

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE  
LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT  
PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO  
KUNDU MOMBASA COUNTY.**

**LR NO. MOMBASA/MAINLAND SOUTH/BLOCK IV/247 – PORTION**

**GPS COORDINATES: Latitude: - 4.0718250, Longitude: - 39.617683**



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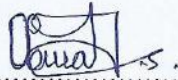
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## DECLARATIONS

This Environmental and Social Impact Assessment (ESIA) has been prepared in accordance with the Environmental Management and Coordination Act (EMCA) 1999 amended in 2015 and the Environmental (Impact Assessment and Audit) Regulations 2003 amended in 2019 for submission to the National Environmental Management Authority (NEMA).

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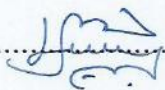
### THE PROPONENT

We confirm that this ESIA has been prepared and forwarded to NEMA with our authority as the project proponent.

**Proponent's Management Representative: - Mr Jamal S. Huwel**

**Designation: -**

Signature: .....



Date: 30/05/2022

**On behalf of**  
**TAIFA GAS INVESTMENT SEZ LIMITED**  
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## **EXECUTIVE SUMMARY**

### **Project description**

Taifa Gas Investment SEZ Limited proposes to construct Liquefied Petroleum Gas (LPG) import and storage terminal and related facilities at Dongo Kundu Special Economic Zone. The proposed plant is designed to store Propane, Butane and LPG mix of various grades for domestic, commercial and industrial use.

The terminal shall consist of construction of 5 spheres with a maximum net capacity of 7,500 M<sup>3</sup> each. This will provide a capacity for 20,000 tons, with an addition of 4 bullets to bring capacity to 30,000 tons. Facilities included in the project shall be an office block and other buildings, warehouses and those installations needed to fill, repack and export LPG including, bulk loading gantries, heating and compression stations, control rooms, firefighting and safety systems, security installations and other amenities.

The project will be located within Dongo Kundu SEZ on LR No. MOMBASA/MAINLAND SOUTH/BLOCK IV/247 – PORTION that covers an area of 3000 acres, demarcated (zoned) to support various economic activities to facilitate the integrated needs of manufacturing and processing industries. It includes areas set aside for industrial parks; a free port zone; a free trade zone; a Meeting, Intensive, Conference, and Exhibitions (MICE) zone to facilitate business and tourist related meetings, conventions, events and exhibitions; and various residential zones. Out of the 3,000 acres, Taifa Gas Investment SEZ Limited will occupy 30 acres within the zone (**GPS latitude: - 4.0718250, longitude: - 39.617683**).

### **Purpose of the ESIA and Compliance with relevant laws and regulations**

The purpose of the ESIA is to identify and address possible direct, indirect significant adverse environmental and social impacts to arise from the proposed project for acceptability and sustainability; and to satisfy both legal and institutional obligations specified under the Environmental Management and Coordination Act (EMCA) 1999 amended in 2015 and Environmental (Impact Assessment and Audit) Regulations 2003 amended in 2019. The project will also ensure compliance with all relevant national and international laws and regulations that govern such projects. A final ESIA study report will be submitted to the National Environmental Management Authority (NEMA) for an Environmental Permit.

### **ESIA Study Approach and Methodology**

The approach and methodology adopted for the study included:

- a) Field inspections and trekking;
- b) Review of available literature;
- c) Specialized studies for baseline information;
- d) Stakeholder Consultations;
- e) Data analysis and assessment of potential environmental and social risks and impacts;
- f) Development of Impact Mitigation and Control Measures;
- g) Development of an Environmental Management Plan (EMP); and
- h) Reporting.

### **Major Potential Impacts**

The indirect positive impacts of the project will have a far-reaching effect nationwide from the utilisation of LPG from the proposed Liquefied Petroleum Gas (LPG) import and storage terminal.

The direct potential positive impacts activities include:

- a) Employment opportunities/job creation
- b) Improved local economy through payment of various taxes and use of local resources during project implementation;
- c) Availability of LPG for use; and
- d) Improved institutional, county, and national revenue

The potential adverse impacts and risks include:

- a. Preparatory and Planning Phase
  - i. Land/wayleave Acquisition
  - ii. Anxiety on the part of potentially affected persons/ institutions
  - iii. Occupational Health and Safety
- b. Construction Phase
  - i. Air quality deterioration
  - ii. Vibration and noise nuisance
  - iii. Loss of vegetation and impacts on flora and fauna
  - iv. Sanitation/waste generation issues
  - v. Labour influx issues
  - vi. Occupational health and safety concerns and labour issues
  - vii. Public health and safety issues
  - viii. Traffic impact
  - ix. Surface water contamination/ impact on aquatic organisms
- c. Operation and Maintenance Phase
  - i. Air quality deterioration
  - ii. Greenhouse Gas Emissions and Impact on Climate Change
  - iii. Contamination of Marine Environment/ impact on marine flora and fauna
  - iv. Waste storage and disposal
  - v. Occupational health and safety concerns and labour issues
  - vi. Public health and safety issues
- d. Post Construction Decommissioning Phase
  - i. The post-operational decommissioning phase impacts will be addressed in a separate section. The significant adverse impacts during the post-construction decommissioning phase will be similar to the construction phase impacts in general, in addition to loss of jobs.

### **Impact Mitigation and Management**

The mitigation and management measures for the identified significant adverse impacts are provided in the table labelled *Summary of potential impacts and mitigation*

measures below. The application of the mitigation measures in general is expected to reduce major and moderate impacts to minor or negligible impacts that may not require further mitigation.

### **Environmental Management Plan**

An Environmental Management Plan (EMP) is developed for the project in accordance with the EMCA 1999 amended in 2015 and Environmental (Impact Assessment and Audit) Regulations 2003 amended in 2019, to assist the project to be carried out in an environmentally safe and sustainable manner. The EMP addresses issues related to the following:

- i. Adoption of Environmental Health and Safety Policy and Operational Procedures;
- ii. Adoption of Environmental Health and Safety Management System;
- iii. Development of Specific Environmental/Social Management Plans;
- iv. Technical Co-operation;
- v. Staff Information and Awareness Creation;
- vi. Public and Community Participation;
- vii. Construction and Operational Phases Impact Management Plan;
- viii. Environmental and Social Monitoring Programmes;
- ix. Audits and Reviews;
- x. Capacity Building and Training;
- xi. Grievance Redress Mechanism;
- xii. Community Development/Social Responsibility;
- xiii. Environmental Reporting;
- xiv. Emergency Response Planning; and
- xv. Environmental and Social Management Budgeting.



**Summary of potential impact and mitigation measures**

<b>Anticipated Environmental and Social Impacts</b>	<b>Receptor(S)</b>	<b>Proposed Mitigation and Management Measures</b>
Project site Acquisition	All institutions within the project site	<ul style="list-style-type: none"> <li>i. Ensure all stakeholders are engaged in the early stage of the project.</li> <li>ii. Project plans and designs must be discussed and agreed by location owners.</li> <li>iii. All permits and necessary documentation needed for acquiring the site must be approved.</li> <li>iv. Prepare and implement a livelihood restoration plan which will also include compensation for potentially affected persons.</li> <li>v. Ensure affected persons are well informed to relocate prior to the start of construction.</li> <li>vi. Taifa Gas SEZ Investment Limited and the Contractor will liaise with the county to access the option of providing a toilet facility for use to prevent open defecation if necessary.</li> <li>vii. Disclose public information of the project.</li> </ul>
Anxiety on the part of potentially affected persons/institutions	Institutions /Potentially affected persons	<ul style="list-style-type: none"> <li>i. Stakeholder interactions to educate all on proposed project activities, impacts and proposed mitigation measures.</li> <li>ii. Will develop and implement grievance mechanism as a part of a wider Stakeholder Engagement Plan enabling community concerns to be documented and resolved in a timely fashion.</li> <li>iii. Will ensure liaison with all stakeholders and nearby communities in the project area is maintained throughout project life.</li> <li>iv. The Mombasa county government and people of Dongo Kundu will be consulted prior to the commencement of work to ensure that all the necessary concerns and issues are address to ensure peaceful coexistence.</li> </ul>

