce at source the production of wastes and hazardous waste e.g., hazardous materials must be stored in a manner that prevents interaction with each other or with the soil or from being tampered accidentally.			
	Adherence to	existing laws and	regulations includir	ng:
<ul> <li>L.N 121 Environment Management and Coordination ( Management) Regulations</li> </ul>			ordination (Waste	
	Adherence to IFCs Environmental, Health, and Safety (E Guidelines GENERAL EHS GUIDELINES: CONSTRUCTION DECOMMISSIONING.			nd Safety (EHS) STRUCTION AND
Mitigation Status	Extent	Duration	Magnitude	Probability
With mitigation	Study area	Short	Small	Improbable
	1	2	0	2
	Result: (-6) Low negative			

### 9.2.9.2 Impacts on the Surface Water

The site for the proposed project broadens towards Indian Ocean on the North and generally to the north with the northern boundary being at 10.8m a.s.l and the north boundary is 10.80m a.s.l. The SOT and KOT pipeline routes slopes northwards towards Indian Ocean. The area around Kipevu bridge has a steep slope towards the ocean and the slope reduces gradually near the KPC Kipevu Thermal Plant.

From the available climatic data, Mombasa has a mean annual rainfall of 1190 mm and is prone to flooding due to poorly maintained drainage system. There is storm water drain channel and a manhole at the project site. The channel drains the northern part of Shimanzi road and some parts of Makande Road to the Indian Ocean at Makupa Creek. During construction, the storm drain structures will be relocated and upgraded to enable uninterrupted flow of surface runoff within the site. Surface water flowing out of the site through the storm drain channel can potentially by impacted by i Water quality at the Indian Ocean could be further degraded through increased turbidity and siltation from soil erosion, runoff, and re-suspension of sediments.

The available hydrogeological data indicates that the depth of the ground water in the project area ranges from 17m-19m. According to the aquifer vulnerability study of Mombasa, the area has low vulnerability to pollution of water supply aquifer. However, the proposed substructure works has the potential to cause subsurface water pollution in the area. The subsurface water can also be polluted in case of any major soil pollution emanating from the construction processes e.g., spill of chemicals, leaks from the chemical storage area and improper management of both sanitary and construction waste.

Contaminant effluents from construction phase or operation phase, poor waste management and materials may also adversely affect underground, surface water quality in the area and subsequently Indian Ocean.

The construction activities will require use various diesel-powered equipment like earth moving equipment, trucks, Cranes etc. there is potential of water pollution due to fuel

#### Assessment of Impacts

storage, repairing and fueling the equipment at site. Use and storage of chemicals like paints has the potential to pollute surface and subsurface water. Construction of the pipeline at the OT and along Kipevu bridge has the potential to contaminate ocean water as a result of spill from the construction equipment.

During operation there will be minimal water impacts since the project is closed system and the fact that LPG has minimal impact on water. Ocean water pollution at the SOT and KOT by a vessel delivering the product is not part of the scope of this ESIA

Aspect	Potential Impact
Water	• Increased sedimentation of the surface run-off due to removal of vegetation cover and cutting of soil during construction
	• Contamination of the surface runoff from the site due to poor waste management and discharging of untreated waste into the environment
	<ul> <li>Fugitive spills from fuel storage and fueling at the site</li> </ul>
	• Spill of the paints and other construction chemicals stores at the site
	• Contamination of subsurface water due discharge of untreated grey and black water into the environment.
	Ocean pollution due to construction work near the ocean or discharging     of untreated waste into the ocean

The following is a summary of the proposed impacts on Water

Mitigation Status	Extent	Duration	Magnitude	Probability
Without mitigation	Study area	Short	Minor	Probable
	2	2	2	3
	Result: (-18) Low negative			
Mitigation measures	<ul> <li>Comments/Mitigation:</li> <li>Site assessment was undertaken by OEKE during the prefeasibility study and it was established there are no water sensitive areas within the project area. Additionally, OLA ensured that the project design by Front</li> </ul>			

The significance of the impacts on water during the construction phase are given below

and it was established there are no water sensitive areas within the project area. Additionally, OLA ensured that the project design by Front End Engineering Team consultant was such that it minimized potential water pollution by designing soil erosion control structures, provision of subsurface water pollution control measures during drilling of piles and provision of a budget to implement water pollution control during construction

• No Construction activities will not be undertaken on the soil embankment on the northern side of the plot to minimize potential sedimentation of the surface runoff to the nearby Indian Ocean. A retaining wall will be constructed to contain the steep slopes, soil movement and compaction will be undertaken in a manner that limits the creation of loose material thereby reducing the potential for the

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	Result: (-8) Low negative			
miliyalion	2	2	0	2
With	Study area	Short	Small	Improbable
Mitigation Status	Extent	Duration	Magnitude	Probability
	Mana	gement) kegula		
	o L.N	121 Environme	ent Management	and Coordination (Waste
	<ul> <li>LN 120 Environment Management and Coordination (Water Quality) Regulation</li> </ul>			
	• The contractors will adherence to existing laws and regulations including			
	<ul> <li>The EPC will employ sound construction techniques, including use of effective soil erosion and sediment control BMPs e.g., areas under excavation should be hoarded and shored to prevent soil erosion, construction of check dams if the construction work is taking place during the rainy season.</li> <li>The Project Contractor will develop and implement a waste management plan for proper management of all types of wastes in order to prevent contamination of surface or groundwater</li> <li>There will be no storage of fuel and servicing of the equipment at the site during construction. Fueling of the equipment will be engaged to supply fuel and fuel the equipment. Both the EPC and the local contractors will develop and implement an onsite fueling procedure with comprehensive emergency response procedures for accidental spills that may occur.</li> </ul>			
	• EPC and the Local contractors will provide sufficient male and female mobile toilets during construction. The toilet shall be well cleaned and a licensed waste handler will be contracted to deal with the sanitary waste.			
	generation of increased suspended solids in the nearby storm water drain.			

#### 9.2.9.3 Air Quality

The proposed project will be located at Shimanzi area which is an industrial setting with other existing industrial establishments that has potential to cause air pollution. The main source of baseline air pollution is the clinker offloading at the Kenya Ports, dust from trucks using Kismayu Road and naturally as a result of wind blowing in the area.

Construction of the proposed project will involve activities with potential to create additional air pollution in the area. These activities include

- Land clearing and grading activities
- Excavation work and trenching
- Ample number of trucks delivering construction materials at the site

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- Concrete work of mounded tanks which have height of more than 20m from the ground generating dust that easily settles on the surrounding offices
- Emission from the vehicles and equipment leading to air pollution. The main source of gaseous emission during the construction phase is exhaust emissions from gas and diesel-powered equipment and vehicular emissions associated with the material/equipment delivery.
- Painting and coating operations can produce emissions of toxic air pollutants. Lubricants, degreasers, and cleaners can release some toxic air pollutants and volatile organic compounds (VOC).
- During operation, the main potential sources of air pollution include
- VOC emissions from the tankers and locomotives visiting the terminal
- Accidental release of the LPG during loading or leak from pipeline or tanks
- Generation of the dust by the trucks visiting the site

The following is a summary of the proposed impacts on air quality

Aspect	Potential Impact
Air Quality	• Generation of dust during site clearance, excavation, back filling and hauling operations along with transportation activities
	Emission of VOCs from the exhaust of the diesel equipment
	Emissions from spray painting

The significance of the impacts on water during the construction phase are given below

Mitigation Status	Extent	Duration	Magnitude	Probability
Without	Study area	Short	Low	Highly probable
mugation	2	2	4	4
	Result: (-32) Me	edium negative		
Mitigation measures	<ul> <li>Result: (-32) Medium negative</li> <li>Comments/Mitigation:</li> <li>The Project Contractor should enforce speed limits to a maximum of 30km/h to reduce the amount of dust generated by the project. Additionally, the Project Contractor will use dust suppression methods such as periodic watering of the construction areas to minimize generation of dust.</li> <li>use of well-maintained equipment to minimize the emissions during construction</li> <li>Use of Hessian fabric to cover building during construction and painting works</li> <li>Monitoring the environmental air quality during construction to determine the effectiveness of the applied air pollution control methods.</li> </ul>		s to a maximum of ed by the project. ppression methods areas to minimize e emissions during construction and g construction to pollution control	

Assessment of Impacts

	<ul> <li>Adherence to existing laws and regulations including         <ul> <li>L.N 34 Environment Management And Coordination (Air Quality) Regulations 2014</li> </ul> </li> </ul>			
Mitigation Status	Extent	Duration	Magnitude	Probability
With mitigation	Study area	Short	Minor	Probable
	2	2	2	3
	Result: (-18) Lo	w negative		

### 9.2.9.4 Noise Quality

The baseline noise quality for the project site industrial with most noise emanating from the trucks along Kismayu road. Other significant sources of noise include pumps operations at the nearby GAPCO terminal, vehicle maintenance activities at AA Transporters and Port activities. There is intermittent noise generated by the train to and from the port.

KPA staff estate is located 100M on the west of the site and there are some offices at GAPCO, AA Transporters and Solvochem that can potentially be affected by excess noise. The major noise generating sources during the construction phase are chain saws for cutting trees at the site, vehicular traffic, construction equipment like dozer, scrapers, concrete mixers, cranes, generators, pumps, compressors, rock drills, pneumatic tools, vibrators, piling machine etc. The operation of these equipment will generate noise ranging between 75 - 120 dB (A).

The following is a summary of the proposed impacts on Noise quality

Aspect	Potential Impact
Noise Quality	• Generation of noise during site clearance, excavation, back filling and hauling operations along with transportation activities
	<ul> <li>Generation of noise by the pumps and trucks during operation</li> </ul>

The following is a summary of the proposed impacts on noise quality

Mitigation Status	Extent	Duration	Magnitude	Probability		
Without	Study area	Short	Low	probable		
mugation	2	2	2	3		
	Result: (-18) low negative					
Mitigation measures	<ul><li>Comments/Mitigation:</li><li>For noise mitigation, the Project Contractor will ensure that the construction plant and equipment is always well maintained</li></ul>					

Assessment of Impacts

	<ul> <li>All loud and sudden noises will be avoided wherever possible and fixed noise sources shall be located at least 50m away from the site boundary.</li> <li>The Project Contractor will limit the construction times preferably to daylight hours and only in exceptional cases will they work beyond daylight hours</li> </ul>					
	• Temporary noise barriers shall be provided surrounding the high noise generating construction equipment. The personnel involved in high noise generating activities shall be provided with personal protective devices to minimize their exposure to high noise levels.					
Mitigation Status	Extent Duration Magnitude Probability					
With	Study area	Short	small	Probable		
mugation	2	2	0	3		
	Result: (-12) Lo	w negative				

### 9.2.10 Impacts on the biological environment

#### 9.2.10.1 Loss of vegetation cover

The proposed project will be erected on approximately 5.8 Ha of land in which grass and approximately 10 trees will be cleared for the construction of the terminal and the associated pipelines to SOT and KOT.

The project area is zoned as industrial and the existing vegetation has no significant ecological value apart from minimal prevention of soil erosion at the site. Therefore, clearing of the existing vegetation will only interfere with natural appearance of the place and expose the soil within the site to potential erosion.

The following is a summary of the proposed impacts on Loss of vegetation cover and plant population

Aspect	Potential Impact
Natural Vegetation Cover	Increased soil erosion

Assessment of Impacts

Mitigation Status	Extent	Duration	Magnitude	Probability		
Without mitigation	Localized	short-term	Minor	Highly Probable		
	1	2	2	4		
	Low (-20) Negative					
Mitigation measures	<ul> <li>Comments/Mitigation:</li> <li>Consider landscaping to have some natural beauty.</li> <li>The contractor will apply soil erosion measures indicated in 11.2. during construction</li> </ul>					

The following is a summary of the proposed impacts on noise quality

## 9.3 Assessment of positive impacts- Operations phase

### 9.3.1 Development of clean energy

Energy production has been and still is one of the main pivots of the social and economic development of Kenya. Kenya currently relies on biomass energy to meet its energy demands. Almost 70% of Kenya's primary energy is biomass i.e., charcoal, wood fuel and agricultural waste.

The use of LPG is considered a non-consumptive use of natural resource which produces zero GHG emissions. The government considers the use of renewable energy as a contribution to sustainable development.

Increasing the contribution of the renewable energy sector to the local economy may contribute to the diversification of the local economy and provide greater economic stability. The development of the LPG facility plant could therefore add to the stability of the economy.

Mitigation Status	Extent	Duration	Magnitude	Probability	
Without enhancement	National	Long Term	Low	Highly Probable	
	5	4	4	4	
	Result: (+52) Medium Positive				
Enhancement measures	Comments/Mitigation: Contributes towards reliable LPG supply.				

Assessment of Impacts

### 9.3.2 Permanent employment opportunities

As discussed, there is a high level of unemployment in the project area. During the operation phase it is expected that there will be approximately 30 employment opportunities which will include 15 permanent technical staff i.e., engineers, health and safety experts, environmentalists, accountants, administration personnel, maintenance operators, loaders and 15 temporary staff e.g., cleaners, office messengers and security guards among others. Even though these job opportunities will be less compared to those generated during the construction phase, the existing poor socio-economic conditions suggest that provision of employment opportunities will have significant impact in the local community and eventually have a multiplier effect as a result of the project activities.

It is also equally important that the community is well prepared in advance to manage expectations and build their capacity in taking up the available jobs during the operation phase. There should also be a transparent process from the advertisement to the recruitment exercise to avoid any potential discontent for the community especially since these opportunities will have reduced as compared during the construction phase

Mitigation Status	Extent	Duration	Magnitude	Probability
Without	Study Area	Short Term	Minor	Probable
mugauon	2	2	2	3
	Re	sult: (+18) Low	Positive	
Mitigation measures	<ul> <li>Comments/Mitigation:</li> <li>Maximize local employment through training and capacity building.</li> <li>Recruitment of locals should be done in consultation with the local authorities in the area</li> <li>Ensure there is transparency in the recruitment process (advertisement and selection)</li> <li>Ensuring the community is well informed in advance on the number of available opportunities to manage expectations</li> </ul>			
Mitigation Status	Extent	Duration	Magnitude	Probability
With mitigation	Regional	Long-Term	Moderate	Highly Probable
	3	4	6	4
	Result: (+52) Medium Positive			

Assessment of Impacts

### 9.3.3 Increased use of Meter Gauge Railway (MGR)

Kenya as a country generally has underdeveloped railway infrastructure. It is anticipated that the implementation of the proposed project will result into increased use of the meter gauge railway for transportation and distribution of LPG from the Terminal and Depots to the end users. This will likely stimulate development of the railway infrastructure to cater for increased wagon hauling across the country.