Occupational health and safety	Taifa Gas Investment SEZ Company Staff, contractors and consultants	<ul style="list-style-type: none"> <li>i. The various contractors to be engaged will be required to comply with the Kenyan Occupational Health and Safety Policy when working within the project site.</li> <li>ii. The contractor will be required to provide first Aid Kits on site to treat minor ailments and cuts. However, major cases will be referred for treatment to well equipped and developed hospital such as Mombasa General Hospital.</li> <li>iii. The owner as well as their various contractors will be required to provide the appropriate personal protective equipment such as safety boots and coats, hand gloves, earplugs and nose masks when carrying out their studies. Supervisors will be mandated to ensure the use of these protective devices and implement sanctions when necessary.</li> <li>iv. Ensure that well-trained workers will be engaged for the various construction roles.</li> </ul>
<b>Construction Phase Impacts</b>		
Air Quality Deterioration	Workers/ Local communities and road users	<ul style="list-style-type: none"> <li>i. Dust emissions from trucks, will be controlled and minimized by the use of designated routes in order to minimize impacts to residents, construction workers, users and institutions along the transport route.</li> <li>ii. Ensure vehicular speed limits of 30mph over any unpaved landscape to minimise dust generation. Material dumping will be regulated to reduce dust emissions.</li> <li>iii. Owners / operators of construction equipment and vehicles will implement the manufacturer recommended engine maintenance programmes to minimize the emission of fumes into the environment.</li> <li>iv. Contractor will monitor dust and remedial action will be taken whenever dust generating activities take place.</li> <li>v. Dust-related grievances will be investigated and managed as part of the Grievance Mechanism.</li> </ul>
Vibration and noise nuisance	Workers/ Local communities and road users	<ul style="list-style-type: none"> <li>i. The contractor should employ standard noise abatement measures and engineering best practices to ensure that the</li> </ul>

		<p>impact of these issues is minimized and reduced to acceptable limits.</p> <ul style="list-style-type: none"> <li>ii. The contractor should ensure that earthworks and other construction activities will be phased out or controlled to reduce noise generation during construction.</li> <li>iii. All equipment and vessels shall be operated and maintained in accordance with appropriate industry and equipment standards including specifications for noise levels and manufacturer's specifications (including regular checks and maintenance).</li> <li>iv. Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum.</li> </ul>
Loss of vegetation and impacts on flora and fauna	Terrestrial Flora, Fauna	<ul style="list-style-type: none"> <li>i. Undertake pre-clearing survey and assessment of the flora to be impacted especially if construction will be carried out in the rainy season to help identify sensitive areas such as vegetation with active nesting.</li> <li>ii. The contractor will develop construction code of practice and ensure critical areas is avoided.</li> <li>iii. Allow an appropriate buffer distance between any construction activity and remnant native vegetation, where practicable.</li> <li>iv. Limit construction activities to only designated places and clearly mark out all vegetation, which will not be cleared, so that they are clearly visible as "no-go areas" to construction staff and vehicles.</li> <li>v. Dismantle and remove all equipment and machinery after construction from site.</li> <li>vi. Rehabilitate trenches and disturbed areas as soon as possible.</li> </ul>

Sanitation/Waste Generation concerns	Soil, Roads	<p><u>General Waste</u></p> <ul style="list-style-type: none"> <li>i. The contractor must appoint a waste management coordinator. The coordinator shall prepare and implement a Waste Management Plan which specifies procedures and, incorporates the existing waste management plan for the proposed project. This is to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed.</li> <li>ii. Waste remaining after implementation of the waste hierarchy measures will be collected by private waste management companies operating at the port for onward disposal.</li> <li>iii. The contractor should provide adequate waste bins at the temporary work camps to minimise littering of the project site and also littering along the pipeline route. The collected refuse will then be transferred to the approved disposal site.</li> <li>iv. Good site practices shall be implemented to avoid waste generation and promote waste minimisation.</li> </ul> <p><u>Construction Waste</u></p> <ul style="list-style-type: none"> <li>i. All scraps or other solid wastes will be disposed of at the approved disposal site.</li> <li>ii. Excavated soils/concrete will be reused as much as possible for backfilling trenches dug during construction.</li> <li>iii. Contaminated soil will be considered as waste material and disposed of accordingly at the authorised Landfill Site.</li> <li>iv. Excavated material shall be used on site to the extent practical.</li> </ul> <p><u>Hazardous Waste</u></p> <ul style="list-style-type: none"> <li>i. All hazardous waste (e.g. oily waste) generated during construction/installation will be appropriately stored as per manufacturer's instructions. For onward recycling, treatment or disposal, NEMA approved hazardous waste collectors will be engaged for collection and disposal of all hazardous waste.</li> </ul>
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Labour influx issues	Local communities	<ul style="list-style-type: none"> <li>ii. Taifa Gas SEZ Investment Limited will implement a labour influx management plan to holistically address labour influx issues.</li> <li>iii. Taifa Gas SEZ Investment Limited will implement a stakeholder engagement plan that will include: <ul style="list-style-type: none"> <li>a) informing stakeholders of increases in workforce and potential for influx.</li> <li>b) Engaging with local government/traditional authorities on issues, risks and opportunities regarding labour influx</li> <li>c) Engaging local communities to understand their concerns, raise awareness of risks and opportunities, and identify solutions to issues relating to labour influx</li> <li>d) Developing a feedback and grievance mechanism to collect any feedback or complaints related to labour influx associated with the project.</li> </ul> </li> </ul>
Occupational Health and Safety Concerns and Labour Issues	Workers	<p><u>Adoption of Health and Safety Policies</u></p> <ul style="list-style-type: none"> <li>i. The contractor will be required to prepare and implement health, safety and environmental protection at the workplace to guide the construction activities in compliance with the policy of OSHA. The responsibility for implementing this policy lies directly and personally with the contractor through its workers. The policy objectives shall include the following: <ul style="list-style-type: none"> <li>a) Conduct activities in the project site in accordance with relevant national and international laws and regulations on occupational health and safety. This includes The Labour Relations Act, 2007; The Work Injury Benefits Act, 2007; The Employment Act, 2007; The public Health Act (Cap 242); The Factories and other Places of Work Act (Cap 514); Building Code (2002); The World Commission on Environment and Development; The Rio Declaration on Environment and Development; establish regulatory and organizational framework for the efficient and effective management of occupational health, safety and environment issues;</li> </ul> </li> </ul>



		<ul style="list-style-type: none"> <li>b) maintain safe plant, machinery and equipment;</li> <li>c) maintain incident and injury-free working environments;</li> <li>d) prevent occupational related diseases/ illness among workers; and</li> <li>e) promote and maintain a clean, healthy and hygienic environment.</li> </ul> <p><u>The Contractors Occupational Health and Safety Plan (OHSP)</u></p> <ul style="list-style-type: none"> <li>i. The contractor will be required to develop an Occupational Health and Safety Plan (OHSP), including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc.</li> <li>ii. The Contractor will apply the hazard hierarchy when planning work to avoid/eliminate risks and reduce risk to as low as reasonably practical.</li> <li>iii. The contractors will educate workers on its health and safety policy. Workers will therefore be required to follow the health and safety policy developed prior to commencement of the works. The adoption of the health and safety policy at site will serve as a precautionary measure to prevent/ minimize the possibility of accidents and reduce health associated risks.</li> <li>iv. The contractors will train selected workers as first aid givers and provide adequate first aid kits at the construction areas to treat minor ailments and cuts. However, major cases will be referred well developed medical hospitals such as the Mombasa General Hospital.</li> </ul> <p><u>Use of Experienced Personnel</u></p> <ul style="list-style-type: none"> <li>i. The contractors will ensure that well-trained workers will be engaged for the various construction roles. Only drivers with the requisite licenses will be allowed to handle vehicles and earth-moving equipment into the port. Initial training and testing in machine/ equipment handling and safe working procedures will be given to all new drivers, operators and other field workers to help minimize the occurrence of accidents on site.</li> </ul>
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		<ul style="list-style-type: none"> <li>ii. The contractors will ensure that regular defensive driving training sessions are organized for the drivers to ensure their safety and the safety of the general public.</li> <li>iii. Provision of Personal Protective Equipment (PPE)</li> <li>iv. The contractor will ensure that workers are provided with the appropriate personal protective equipment such as safety boots and coats, hand gloves, earplugs and nose masks. Supervisors will be mandated to ensure the use of these protective devices and implement sanctions when necessary.</li> </ul> <p><u>Phasing out of Material Movements/ Scheduling Material Movements</u></p> <ul style="list-style-type: none"> <li>i. Movement of tanks, pipes and other construction materials to site or storage areas will be carried out in phases and properly regulated to control the number of cargo vehicles coming into the project site at any given time to reduce the risk of accidents. Taifa Gas Investment SEZ Limited intends to carefully plan materials movement to minimise these impacts. Materials and equipment will be transported to the sites during off peak periods.</li> </ul> <p><u>Use of Equipment</u></p> <ul style="list-style-type: none"> <li>i. All equipment's to be used will be in good condition and scheduled regular maintenance will be ensured to reduce/minimize of accidents.</li> </ul> <p><u>Worker Rights and Wellbeing</u></p> <ul style="list-style-type: none"> <li>i. The Contractor will develop and implement a Human Resource Policy and plan that adheres to the requirements of the policy, including requirements for workers to have contracts, Workers Grievance Mechanism and develop retrenchment plans if there is a requirement for collective dismissals.</li> </ul>
Public Health and Safety, and Security Impacts	Public/Communities	<u>Restriction of Access</u>

		<ul style="list-style-type: none"> <li>i. Taifa Gas Investment SEZ Limited security personnel will maintain security at the proposed site to ensure that only authorised persons are allowed into the construction area.</li> <li>ii. The security personnel will be trained to respect the human rights of the local people.</li> </ul> <p><u>Public Health /Toilet facilities</u></p> <ul style="list-style-type: none"> <li>i. The contractor will provide mobile toilet facilities for workers during construction of the project.</li> <li>ii. Uncovered trenches or deep excavations will be protected using indicator linings or illustrative warning notices or wire mesh (whichever best suits the situation) to prevent fall hazards. All trenches and excavation will be covered as soon as possible.</li> <li>iii. As much as possible the contractor will adopt progressive opening of trenches to reduce risks to as low as reasonably practicable</li> <li>iv. Caution/warning signs should be placed at vantage points around the project site</li> </ul> <p><u>Scheduling of Work</u></p> <ul style="list-style-type: none"> <li>i. The contractor will analyse traffic flows and ensure that the transport of equipment is carried out during low peak periods.</li> <li>ii. Announcement and Notification of Work</li> </ul> <p><u>Transport of Equipment and Materials</u></p> <ul style="list-style-type: none"> <li>i. Traffic impacts resulting from carting of equipment and materials will be limited to the selected project roads and will be managed in line with the Traffic Management Plan to be prepared by the contractor for the movement of materials.</li> <li>ii. The traffic management plan will be prepared in consultation with SEZA and Mombasa County Government in order to minimise congestion on roads within the project site.</li> <li>iii. All the vehicles to be used for the project and especially in transporting equipment and materials will be serviced regularly and all the drivers to be engaged/assigned, would</li> </ul>
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		<p>be required to hold the requisite driver's license as prescribed by the National Transport and Safety Authority (NTSA), and would be educated on public safety issues. Adequate traffic management measures will be instituted to caution the public and to create safety awareness.</p> <p>iv. Some adequate measures and conditions to be instituted by the contractor in the transport of materials include the following:</p> <ul style="list-style-type: none"> <li>a) Haulage of materials including quarry products to the project site will be limited to off-peak hours;</li> <li>b) Trucks transporting quarry products and other friable materials to the project site will be covered;</li> <li>c) Road worthy dump trucks will be used;</li> <li>d) Very experienced drivers will be engaged;</li> <li>e) Traffic wardens will monitor dump truck movements and ensure public and traffic safety; and</li> <li>f) Carry out regular inspections of haulage roads. In the event truck failure along haulage routes, such trucks will be towed within 24 hours.</li> </ul>
Road crossing and traffic impact	Commercial and private vehicles	<ul style="list-style-type: none"> <li>i. The contractor will be required to schedule its work such that crossing of the untarred access road is done when traffic is low to minimize inconvenience to motorists.</li> <li>ii. Where the untarred access road has to be blocked for work to proceed smoothly, adequate signs and notices will be strategically placed at diversion routes.</li> <li>iii. Any damaged sections of the roads will be reinstated by the contractor</li> </ul>
Loss of livelihood and access to land	Affected persons / individuals	<ul style="list-style-type: none"> <li>i. SEZA (with relevant governments lead agents) being the land leaser for Taifa Gas Investment SEZ Limited, will implement a livelihood improvement plan for potentially project affected persons that will take care of compensation, relocation, and livelihood assistance arrangements as required</li> <li>ii. Monitoring will be undertaken to determine potential compensation/livelihood assistance measures required and verify they have been effective.</li> </ul>

General Disturbance of Port Operations	Port users	<p><u>Trenching</u></p> <ul style="list-style-type: none"> <li>i. Restricting trenching times, particularly during periods of high wave/wind activity</li> <li>ii. To reduce turbidity and spill, design and implement a trenching management plan which is informed by geotechnical and geophysical knowledge of the pipeline route</li> <li>iii. Install appropriate silt curtains around offshore works</li> </ul> <p>Oil spills</p> <ul style="list-style-type: none"> <li>i. The contractors, prepare a spill prevention and control plan, incorporating measures outlined in the emergency response plan of the proposed project, to minimize increased turbidity and surface pollution through oil spills. Monitoring and spill prevention drills will be required to ensure impacts are avoided to the maximum extent practical.</li> </ul>
<b>Operations and Maintenance Phase Impacts</b>		
Air Pollution	Workers and other users	<ul style="list-style-type: none"> <li>i. Terminal operator will incorporate the Air Quality Management Plan into standard operations. The plan will include the following: <ul style="list-style-type: none"> <li>a) dust from vehicular movement</li> <li>b) dust from cleaning activities</li> <li>c) exhaust emission from vehicles and machinery</li> <li>d) fumes from chemicals and welding</li> <li>e) VOCs from fuel storage and dispensing areas</li> <li>f) noise from operation of machinery</li> <li>g) monitoring</li> </ul> </li> <li>ii. Regular maintenance of machinery/ equipment in accordance with manufacturers' specifications to ensure minimum levels of emission from the terminal operations.</li> </ul>



Waste Management	Workers and users	<p><u>Education campaigns</u></p> <p>i. The terminal operator will ensure proper management and disposal of waste generated and will continue to educate workers on its waste management plan.</p> <p><u>Waste Collection and Disposal</u></p> <p>i. The terminal operator will appoint a waste management coordinator. The coordinator shall prepare and implement a Waste Management Plan which specifies procedures and, incorporates the existing waste management plan for the project. This is to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed</p> <p>ii. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste.</p> <p>iii. Ensure chemical wastes are stored, handled and disposed of in accordance with the Waste Management Regulations (2006)</p>
Noise Nuisance	LPG storage plant users/ workers	<p>i. The project operators will ensure that silent equipment (low noise versions, which may cost a little extra) are used in the project. Additionally, silencers, mufflers and other appropriate engineering control devices shall be used on the noise generating equipment. Where possible, electrical instead of diesel or diesel-electric moving equipment will be used.</p> <p>ii. Reduce noise levels through optimizing the plant's layout</p> <p>iii. Regular site inspections will be carried out to audit the compliance with regard to noise control.</p>

		iv. The project operators will provide appropriate PPEs for workers use.
Occupational Health and Safety Concerns and Labour Issues	LPG storage plant workers and subcontractors	<p><u>Training in equipment and chemical handling</u></p> <ul style="list-style-type: none"> <li>i. Risk assessments will be undertaken and avoidance / elimination of hazards prioritised to reduce the need for manual handling of chemicals.</li> <li>ii. The plant's operator will also ensure that workers handling fuels, chemicals, machinery and equipment are well trained. Such workers will be provided with the necessary documentations including Material Safety Data Sheet (MSDS) to serve as reference sources on the dangers and ways of handling these chemicals, fuels etc.</li> </ul> <p><u>Provision of appropriate PPEs</u></p> <ul style="list-style-type: none"> <li>i. The LPG Storage Plant operators will ensure that the Management of the various terminals provide workers with adequate personal protective equipment including overalls, earplugs, overalls and anticorrosive gloves etc. as their particular operations would require.</li> <li>ii. Non-conductive hand tools rated for the voltage at which live electrical work is being performed at a section will be provided.</li> <li>iii. Caution/warning signs should be placed at vantage points around the site</li> </ul> <p><u>Preventive Measures</u></p> <ul style="list-style-type: none"> <li>i. The LPG Storage Plant operator will prepare comprehensive maintenance programme on commencement of operations to put in place measures to avert any serious breakdowns or failures. The required maintenance for the systems will include among others: <ul style="list-style-type: none"> <li>a) Environmental incident/accident investigation;</li> <li>b) Routine equipment maintenance/inspection schedule;</li> <li>c) Annual equipment inspection and maintenance record;</li> <li>d) Procedure for pre-arranged repair service;</li> </ul> </li> </ul>