Enhancement Status	Extent	Duration	Magnitude	Probability
Without	Study Area	Short Term	Minor	Improbable
ennancement	2	2	2	2
	Re	sult: (+12) Low	Positive	
Enhancement measures	<ul> <li>Comments/Mitigation:</li> <li>The national Government will leverage on the anticipated increased use of MGR to transport and distribute LPG via the MGR from the proposed LPG marine terminal to the consumers</li> <li>The national government will support railway infrastructural development to meet the growing demands</li> <li>The national Government and to the extent possible will endeavor to prioritize the development of railway infrastructure to meet the demands of LPG distribution</li> </ul>			
Enhancement status	Extent	Duration	Magnitude	Probability
With enhancement	National	Long-Term	Moderate	Highly Probable
	3	4	6	4
	Result: (+52) Medium Positive			

### 9.3.4 Business and investment opportunities

In addition to the creation of temporary employment opportunities, during the operation phase there will likely be business and investment opportunities as a result of increased disposable income and local expenditure by the employees in the project area. The local expenditure will likely have a multiplier effect in other sectors of the economy for example opening of new business ventures within the project area, increased demand for consumer goods and price increases can all have a positive outcome since the profits will be reinvested in the local economy.

Assessment of Impacts

Enhancement Status	Extent	Duration	Magnitude	Probability	
Without	Study Area	Short Term	Minor	Improbable	
ennancement	2	2	2	2	
	Re	sult: (+12) Low	Positive		
Enhancement measures	<ul> <li>Comments/Mitigation:</li> <li>Promote the local suppliers in order to boost their financial base;</li> <li>Inform the community in advance of the required materials and supplies needed and that meet the required specifications.</li> </ul>				
Enhancement status	Extent	Duration	Magnitude	Probability	
With enhancement	Regional	Long-Term	Moderate	Highly Probable	
	3	4	6	4	
	Result: (+52) Medium Positive				

### 9.3.5 Social Investment Opportunities

During the public consultation meeting with the residents in the area, most members felt that street lighting is limited in the area followed by improvement of the Kenya railways Dispensary in Shimanzi (i.e., erection of a wall fence to enhance security and painting of the health facility). It is recommended that as part of the CSR programme, OEKE should improve street lighting in the project area especially those not covered by the county government or further complement the efforts of the county government and establish a fence or upgrade of the health facility in Shimanzi. It is important that such social investment programs be integrated with existing ones and in collaboration with the county government to ensure maximum positive impacts.

Enhancement Status	Extent	Duration	Magnitude	Probability	
Without	Study Area	Medium Term	Low	Improbable	
ennancement	2	3	4	3	
	Result: (+27) Low Positive				
Enhancement measures	Comments/Mitigation: The developer should develop a CSR Plan that will involve identifying the sustainable thematic areas of challenge within the project area Engage the residents to determine the areas of challenge and decide on the CSR activity to be carried out				

Assessment of Impacts

	Provide a budget to facilitate the CSR activities; Appoint staff responsible for implementing and overseeing the CSR activities to be undertaken.				
Enhancement Status	Extent Duration Magnitude Probability				
With enhancement	Study area	Long-Term	High	Highly Probable	
	3	4	8	4	
	Result: (+48) Medium Positive				

### 9.3.6 Traffic Impacts

As indicated in section 2 of this report, the project will be located at Shimanzi, in Mombasa which is the main industrial area of Mombasa especially for the industries using or being served by the Kenya Port. The two main road serving the area are Makande road/Shimanzi road which is under Kenya Urban Roads Authority and Kismayu road under county Council of Mombasa. Kismayu road is a one-way loop connecting Makande and Shimanzi Roads. Trucks accessing the site will use Kismayu Road which at the time of this study required some facelift and maintenance of the drainage.

A high-level traffic assessment of the roads with the project area during the ESIA study indicated the following.

Makande road is the main access road to Shimanzi area and connects Shimanzi Road with Nairobi Road. The Road is under Kenya Urban Roads Authority (KURA). An interview during EIA stakeholder consultation with KURA established that there are scheduled maintenance work for the road

Kismayu road is a one-way access loop connecting most oil depots in Shimanzi to Makande Road. The road is under County Government of Mombasa. Makande road is not well maintained and is characterized by a convoy of packed tankers waiting to access various depots.

The main vehicular traffic along the three roads are petroleum and vegetable oil tankers, Petro chemical tankers, container trucks and medium trucks for transporting blended lubricants. Other road users include public transport vans, personal vehicles, motorcycles and tuk tuks.

The roads are not well marked, there are no road signs and dedicated pedestrian crossing points and walkways.

There are two schools and two residential estates served by Makande road

There are National Government and County Government offices and several small-scale businesses along Makande Road

The number of trucks is high on Mondays, Tuesdays and Fridays morning hours causing traffic congestion, the number normalizes during the daytime and on the other days of the week. On Saturdays and Sundays, the trucks are few in the area.

#### Kismayu road has oil tankers pa

The operation of the proposed terminal will add more trucks into the existing number. Based on the preliminary design of the facility, it is envisaged that 4 trucks will be loaded and cleared at the proposed facility in an hour. This will add approximately 40 trucks in a day to the already strained roads and parking slots.

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It is also envisaged that there will be an increase in the number of LPG tankers along A109 Highway. However, the impacts along A109 have not been considered in this section but under cumulative impacts.

The addition of LPG tankers in the area will potentially result to the following

Aspect	Potential Impact
Traffic	<ul> <li>Traffic congestion leading to disruption of the movement along Makande and Kismayu Roads</li> </ul>
	Increased road accidents
	Obstruction of the road reserve leading to accidents

Enhancement Status	Extent	Duration	Magnitude	Probability		
Without	Study Area	Long Term	Moderate	Highly probable		
ennancement	2	4	6	4		
	Result: (-48)	Medium Negat	ive			
Enhancement measures	<ul> <li>OEKE will the propos risk assess include the act 2019, v protection and Respo</li> <li>OEKE will implement represente</li> <li>OEKE is in 10 parking awaiting lo accessible Additionall at Dakawo site at Cha</li> <li>OEKE will will have of truck can n existing roc</li> </ul>	Comments/Mitigation: OEKE will develop a Traffic Management Plan under ESMS for the proposed facility. The plan will be based on a comprehensive risk assessment, HAZOP and The Transport Act ,2019 and will include the following among others requirements of the traffic act 2019, vehicles movement to and out of the facility, signage, protection and PPEs, Safe crossings and Pedestrian zones, Roles and Responsibility and training and understanding OEKE will constitute a transport safety team to ensure implementation of the Traffic Management Plan that will be represented in HSC of the facility OEKE is in consultation with the nearby VIVO Energy to acquire 10 parking spaces from their yard for the LPG trucks to queue awaiting loading. The location is proximal to the facility, easily accessible and has an adequate room for truck turning. Additionally, OEKE plans to acquire more trucks parking spaces at Dakawou Transport Services located 6km from the project site at Changamwe. OEKE will develop and implement a product loading plan which will have clear truck validation and queuing procedures before a truck can report to the facility to avoid truck parking along the existing roads.				
Enhancement Status	Extent	Duration	Magnitude	Probability		

Assessment of Impacts

With	Study area	Long-Term	Low	Probable	
ennancement	2	4	4	2	
	Result: (-20) Low Negative				

#### 9.3.6.1 Air Quality

The proposed project will be located at Shimanzi area which is an industrial setting with other existing industrial establishments that has potential to cause air pollution. The main source of baseline air pollution is the clinker offloading at the Kenya Ports, dust from trucks using Kismayu Road and naturally as a result of wind blowing in the area.

During operation, the main potential sources of air pollution include

The following is a summary of the proposed impacts on air quality

Aspect	Potential Impacts
Air Quality	• Emission of VOCs from the exhaust of the trucks and locomotives
	Release of the LPG during operation
	Generation of the dust by the trucks visiting the site during operation

The significance of the impacts on water during the construction phase are given below

Mitigation Status	Extent	Duration	Magnitude	Probability
Without	Study area	long-term	Minor	Probable
mugation	2	4	2	3
	Result: (-24) Me	edium negative		
Mitigation measures	<ul> <li>Comments/Mitigation:</li> <li>Designing the facility in accordance with international and Kenyan standards to ensure no product loss during receiving, piping, storage and loading</li> <li>Development and implementation of air pollution control plan based on IFC PS 3 and LN 34 of EMCA with an effective air pollution sources identification, control, monitoring and training</li> <li>Ensuring no idle running of truck and locomotive engines within the site</li> <li>Proper housekeeping and paving or tarmacking of the surfaces to avoid generation of the dust by the trucks during operation</li> </ul>			
Mitigation Status	Extent	Duration	Magnitude	Probability
	Study area	long-term	Minor	Improbable

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With	2	4	2	2
muyauon	Result: (-16) Lo	w negative		

### 9.3.7 Waste

The main types of Wastes generated during operation of the proposed terminal will comprise of liquid and solid waste streams.

There will be uncontaminated surface runoff water from the facility (i.e., rainwater from roof structures etc.)

Sanitary waste consisting of wastewater from sanitary facilities such as showers, wash basins and toilets and also wastewater coming from the office facilities will be generated.

It is envisaged that pumps, compressors and generators will be serviced biannually or annually and some used oil will be generated.

The main types of solid waste to be generated as a result of the proposed Terminal include:

- Paper waste and similar wrapping materials generated by offices, storage and infrastructure;
- Material waste such as oily rags from workshop
- Food and domestic waste from kitchens and waste bins.
- Solid wastes will be sorted, collected, and dispatched via containers. The containers will be clearly sign posted and colour coded to denote the type of waste.
- Food and domestic waste generated from the kitchens, canteen and office waste bins will be collected in bins then transferred to skips located in a defined area.

Aspect	Potential Impacts
Air, Water	Soil pollution from sanitary waste
and soil	Release of the LPG during operation
	Generation of the dust by the trucks visiting the site during operation

Mitigation Status	Extent	Duration	Magnitude	Probability
Without	Study area	long-term	Minor	Probable
mugation	2	4	2	3
	Result: (-24) Medium negative			

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Mitigation	Comments/Mitigation:				
measures	• The project will be designed to effectively drain the uncontaminated surface run-off from the site to the existing storm water drains and to connect the facility to the to the proposed sewer system for Mombasa.				
	• Should the sewer system not be available during the operation of the project, a septic tank system will be installed to manage the sanitary waste.				
	• OEKE will develop and implement a site-specific waste management plan based on IFC PS3 and LN 20 and LN 21 EMCA. The plan will				
Mitigation Status	Extent Duration Magnitude Probability				
With	Study area	long-term	Minor	Improbable	
mugation	2	4	2	2	
	Result: (-16) Lo	Result: (-16) Low negative			

### 9.3.8 Visual Impacts

The project will be located in the industrial area of Mombasa with several petroleum and vegetable oil tanks visible from as far is Kipevu Course Way. The proposed project will consist of six mounded tanks with diameter of 20m and height of 25m.

The tanks will be taller that other tanks in the area and will have unique appearance visible from as far as Chanagamwe round- about, Kipevu area and along Makande road.

Aspect	Potential Impact
Landscape and Visual	Alteration of the existing appearance

The following is a summary of the proposed impacts on noise quality

Mitigation Status	Extent	Duration	Magnitude	Probability	
Without mitigation	Study area	Short	Low	probable	
	2	2	2	4	
	Result: (-24) low negative				
Mitigation measures	<ul><li>Comments/Mitigation:</li><li>OEKE should undertake a VIA to address the potential landscape and visual impacts associated with the proposed project</li></ul>				

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## 9.5 Quantitative Risk Assessment

### 9.5.1 Identification of Hazards

The material of concern was the large LPG inventory that is hazardous, and which has the potential to create major hazards, if released. The proposed project is a Major Hazard installation and LPG is classified as a highly flammable gas under UN classification of dangerous goods.

Environmental effects (biophysical impacts) are not relevant the proposed project and no environmental risk assessment was carried out as part of the Major Hazard Installation Risk Assessment.

### 9.5.2 Hazard Analysis

### 9.5.2.1 Sections analyzed

The site was broken down into discrete sections to facilitate the analysis of possible hazards. These sections are:

- LPG receiving line from the CUM
- LPG storage in mounded spheres
- Piping from sphere to pump suction and delivery to rail and road tanker filling
- LPG pump
- Rail wagon filling
- Road tanker loading

#### 9.5.2.2 Cause Development

When a flammable material like LPG is released as a gas, initial dispersion will take place by the jet velocity, where-after it will form a gas cloud, which will drift away assisted by the wind. Similarly, when an LPG liquid is released, a portion will flash off from the jet, while the remainder will fall on the ground and form a pool. If there is immediate ignition, a flash, jet and pool fire will result, otherwise evaporation will take place from the pool, and will combine with the flashed off vapour to form a cloud, which will drift away assisted by the wind. Later ignition could cause a flash fire or an explosion when the cloud is in a confined area, or the flash fire could flash back igniting the pool. Fires will lead to radiation injuries and damage, whereas explosions will result in blast injuries and damage.

When a toxic material is released as a gas, initial dispersion will take place by the jet velocity, where-after it will form a gas cloud, which will drift away assisted by the wind. Similarly, when a toxic liquid is released, a portion will flash off from the jet, while the remainder will fall on the ground and form a pool. If the liquid is volatile, evaporation will take place from the pool, and combine with the flashed off vapour to form a cloud, which will drift away assisted by the wind. As the cloud moves away, it will mix with air and become dispersed and the concentration will decrease as it travels. Thus, the further away from the source, the lower will be the gas concentration.

#### 9.5.2.3 Hazard Analysis

Hazards were analyzed as shown in table 9-1 below.