		<ul style="list-style-type: none"> <li>e) Procedure for preventive maintenance; and</li> <li>f) Regular calibration of equipment.</li> </ul> <p>ii. The following safety precautions will be implemented to minimise danger of electrocution at the LPG Storage Plant:</p> <ul style="list-style-type: none"> <li>a) As much as possible avoid working on live electrical parts except when de-energizing the equipment creates additional hazards or when the equipment must be energized to allow for testing that can only be performed live.</li> <li>b) Permit to work system will also be implemented for hot works, electrical works and work at height.</li> <li>c) Prior to initiation of hot works, it will be checked that there is no flammable material, gas or dry woodwork which could catch fire; and that surfaces which have been in contact with hydrocarbons or toxic substances are completely clean.</li> <li>d) Ensure that all staff working on live equipment or lines will be without conductive apparel (watches, bracelets, rings, key chains, necklaces, zippers, cloth with conductive thread, etc.)</li> <li>e) Provide barricades and signage for all live electrical equipment</li> </ul> <p><u>Emergency Provisions</u></p> <p>i. The LPG Storage Plant operators will implement its emergency response plan (to be developed from the framework plan to be provided). The plan which will incorporate the emergency response plan set by Taifa Gas Investment SEZ Limited Company and it will include information on how all emergency situations will be handled including fire, mechanical failures etc. that will arise from operations to minimize any hazards to humans and the environment. Management will ensure a yearly review of the plan.</p> <p><u>Housekeeping</u></p> <p>i. Good housekeeping practices will be an integral part of LPG Storage Plant operations to maintain a well laid out working</p>
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		space and avert accidents resulting from slippage, fires from torn electrical wires, cobwebs etc.
Public Health, Safety and security	LPG Storage Plant Users, Local communities, General Public	<ul style="list-style-type: none"> <li>i. The design of the facilities has incorporated adequate safety and security considerations as provided in Section on project description in this ESIA Study, and the operations of the LPG Storage Plant will incorporate a scheduled inspection, monitoring and maintenance regime to avoid accidents.</li> <li>ii. Taifa Gas Investment SEZ limited will collaborate with its selected security personnel to maintain security of the facilities within the project site environment to ensure that only authorised persons have access to the facilities.</li> <li>iii. Taifa Gas Investment SEZ Limited will engage private security firms and also involve key local community members in maintaining security of the facilities.</li> <li>iv. The security firm and the key community members will be hired and trained to comply with required security protocols for operations of such facilities. The security people will also be trained to respect human rights of the local people to avoid conflicts and human right abuses.</li> <li>v. Taifa Gas Investment SEZ Limited Will define a protocol for community reporting of observed incidents (e.g. sight, smell or sound of pipeline leaks and procedures for community grievance redress mechanism.</li> <li>vi. Taifa Gas Investment SEZ Limited will identify emergency scenarios and develop emergency preparedness and response plans with allocation of responsibilities to local communities and authorities, (where appropriate)</li> <li>vii. Taifa Gas Investment SEZ Limited will continue safety awareness and education programs for impacted communities.</li> </ul>

		<ul style="list-style-type: none"> <li>viii. Taifa Gas Investment SEZ Limited will develop clear guidelines as to what level of public access and activity along the project site is acceptable for maintaining pipeline safety and integrity, and ensure that this is enforced to help avoid encroachment and other potentially dangerous activities.</li> <li>ix. Taifa Gas Investment SEZ Limited will carry out community awareness /sensitization on the above guidelines to be developed regarding public access/use restrictions and safety.</li> <li>x. Taifa Gas Investment SEZ Limited will organise, in collaboration with the respective local community representative members i.e. chiefs and elders and the County Government Health Department, awareness creation seminars and educational programmes for all workers and the general public on the behavioural changes required to prevent the spread of HIV/AIDS and other STDs.</li> </ul>
Accidental Events and impacts on Terrestrial ecology and property	LPG Storage Plant users, Local communities	<ul style="list-style-type: none"> <li>i. The design of the facilities has incorporated adequate safety and security considerations as provided in the project description section of the study, to minimize potential accidents.</li> <li>ii. Taifa Gas investment SEZ Limited will develop and implement an emergency preparedness and response plan in collaboration with relevant stakeholders including relevant government authorities as it is deemed appropriate.</li> </ul>
Sustainability of the Taifa Gas Investment SEZ Company LPG Storage Plant Project	County government of Mombasa / ministry of industrialization / LPG Storage Plant users/workers	<ul style="list-style-type: none"> <li>i. The Management of Taifa Gas investment SEZ Limited will seek to operate profitably by implementing a system to collect appropriate user charges to cover the running and maintenance cost of its facilities.</li> <li>ii. The LPG Storage Plant will develop and implement an emergency response plan to handle all emergencies including gas leaks, fire, and oil spills that will arise from all its operations to minimize any hazards to humans and the environment. Management will ensure a periodic review of the plan.</li> </ul>



		<ul style="list-style-type: none"> <li>iii. A comprehensive maintenance programme will be put in place to avert any serious breakdowns or failures or accidents. The required maintenance for the systems will include among others: <ul style="list-style-type: none"> <li>a) Environmental incident / accident investigation;</li> <li>b) Carry out mock spill response drills;</li> <li>c) Routine equipment maintenance/inspection schedule;</li> <li>d) Annual equipment inspection and maintenance record;</li> <li>e) Procedure for pre-arranged repair service;</li> <li>f) Procedure for preventive maintenance;</li> <li>g) Procedures for handling materials; and</li> <li>h) Regular calibration of equipment;</li> </ul> </li> <li>iv. Coordinate with other agencies and organizations to provide technical assistance to inform activities and programs that can support the project</li> <li>v. Ensure resource use efficiency influencing supply chain sustainability</li> <li>vi. Adopt a comprehensive monitoring plan to ensure effective implementation of mitigation and management measures.</li> </ul>
<b>Decommisioning Phase</b>		
<b><i>Post construction phase</i></b>		
Loss of jobs after preparatory and construction phases	Preparatory and construction phase workers	i. All workers to be engaged by the Contractor will be informed that their engagement is temporary and ends after construction, and that their engagement is not a guarantee for reemployment during the operational phase.
		ii. The contracts for all consultants to be involved during the preparatory and construction phase will clearly indicate the duration of their assignment.
Occupational health and safety	Similar to construction phase	i. Apply mitigation measures for construction phase

Public safety and traffic issues	Similar to construction phase	i. Apply mitigation measures for construction phase
Waste disposal	Similar to construction phase	i. Apply mitigation measures for construction phase
Air pollution	Similar to construction phase	i. Apply mitigation measures for construction phase
<b>Post operation phase</b>		
Loss of job	Operation and decommissioning phase workers	i. A retrenchment policy will be developed and included in the condition of service/service agreement for workers for them to know what they will be entitled to during retrenchment and closure of the affected company/ operator.
All other impacts	Bio-physical and social environment	i. A detailed EIA will be carried out for approval and permitting by the operator before final decommissioning of both offshore and onshore facilities to confirm all impacts and appropriate mitigation measures to be implemented

**Conclusion**

The implementation of the project will provide increased availability of LPG and reduce high cost of the commodity currently constraining the industrial and household sectors. In addition to direct cost benefits, the project will also improve the diversity clean energy fuel supply, improve environmental performance (lowest emission fossil fuel) and improve security of supply for LPG in the Kenyan and East African Market. Generally, stakeholders are willing to participate in project implementation where necessary to help ensure that the project is implemented in an environmentally friendly and socially acceptable manner to the benefit of the country. The local communities however expect that appropriate measures will be put in place to address the potential risk especially explosion identified during the engagement.

## CHAPTER 1

### 1.0 INTRODUCTION

#### 1.1 Background

TAIFA gas group of companies, initially established as Mihan Gas in 2005 with the primary aim of supplying clean energy to the East and Central African market, currently has operations in Tanzania, Kenya, Uganda and Rwanda. The LPG is imported and distributed in the East African Market. The company owns and operates the largest import storage LPG terminal at the port of Dar es Salaam and directly employs 250 staff in addition more than 10,000 people are indirectly employed countrywide in Tanzania alone.

The company to date has expanded into Uganda (2015), Kenya (2017) and most recently in Rwanda (2021) where it is licensed to import and export LPG in bulk as well as sell cylinders on a wholesale basis. In ensuring that TAIFA GAS GROUP OF COMPANIES fulfill its expansion programme, **Taifa Gas Investment SEZ Limited** is proposing to develop an LPG plant within the Mombasa Port within Special Economic Zone Dongo Kundu Likoni Constituency, which alongside its future investments, will aid Kenya and its landlocked neighbors reduce inefficiencies in the supply chain that lead to high user cost and low demand of LPG.

Taifa Gas Investment SEZ Limited appreciates the acceptability gesture by Special Economic Zones Authority (SEZA) for issuance of part of Special Economic Zone (SEZ) Dongo Kundu a public zone for its investment. The project proponent is very keen to ensure maximum use of the space allocated and the envisaged infrastructure developed by the Government of Kenya thereby ensuring that wider economic benefits are passed onto the regional nations associated with this project.

Upon operationalization of this project the company will export LPG on a wholesale basis to distribution companies in Kenya, Uganda, Rwanda, Democratic Republic of Congo, South Sudan and Ethiopia thereby increasing Kenya Government revenue and foreign exchange earnings. The project will also promote investments in local cylinder, cooking stove and other manufacturing, investment in new innovative technologies, bulk transport, especially rail transport thereby increasing local employment opportunities. Industry experience shows that for every ton of LPG consumed per month, approximately 3 new jobs are created. The project therefor has the potential to add over 50,000 jobs to the local Kenyan market.