#### Assessment of Impacts

#### Table 9-1: Effect categories

Hazard Analysis						
Plant Section	Failures and Causes	Preventative Measures	HAZARDOUS EVENT	Protective Measures	Final Consequences	
Berth pipes, feed pipes to pump and rail and road tanker loading	<ul> <li>Pipe rupture or large leak, e.g., soil movement, bleed valve left open, loose gasket</li> <li>Ignition from static charges, electrical faults, hot work or smoking</li> </ul>	<ul> <li>Integrity assurance, maintenance</li> <li>Electrical classified area, hot work procedures, smoking prohibited and earthing</li> </ul>	<ul><li> Pool fire</li><li> Jet fire</li><li> Flash fire</li><li> Explosion</li></ul>	<ul><li>Emergency isolation</li><li>Harbour fire brigade</li></ul>	<ul> <li>Potential for overheat damage of nearby piping</li> <li>Radiation injuries to employees, possible outside public</li> </ul>	
Tank farm bulk storage in spheres	<ul> <li>Rupture of sphere or large leak, e.g., integrity loss</li> <li>Outlet pipeline rupture or leak due to damage, e.g., corrosion</li> <li>Sabotage</li> <li>Ignition sources, e.g., hot work, electrical sparks, static, smoking</li> </ul>	<ul> <li>Integrity assurance, maintenance</li> <li>Electrical area classification</li> <li>Earthing</li> <li>Security and fenced in</li> </ul>	<ul> <li>Pool fire</li> <li>Jet fire</li> <li>Flash fire</li> <li>Explosion</li> </ul>	<ul> <li>Emergency isolation, water sprinkler system on tanks</li> <li>Foam application</li> <li>Containment in mound wall</li> <li>Harbour fire brigade</li> </ul>	<ul> <li>Potential for overheat damage of nearby sphere</li> <li>Blast or radiation injuries to employees, possible outside public</li> </ul>	

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Hazard Analysis					
Plant Section	Failures and Causes	Preventative Measures	HAZARDOUS EVENT	Protective Measures	Final Consequences
Road tanker loading	<ul> <li>Tanker burst</li> <li>Loading hose rupture due to loss of integrity e.g., corrosion, or tanker pulled away with hose</li> <li>Ignition sources present, e.g., hot work, electrical sparks, static, smoking</li> </ul>	<ul> <li>Integrity assurance, e.g., inspection, maintenance, testing</li> <li>Electrical classified area, hot work procedures, smoking prohibited and earthing</li> </ul>	<ul><li>Pool fire</li><li>Jet fire</li><li>Flash fire</li><li>Explosion</li></ul>	<ul> <li>Emergency procedures, e.g., isolation</li> <li>Fire extinguishing</li> <li>Harbour fire brigade</li> </ul>	<ul> <li>Potential for overheat damage of nearby tankers</li> <li>Radiation injuries to employees, possible outside public</li> </ul>
Rail wagon loading	<ul> <li>Wagon burst</li> <li>Loading arm rupture due to loss of integrity e.g., corrosion, or tanker pulled away with arm</li> <li>Ignition sources present, e.g., hot work, electrical sparks, static, smoking</li> </ul>	<ul> <li>Integrity assurance, e.g., inspection, maintenance, testing</li> <li>Electrical classified area, hot work procedures, smoking prohibited and earthing</li> </ul>	<ul><li> Pool fire</li><li> Jet fire</li><li> Flash fire</li><li> Explosion</li></ul>	<ul> <li>Emergency procedures, e.g., isolation</li> <li>Fire extinguishing</li> <li>Harbour fire brigade</li> </ul>	<ul> <li>Potential for overheat damage of nearby wagons</li> <li>Radiation injuries to employees, possible outside public</li> </ul>
Pump	<ul> <li>Pump burst or gland leak</li> <li>Ignition sources present, e.g., hot work, electrical sparks, static, smoking</li> </ul>	<ul> <li>Integrity assurance, e.g., inspection, maintenance, testing</li> <li>Electrical classified area, hot work procedures, smoking prohibited and earthing</li> </ul>	<ul><li> Pool fire</li><li> Jet fire</li><li> Flash fire</li><li> Explosion</li></ul>	<ul> <li>Emergency procedures, e.g., isolation</li> <li>Fire extinguishing</li> <li>Harbour fire brigade</li> </ul>	<ul> <li>Potential for overheat damage of nearby equipment</li> <li>Radiation injuries to employees, possible outside public</li> </ul>

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## 9.5.3 Consequence Analysis

Use was made of the computer programme DNV-GL PHAST 8.23 to model the hazard scenarios identified by the Hazard Analysis in terms of the flow rate, pool formation, evaporation, dispersion and resultant radiation for fires or overpressures from explosions. This was done for three weather conditions: Inversion, with a wind speed of 1.5 m/s, neutral with a wind speed of 5 m/s and unstable with a wind speed of 3 m/s. These represent both low and high wind speed conditions, as well as day and night conditions.

The input data to these calculations, which are based on the cause analysis, is given in the A-Tables 6 to 8 in Appendix 8.

#### 9.5.3.1 Effect Distances

In order to interpret the effects of explosion, fire and toxic releases, effects of consequence were compiled from various sources: DNV (2020), TNO (1992), TNO (1997), ICI (1986). From this information the following three effect categories are defined based on the modelling outputs in the 'Safeti 'software as shown in Table 9-1 below.

Table 9-2 Effect categories						
Category	1	2	3			
	Least severe	Moderately severe	Most severe			
Fire radiation kW/m <sup>2</sup>	4	12.5	37.5			
Effects from a pool or jet fire or a fire ball for 10 s	0 % fatal, pain, blistering	~ 0 - 1% fatal, 2 <sup>nd</sup> degree burns	100% fatal			
Flash fire radius m	Radius from the release to 1/2 the Lower Flammable Limit (LEL)					
Effects from a flash fire	100 % fatal					
Explosion overpressure kPa	2	13.8	20.7			
Explosion effect on	0 % fatal	0 % fatal	0 % fatal			
peopie in open	0,1% ear drum rupture	1% ear drum rupture	10% ear drum rupture 0 % fatal			
Explosion effect on people inside masonry building	0 % fatal	1 % fatal	20 % fatal			

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Table 9-2 Effect categories						
Category	1	2	3			
	Least severe	Moderately severe	Most severe			
Explosion effects on masonry buildings	No masonry damage, safe building. 10-20 % windows broken. Minor structural damage to houses. Missile limit	Masonry damage. 100 % windows broken. Partial collapse of walls and roofs of houses.	Steel building damage. 100 % windows broken. Steel frame buildings distorted and pulled away from foundation. Frameless, self- framing steel building demolished, rupture of storage tanks			
Toxic concentration	ERPG 1	ERPG 2	ERPG 3			
Toxic effects on people	Suffer only mild transient health effects and objectionable odour	Not suffer irreversible or other serious health effects or symptoms that could impair ability to take protective action	Will not suffer life threatening health effects			

Severity effect distances for the 3 effect categories, were determined by the consequence modelling. Events, which have a serious effect the longest distance away from the source (hazard end points), are summarised in Table 9-3 below, for each severity category.

Table 9-2 above shows that, if any of the events had to occur, one could possibly expect, as a minimum, some serious effects as far away as 736 m for a flash fire due to a burst of an LPG import pipeline followed by ignition. These results do not include any escape or shielding factors, i.e., it is for a person in the open, stationary at that distance. Neither do these results include the likelihood (frequency) of the events happening. Account is only taken of the probability of the effects on a person.

Table 9-3 Events with maximum effect distances					
Category	1	2	3	Event	
Effect	Maximum effect distance m				
Pool fire	-	240	157	LPG import pipe burst	
Jet fire	-	265	212	LPG pump suction pipe burst	
Fire ball	-	393	225	Rail wagon burst	
Flash fire	736			LPG import pipe burst	
Explosion	-	660	-	LPG import pipe burst	

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Table 9-3 Events with maximum effect distances				
BLEVE blast	-	378	218	Rail wagon fail
Toxic release	NA	NA	NA	NA

NA <sup>o</sup> Not applicable, effect does not occur

#### 9.5.3.2 Hazard Effect Zones

The hazard effects zones considered include fire radiation and explosion over pressures as illustrated below



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Explosion	A 13.79 kPa overpressure as per the figure below is a Category 2 effect, which
overpressures	could result in a 1% probability that persons inside a building would be fatally
	injured when the building collapse due to the side on pressure of 13.79 kPa. The worst overpressure effect circle is displayed on the map in the Figure below.

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### 9.5.4 Likelihood Analysis

Currently, there is no information available in Kenya related to failure frequencies or rates of petroleum facilities infrastructure. Subsequently, generic failure rates from the data bases in the Dutch standards i.e. Purple Book, Bevi document and HSE etc. The failure data was adjusted according to the evaluation of the Process Safety Management (PSM) and organizational measures which are proposed to be practiced on the site. This may be well managed, not well managed or neutral and the failure frequency was adjusted accordingly.

### 9.5.5 Risk Results

Two types of risks were evaluated using QRA computer model DNV-GL SAFETI

- (i) individual risk to employees and
- (ii) public and societal risks.

### 9.5.5.1 Individual risk to employees

Individual risk is the chance that a particular individual at a particular location will be harmed in the course of a year. The risk is typically expressed as the chance (e.g.,  $10^{-3}$ ,  $10^{-4}$ ,  $10^{-5}$ ...  $10^{-8}$ ) of a fatality per person per year. Contours have been plotted on a map of the site taking into account the combined risk scenarios, as shown in Figure 9-4 below
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#### Figure 9-4: Individual risk contours









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Table 9-4: OLA Energy site and surrounding population areas



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## 9.5.5.2 Societal Risk

Societal risk depends on the population distribution normally surrounding the site, as well as on whether persons are indoors or outdoors, i.e., their ability to escape from the hazard area. Societal risk is a way to estimate the chances of numbers of people being harmed from an incident. The likelihood of the primary event (an accident at a major hazard plant) is still a factor, but the consequences are assessed in terms of level of harm and numbers affected, to provide an idea of the scale of an incident in terms of numbers killed or harmed.

An estimate of the number of people in a populated area was done and the population density calculated based on the surface area. The areas delineated in Figure 9-4 were calculated by the software; probability that people would be indoors was assigned to each population area based on the Dutch risk management guidelines, known as the Green Book 1992. See Table10-4 below

Time	Population area	<b>→</b>	Ola Energy	Harbour industrial	West public	East public
Day	People		22	11 440	2900	8000
	Population (persons / m <sup>2</sup> )	density	0.00026	0.004	0.004	0.004
	Fraction indoors		0.93	0.93	0.9	0.9
Night	People		8	5,000	5,964	16,000
	Population (persons / m <sup>2</sup> )	density	0.00012	0.002	0.008	0.008
	Fraction indoors		0.99	0.99	0.99	0.99

Table 9-5: Population data close to the project

Societal risks were determined by using the individual risks to calculate the number of fatalities in a specific population area, taking account of the population density, the probability that people will be indoors, the wind direction distribution and ignition probabilities associated with the population and other activities. Societal risk was then expressed in frequency – fatality (F-N) curves as shown on the graph in Figure 7-6 below. The blue curve denoted 'Combination 1', is the combination of day and night societal risk curves. In this evaluation, the population on-site was included. Incidents, which will lead to many fatalities, are less likely to occur. There is a lower limit line (green) below which the risks are acceptable and an upper limit line (red) above which risks are intolerable. The risk region between these two limit lines is regarded as 'tolerable'

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Figure 9-7: Societal risk F-N cure (frequency / year versus number of fatalities)

# 9.5.6 Risk Judgement

In order to assess the acceptability of the risks that were determined, the criteria for decision making were adopted from the British Health and Safety Executive document, HSE (2001), and applied as described below.

## 9.5.6.1 Workforce Individual Risk

Risk greater than a  $1*10^{-3}$  chance of a fatality per person per year: Unacceptable.

Risk less than a 1\*10<sup>-3</sup> but greater than 1\*10<sup>-5</sup> chance of a fatality per person per year: Tolerable, provided as low as reasonably practical (ALARP) i.e., risk can be tolerated if further risk reduction is either impractical or not cost effective.

Risk less than a 1\*10<sup>-5</sup> chance of a fatality per person per year: Broadly acceptable.

The maximum risk from incidents inside the site where employees are exposed (see risk profiles Figure  $10^{-5}$ ,  $10^{-6}$ ) is at most a 2 \*  $10^{-4}$  chance of a fatality per person per year. OLA Energy employee risks are therefore tolerable. Further risk reduction is not practical or cost effective; hence risk is accepted as low as reasonably practicable (ALARP).

## 9.5.6.2 Public Individual Risk

Risk greater than a 1\*10<sup>-4</sup> chance of a fatality per person per year: Intolerable

Risk less than a 1\*10<sup>-4</sup> but greater than a 1\*10<sup>-6</sup> chance of a fatality per person per year: Tolerable, provided as low as reasonably practical (ALARP) i.e., risk can be accepted if further risk reduction is either impractical or not cost effective.

Risk less than a  $1*10^{-6}$  chance of a fatality per person per year: Broadly acceptable.

The maximum risk at the site boundary is  $8 * 10^{-5}$  chance of a fatality per person per year. Public individual risks are therefore tolerable. Further risk reduction is not practical or cost effective, hence risk is accepted as low as reasonably practicable (ALARP).

Main contributions to risk from the proposed OLA Energy LPG upgrade project at the ranking point (boundary of the eastern township) are.

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LPG rail wagon burst	31%
LPG import pipeline burst	5.0%
Spheres catastrophic rupture	4.5% each
Road tanker burst	3.7%
Spheres large leak	3.1% each
Others, less than	3%.

## 9.5.6.3 Societal risk

The F-N curve indicates that societal risks are tolerable and tending to be acceptable for infrequent severe hazardous events; Further risk reduction is not practical or cost effective, hence risk is accepted as low as reasonably practicable (ALARP).

Societal risks are tolerable despite large numbers of people present at adjacent industrial and residential areas. It was found that the top events contributing to societal risk are:

LPG rail wagon burst	26%
Road tanker bursts	19%
Road tanker hose burst	11%
Road tanker large leak	3.4%
LPG pump burst	2.4%
Rail wagon large leak	1.8%
Road tanker load hose leak	1.6%
Rail wagon arm burst	1.5%
Others, less than	1%.

# 9.5.7 Mitigation Measures

The following mitigation measures, as part of the organizational risk management should be implemented by OEKE during operation of the project

Implement a permit to work clearance system for maintenance and a management of change for modifications.

Compile registers of all pressure vessels (spheres), relief valves, piping, loading hoses and arms, interlock and trips, flame, and explosion proof electrical equipment.

Set up schedules for inspecting and testing of all pressure vessels (spheres), relief valves, piping, loading hoses and arms, interlock and trips, flame and explosion proof electrical equipment.

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Put in place a system to prevent unauthorized override or defeats of alarms, interlock and trips.

Institute formal training of all operating personnel with pass out for competency.

Set up refresher training, accident recall and major hazard awareness training for operating personnel, as well as the public.

Implement formal investigation of accidents, incidents and near misses with recording documentation.

Operating, technical and training manuals as well as formal standard Piping and Instrumentation (P & I) diagrams for the plant should be compiled. This information should be updated whenever any change takes place, as it is essential for proper operation and identification of valves, piping, equipment and instrumentation for maintenance. Accidents originating from, e.g., modifications or operations based on inadequate information will thus be avoided.

The condition of rail and road tanker loading hoses should be regularly inspected to ensure that deterioration is detected early, thus preventing their unexpected rupture.

Provide emergency isolation on the sphere outlet piping and the pump via a leak detector system.

Provide fire protection systems on the pump and road and rail filling gantries

All project designs must be signed by a professional engineer registered in Kenya in accordance with the Professional Engineers Act, who takes responsibility for suitable designs

Cumulative Impact Assessment

# **10** Cumulative Impact Assessment

According to IFC, Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonably anticipated future ones. Additionally, IFC Performance Standard 1, Assessment and Management of Environmental and Social Risks and Impacts, recognizes that in some instances, developers need to consider cumulative effects in their identification and management of environmental and social impacts and risks.

# **10.1** Approach taken to assess Cumulative Impacts

IFC Performance Standard 1, in paragraph 8, defines the area of influence to encompass "cumulative impacts that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned, or reasonably defined developments at the time the risks and impact identification process is conducted." Performance Standard 1, in footnote 16, limits the cumulative impacts to be addressed to "those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities". For practical reasons, the identification and management of cumulative impacts are limited to those effects generally recognized as important based on scientific concerns and/or concerns of affected communities.9 Examples of cumulative impacts include the following:

- Effects on ambient conditions such as the incremental contribution of pollutant emissions in an air shed.
- Increases in pollutant concentrations in a water body or in the soil or sediments, or their bioaccumulation.
- Reduction of water flow in a watershed due to multiple withdrawals.
- Increases in sediment loads on a watershed or increased erosion.
- Interference with migratory routes or wildlife movement.
- Increased pressure on the carrying capacity or the survival of indicator species in an ecosystem.
- Wildlife population reduction caused by increased hunting, road kills, and forestry operations.
- Depletion of a forest as a result of multiple logging concessions.

Secondary or induced social impacts, such as in-migration, or more traffic congestion and accidents along community roadways owing to increases in transport activity in a project's area of influence

Cumulative Impact Assessment

# **10.2** Cumulative Impacts for the proposed project

## **10.2.1** Depletion of the local construction materials

The Vision 2030 blueprint of Kenya recommended an increase in LPG storage capacity at Mombasa to ensure stable supply of the commodity within the country. Several other studies by the GOK and International Organizations has emphasized on the need to have more LPG storage facilities, additionally KPA will have a higher capacity tie-in points for LPG at the proposed CUM. Based on the above plans and developments it is envisaged that several other LPG facilities will be established in Mombasa.

The ESIA study established the following regarding other similar projects in Mombasa

- There is an operational 20,000 MT mounded bullet tanks terminal at Miritini (8km from the project site) and a proposed 10,000 MT within the same site
- There is a proposed 30000MT mounded bullet tanks LPG terminal at Kipevu area near the KenGen's Kipevu 2 thermal power plant
- There is a proposed 22,000 Metric ton mounded storage LPG terminal at Liwatoni area (4Km from the project site)
- There are other proposed large-scale establishments within Mombasa

The proposed project will require approximately 100,000 MT of sand and 120,000MT of ballast which will most probably be sourced from Marafa in Malindi and Mazeras respectively. Other upcoming large-scale facilities within Mombasa will require approximately the same or more amount of sand and ballast and this will cumulatively impact the availability of the local construction materials within Mombasa. The impact includes

• Potential depletion of the ballast at Mazeras area

# **10.2.2** Increased LPG trucks in Mombasa and along A109 Road

Kenya has approximately 900km of white oil pipeline from Mombasa to Kisumu and Eldoret. However, the country lacks a similar LPG pipeline connecting Mombasa with other towns and cities. Additionally, and interview with Kenya Railways Cooperation staff during stakeholder's consultation established that the Meter Gauge Railway (which has a better network within the country) does transport LPG. It was also confirmed that SGR is yet to start transportation of the LPG. LPG in Kenya is transported via road

Operation of the various bulky terminals including the proposed project in Mombasa will lead to increased LPG trucks in Mombasa and along the roads connecting to the port city especially A109 Road a single carriageway to Nairobi. In order to meet the projected demand of the LPG in the country and in the region, sizable number of trucks will use the already busy road to Mombasa leading to potential congestion along the roads and traffic related incidents.

Cumulative Impact Assessment

# **10.2.3** Fire and explosion hazards

As indicated in section 10.2.1 above, there are several proposed LPG terminals, depots and filling plants in Mombasa in order to meet the projected demand of LPG in the country and the East Africa Region. It is envisaged that in the next 10 years Mombasa will have an LPG capacity of close to 100,000 MT with storage terminals concentrated within Shimanzi, Kipevu and Mairitini areas. The three areas are the main industrial zones with important facilities like Moi International Airport, Kenya ports and Kenya Pipeline Terminal.

The operation of these projects will potentially expose Mombasa town to more fire and explosion hazards. Through the following ways

- Presence of large amount of LPG which could potentially lead to huge fire and explosion as a result of product release due to overfill, tank or pipes failure. This could lead to multiple fatalities, loss of property and disruption of airport and port activities.
- Increased LPG pipe network within Mombasa which can lead to increased list of fire and explosion as a result of pipe failure or accidental interference of the pipes leading to release of the LPG. Additionally, increased pipelines to SOT and KOT will lead to acquisition of more way leaves lead potential displacement of business establishments.
- It is envisaged that the proposed LPG terminals in Mombasa will be served by huge LPG vessels which will use the port of Mombasa. The increase in number LPG vessels visit Mombasa will potentially lead to increased risk of fire and explosion risk at the port of Mombasa.

# **10.2.4** large scale influx of people

The development of large-scale oil and gas projects in Shimanzi will likely draw a large number of labour and jobseekers to the area. If the local labour force cannot be sourced locally or the local labour pool is inadequate for the LPG storage projects, labour will likely be sourced from outside the area to fill the gap. The area may experience an influx of new residents who may move to the area looking for job opportunities which will have effects on the existing population during the construction periods that could entail problems of housing, sanitation, water usage and solid waste disposal. Employment at an LPG storage facility peaks during construction and significantly declines during operation; since LPG storage facilities need relatively few workers while in operation, the LPG storage facilities will not create long-term booms. Though there may be an influx of workers during construction, these workers are largely temporary. Towns/areas with larger populations and with impact the current communities and increase the pressure on locals to meet the basic needs of these potential new communities. The poor communities are likely to be the most vulnerable to loss of service provision and suffer the negative impact of largescale influx. There is potential for the influx of migrants to significantly change the local receiving environment and this is likely to have a permanent impact in the region. However, not all the potential projects in the area will be developed at the same time or on the same timeframe, which will reduce this impact. However, it is very difficult to control an influx of people into an area (particularly jobseekers), especially in a country where unemployment rates are high. Developed services will likely experience greater rates of population growth than areas without developed services. In relation to the area, the towns that are sensitive receptors will be the nearby estates in Ganjoni.

# **11** Environmental and social management plan

OEKE has an EHS management systems for their African operations. The system is called Safety Health Environmental Management System (SHEMS) has 14 systems for the management of the EHS within OLA Energy facilities in Africa. Additionally, a Quantitative Risk Assessment (QRA) was undertaken to comprehensively identify and quantify the magnitude of the potential risk associated with construction and operation of the terminal.

This Environmental and Social Management Plan (ESMP) seeks to manage and keep to a minimum the negative impacts of the proposed Marine LPG Terminal Project and at the same time, enhance the positive and beneficial impacts.

# **11.1** Objectives of the ESMP

The objectives of the ESMP are to:

- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- To identify measures that could optimize beneficial impacts;
- To create management structures that address the concerns and complaints of stakeholders with regards to the development;
- To establish a method of monitoring and auditing environmental management practices during all phases of development;
- Ensure that the construction and operational phases of the project continues within the principles of Integrated Environmental Management;
- Detail specific actions deemed necessary to assist in mitigating the environmental and social impact of the project;
- Ensure that the safety recommendations are complied with;
- Propose mechanisms for monitoring compliance with the ESMP and reporting thereon; and
- To ensure that the legal requirements applicable to the project are complied with

# **11.2 ESMP** roles and responsibilities

Several professionals will form part of the construction team. The most important from an environmental perspective is the Project Manager, the Project EHS Officer and the Contractors that will engage.

The Project Manager is responsible for ensuring that the ESMP is implemented during the **construction** phases of the project.

The Project EHS Officer is responsible for monitoring the implementation of the ESMP during the **construction** phases of the project.

Each of the proponent appointed Contractors is responsible for abiding by the mitigation measures of the ESMP which are implemented by the Project Manager during the **construction** phase.

OEKE Project Manager is responsible for ensuring that each of the Contractors complies with the mitigation measures and ESMP requirements during the **design**, **pre-construction** and **construction** phases of the project.

The proponent will be responsible for implementation of the ESMP during the **operational** and **decommissioning** phases of the project. Decommissioning will however entail the appointment of a new professional team and responsibilities will be similar to those during the design, pre-construction and construction phases. It is unlikely that the Marine Terminal will be decommissioned for several years.

# 11.2.1 Project Manager

The Project Manager is responsible for overall management of the project and ESMP implementation. The following tasks will fall within his/her responsibilities:

- Be aware of the findings and conclusions of the Environmental and Social Impact Assessment and the conditions stated within the EIA License issued by NEMA;
- Be familiar with the recommendations and mitigation measures of this ESMP, and implement these measures;
- Monitor site activities on a daily basis for compliance;
- Conduct internal audits of the construction site against the ESMP;
- Confine the construction site to the demarcated area; and
- Rectify transgressions through the implementation of corrective action(s).

## **11.2.2** Environmental Manager

The Environmental Manager will be responsible for the implementation of the ESMP during the construction phase as well as liaison and reporting to the client, appointed Contractors and Authorities. The following tasks will fall within his/her responsibilities:

- Be aware of the findings and conclusions of the Environmental and Social Impact Assessment and the conditions stated within the EIA License;
- Be familiar with the recommendations and mitigation measures of this ESMP;
- Conduct periodic (e.g., monthly) audits of the construction site according to the ESMP and EIA License conditions;

- Educate the contractors about the management measures of the ESMP and ESIA License conditions;
- Regularly liaise with the Contractors and the Project Manager on the ESMP implementation;
- Recommend corrective action for any environmental non-compliance incidents on the construction site; and
- Compile a regular report highlighting any non-compliance issues as well as good compliance with the ESMP.

# **11.2.3 EPC and Local Contractor**

The EPC and the local contractors are responsible for the implementation and compliance with recommendations and conditions of the ESMP. The Contractor will:

- Ensure compliance with the ESMP at all times during construction;
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. Examples of such incidents include:
  - Public involvement/complaints;
  - Health and safety incidents;
  - Incidents on site; and
  - Non-compliance incidents.

## **11.2.4** Environmental management responsibilities

The following are the environmental management responsibilities of the various parties during construction and operational phases. Unless otherwise stated the ESMP will be adhered to as follows:

- The Contractor's EHS Officer will be accountable for compliance with this ESMP during the construction phase as it applies to their work area;
- The monitoring party will be led by OEKE Environmental Manager;
- The method of record keeping will be regular inspections depending on the stage of the project;
- The inspection technique will include a review of records that will be kept on site by the Contractor EHS Officer and/or site inspections;
- OEKE will bear ultimate responsibility for environmental management.

Environmental and social management plan

# 11.3 Environmental monitoring

A monitoring program will be implemented for the duration of the construction phase of the project. This program will include:

- Monthly environmental inspections to confirm compliance with the ESMP and EIA License conditions. These inspections can be conducted randomly and do not require prior arrangement with the Project Manager;
- Compilation of an inspection report complete with corrective actions for implementation;
- Monthly EHS committee meetings to be held to ensure compliance with the OSHA and its subsidiary legislation.

The EHS Officer shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable.

During the pre-construction, construction and operational phases, OEKE will implement its Grievance Mechanism. Each OEKE appointed Contractor shall be responsible for acquiring all necessary permits during the construction phase of the project. Such licenses include any abstraction of water permits, local authority approvals and operations, extraction of aggregates from borrow pits and their rehabilitation, etc.

## **11.3.1** Compliance with the ESMP and associated documentation

A copy of the ESMP must be kept on site during the construction period at all times. The ESMP will be made binding on all contractors operating on the site and must be included within the Contractual Clauses. It should be noted that in terms of the principles of environmental management espoused through the EMCA, those responsible for environmental damage must pay the repair costs both to the environmental damage (the polluter pays principle).

## **11.3.2** Training and Awareness

## **11.3.2.1** Training of Construction Workers

The construction workers must receive basic training in environmental awareness, including the storage and handling of construction materials and substances, minimization of disturbance to sensitive areas, management of waste, and prevention of water pollution. They must also be appraised of the ESMP's requirements.

## **11.3.2.2** Contractor Performance

The appointed Contractors must ensure that the conditions of the ESMP are adhered to. Should the Contractor require clarity on any aspect of the ESMP, the Contractor must contact the Project Manager for advice.

Environmental and social management plan

# **11.4 ESMP** requirements for the construction phase

The requirements that need to be fulfilled during the construction phase of the project are as follows:

- There should be continuous liaison between OEKE, its appointed Contractor and the community to ensure all parties are appropriately informed of construction phase activities at all times;
- The community should be informed of the starting date of construction as well as the phases in which the construction will take place;
- The OEKE appointed Contractor must adhere to all conditions of contract including the ESMP;
- The OEKE appointed Contractor should plan its construction program taking cognizance of climatic conditions especially wet seasons and disruptions that can be caused by heavy rains;
- The Community Liaison Officer must keep a proper record of all complaints received and actions taken to resolve the complaints;
- The Environmental Manager and Contractor's EHS officer should implement this ESMP;
- Internal environmental inspections and audits should be undertaken during and upon completion of construction. The frequency of these audits should be quarterly;

A formal communications protocol should be set up during this phase. The aim of the protocol should be to ensure that effective communication on key issues that may arise during construction be maintained between key parties such as the Project Manager, Environmental Manager, Social Performance Manager and the contractors. The protocol should ensure that concerns/issues raised by stakeholders are formally recorded and considered and where necessary acted upon. If necessary, a forum for communications with key stakeholders on a regular basis may need to be set up. The communications protocol should be maintained throughout the construction phase.

# **11.4.1** Dismantling and Demolition of the Existing Structures

The LPG plant will be decommissioned and later dismantled and demolished together with the Bush Tanks.