A proposal was made to the Special Economic Zones Authority (SEZA) of Kenya for the purpose of obtaining land and an Enterprise License to import, process, store and repackage Liquid Petroleum Gas (LPG) within the Special Economic Zone at Dongo Kundu, Mombasa, for Taifa Gas Investment SEZ Limited that is targeting to develop a large 30,000 MT LPG Plant (terminal) in Kenya in alignment with the Government Sustainable Energy for All Action Agenda in vision 2030, at an estimated Costs of US\$ 75.5 million for the construction of the terminal at Dongo Kundu that will be fully funded by Taifa Gas Investment SEZ Limited.

Taifa Gas Kenya Investment SEZ Limited proposes to construct Liquefied Petroleum Gas (LPG) import and storage terminal and related facilities at Dongo Kundu Special Economic Zone. The proposed plant is designed to store Propane, Butane and LPG mix of various grades for domestic, commercial and industrial use.

The terminal shall consist of construction of 5 spheres with a maximum net capacity of 7,500 M3 each. This will provide a capacity for 20,000 tons, with an addition of 4 bullets to bring capacity to 30,000 tons. Facilities included in the project shall be an office block and other buildings, warehouses and those installations needed to process, repackage and export LPG including, bulk loading gantries, heating and compression stations, control rooms, firefighting and safety systems, security installations and other amenities.

The project will be located within Dongo Kundu SEZ on LR No. MOMBASA/MAINLAND SOUTH/BLOCK IV/247 – PORTION that covers an area of 3,000 acres, demarcated (zoned) to support various economic activities to facilitate the integrated needs of manufacturing and processing industries. It includes areas set aside for industrial parks; a free port zone; a free trade zone; a Meeting, Intensive, Conference, and Exhibitions (MICE) zone to facilitate business and tourist related meetings, conventions, events and exhibitions; and various residential zones. Out of the 3,000 acres Taifa Gas Investment SEZ Limited will occupy 30 acres within the zone (GPS latitude: - 4.0718250, longitude: - 39.617683).

This space allows for sufficient safety separation distances of between LPG plant development and the utility facilities and also allows for suitable safety distances between the terminal and immediate neighbouring structures outside the facilities in compliance with the Kenyan LPG standard KS: 1938-2012 and international standard API 2510 for handling storage and distribution of LPG in domestic, commercial and industrial installations

The Kenya Government policy on all new projects, programmes or activities requires that a project of this nature undergoes the process an Environmental and Social Impact Assessment during its planning stages to ensure that significant impacts on the environment and social aspects are taken into consideration during the design, construction, operation and decommissioning of the facility. The scope of this Environmental and Social Impact Assessment, therefore, covered:

- i. The baseline environmental conditions of the area,
- ii. Description of the proposed project,
- iii. Description of the relevant environmental laws,
- iv. Identification and discussion of any adverse impacts to the environment anticipated from the proposed project,
- v. Description of appropriate mitigation measures,
- vi. Preparation of an environmental management plan outline for all the phases of the project.

## **1.2 Rationale for Proposed Project**

The LPG consumption has grown rapidly in Kenya in recent years as import and distribution infrastructure has improved. In the coming years, we believe the primary

constraint on growth will switch from access to supply to affordability, resulting in slower demand growth in the near term. The Kenyan government has sought to encourage displacement of biomass and kerosene in households with LPG, and in recent years has had some initial success. LPG consumption began growing rapidly from a very small base in 2014, and by 2017 consumption in the residential/commercial sector had tripled from 2013 levels to about 124,000 metric tons. Still, this translated to only about a 0.7% share of the overall fuel mix. Rapid demand growth continued in 2018-19, with demand nearly doubling again to 217,000 metric tons. With the increase in demand of use of LPG there is need to increase supply. This is where Taifa Gas Investment SEZ Limited comes in, to increase supply at affordable pricing. The availability of LPG supply will: -

- i. be cheaper than the liquid fuel alternatives;
- ii. bring the added advantages of improved operational efficiencies; and
- iii. bring significant environmental benefits in Kenya, especially in operations that still utilize the use of fossil fuel.

### **1.3 Aim/Purpose of the ESIA Study**

The purpose of the ESIA study is to identify and address possible direct, indirect and cumulative significant adverse environmental and social impacts to arise from the proposed project for acceptability and sustainability. The study aims at satisfying both legal and institutional obligations specified under the Environmental Management and Coordination Act 1999 (amended 2015). This ESIA has also been developed as part of Taifa Gas Investment SEZ Limited commitment to address the requirements of the setting up of such projects in Kenya as set by NEMA a parastatal under the Ministry of Environment and Forestry in Kenya; to support the identification of project environmental and social impacts in comparison with potential benefits and the requirements for mitigation.

### **1.4 Scope of Work for the ESIA Study**

The scope of work for the ESIA study is to:

- a) Provide technical description of the proposed project and identify all activities of environmental/social concern;
- b) Establish the existing environmental and socio-economic baseline conditions of the project area of influence;
- c) Predict and examine all the significant environmental impacts on the surrounding communities and the general environment during implementation of the proposed project and advise on appropriate mitigation and abatement measures against potential adverse impacts;
- d) Provide a monitoring program for predicted impacts;
- e) Provide an Environmental and Social Management Plan (E&SMP);
- f) Document the socio-economic and cultural advantages and disadvantages associated with the proposed project for stakeholders and interested groups to make an informed decision on the level of environmental compromise and permitting.
- g) Provide framework to guide the development of an emergency response plan for the project;
- h) Provide guidelines to be followed in the event of decommissioning; and

- i) Carry out public consultations and include the outcome in the ESIA report with arrangements to address stakeholders' concerns.

### **1.5 Approach/Methodology for the ESIA Study**

The approach and methodology adopted for the study include but not limited to:

- i. Field inspections and trekking;
- ii. Review of available literature;
- iii. Specialists studies for baseline information;
- iv. Stakeholders' Consultations; and
- v. Data analysis and reporting.

#### **1.5.1 Field Inspections**

Surveys of the proposed project sites were carried out for two months from 20<sup>th</sup> March 2022 to 20<sup>th</sup> May 2022 to confirm the project's area of influence as well as the environmental and social issues and conditions to be affected or are likely to develop from the implementation of the proposed project. The field studies identified the potential project affected persons, as well as confirm the project's area of influence, key stakeholders, as well as environmental and social issues and conditions to be affected or are likely to develop from the implementation of the proposed project.

#### **1.5.2 Review of Available Literature**

The major documents reviewed include:

- i. Documents from the project implementers on scope of the project;
  - a) Project's site plan
  - b) Architectural drawings of the proposed project
- ii. SEZA 's Dongo Kunde Site's Master Plan
- iii. Mombasa County Integrated Development Plan (2018-2022)
- iv. Kenya National Bureau of Statistics. (2019). 2019 Kenya Population and Housing Census: Volume II, Distribution of Population by Administrative Units. Nairobi. Retrieved from Africacheck
- v. Energy and Petroleum Regulatory Authority (2019).
- vi. Ministry of Environment and Natural Resources. 1999. Environmental Management Coordination Act. Nairobi: Government Press.
- vii. Ministry of Environment Kenya. 2004. Legal Notice 31: The Factories and Other Places of Work (Safety and Health Committee) Rules. Nairobi: Government Printers.
- viii. Ministry of Environment Kenya. 2006. Legal Notice 120: Environment Management and Coordination (Water Quality) Regulations. Nairobi: Government Printers.
- ix. Ministry of Environment Kenya. 2006. Legal Notice 121: Environmental Management and Coordination (Waste Management) Regulations. Nairobi: Government Printers.
- x. Ministry of Environment Kenya. 2006. Legal Notice 160: Environment Management and Coordination (Conservation of Biological Diversity and Resources, Access to Genetic Resources and Benefit Sharing) Regulations. Nairobi: Government Printers.
- xi. Ministry of Environment Kenya. 2009. Legal Notice 61: Environmental Management and Coordination (Noise and excessive vibration Pollution) (Control) Regulation. Nairobi: Government Printers.

- xii. Ministry of Environment Kenya. 2014. Legal Notice 41: Environment Management Coordination (Air Quality) Regulations. Nairobi: Government Printers.
- xiii. United Nations (UN) Convention on Biological Diversity 1994
- xiv. United Nations Framework Convention on Climate Change (UNFCCC)
- xv. Stockholm Convention on Persistent Organic Pollutants
- xvi. Basel Convention on the control of transboundary movements of hazardous wastes and their disposal
- xvii. ILO Conventions

### 1.5.3 Specialist Studies for Baseline Information

Specialist Studies conducted to provide additional information on the current environmental and socio-economic baseline to identify key issues and help assess potential impacts of the project. The scope of these specialist studies is presented in **Table 1-1** below.

**Table 1-1: Overview of Scope of Specialist Studies**

Resource	Description
Noise	<ul style="list-style-type: none"> <li>i. Baseline noise levels were measured simultaneously with air quality at the identified locations. The criteria for choosing the sampling points/location were: - <ul style="list-style-type: none"> <li>a) Proximity to the Sensitive Receptors (AQSR and NSRs)</li> <li>b) Prevailing Wind Direction/Speed (Meteorological information)</li> <li>c) The standard methodologies and the regulatory requirements e.g. EMCA Air Quality Regulations, 2014; EMCA Noise and Excessive Vibrations, 2009; Occupational Noise Regulations, 2005 and IFC/WHO Guidelines.</li> </ul> </li> <li>ii. The noise monitoring was based on noise measurements obtained via the use of a sound level meter, in accordance with international standards for sound level meter specifications IEC 61672:1999, IEC 61260:1995 and IEC 60651, as well as ISO 19961:2003 and ISO 3095:2001 for the measurement and assessment of environmental noise. The measurements were performed using Sound Level Meter with data-logging system, model 8005.</li> <li>iii. A detailed report on the noise survey is attached in the annex</li> </ul>



Hydrological	<ul style="list-style-type: none"> <li>i. Hydrogeological survey was carried out to investigate the hydrological and geological parameters at the subsurface level at the project site. The main objective of hydrological survey was to determine the level of hydrological and hydraulic risk for all types of infrastructure. The water was also sampled from various point of the project site. The streams and water ways within the project site was also identified.</li> <li>ii. Water analysis details are attached in the annex</li> </ul>
Soil analysis for TPNs	<ul style="list-style-type: none"> <li>i. Soils contaminated with petroleum products create widespread environmental problems due to their adverse effects. It has become crussial to assess sites, especially where TPH pollution could likely occur in such proposed projects. Pollution of soil with petroleum derivatives is often observed in soils around industrial plants and in areas where petroleum and natural gas are obtained, processed or distributed. TPH are an important group of environmental contaminants that are toxic to human and environmental receptors.</li> <li>ii. For the proposed project soil analysis was carried out to determine the current state of TPH at the proposed site to be used as a pollution control indicator during subsequent TPH analysis especially during the various stages or phases of the project.</li> <li>iii. Soil analysis results are attached at in the annex.</li> </ul>
Risk assessment	<ul style="list-style-type: none"> <li>i. Environmental risk management was carried out to identify a credible environmental hazard, analysing the likelihood of occurrence and severity of the potential consequences, and managing the resulting level of risk.</li> <li>ii. Details of the risks/ impacts identified are discussed in <b>Chapter 8</b></li> </ul>

Terrestrial Ecology	<ul style="list-style-type: none"> <li>i. Conducted detailed desk and site surveys of the terrestrial habitats encompassing vegetation, birds, mammals, reptiles etc in the vicinity of the proposed project sites,</li> <li>ii. determined the habitat structure of the whole site,</li> <li>iii. evaluated the habitat in the context of its uniqueness within the local area, and</li> <li>iv. identified any species of particular ecological value.</li> <li>v. determined the occurrence, distribution, relative abundance and diversity of terrestrial invertebrates and vertebrates inhabiting the proposed sites</li> </ul>
Socio Economic Baseline	<p>Desktop studies reviewed available data from the National Population and Housing Census reports, existing EIA reports and other socioeconomic research/reports for the Project Area.</p> <ul style="list-style-type: none"> <li>a) Land ownership, land tenure and land use in the project area</li> <li>b) Key informant interviews and focus groups with local leaders (government, traditional leaders),</li> <li>c) key workers. These was inclusive of men, women, and youth, land users, and land owners.</li> <li>d) Socio-economic analysis for socio-economic baseline.</li> </ul> <p>The methodology used for the studies included:</p> <ul style="list-style-type: none"> <li>i. Observational studies;</li> <li>ii. Interviews with traditional leaders and members of Dongo Kundu communities;</li> <li>iii. Interviews with the Mombasa County representative;</li> <li>iv. Review of Likoni Profiles; and</li> <li>v. Review of district information from the 2019 Population and Housing Census report.</li> </ul>
Land use studies	<p>Methods employed included:</p> <ul style="list-style-type: none"> <li>a) Field observations of existing properties at the project area; and</li> <li>b) Use of the 1:50,000 topographical maps and satellite images of the project area to demarcate the project area of influence.</li> </ul>

#### ***1.5.4 Stakeholder Identification and Consultations***

The project proponents have been engaged to understand the project scope, design and implementation and to obtain relevant project documents. Extensive consultations have been held with key stakeholders and interested groups as part of information gathering process on environmental and socio-economic issues by means of one-on one interviews and stakeholder consultation meetings. These include relevant Government Institutions and regulatory bodies, the project beneficiaries and engineers, local political authorities and project affected persons/interest groups.

The stakeholder engagements also assisted in appreciating the role of the identified stakeholders in the successful implementation of the proposed project. Details of the stakeholders' consultations are provided under **Chapter 6**.

#### ***1.5.5 Data Analysis and Reporting***

The data obtained from the desk and field studies were analysed and have been presented in this Environmental and Social Impact Assessment Report for the purposes of applying for an ESIA licence.

## CHAPTER 2

### 2.0 POLICY, LEGISLATIVE AND ADMINISTRATIVE FRAMEWORK

This section of the report discusses the policies, applicable Environmental Health and Safety (EHS) legislations and institutional framework that are relevant to the Proposed Project.

#### 2.1 National Policies and Regulations

In Kenya there are various sector specific legal instruments that cover environmental and social issues such as public health; soil erosion; protected areas; endangered species; water rights and water quality; air quality, noise and vibration; cultural, historical, scientific and archaeological sites; land use; resettlement; etc.

The main piece of legislation governing environmental management in Kenya is the Environmental Management and Co-ordination Act (EMCA) of 1999, Amended 2015. The main objective of this Act is to provide for the establishment of an appropriate legal and institutional framework for the management of the environment in Kenya. EMCA provided for the establishment of a National Environment Management Authority (NEMA), which became operational in July 2002. NEMA has the statutory mandate to coordinate all environmental activities.

The EMCA has given rise to various regulations that govern environmental Impact Assessment and Audit and regulations governing Water Quality, Air Quality, Noise and Excessive Vibrations, Waste Management, Wetlands, River Banks, Lake Shores and Sea Shore Management and Conservation of Biological Diversity.

#### 2.2 National Policies

Table below shows the National Policies relevant to the Proposed LPG Plant/Terminal

National Policy	Community development
The National Environment policy, 2013	<ul style="list-style-type: none"><li>i. The National Environment Policy aims to provide a holistic framework to guide environmental and natural resource management in Kenya.</li><li>ii. It also ensures that the link between the environment and poverty reduction is integrated into all government processes and institutions in order to facilitate and realize sustainable development at all levels in the context of a green economy, enhancing social inclusion, improving human welfare, creating employment opportunities and maintaining a healthy functioning ecosystem.</li></ul>

EPRA (Energy and Petroleum Regulatory Authority).	<ul style="list-style-type: none"> <li>i. The government to 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 the households.</li> <li>ii. Government to ensure compliance with the environmental laws on restoration and decommissioning of projects.</li> <li>iii. Government to develop and implement a compliance mechanism for safety and protection of environmental pollution.</li> <li>iv. Government to mainstream ecosystem and biodiversity management in energy and petroleum sector.</li> <li>v. Government to establish a Disaster Preparedness, Prevention and Management (DPPM) Unit to spearhead response to accidents and disasters in the energy and petroleum sector</li> <li>vi. Government to provide security for all energy and petroleum installations, which shall be gazetted as national protected zones.</li> </ul>
Sessional Paper No. 4 On Energy, 2004	<ul style="list-style-type: none"> <li>i. Envisions equitable access to quality energy services at least cost while protecting the environment.</li> <li>ii. Requires the government to give legal authority to the Energy and Petroleum Regulatory Authority to permit and license generation, transmission and distribution. EPRA is also given mandate to facilitate issuance of permits and licenses by concerned authorities in liaison with NEMA in such cases.</li> <li>iii. The Paper tasks the government to ensure environmental rehabilitation on project completion or abandonment.</li> <li>iv. Encourage private sector investment in additional capacity for handling, storage and distribution of LPG.</li> <li>v. Consistent with this policy, Government will pursue implementation of: <ul style="list-style-type: none"> <li>a) Construction of LPG import handling, storage and distribution facilities in the short term.</li> <li>b) Promoting wider use of both kerosene and LPG in households, as an alternative fuel to improve the quality of household energy and mitigate demand on wood fuel.</li> <li>c) Government will continue to promote distribution of petroleum fuels including liquefied petroleum gas (LPG) as part of the energy infrastructure to stimulate both on and off-farm income generating activities, in addition to providing clean energy for rural household use.</li> </ul> </li> </ul>
The Kenya Health Policy 2012 – 2030	<ul style="list-style-type: none"> <li>i. The policy is based on the Constitution of Kenya 2010, Vision 2030 and global health commitments.</li> <li>ii. Its broad aim is to ensure equity, people-centeredness and participation, efficiency, multi-sectoral approach and social accountability in delivery of healthcare services.</li> <li>iii. It sets out the goal, objectives, guiding principles and policy directions aimed at achieving Kenya 's health agenda and</li> </ul>