## **11.4.2** Site preparation

Site clearing will be limited to the area required by each contractor allocated work area. Site clearing must take place in a phased manner, as and when required. Areas which are not to be constructed on within say one month of time must not be cleared to reduce erosion risks. The area to be cleared must be clearly demarcated and this footprint strictly maintained.

# **11.4.3** Establishment of construction materials yards

The EPC will establish their work area in an orderly manner and all required amenities shall be installed at its work area before the main workforce move onto site. The area shall have the necessary ablution facilities with chemical toilets at commencement of construction. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate sanitary activities be allowed other than in supplied facilities.

The Contractor shall supply waste collection bins and all solid waste collected shall be disposed of using NEMA approved waste handlers. A Waste Tracking Sheet required by Legal Notice 121: Waste Management Regulations, 2006 will be obtained by the Contractor and kept on file. The disposal of waste shall be in accordance with the Waste Management Regulations, 2006. Under no circumstances may any form of waste be burnt on site.

# **11.5** Decommission plan

A detailed decommissioning Plan of the above existing facilities will be developed by the demolition contractor in consultation with this ESMP of this SR and it outlines procedures for dismantling, demolition and the removal of the above ground and subsurface structures. In summary the plan presents the procedure, order, and scale of on-site activities to:

- Identify locations of tanks, structures, and piping to be removed
- Remove of the LPG cylinders, LPG filling plant and associated structures
- Evacuate LPG from the delivery line, bullet tanks and the associated pipelines
- Identify existing subsurface and underground structures
- Identify structures that will not be removed or demolished

• address all the potential Environmental and social impacts associated with the decommissioning process

- Estimate the anticipated number of site workers
- Estimate equipment and materials utilized during demolition
- Maximize recycling and reuse of waste products, and
- Describe transportation methods and total number of on-/off-site trips

## **11.5.1** Demolition Preparation

A plan to undertake dismantling and demolition activities will be developed by the demolition contractor in consultation with OEKE. The plan will refer to the ESMP in this report ensure good management of potential EHS issues associated with the demolition activities. OSHA requirements for worker protection will be adhered to during all dismantling and handlings activities and will be outlined in the task-specific Job Safety Analysis (JSA). The contractor will track and report daily progress, planned activities, and plan modifications.

## 11.5.1.1 Licensing

The demolishing contractor/ subcontractors will be required to acquire all the required permits and licenses which includes

- Demolishing licence from county council of Mombasa
- NEMA licence for the waste handler

## 11.5.1.2 As-built layout for the site

OEKE will prepare and provide an as-built drawing of the existing facility site showing the location and the dimensions of all the above ground and underground structures. The layout will enable the contractor to make an informed decision on the demolitions method to be used.

## 11.5.1.3 Pre-demolition site assessment

OEKE will undertake soil sampling for the project site during decommissioning. Test pits will be made through auguring to a depth of 1.5m. The samples will be collected between 1.3m and 1.5m and taken to a NEMA accredited Analytical Laboratory for laboratory analysis of TPH (Total Petroleum Hydrocarbons (C10 – C40)), PAH (Polycyclic aromatic hydrocarbons) and BTEX (Benzene, Toluene, Ethylbenzene and Xylenes).

## 11.5.1.4 Job Safety Analysis

Dismantling will require the use of oxy-acetylene torches to cut piping and equipment. A JSA will be completed and followed for specific operations. Prior to any cutting or hot work, a site "Hot-Work Permit" will be secured from OEKE Mombasa. A lower-explosive limit (LEL) meter will be utilized to verify that tank/vessel atmospheres are below 25 percent of the LEL prior to initial cutting. LEL monitoring should not be required once a tank/vessel is open to the atmosphere. Monitoring may be directed based on operational conditions as evaluated by the PM or SSO. A fire watch will be required for all hot work activities.

## **11.5.1.5** Personnel and Logistics

Demolition activities will require 10 to 14 on-site personnel including the PM and SSO/SM. The demolition contractor will employ the workers anticipated to be residents of the surrounding area so transport arrangements of workers would not be necessary. The access to the site is tarmacked.

## **11.5.1.6** Site Controls

The existing security measures at the site will be enhanced to allow the demolition workers access and leave the site as required. Site access will be restricted during all work periods to protect human health and safety. The existing perimeter fence, with locked gates, should keep pedestrian and vehicle traffic away from site operations. On-site controls will include fencing (interior to the perimeter fence), construction fencing, cones, barricades, barrier tape, and other precautions to keep non-involved workers and equipment from open excavations and active work areas. Any open excavations will be backfilled or fenced off before work is concluded. Equipment will remain on site overnight within the secured interior fenced area.

## 11.5.1.7 Equipment Required for Demolition

The equipment to be utilized for this activity will be task specific and dependent upon the methods selected by the demolition contractor. The following is a tentative list of equipment that is anticipated to be used during the demolition project.

• Excavators where hydraulic cutting pincers will be installed and utilized, as required

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- tractor trailers
- forklifts
- backhoes,
- Dual loader
- Waste hauling trucks, 18-wheeler, 21- ton capacity
- Welding/cutting tools
- Dump trucks, as needed
- Five tool trucks
- Hand tools

# **11.6 Waste Management Plan**

All project generated wastes will need to be managed and disposed of in a manner to prevent potential impacts on the environment and risks to human health.

# 11.6.1 Objectives

The demolition, construction and operation of the proposed project will generate various type of waste which will need appropriate collection, transportation, primary treatment and disposal. Hence, to serve the purpose, a Waste Management Plan has been formulated to demonstrate:

- Characterization of waste in different type of categories like garbage, rubbish, hazardous, waste etc.;
- Maintain the site in a clean and tidy state to reduce the attraction of pest species, impacts on the local environment and negative impacts on visual amenity; and
- Suggestion of options for waste handling and disposal during construction and operation phase of the project.

## 11.6.2 Scope

This plan shall be applicable to the EPC and the other contractors engaged by OEKE during the construction phase of the proposed project. The elements of the plan will be directly implemented by the contractors hired by the Developers while overall management and responsibility will lie with OEKE. The Plan also identifies the individuals currently assigned to the various roles designated in this Plan.

Applicable Standards and Legislations

- The L.N 121 ENVIRONMENT MANAGEMENT AND COORDINATION (Waste Management) REGULATION applicable. The salient features are:
- Section 4 Any person whose activities generate waste shall collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under these Regulations.

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- Section 5 Segregate such waste by separating hazardous waste from non-hazardous waste.
- Section 6 minimize the waste generated by adopting cleaner production principles
- Section 7 No person shall be granted a license under the Act to transport waste unless such person operates a transportation vehicle approved by the Authority
- Section 8 Transportation of waste shall be in such a state that shall not cause the scattering of, escaping of, or flowing out of the waste or emitting of noxious smells from the waste;
- Section 17 Installation of anti-pollution technology for the treatment of waste emanating from such trade or industrial undertaking
- Section 18 No discharge or dispose of any waste in any state into the environment, unless the waste has been treated
- IFC PS 3
- Pollution Prevention-EOKE will be required to avoid the release of pollutants or, when avoidance is not feasible, minimize and/or control the intensity and mass flow of their release.
- Waste and Hazardous Materials Management-OEKE should avoid the generation of hazardous and non-hazardous waste materials. Where waste generation cannot be avoided, the client will ensure that the developers reduce the generation of waste and recover and reuse waste in a manner that is safe for human health and the environment.
- The developers should investigate options for waste avoidance, waste recovery and/or waste disposal during the design and operational stage of the project. Material Safety Data Sheet (MSDS) for all the hazard chemicals to be used during construction and operation phase should be readily available.

## **11.6.3** Roles and Responsibilities

## **11.6.3.1** Site Supervisor of Developer

Site Supervisor will be responsible for the following activities:

Management of onsite waste generation associated with construction works to help avoid excessive generation where practicable;

Maintaining of all records of waste type which are construction waste and debris, hazardous waste; and

To have authorization for hazardous waste generation and storage granted

## 11.6.3.2 EHS Manager of Developer

The following responsibilities are entrusted to the EHS Manager:

Demarcation of area within the construction area for keeping of segregated wastes;

Labelling of the drums containing hazardous wastes like used oil;

Maintaining of receipts for hazardous waste management records;

Notifying the Site Supervisor of any activity that may generate a large amount of waste to allow appropriate controls to be put in place to manage waste generated; and

# **11.6.4** Waste Types and Quantities Generated

All wastes generated from the project will be categorized as either non-hazardous or hazardous following an assessment of the hazard potentials of the material, in line with local and national requirements.

The construction and decommissioning phases will require the use of hazardous materials such as diesel or petrol to cater the fuel equipment and vehicles and maintain equipment. The following hazardous wastes will also be produced from construction activities.

- Dismantled tanks waste consisting of iron sheets and tank fittings
- Demolition waste which includes concrete, reinforcement steel rods, masonry stones, pipe fittings and roofing materials
- Cleared vegetation
- Spoil materials from site preparations
- Steel and timber offcuts
- Oily rags, Used oil and oil filters from generators or vehicle maintenance; and
- packaging material especially paint cans.
- Grey and black water
- Domestic waste including food waste, food packaging material and water bottles
- Office waste including empty printer cartridges, papers and packaging materials

## **11.6.4.1** Operation Phase

Operations and maintenance of the terminal is not expected to generate significant amount of waste. The minimal waste produced will include

- Sanitary waste from approximately 20 workers
- Oily rags from workshop and pumps maintenance
- used oil from pumps and generator sets
- food waste
- Office waste
- Paint cans during maintenance activities

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## 11.6.5 Waste Handling, Management and Disposal

#### 11.6.5.1 Demolition and Construction Phase

Waste from dismantling, demolition and construction activities will include

- The decommissioned bullets tanks, LPG filling tank and the associated pipes and fittings will be relocated by OEKE to other sites within the country most probably Nairobi or Eldoret for reuse.
- The dismantled metal sheets from the bush tanks, reinforcement steel rods, steel cuttings from construction and other metallic waste will be sold to a licensed metal waste recycling plants within Mombasa
- Worn out steel rails from the dismantled railway lines will be handed over to the Kenya Ports in Mombasa, while the rest will be reused at the project site
- Concrete and masonry stones from the demolition activities will be reused at the site for ground filling and the excess will be dumped at the approved dumping site at Mombasa.

#### **11.6.5.2** Construction Phase

All wastes produced from the project activities on site will be temporarily stored in designated waste storage areas. All wastes that cannot be reused or recycled will be collected by approved waste contractors and transferred to an appropriately licensed waste management facility for treatment and disposal. Following steps will be taken to manage the waste generation during construction phase:

- Fuel will be stored on site in temporary aboveground storage tanks and will be stored in a locked container within a fenced and secure temporary staging area;
- Trucks and construction vehicles will be serviced off site;
- All concrete mixing be undertaken on impermeable plastic lining to prevent contamination of the soils and surrounding areas;
- Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently;
- The use, storage, transport and disposal of hazardous materials used for the project will be carried out in accordance with all applicable regulations;
- All hazardous waste to be disposed through NEMA approved waste handlers;
- Material Safety Data Sheets for all applicable materials present on site will be readily available to on-site personnel;
- All construction debris will be placed in appropriate on-site storage containers and periodically disposed of by a licensed waste contractor;
- The construction contractor will remove refuse collected from the designated waste storage areas at the site at least once a week;
- It is proposed that the Contractors will supply the required temporary ablution facilities and be responsible for the removal and treatment thereof. Portable toilets would be provided for onsite sewage handling during construction. Sewage would be pumped out and removed regularly and disposed of in compliance with waste regulations in Kenya (Legal Notice 121: Environment Management and Coordination (Waste Management) Regulations, 2006).

- Empty fuel containers will also be stored at a secured area designated for scrap and sold to authorized vendors. All packaging material will also be collected at the storage area and sold to scrap dealers.
- Tree from the site will be cut into small pieces and sold out as firewood within Mombasa, grass and shrubs will be dumped at approved dumping sites within Mombasa.
- Top soil and other spoil will be gathered and temporary stored within the site for reuse. The excess will be dumped at the approved dumping sites within Mombasa

# **11.7** Construction EHS management plan

# **11.7.1** Purpose of a construction EHS plan

A construction HSE plan is a management tool used to manage HSE activities associated with the construction of a project. It is a prerequisite for satisfying the Proponent that the successful contractor has implemented a management system for the safe operation of construction related activities in a project.

The construction HSE plan sets out the HSE management system as well as the resources required to implement it. It includes the minimum requirements for compliance with local HSE laws and regulations in order to prevent injuries to workers, damage to property or the environment. In the absence of relevant legislation, the main contractor and nominated sub-contractors will ensure compliance with international standards, guidelines and best practices in the safe operation of construction activities associated with the project.

# **11.7.2** Objectives of a construction EHS plan

The principal objectives of a construction HSE plan include:

- Prevention or limitation of injuries to workers, damage of property or the environment through an emergency preparedness and response plan;
- Prevention of recurring accidents or incidents through a program of root cause analysis;
- Ensuring that safe work practices and procedures are issued and understood by all construction workers;
- Verification through planned audits and reviews that procedures and instructions are complied with fully; and
- Counselling construction workers involved in near misses on better safe work practices.

In order to implement the construction HSE plan, the main contractor and nominated subcontractors will implement the following strategy:

 The HSE goals/objectives of the project will be verified and commented upon in each HSE meeting;

- A monthly HSE theme relevant to the planned objectives will be issued;
- Monitoring and control of unsafe practices;
- Initiate an unsafe act/condition report system for conveying accountability to affected employees including a disciplinary action system for non-compliance;
- Initiate an HSE recognition and rewards program for good HSE behaviour among construction workers;
- Organize HSE competitions to promote interaction of construction workers through direct involvement in routine HSE objectives.

# **11.7.3** HSE organization

HSE is a management responsibility. Subsequently construction management of the proposed project shall form part of the daily responsibility of each member of the main contractor's management team and the sub-contractors' they supervise.

# **11.7.4 HSE performance measurement**

The main contractor will be required to develop, rollout and implement an HSE performance measurement system. The measurement system will be used to recalibrate the HSE performance of the project during the construction phase to ensure that there are no injuries to people, damage to property or the environment. Some of the performance measurement metrics that should be considered for tracking include the following lagging and leading indicators:

- No. of fatalities;
- Lost time incident rate (LTIR);
- No. of fire incidents;
- No. of environmental incidents;
- Equipment damage/minor injuries;
- No. of health and hygiene reports;
- No. of HSE meetings conducted;
- No. of HSE inspections undertaken;
- No. of HSE training courses conducted.