	<p>a comprehensive implementation framework. Also included is the institutional management plan under the evolved system of government taking into account the varied roles of the national and county levels of Government.</p> <p>iv. The policy also sets out a monitoring and evaluation framework to track progress in achieving the policy objectives.</p>
The National Environmental Sanitation and Hygiene Policy 2007	<p>i. The Environmental Sanitation and Hygiene (ESH) Policy is intended to improve people's health and quality of life.</p> <p>ii. Strategic interventions have been developed to determine the success of the policy implementation.</p> <p>iii. One of the key purposes of this policy is to clarify the various roles in order to enhance the existing legal and constitutional framework and to encourage the private sector, civil society and community participation in the planning, implementation and ownership of ESH services.</p> <p>iv. Sanitation and the Environment: One of the key objectives of the policy is to protect the environment from pollution and its negative effect on human health. The government will seek to minimize negative impacts arising from various types of sanitation systems, and maximize positive effects.</p> <p>v. Well-functioning sanitation and hygiene systems are a means of protecting the environment.</p> <p>vi. The health risks associated with poor ESH increase poverty.</p>
National Policy on Water Resources Management and Development (Sessional Paper No.1 of 1999).	<p>i. Recognizes the need to avoid the pollution of water resources and thus proposes development of strict stream effluent discharge standards for controlling the discharge of wastes into water bodies. Also recognizes the need to make water abstraction and disposal permits dynamic and economic instruments for water pollution control</p> <p>ii. Proposes a process of water quality monitoring of all water bodies and pollution control inspection of potential polluting sources. Proposes that all factories and other waste water generating concerns be required to incorporate in their designs waste water treatment devices</p> <p>iii. Proposes the monitoring of water quality parameters to provide baseline data for the purposes of pollution control. Also proposes monitoring of water abstraction and water use to work out naturalized river flows, misuse and over abstraction</p>
Land Policy (Sessional Paper No. 3 of 2009).	<p>i. Envisions the efficient, sustainable and equitable use of land for prosperity and posterity</p> <p>ii. Seeks to secure rights over land and provide for sustainable growth, investment and the reduction of poverty in line with the Government's overall development objectives.</p> <p>iii. Seeks to offer a framework of policies and laws designed to ensure the maintenance of a system of land administration</p>

	<p>and management that will provide inter alia, economically viable, socially equitable and environmentally sustainable allocation and use of land, efficient and effective utilization of land and land-based resources.</p> <p>iv. Commits the government to restoration of the environmental integrity of land and facilitation of the sustainable management of land-based resources. This is through incentives to encourage the use of technology and scientific methods for soil conservation; encouraging use of traditional land conservation methods; establishing measures to control degradation of land through abuse of inputs and inappropriate land use practices; and establishing institutional mechanisms for conservation of quality of land for environmental conservation purposes</p> <p>v. Government shall develop a comprehensive and integrated land use policy having regard to fragile areas and the needs of neighboring communities and individuals in such areas</p> <p>vi. Government shall ensure that environmental impact assessments and audits are carried out on all proposed projects, programmes and activities on land that have a likelihood to degrade the environment.</p>
The Kenya National Biodiversity Strategy and Action Plan, 2000	<p>i. The overall objective of the NBSAP is to address the national and international undertakings elaborated in Article 6 of the Convention on Biological Diversity' (CBD). It is a national framework of action for the implementation of the Convention to ensure that the present rate of biodiversity loss is reversed, and that present levels of biological resources are maintained at sustainable levels for Posterity.</p>

### 2.3 National Legislation

The following legislative provisions and regulations are considered key to management of the environmental, health and safety aspects related to the proposed development.

#### Legal and regulatory framework applicable to the project

No	Legislation/Regulation/Standard	Provisions	Relevance to the Project/ License or Permit Required/ or Activity requiring regulation
1	The Constitution of Kenya (2010).	The Constitution has enhanced protection and enforcement of fundamental rights amongst other gains. It provides for a two-tier	The project shall be implemented in consultation with both the national government and

		<p>structure of government, i.e. the National and the County Governments. It distributes the functions and powers between the two levels as detailed in Chapter Eleven and the Fourth Schedule.</p> <p>Specifically in relation to the energy sector, Part 1 of the Fourth Schedule provides that the National Government shall be responsible for: - (a) Protection of the environment and natural resources with a view to establishing a durable and sustainable system of development including water protection, securing sufficient residual water, hydraulic engineering and the safety of dams (b) Energy policy including electricity and gas reticulation and energy regulation; and (c) Public investment.</p> <p>In relation to the County Governments, Part 2 of the Fourth Schedule provides that they shall be responsible for county planning and development including electricity and gas Reticulation and energy regulation.</p>	the county government including the relevant authorities.
2	Environmental Management and Coordination Act 1999, Amended 2015.	Provides for protection and conservation of the environment, environmental impact assessment, and environmental auditing and monitoring.	Project has initiated this ESIA in compliance with regulations.



		Provides that all reasonable measures shall be taken to mitigate any undesirable effects not contemplated in the ESIA and an environmental audit report on those measures be prepared and submitted to NEMA	
3	Environmental (Impact Assessment and Audit) Regulations, 2003 Amended 2019.	Provides for the procedure for carrying out the Environmental and Social Impact Assessment (ESIA). Provides for the contents of an ESIA Study Report.	The ESIA to be carried out in accordance to the regulations.
4	Environmental Management and Co- ordination (Water Quality) Regulations 2006.	Provides for the protection of ground and surface water resources. Provides for the parameters in the quality of wastewater discharged from any facility/activity into the environment or sewer.	Any discharges to the surface water courses during operation phases to be monitored for conformance with the standards.
5	Environmental Management and Co- ordination (Noise and Excessive Vibration Pollution) (Control) Regulations 2009.	Prohibits the generation of unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. Provides for the maximum noise levels permissible in various environmental set ups such as residential areas, places of worship, commercial areas and mixed residential. Provides that where a sound source creates or	Sound level limits of 60dB (day) and 35dB(night) to be observed during operations License to emit noise/vibrations in excess of permissible levels to be acquired if necessary.

		is likely to emit noise or excessive vibrations, or otherwise fail to comply with the provisions of these Regulations, a license is required	
6	Environmental Management and Co-ordination (Waste Management) Regulations 2006.	Provides for standards for handling, transportation and disposal of various types of wastes including hazardous wastes. Requirements to ensure waste minimization or cleaner production, waste segregation, recycling or composting. Provides for licensing of vehicle transporting waste. Provides for the licensing of waste disposal facilities.	Disposal of generated waste from operations under the Project; Generation of hazardous wastes such as used oil and oily parts from servicing of equipment and vehicles.
7	Environmental Management and Co-ordination (Fossil Fuel).	Provides for emission standards for internal combustion engines.	Use of diesel-powered generators and compressors in operations Taifa Gas Investment SEZ Limited vehicles in use by staff.
8	Environmental Management and Co-ordination (conservation of biological diversity and resources, access to genetic resources and benefit sharing) Regulations, 2006	Provides that a person shall not engage in any activity that may have an adverse impact on any ecosystem; lead to the introduction of any exotic species; or lead to unsustainable use of natural resources, without an Environmental Impact Assessment License. Provides for the imposition of bans, restrictions or similar measures on the access and use of any	Project activities are within the natural ecosystem.

		threatened species in order to ensure its regeneration and maximum sustainable yield Provides for the inventory and monitoring of the status of threatened, endangered or rare species.	
9	Environmental Management and Coordination (Air Quality) Regulations, 2014.	Provides for ambient air quality tolerance limits. Prohibits air pollution in a manner that exceed specified levels. Provides for installation of air pollution control systems where pollutants emitted exceed specified limits. Provides for the control of fugitive emissions within property boundary. Provides for the control of vehicular emissions. Provides for prevention of dispersion of visible particulate matter or dust from any material being transported. Provides for acquisition of an emission license.	Exhaust/stack emissions from equipment at the Gas facility and Taifa Gas Investment SEZ Limited vehicles in use by staff.
10	The Public Health Act (Cap 242)	Provides for the prevention of the occurrence of nuisance or conditions dangerous/injurious to humans.	Generation of wastes from operations under the Taifa Gas Investment SEZ Limited Facility Handling, storage and disposal of waste at the Taifa Gas Investment SEZ Limited Facility.
11	Occupational Safety and Health Act (OSHA), 2007.	Provides that every occupier shall ensure the safety, health and welfare	Site registration as a workplace Safety measures are required in use