## **11.7.5** HSE interface between contractor and proponent

Throughout the construction phase, there will be an interface between the proponent and the main contractor on HSE management. The objectives of this activity are to ensure that:

• The main contractor achieves the same or higher HSE standards than those stipulated by the Proponent;

- All HSE related hazards of the construction phase are identified, evaluated and appropriate control measures implemented;
- The main contractor understands their obligations with respect to HSE associated with the project;
- HSE performance management arrangements are in place by mutual definition.

The interface on HSE management may be achieved by the proponent and main contractor through meetings, reviews and audits during the design and construction phases of the project respectively. Some of the meetings may be defined as follows:

- HSE kick-off meeting;
- Weekly HSE progress meetings;
- Ad-hoc HSE meetings called by either the proponent or the main contractor to discuss specific HSE issues; and
- HSE reviews/inspections undertaken by either the proponent or the main contractor or both.

# **11.8** Safety Action Plan

# **11.8.1** Construction and fabrication phase

## **11.8.1.1** Safety hazards and critical areas

Prior to commencing construction, the main contractor will identify potential hazards to the safety of personnel associated with construction phase of the project. The main contractor and nominated sub-contractors shall also comply with relevant requirements of L.N. 40: Building Operations and Works of Engineering Construction Rules, 1984. The list of potential hazards will be updated on-site at regular intervals. For each hazard identified the main contractor will ensure that there is a safe work procedure that is developed, rolled-out and implemented for the project.

## **11.8.1.2** Safety procedures

As a petroleum experienced contractor will be engaged for this project, it is envisaged that they will already have safe work procedures developed for similar types of projects. These procedures will be customized for the proposed project and used throughout the construction phase. Examples of construction activities for which safe work procedures are required include:

- Cranes and lifting equipment operations;
- Electrical work;
- Confined space entry;
- Fire protection and prevention;
- Emergency response;
- Permit-to-work;
- Job safety analysis (JSA);
- Risk analysis;

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- Root cause analysis;
- Safety incentive program; and
- Disciplinary system, etc.

## **11.8.1.3** Safety training

Health and safety training of workers is required by Kenyan legislation under the Occupational Health and Safety Act, 2007 (OSHA). Additionally, the main contractor will be required to train their sub-contractors on the safe work procedures some of which are identified above. Health and safety training needs will be identified by the contractor prior to commencement of the construction phase of the project.

Health and safety training associated with the project will be extended to all levels of management and workers who may potentially be exposed to health and safety risks during the construction phase of the project. Health and safety training records will be maintained on site by the main contractor for review by appropriate lead agencies and the Proponent.

## **11.8.1.4** Safety guidelines and rules of operation

The proposed project will be put up in an area with numerous depots and terminal storing highly flammable petroleum and vegetable oil products. An existing LPG plant will be decommissioned and dismantled and the two Bush tanks will be dismantled using oxyacetylene open flames. Welding, cutting, brazing, and grinding create a significant risk of fires and explosions. This type of work generates hot sparks and slag. Those can then come into contact with nearby combustibles and flammable gases. OEKE and the contractors will have the following in place to prevent hot-work fire incidents at the project area

- OEKE will inform the other Shimanzi Terminal Users through their monthly meetings of the proposed construction work and keep them updated of the construction plans. The team will be in a position to activate mutual ERP in case of any emergency during construction.
- The LPG plant will be completely cleared off the LPG gas and gas testing done before dismantling.
- All the potential fire risk associated with the proposed hot works will be identified by the contractor in consultation with OEKE and all safety precautions measures will be collectively put in place.
- All combustible materials will be removed from the hot works area and whenever possible hot works will be performed away from other activities
- Using fire blankets to protect nearby equipment from sparks and slag
- Having fire extinguishers nearby and ready to use
- Assigning a fire watch for all hot-work activities

The contractor will be required to have a formal PPE program that can be implemented for the proposed project. The PPE program will in the main include instructions for:

- Selection of correct type of PPE based on the hazards at the job site;
- Issuance of PPE;
- Correct use of PPE;
- Inspection and maintenance of PPE;

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• Replacement of worn-out PPE.

In addition to the PPE program, the contractor will evaluate all risks associated with working at heights (1.8m above grade level). For such work, the construction workers will be provided with appropriate safety harnesses or safety nets. All construction vehicles will be fitted with seat belts that operators must wear while working.

The construction site will contain appropriate signs, signals and barricades that are visible to the workers to protect them from potential hazards. Trenches and other excavation will also be provided with appropriate barricades, signs and signals. Where it is necessary to perform work at night, the main contractor will ensure that their sub-contractors provide artificial lighting sufficient to permit work to be carried out safely, efficiently and satisfactorily.

All tools and equipment deployed by the main contractor and their sub-contractors shall be free from defects, be in good operating condition and maintained in a safe condition. Any equipment that falls under the Examination of Plant Order under the OSHA shall be inspected by a DOHSS approved person and a certificate issued prior to its use at the construction site. Some of the tools, equipment and plant expected to be used for the proposed project include:

- Hand and portable power tools;
- Compressed gas cylinders;
- Scaffolds;
- Cranes and lifting equipment;
- Motor vehicles;
- Ladders.

In addition to the above, the main contractor will develop, rollout and implement the following health and safety rules for the construction site:

- Job site transportation;
- Daily construction plant inspection;
- Electrical operation;
- Floor and wall openings and stairways;
- Excavation and trenching;
- Steel erection;
- Confined space entry;
- Work near pressurized pipelines;
- Medical services;
- Alcohol and drug abuse.

# **11.9** Occupational Health Action Plan

An occupational health plan is primarily concerned with identification, evaluation and control of environmental health exposure that result from construction processes. The

stresses can be physical, chemical, biological and physiological and may cause sickness, impaired health or discomfort to employees.

An occupational health plan therefore addresses the above concerns as they apply to the project and to provide cost effective solutions to assure the health and well-being of project employees.

## **11.9.1** Medical and health program

The medical and health plan provides the necessary and important parts of a construction project medical and health program. The objectives of this program are to:

- Protect employees against occupational health hazards at the construction worksite.
- Facilitate placement of workers according to their physical, mental and emotional capabilities without endangering their own health and safety or that of others; and
- Ensure adequate medical care and rehabilitation of the occupationally injured or ill person.

The contractors will engage the services of a DOHSS approved Designated Health Practitioner (DHP) for undertaking medical examinations in accordance with the Second Schedule of the OSHA and Legal Notice No. 24: Medical Examination Rules, 2005. For those occupations defined in the Second Schedule of the OSHA, the main contractor will avail their employees to a DHP for medical examinations throughout the construction phase of the project during the following occasions:

- Pre-assignment;
- Periodic;
- Post illness or injury; and
- Termination.

An occupational injury or illness will be diagnosed as promptly as practical and treated as appropriate within the capabilities of the workplace medical facility. The main contractor's occupational health program should include treatment of emergency conditions at the work site which may occur during the construction phase of the project.

Construction workers and other employees will be inducted to the potential occupational health hazards that they may encounter in their specific roles. The induction will include methods of recognizing and preventing adverse health and safety effects at the work place.

The occupational health program will also include training of construction workers on the correct use and maintenance of PPE issued to them. The site HSE Manager will periodically inspect and evaluate the workplace for potential adverse occupational health hazards.

Occupational health record keeping will be maintained by the site HSE Manager for all employees that are medically examined. The records will contain sufficient data to reproduce a chronology of an employee's medical occurrences, illnesses and injuries. All employee medical records will be maintained confidentially.

If the main contractor engages catering personnel for their staff, it will be mandatory for each food handler to be immunized every six months as required by the Local Government Act and comply with the requirements of the Public Health Act.

## **11.9.2** Record keeping requirements

Medical records will provide data for use in job placement, establishing health standards, health maintenance, treatment and rehabilitation, worker's compensation cases and assisting project management with program evaluation and management. The record keeping requirements will comply with Kenyan laws and regulations as well as the Proponent's insurance requirements.

The contractor and their appointed DHP will maintain occupational health records of workers as required by Kenyan legislation (OSHA, WIBA and L.N. 24). The DHP will confidentially maintain health examination records of all employees that visit him/her. Examples of records that need to be maintained include:

- Physical examination reports.
- Clinical reports.
- Chest x-rays,
- Audiograms, etc.

The medical records shall be maintained in locked files and only authorized persons shall have access to them. In certain situations, requests for specified medical information may be sought by authorized Government officials. Additionally, an employee or his/her designated representative may seek information about themselves or their environmental exposure. These requests shall be turned over to the project manager for handling.

## **11.9.3** Inspection program

The site HSE Manager will conduct sanitation and health inspections at the job site to ensure compliance with the Public Health Act. The sanitation inspections will cover the following areas:

- Drinking water
- Control of vermin and pests
- Toilet facilities
- Waste disposal
- Lunch areas.

Written reports will be issued having target dates for corrective actions to be taken by responsible supervisory personnel.

# 11.9.4 Training

During the construction phase, the contractor will be required to arrange for training on first aid, health and safety, security and fire safety.

## **11.9.5** Communications system

The main contractor will be required to develop, rollout and implement a rapid communications system to ensure fast and reliable emergency communications between the project site and crews at the scene of an accident.

## **11.9.6 Procurement and material control**

The contractor's HSE Manager will develop a master listing of all medical and first aid materials, supplies and equipment that will be needed during the construction phase of the project. First Aid boxes will be stocked in accordance with L.N. 160: First Aid Rules, 1977.

# **11.10** Environment Action Plan

The purpose of a construction environment management plan (CEMP) is to specify environmentally sound working methods in order to minimize environmental impact of the construction works associated with the proposed project.

The CEMP identifies key environmental aspects and the related impacts which may occur and specifies methods, measures and controls that the main contractor will comply with during the construction phase of the project.

## **11.10.1** Key environmental positions

The beginning of this section identified the key HSE positions that will be used to manage health, safety and environmental aspects during the construction phase of the project. The primary persons from the main contractor's organization responsible for implementing the CEMP include:

- Construction Manager; and
- HSE Manager.

The Construction Manager will have overall responsibility for all aspects related to environmental issues and to ensure that the main contractor's environmental policy statement and objectives are complied with.

The Construction Manager will be responsible for developing, rolling out and implementing environmental procedures and work instructions in conjunction with the HSE Manager.

The HSE Manager will be responsible for several environmental functions such as:

- Coordinating environmental inputs to the project and advising the Construction Manager on environmental matters.
- Coordinating the development, rollout and implementation of the main contractor's environment management system (EMS) for the project;
- Routine monitoring of implementation of the main contractor's EMS at the project site;

- Authority to halt any works where actions are found to be in contravention of particular environmental procedures, work instructions or legal requirements;
- Authority to amend work instructions and procedures as required by sound environmental management including amendments to the EMS as identified by audits.

Environmental training

The main contractor's management and their sub-contractors will receive environmental induction training prior to commencement of the construction phase of the project. The training will cover the contractor's EMS and environment work instructions relevant to the construction activities.

# **11.10.2** Environmental objectives

The contractor will develop an environment management system (EMS) in order to comply with basic environmental objectives and targets set for the project. Environmental objectives for the construction phase will be discussed and agreed between the Proponent and the main contractor. The EMS will detail the environmental standards for the project and will include a number of environmental work instructions. The EMS will be implemented in conjunction with the main contractor's health, safety and environment action plan. Environmental activities will be audited regularly to ensure continued compliance with predetermined environmental objectives.

Environmental work instructions will be developed to comply with all legislative and regulatory requirements as a minimum. The objective is to endeavour to minimize and prevent where possible adverse environmental impacts. The environment work instructions will apply equally to all the main contractor's workers, sub-contractors, project consultants and suppliers.

The main contractor will provide environmental training for their workers in order to minimize the likelihood of environmentally damaging incidents occurring.

# **11.10.3** Environmental procedures

The contractor will develop, rollout and implement environmental procedures for the construction phase of the project. The procedures will be organized under two categories namely:

- Management and Organization procedures; and
- Environmental Management Procedures.

The above types of environmental procedures will be developed jointly by the HSE Manager and construction team. Once drafted, the procedures will be discussed with the Construction Manager to ensure operability.

# **11.10.4** Environmental performance meetings

The contractors will schedule regular meetings to discuss environmental performance of the project during the construction phase. The meetings will be attended by the

Construction Manager, HSE Manager and the Proponent. Minutes of the meetings will be circulated to all employees and posted on construction site notice boards.

## 11.10.4.1 Environmental reviews

Environmental reviews include both inspections and audits to be conducted by the contractor. Audits will be conducted by the HSE Manager and will include monitoring of construction phase environmental effects against identified performance targets. Findings and recommendations will be shared with the Construction Manager and the Proponent.

Inspections of working areas will be performed periodically using appropriate checklists. Inspections will be undertaken by construction supervisors and findings/corrective actions discussed in daily construction meetings. A tracking system shall be employed for monitoring status of implementation of corrective actions. Records of inspections will be filed on-site and made available to relevant lead agencies and the Proponent.

# **11.10.5** Soil conservation and erosion mitigation

The civil contractor will develop a soil conservation and erosion mitigation plan which will include details on how to perform clearing, grading, excavation, trenching and backfilling work at the project site.

During the construction phase, the main contractor will take adequate measures to prevent soil erosion especially during the rainy season. The integrity of soil erosion mitigation shall be sufficient to provide continued protection against erosion until the site soils have stabilized and added protection is no longer necessary.

# **11.10.6** Site restoration

Prior to handover of the completed project to the Proponent, the civil contractor will undertake a final clean-up of the entire project site including removal of all non-hazardous and hazardous waste or excess materials. Surface restoration and stabilization will be performed in accordance with environmentally sound practices

# **11.11** Traffic Management Plan

There will be increase of traffic along makande, Shimanzi and part of Kismayu Road during construction and operation phases of the proposed project. Kismayu Road which is the access road to the project site is located off the busy and narrow Kismayu road which connects to the busy Shimanzi road (main road that serves the terminals and other business establishments characterized by high traffic in the area). Transportation of construction materials, project components and equipment to the proposed site will be by vehicular trucking transport. At the peak of construction work it is envisaged that approximately 40 trucks especially tippers and concrete mixers will visit the site daily. This increase in traffic will potentially create congestion along the road, short term disruptions and safety hazards for current road users.

The Traffic Management Plan (TMP) during construction and operation will be developed by allow OKE and ECP respectively and implemented to ensure appropriate management procedures to mitigate potential traffic impacts associated with the project. The TMP will outline the mechanisms for managing the movement of all land traffic and will be

associated with the Project for each of the three phases (construction, operation and decommission), in order to minimize associated risks for traffic accessing the construction site from the public roads.

The TMP will highlights the hazards, and the standard operating practices, which will be adhered to in order to minimize the potential for undesirable incidents on site, on public roads and at seawater routes for the period of the construction phase onshore and offshore and also during operations.

It should be noted that at the time of producing this ESIA, detailed information on the construction, operation and decommission of the sites is unavailable. The principal role of this section is to provide framework guidance on preparation of the comprehensive TMP.

# **11.11.1** Objectives of the TMP

Objectives of the Plan will be as follows:

- Promote the safe movement of equipment and personnel to and from the Project site and facilities;
- Promote safe transport of personnel and equipment for Project related activities; Identify and respond to stakeholder concerns
- Address environmental management associated with shipping and road transports during the construction phase
- Ensure that all relevant statutory requirements in relation to The Traffic Act 2012 are met during the construction, operation and decommissioning of the Project
- Establish the baseline traffic conditions
- Describe the access routes for traffic generated by the Project
- Detail traffic management measures to be implemented by the Project
- Outline the roles and responsibilities for traffic management for both onshore and offshore traffic schedule
- Outline a program to monitor and audit Project related traffic and associated impacts
- Minimize disruption, congestion and delays as a result of construction activity along Makande, shimanzi and Kismayu Roads

## 11.11.2 Roles and Responsibilities

OEKE will provide all necessary supervisory staff to ensure that the TMP is implemented and adhered to during all aspects of the Project. The TMP will be monitored to ensure compliance by all site personnel, including management, supervisory staff, and contractors. All site personnel will be responsible for the identification, reporting and correction of areas found to be in non-compliance to the TMP, and adapt the plan where required, to encompass operational change during the phases of construction.

### Environmental and social management plan

The Project Manager is responsible for the safe implementation of this Plan and evaluating all information received from involved personnel and to define corrective actions in case of need.

The HSE Manager is responsible for the overall evaluation of the health, safety, and environmental aspects of this Plan and confirmation that the appropriate hazard studies are performed for the planning, design, construction, and operations phases. The HSE Manager reports to the project manager who in turn will report to OLA Management.

The Community Liaison Officer will be responsible for any communication with counterparts and the community associated with the TMP

It will be the responsibility of OEKE to ensure that all vessels, equipment, and vehicles shall comply with the required statutory and state legislation.

# 11.11.3 Regulations and standards

The TMP should comply with the requirements of following regulations and standards

The Traffic Act of 2012 and its subsidiary legislations

The Occupation Safety and Health Act of 2007 and subsidiary legislations

The Petroleum Act, 2019

The Energy (LIQUEFIED PETROLEUM GAS) Regulations, 2009

KS 1938 on Handling, Storage and Distribution of Liquefied Petroleum Gas in Domestic, Commercial and Industrial Installations

# 11.11.4 Traffic Activities

During construction, the traffic activities can be broken down into.

Transportation of equipment and machinery to and from the construction site;

Transportation of raw materials to the construction site.

Transportation of people working at the construction site;

During Operation, the traffic activities can be broken down into.

Transportation of LPG from the terminal by road

Transportation of LPG from the terminal by rail

Transportation of the LPG by vessel to SOT or KOT

Transportation of workers to the facility

Transportation of equipment and machinery during maintenance.

## 11.11.5 Traffic Risk Management

Risk Assessment will be undertaken to identify and analyze the potential negative environmental and social impacts associated with the above traffic activities. OEKE will be required to establish and maintain a process for identifying E&S risks that are related to

the construction and operation of the proposed project, in accordance with OSHA 2007 and good international industry practice (GIIP).

Risks associated with traffic will be identified, assessed and managed to prevent or reduce the likelihood and consequence of incidents, subsequently an effective risk assessment and management should ensure the following;

- All the potentially affected road users within the project site are comprehensively consulted and their views incorporated in the risk assessment
- Safe vehicle operating practices and procedures are established
- Drivers and other members of the staff are properly instructed in their use
- Systems are in place to monitor and steward compliance with applicable Laws
- There are safe dispatches to all customers, each delivery route and site must be assessed for potential risk
- Assessments are performed prior to first delivery to the customer, and whenever this is a significant change in routing or site facilities
- Persons conducting Risk Assessments must be trained in Risk Assessment Methodology.
- The management endorses risk assessments

Fit-for-purpose risk controls will be developed, to prevent and mitigate the negative impacts of the assessed risk. Risk control will require use of appropriate techniques such as HAZOP which should cover:

- All activities, products, and/or services controlled by GCG and those influenced by GCG, such as suppliers.
- The activities, products, and/or services carried out by all personnel having access to the workplace and facilities at the workplace including suppliers
- Routine (frequently performed), non-routine (infrequently performed), and/or emergency operating conditions and activities. Sometimes the categories of normal and abnormal operating conditions are also considered.
- The lifecycle of an asset or activity, from the planning stage, through operation to decommissioning, and disposal and restoration.
- Risk prevention, mitigation, and recovery measures.

# **11.11.6** Evaluation and Monitoring

Monitoring will be achieved through monthly reporting, which will come under the OEKE's overall auditing and compliance procedure. This will ensure that the relevant legislation within the project area is adhered to. A monitoring plan will be developed to ensure there is a routine, risk-based, 'internal' steps to confirm the effectiveness of a prescribed process or activity.

# **11.11.7** Implementation Schedule

The implementation schedule of the traffic management plan will be determined in accordance with the project's implementation and operation schedule. Thus, it will be accurately be able to be determined during the early stages of implementation, before construction and more precisely upon awarding of the specific works contract to contractors and suppliers.

# **11.12** Emergency Planning during Operation

There are usually three levels of emergency response to be considered during the operation of the proposed project:

Installation emergencies- These are normally of a small nature, e.g., leaks, small fires and can in almost all cases be dealt with by the operator. It is included as part of the operating procedures, which are simple and straightforward. Therefore, they will not be considered in this ESMP.

Site emergencies- These are emergencies that result from a fire or explosion which usually only has an effect on the installation itself and on any other surrounding installations within the boundaries of the site. An emergency response plan must be drawn up for the Ola Energy Oil Terminal.

Off-site Emergencies -These are Emergencies that involve the outside public and local authorities. An off-site emergency plan or procedure is the responsibility of the local emergency services and needs to be prepared, reviewed and updated with the assistance of the Ola Energy Oil Terminal personnel.

# **11.12.1** Administration

The plan should be readily available on site for all persons to use when needed (i.e., it should not only be a document on the computer system, there should be summary copies at key locations)

The plan, or at least the parts readily available for use, should be simple and concise.

The plan should be part of a quality management system, which includes means to control the document. Ensure revision and updating every 3 years, require witnessing and inclusion of the relevant authorities in reviewing the plan, etc.

All personnel, visitors, contractors, etc. should be trained in the relevant aspects of the emergency plan.

Commitment to annual emergency drills

The plan should indicate the need to inform the relevant authorities of every occurrence, which has brought the MHI aspects of the plan into action, of actual MHI incidents as well as of near misses.

Commitment to communicate all necessary emergency planning information to potentially affected neighbours.

Emergency plan signed by Chief executive Officer

# 11.12.2 Roles and Responsibilities

The procedures should address all different groups of persons on site, e.g., person who discovers the emergency situation, visitors, staff, first response team, emergency coordinator, etc.

All personnel should be able to easily determine which group of people they fit into. An organogram is particularly useful.

The actions of the person discovering the emergency situation need to be clearly spelled out.

The person who has over-all responsibility during an emergency clearly designated, e.g., the emergency controller, his/her name and normal job title.

Contact names and numbers for key role players should be clearly indicated.

# 11.12.3 Raising the alarm and evacuation

There should be means of raising the alarm

Clear indication of who is responsible for raising the alarm (or the various levels of alarm if there are more than one) and the method of doing so.

The procedures must clearly describe what actions all personnel are to take in the event that the alarm is raised. If specific groups are to take different actions, this must be clear.

Procedures for testing the alarm must be indicated.

The circumstances under which evacuations are undertaken must be clear.

The details of muster/assembly points should be available in the procedures. A map showing the location should be included.

The responsibilities of the different persons at the muster points must be clearly defined.

Depending on the site and the nature of the risks, there may need to be an indication that the nature of the emergency may require changes in the location of assembly points or actions to be taken, once there.

# **11.12.4** Type of emergencies

The plan should cover the major risks assessed, i.e., fire, explosion and toxic releases.

The plan must be easy to interpret, i.e., the sections dealing with fire, explosions and toxic gas events must be clearly identifiable on the first or second page and the written layout of the plan should be logical and systematic.

Ideally the plan should differentiate between potential fire and explosion situations and the situation after an initial fire or explosion.

The plan must indicate the location of emergency equipment such as BA sets, foam supplies, etc.

Persons responsible for ensuring the maintenance of such equipment must be clear.

Environmental and social management plan

The actions of First Response Teams or emergency controllers may need to be specified in more details, e.g., go to assembly point, don suitable PPE, approach the location of the emergency, isolate releases, activate firefighting systems, etc.

The location of the designated emergency control centre should be indicated.

The facilities to be available at this location and the persons responsible for maintenance thereof must be indicated.

# 11.12.5 Contact with outside

There must be an indication of who is responsible for notifying the external emergency services and which services must be contacted under what circumstances.

There must be an indication of which external neighbouring facilities need to be notified and who is responsible for this.

Contact details for external services and neighbouring facilities must be in the procedures and readily available to the responsible persons.

There must be a clear indication of what will be communicated to the emergency services, as well as to neighbours, as per a pre-agreed plan of action.

The manner in which roles and responsibilities change once external emergency services are on site needs to be clear.

Access to the site / area during an emergency should be controlled and the means of achieving this must be described.

If a specific offsite emergency plan exists, then this should be referred to by name/number.
### **11.13** Environmental and Social Management and Monitoring Plan-Construction Phase.

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
Contamination of soil due to poor waste management and through accidental spills of oil as a result of field refueling, onsite storage of fuel/oil and fugitive spills due to leaks	✓ Ensuring that the site has adequate sanitary waste disposal facilities and waste bins	<ul> <li>Number of operational mobile male and female toilets with tissue papers and water</li> <li>Evidence of grey and black water approved disposal methods either through daily extract from mobile toilets or presence of effective temporary soak pit at the site</li> <li>Number of well-marked litter bins</li> </ul>	<ul> <li>✓ OEKE</li> <li>✓ EPCC</li> <li>✓ NEMA Mombasa</li> </ul>	<ul> <li>✓ Confirmation of toilets to be done at the construction planning stage</li> <li>✓ Daily inspection of the toilets</li> </ul>	✓ Daily rate of hiring a single toilet is \$ 60
	✓ Storing Waste/used oil generated from generators and construction machinery and equipment on paved surface in a secure location at the project site.	<ul> <li>✓ Presence of hard standing areas for fuel tanks</li> </ul>		<ul> <li>✓ Environmental audit to be undertaken annually</li> </ul>	<ul> <li>✓ To be contained in the contractors BOQ</li> </ul>

### Environmental and social management plan

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
	✓ The waste oil to be handled by licensed waste handler at frequent intervals.	<ul> <li>✓ oil storage facilities placed on a 1.5mm thick HDPE membrane</li> <li>✓ NEMA license of the contracted waste oil handler</li> <li>✓ Completed waste oil tracking documents in accordance with LN 121 of EMCA</li> </ul>		<ul> <li>✓ Waste handling licence to be confirmed during the awarding of waste handling contract</li> <li>✓ Environmental audit to undertaken annually</li> </ul>	<ul> <li>✓ Services from a licensed hazardous waste handler in Mombasa is approximately \$300 per month-to be included in the contractors BOQ</li> </ul>
	<ul> <li>✓ Controlling and reducing at source the production of wastes and hazardous waste</li> </ul>	<ul> <li>✓ Presence of waste management plan that is based on the hierarchy of waste reduction (Prevention, Minimization, Reuse, Recycling, Energy Recovery and Disposal)</li> </ul>		✓ Confirmation of the document to be done during the tendering process	<ul> <li>✓ Cost to be included in the budget for implementatio n of the ESMP by the contractor.</li> </ul>

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
	<ul> <li>✓ Adherence to existing laws and regulations including</li> </ul>	<ul> <li>✓ Soil sampling and quarterly submission of the reports to NEMA</li> <li>✓ Filled waste tracking sheets</li> <li>✓ Effluent Discharge license where applicable (EDL)</li> </ul>		<ul> <li>✓ Implementation of the waste control plan to be monitored on monthly basis</li> </ul>	<ul> <li>✓ Soil sampling and analysis will cost approximately \$100 per sample</li> <li>✓ EDL will cost approximately \$600</li> </ul>
Contamination of the surface runoff from the site due to poor waste management, fugitive spills on the soils and soils contaminated by construction chemicals.	✓ Ensuring that the site has adequate sanitary waste disposal facilities and waste bins	<ul> <li>✓ Number of operational mobile male and female toilets with tissue papers and water</li> <li>✓ Evidence of grey and black water approved disposal methods either through daily extract from mobile toilets or presence of effective temporary soak pit at the site</li> </ul>	<ul> <li>✓ OEKE</li> <li>✓ EPCC</li> <li>✓ NEMA Mombasa</li> </ul>	<ul> <li>✓ Confirmation of toilets to be done at the construction planning stage</li> <li>✓ Daily inspection of the toilets</li> </ul>	<ul> <li>✓ Daily rate of hiring a single toilet is \$ 60</li> </ul>

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
	<ul> <li>Storing Waste/used oil generated from generators and construction machinery and equipment on paved surface in a secure location at the project site.</li> </ul>	<ul> <li>✓ Number of well-marked litter bins</li> <li>✓ Presence of hard standing areas for fuel tanks</li> <li>✓ oil storage facilities placed on a 1.5mm thick HDPE membrane</li> </ul>		<ul> <li>✓ Environmental audit to undertaken annually</li> </ul>	<ul> <li>✓ To be contained in the contractors BOQ</li> </ul>
	✓ The waste oil to be handled by licensed waste handler at frequent intervals.	<ul> <li>✓ NEMA license of the contracted waste oil handler</li> <li>✓ Completed waste oil tracking documents in accordance with LN 121 of EMCA</li> </ul>		<ul> <li>✓ Waste handling licence to be confirmed during the awarding of waste handling contract</li> <li>✓ Environmental audit to undertaken annually</li> </ul>	<ul> <li>✓ Services from a licensed hazardous waste handler in Mombasa is approximately \$300 per month-to be included in the contractors BOQ</li> </ul>

### Environmental and social management plan

Environment/ Social Impacts	Mi	itigation Measures	Mo	onitoring Indicators	Entity Responsible and Supervising Agency	Fr Mo	equency of onitoring	Со	st (US\$)
	~	Controlling and reducing at source the production of wastes and hazardous waste	~	Presence of waste management plan that is based on the hierarchy of waste reduction (Prevention, Minimization, Reuse, Recycling, Energy Recovery and Disposal)		~	Confirmation of the document to be done during the tendering process	~	Cost to be included in the budget for implementatio n of the ESMP by the contractor.
	~	Adherence to existing laws and regulations including	× × ×	Soil sampling and quarterly submission of the reports to NEMA Filled waste tracking sheets Effluent Discharge license where applicable (EDL)		✓	Implementation of the waste control plan to be monitored on monthly basis	× ×	Soil sampling and analysis will cost approximately \$100 per sample EDL will cost approximately \$600
Generation of dust during site clearance, excavation, back filling and hauling	✓	Developing a site-specific air quality pollution prevention plan based on IFC PS 3, LN 34 of EMCA 1999 and on the finding of impacts assessment of the ESIA report.	~	Presence of Site-specific Air Pollution Prevention Plan based on the requirements of LN 34 and with SMART objectives.	<ul> <li>✓ OEKE</li> <li>✓ EPCC</li> <li>✓ NEMA Mombasa</li> </ul>			~	Air pollution plans to be part of the OHS management

### Environmental and social management plan

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
operations along with transportation activities	✓ Protecting all soil stockpiles subject to wind erosion using a barrier, windscreen or grass cover. Enforcing speed limits to a maximum of 30km/h to reduce the amount of dust generated by the trucks. Use of dust suppression methods such as periodic watering of access roads and other construction areas to minimize generation of dust.	<ul> <li>✓ Number of soil stockpiles adequately covered using windscreen</li> <li>✓ Number of appropriate speed limit signs - 30km/h within the site</li> <li>✓ Frequency of the duct suppression during construction</li> </ul>		<ul> <li>✓ Daily</li> <li>✓ Need based</li> </ul>	<ul> <li>systems budget</li> <li>✓</li> <li>✓ The cost of access road construction will be included in the Project BOQ</li> <li>✓ \$200 unit cost of water and sprinkling services using a 13m<sup>3</sup> water bowser</li> </ul>
Emission of VOCs	<ul> <li>✓ Use of well-maintained equipment to minimize the emissions during construction</li> <li>✓ Adherence to existing laws and regulations including</li> </ul>	<ul> <li>Availability of maintenance plan for the construction equipment</li> <li>Availability of equipment maintenance records</li> <li>Measurements of stationary emissions and</li> </ul>	<ul> <li>✓ OEKE</li> <li>✓ EPCC</li> <li>✓ NEMA Mombasa</li> </ul>	<ul> <li>✓ Annual or need based (milage)</li> </ul>	<ul> <li>✓ Equipment maintenance plans to be part of the OHS management systems</li> </ul>

### Environmental and social management plan

Environment/ Social Impacts	Mi	itigation Measures	Μ	onitoring Indicators	Er Re ar Su Ag	ntity esponsible nd upervising gency	Fre Mo	equency of onitoring	Co	ost (US\$)
	✓	L.N 34 Environment Management and Coordination (Air Quality) Regulations 2014		evidence of submission of the reports to NEMA					~	Equipment inspection cost to be included in the supply and maintenance section of the BOQ
Increased noise during construction affecting workers and Neighbours	<ul> <li>✓</li> </ul>	Ensure that the construction plant and equipment are always well maintained	✓ ✓	Availabilityofmaintenance plan for theconstruction equipmentAvailability of equipmentmaintenance records	✓ ✓ ✓	OEKE EPCC NEMA Mombasa	✓ ✓	Annual planned maintenance Need based maintenance	~	Equipment inspection cost to be included in the supply and maintenance section of the BOQ
	~	Continuous Noise survey during construction and well detailed corrective plan	~	Base line noise surveyreportwithcomprehensivecorrective actions			~	Once during the peak of construction	~	Unit cost of baseline noise survey is \$600
	✓	limit the construction times preferably to daylight hours and	~	Construction Work Plan indicating the times of the day when loud					<ul> <li>✓</li> </ul>	No cost associated with this

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
	only in exceptional cases will they work beyond daylight hours	activities will be undertaken			mitigation measure
Fire and explosion affecting workers and the community	<ul> <li>OEKE will engage a contractor with a well-developed EHS management system and with reputable experience in Oil and Gas. The main contractors will be required to have a fire policy, EPRA approval, full time EHS officer with adequate firefighting training, well trained workers, and comprehensive and site-specific ERP among others.</li> </ul>	<ul> <li>✓ Evidence of contractors EHS management system including training matrix, ERP, EHS policy</li> <li>✓ List of the project references by the contractor</li> <li>✓ Engagement contract and JD of the full time EHS officer</li> <li>✓ EHS Training certificates of the Key workers</li> </ul>	<ul> <li>✓ OEKE</li> <li>✓ EPCC</li> <li>✓ LCC</li> <li>✓ MCC</li> <li>✓ DOSHS is the supervising agency for the OHS requirement like workplace registration</li> </ul>	<ul> <li>✓ Confirmation of the document to be done during the tendering process</li> <li>✓ Monthly document review will be undertaken during construction</li> <li>✓</li> </ul>	✓ Cost will be included in the tendering budget
	✓ A recognized process of hazard identification and analysis (such as a HAZCON) should be undertaken before construction of the proposed terminal to ensure that potential fire hazards during construction process are well	✓ A site specific and appropriate risk assessment report based on recognized hazard identification and analysis process.		<ul> <li>Risk assessment will be undertaken before construction</li> <li>Monthly document review will be undertaken during construction</li> </ul>	<ul> <li>✓ An appropriate OHSRA will cost \$ 2000</li> </ul>

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
	identified and adequate control measures are put in place.	<ul> <li>✓ Evidence of comprehensive safety methods based on</li> <li>✓ Evidence of submission of the risk assessment to DOSHS Mombase</li> </ul>		✓	
	✓ Monitoring the presence of petroleum fumes and LPG before and throughout the hot work processes along the ROW and within the Tank farm area.	<ul> <li>Availability of an explosimeter that is calibrated by a competent</li> <li>Inclusion of the Petroleum Fumes monitoring in the PTW for the construction work along the SOW</li> <li>Results of the petroleum fumes measured</li> </ul>		<ul> <li>✓ Continuous monitoring of the fumes during construction along the SOW</li> </ul>	<ul> <li>✓ Unit cost of multigas monitor is approximately \$ 600</li> <li>✓</li> </ul>
	<ul> <li>✓ Use of appropriate signage.</li> </ul>	✓ Availability of suitable signs installed at the appropriate areas within the construction sites in accordance with OSHA		<ul> <li>✓ Regularly during construction</li> </ul>	<ul> <li>✓ Signage, granding and signals are items under project BOQ</li> </ul>

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
		2007 and Building code of Kenya, 2017			
	✓ Ensuring that there is an effective and efficient firefighting system together with an adequately trained Emergency Response Team	<ul> <li>Presence of appropriate firefighting equipment in accordance with section 31 of LN 59 (Fire risk reduction rules)</li> <li>Presence of a dedicated and fully operational portable fire engine (truck or van) along the SOW</li> </ul>		<ul> <li>✓ At the beginning of the construction</li> <li>✓ Daily inspection during</li> <li>✓ Fire safety audits and inspections to be conducted annually</li> </ul>	<ul> <li>✓ Firefighting equipment will part of the project BOQ. To include the cost of portable extinguishers and cost of hiring a fire truck or engine.</li> </ul>
Influx of workers Social Cohesion Impacts on security	<ul> <li>Adopt a 'locals first' policy for construction employment opportunities especially for semi and low skilled categories.</li> <li>Community expectations for employment and other local benefits should be addressed and managed. Regular updates on</li> </ul>	<ul> <li>✓ Presence of an area specific Local Content (LC) guide.</li> <li>✓ Percentage of the local people working in the solar farm</li> </ul>	<ul> <li>✓ EPC Contractor</li> </ul>	<ul> <li>✓ Continuous</li> </ul>	<ul> <li>✓ Security cost to be included in the BOQ preliminaries</li> <li>✓ \$70 is the unit cost of a fit to</li> </ul>

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
	<ul> <li>opportunities and skill requirements shall be provided to the community.</li> <li>Ensure possible sourcing of construction labour from the local region to the extent possible.</li> <li>Ensure local contracting and vendor opportunities as far as possible.</li> <li>Arrange and provide amenities such as water, ablution facilities etc.</li> <li>Implement procedures for the control and removal of loiters at the construction site</li> <li>A security company to be appointed and appropriate security procedures to be implemented.</li> <li>A method of communication should be implemented whereby procedures to lodge complaints</li> </ul>	<ul> <li>Percentage of the goods and services procured locally for construction purposes</li> <li>Presence of a security management system and an independent security company</li> <li>Presence of pre- Employment program</li> <li>Presence of project specific GM</li> <li>No of workers examined medically before employment</li> </ul>			work test for workers

### Environmental and social management plan

Environment/ Social Impacts	М	itigation Measures	Mo	onitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Co	ost (US\$)
	~	are set out in order for the local community to express any complaints or grievances with the construction process. Medical tests to be undertaken by the contract workers prior to engagement to identify any communicable diseases						
Impacts on traffic and movement patterns	✓ ✓	Public awareness programs should be developed to identify areas of particular risk and approaches to reduce risk. This is expected to include awareness programs along roads leading to the site to frequent users on traffic dangers. Traffic calming and speed control measures should be instigated in consultation with the relevant authorities. develop a Traffic management plan for the construction phase of the project	✓ ✓ ✓	Presence of Traffic management plan (TMP) to include traffic safety programs Number of road signs installed Presence Awareness Programme and community safety Number of road safety awareness forums	✓ EPC	✓ Monthly	<ul> <li>✓</li> </ul>	TMP to be part of the EHS system which is part of the BOQ \$500 is the cost of organizing a forum with the community

Environment/ Social Impacts	Mitigation Measures	Monitoring Indicators	Entity Responsible and Supervising Agency	Frequency of Monitoring	Cost (US\$)
	✓ The Project Contractor will regularly inspect the access roads conditions and whenever necessary, promptly repair damages related to construction traffic				
	✓ Abnormal loads will be timed to avoid times of the year when traffic volumes are likely to be higher e.g., start and end of school holidays, long weekends, etc.				
	<ul> <li>Prepare detailed plan for signage along the Construction Area to facilitate traffic movement, provide directions to various components of the Works, and provide safety advice and warnings. Details regarding maximum permissible vehicular speed on each section of road. All signs will be in both English and Swahili language</li> </ul>				

Recommendations and Conclusion

## **12** Recommendations and Conclusion

The Environmental and Social Assessment study for the proposed Marine Terminal in Shimanzi, Mombasa County was undertaken. According to LN 31 and 32 of 2019 under EMCA the project is classified as High-Risk Project and hence this ESIA study was undertaken in accordance with Kenyan regulations and international guidelines on environmental and social sustainability.

The Kenyan Occupational Safety and Health Act, 2007 (OSHA) requires that an Occupier shall carry out "appropriate" safety and health risk assessments and based on these, develop and implement appropriate mitigation measures for protecting the workers. A Quantitative Risk Assessment (QRA) was carried out, which is a requirement under the OSHA 2007 to implement the project.

Based on Site Assessment, Quantitative Risk Assessment, Stakeholders' Consultations, and Impacts Assessment, this ESIA study recommends the following for the proposed project

- OEKE should ensure full implementation of ESIA's ESMP by the EPC, Main civil Contractor and other subcontractors during construction of the proposed project.
- OEKE should ensure adherence to all applicable regulations and standards for the construction and operation of the LPG terminal and associated pipelines.
- During design and operation of the proposed project, OEKE should ensure development and implementation of a Process Management System addressing the elements relevant to LPG storage which include Employee Participation, Process Safety Information (PSI), Process Hazard Analysis, Operating Procedures, Training, Mechanical Integrity (MI), Emergency Planning and Response.
- OEKE should continue to formally engage the various stakeholders i.e., National Government, Lead agencies, County Government, Neighboring Business establishments and residents living in the project area.
- Quantitative Risk Assessment and Stakeholders Engagement Plan should be updated periodically throughout the lifetime of the project

The ESA study aimed at identifying and evaluating potential environmental and social impacts associated with construction, operation and decommissioning of the proposed project. The impacts due to the project range from High to low, are site specific and has reversible impacts on the microenvironment of the project site owing to the construction and operation activities. High environmental and social impacts identified by the ESIA study are Fire risk and traffic impacts during both construction and operation phases.

QRA was undertaken to identify the major hazards, analyze their causes and consequence and estimate the individual risks and societal risk. The hazards that were identified as potentially serious were the release of LPG from the bursting of pipes, vessels, loading arms and hoses. An ignition of a vapour cloud would result in fires and explosions with serious effects extending 736m across the site boundary. Through the QRA, it was confirmed that the combined individual risks (for employees and for the public) are tolerable. Societal risks are low and can also be regarded as tolerable. Risks that are tolerable should be reduced where practical and cost effective; otherwise, they may be accepted as ALARP (as low as reasonably practicable).

#### Recommendations and Conclusion

It may be concluded that the proposed marine LPG terminal and associated infrastructures are unlikely to result in permanently damaging environmental and social impacts if the proposed mitigation measures proposed in this study are adequately implemented in all phases of the project. The potential for positive socio-economic benefits can be realized if the enhancement measures are put in place. Based on the findings of the ESIA engagements with Lead Agencies, County Government Departments, Local Administrations, community representatives and residents living in the project area, there was no objection to the proposed project.

The proposed Environmental and Social Management Plan describe implementation mechanism for recommended mitigation measures together with monitoring to verify overall project performance. The implementation of the mitigation measures including monitoring schedule will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the proposed project are adequately addressed. This ESA study together with mitigation measures and follow up of recommendations on management actions will help OEKE in complying with the EMCA 1999, the OSHA 2007, the Petroleum Act 2019 and their subsidiary legislations.

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## 14 Appendices

Appendix	Description		
1.	Lead Expert Practicing License		
2.	KTL Firm of Experts License		
3.	Land Lease Agreements		
4.	Project layout		
5.	SIA Report		
6.	Minutes of Meetings-KII		
7.	Minutes of the public meetings and Registration sheets		