		<p>at work of all persons working in his workplace Provides that before any person occupies or uses any premises as a workplace, he shall apply for the registration of the premises.</p> <p>Provides that workplace shall be of sufficient size for work to be carried out with ease and shall further have the necessary free space and, having regard to the nature of the work, an adequate amount of air for each employee, the minimum permissible being ten cubic meters per person.</p> <p>Provides that an occupier shall ensure that effective and suitable provision is made for securing and maintaining, by the circulation of fresh air in each workroom, the adequate ventilation of the room.</p> <p>Provides that an occupier shall ensure that effective provision is made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of his workplace in which persons are working or passing.</p> <p>Provides that sufficient and suitable sanitary conveniences for the persons employed in the workplace shall be provided, maintained and kept clean, and effective provision shall be made for</p>	<p>of tools and machinery on sites Protection of the workers and general public with any form of interaction with the sites is necessary.</p>
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		<p>lighting the conveniences; and, where persons of both sexes are or are intended to be employed (except in the case of workplaces where the only persons employed are members of the same family dwelling there), such conveniences shall afford proper separate accommodation for persons of each sex.</p> <p>Provides that all plant, machinery and equipment whether fixed or mobile for use either at the workplace or as a workplace, shall only be used for work which they are designed for and be operated by a competent person.</p>	
12	The Factories and Other Places of Work (Noise Prevention and Control) Rules, 2005.	<p>Rules provide for the maximum noise exposure levels for workers in places of work and for the provision of protective equipment for those exposed to high noise levels.</p> <p>Provides that an occupier shall also institute noise reduction Measures at the source of noise in the workplace.</p>	Noise emitted during the operation of the emergency diesel generator require provision of PPE to workers and minimization of noise exposure to the public.
13	The Factories and Other Places of Work (Fire Risk Reduction) Rules, 2007.	These rules apply to every workplace, process and operations to which the provisions of the Act apply.	The project will be involved with handling "Class B fire" - fire involving flammable gases.
14	Water Act 2016.	Provides that a permit shall be required for any use of water from a water resource, especially where	Use of water abstracted from the natural spring requires an

		there is abstraction and use of water with the employment of works.	abstraction permit.
15	Water Resource Management Rules 2007.	Provides for application by all those intending to abstract ground water. Provides that where any borehole or well is intended to be equipped with a motorized pump the application shall be accompanied by a hydrogeological assessment report.	Depending on the proposed source of water for construction activities, permits may be required.
16	The Energy Act 2019.	It sought to consolidate the laws relating to energy, to provide for National and County Government functions in relation to energy, to provide for the establishment, powers and functions of the energy sector entities; promotion of renewable energy; exploration, recovery and commercial utilization of geothermal energy; regulation of midstream and downstream petroleum and coal activities; regulation, production, supply and use of electricity and other energy forms; Enforcement and review environmental, health, safety and quality standards Need to promote environmental protection and compliance with environmental, health and safety requirements Construction permit request to be accompanied by ESIA Study Report	Applicable for importing, transporting, refining, storing and selling petroleum or petroleum products; Construction permit shall be sought from EPRA.

17	The Energy Management) (Energy Regulations 2012.	Provides for the development of an energy management policy with inter alia, commitment to improve energy efficiency and conservation, and commitment to provide resources necessary to achieve energy efficiency and conservation. Provides for maintenance of energy consumption records.	Development and implementation of an Energy Management Policy by Taifa Gas Investment SEZ Limited is required since the existing complex is connected to the national grid Energy audits should also be carried out on the facilities to identify opportunities for improving efficiency
18	Liquefied Petroleum Gas (LPG Regulations 2019).	Promulgated for Management of LPG in Kenya Covers on Export Transport storage, import, Retail of wholesale LPG	The Regulations requires the proponent to; Apply for/obtain license from EPRA prior to operating bulk LPG storage facility. Application for the license should be accompanied by the following: EIA License issued in accordance with EMCA 1999, Amended 2015 Proof of compliance with OSHA 2007 and Public Health Act;

			<p>Certificate of compliance issued in accordance with Physical Planning Act of 1986;</p> <p>Copy of approved drawing in accordance with County Government Act 2012, with specifications and plans in duplicate;</p> <p>A clearance certificate from Chief Fire Officer;</p> <p>A declaration of the intended use of LPG that is to be stored</p> <p>A copy of certificate of adherence to the KS1938(1-5) Transport LPG by road in accordance with the Act and terms and conditions of a valid license issued by the Authority.</p>
19	Land Registration Act, 2012 (Act No. 3 of 2012).	Provides for the registration of titles to land, to give effect to the principles and objects of devolved government in land registration, and for connected purposes.	The proposed project site is registered and has a title deed.
20	The Physical and Land Use Planning Act, 2019.	Provides for zoning of areas for storage, distribution and retailing of	The Proposed Project has been approved by the



		petroleum products and construction of electric power sub- stations and other infrastructure.	County's Physical Planning Department.
21	Land Act, 2012 (Act No. 6 of 2012).	Provide for the sustainable administration and management of land and land-based resources, and for connected purposes. The Act also provides for the repeal of the Way leaves Act (Cap. 292) and the Land Acquisition Act (Cap. 295).	The proposed project site is registered and has a title deed.
22	National Construction Authority Act. (Cap.449A) National Construction Authority Regulations, 2014.	Regulates construction activities and registration of contractors in Kenya.	The Project shall seek development approval from the NCA and engage approved contractor during construction phase.
23	The Standards Act, Chapter 496.	Provides for establishment of minimum quality specifications, mode, materials and apparatus used in the country.	The Project shall comply with this act in packaging and measurement.
24	The Weights and Measures Act, Chapter 513.	Regulation under which storage tanks and dispensing equipment for sale of petroleum products are calibrated and regulated for accuracy.	LPG Storage tanks.
25	The Traffic Act, Cap 403.	Relating to traffic on all public roads. Key provisions include registration and licensing of vehicles; driving licenses; driving and other offences relating to the use of vehicles on roads; regulation of traffic; accidents; offences by drivers other than motor	Many types of equipment and fuel shall be transported through the roads to the proposed site. Their registration and licensing will be required to follow the

		vehicles and other road users. It prohibits encroachment on and damage to roads including land reserved for roads.	stipulated road regulations.
26	Public Roads and Roads of Access Act Cap. 399.	Ensure non-interference with public roads when constructing the LPG terminal and the pipeline infrastructure. Provision of safe passage.	The Proponent to apply proposed mitigation measures in the ESIA Study Report to minimize impact and safeguard against explosion and fire.
27	The KMA (Kenya Maritime Authority) Act.	The KMA Act domesticates the ability of the Kenya government to implement IMO (International Maritime Organization) (International Conventions related to shipping and maritime safety that it has ratified	KMA is the designated national competent oil spill authority responsible for the development and provision of guidelines for the management of oil spills in the maritime environment. Under Sec. 5 (i) of the Act, KMA is required to enforce safety of shipping, including compliance with construction regulations, maintenance of safety standards and safety navigation rules.
28	The BMU (Beach Management Units) Regulations, 2007.	The BMU regulations were gazette through a legislative supplement	KMA is the designated national

		<p>No. 67 of 2007 to serve the following purposes:</p> <p>Strengthen the management of the fish-landing stations, fishery resources and aquatic environment</p> <p>Support the suitable development of the fisheries sector.</p> <p>Assist in alleviating poverty and improving fisher community livelihoods.</p> <p>Mainstream gender issues in the management of Fisheries resources</p> <p>Ensure the achievement of quality standards with regard to fish and fishery products.</p> <p>Build local fishing community capacities to effectively engage with other stakeholders in management of fisheries resources.</p> <p>Mitigate conflicts in resource use in the fisheries sector.</p>	<p>competent oil spill authority</p> <p>Responsible for the development and provision of guidelines for the management of oil spills in the maritime environment.</p> <p>Under Sec. 5 (i) of the Act, KMA is required to enforce safety of shipping, including compliance with construction regulations, maintenance of safety standards and safety navigation rules.</p> <p>All ships operating at the jetty shall be registered and licensed by KMA</p> <p>BMUs in the area are key stakeholders of the project as they crisscross the area to access fishing grounds and land their catch. Decisions taken by the proponent</p>
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			should be undertaken in consultation with the fishermen.
29	Employment Act No 11 of 2007.	Prohibition Against Forced Labor.  Prohibition of child Labor.	Project proponent undertakes to abide by the requirements of the Employment Act.
30	Wayleave Act Cap 292.	An Act of Parliament relating to wayleaves.	The pipeline will pass through the wayleave.
31	KS 1938:2006.	Code of practice by KEBS for handling, storage and distribution of LPG in domestic, commercial and industrial installations Part 3: LPG installation involving storage vessels of individual water storage capacity exceeding 500L.	The Standard provides guidelines for: Design pressure; Fire protection; Construction and initial (production) testing of LPG vessel; Filling ratio and volumes of storage vessel; Storage vessel location; Installation of LPG vessels; Installation of vaporizers; Periodic inspection and retesting; Electrical equipment and other sources of ignition; Filling point for bulk storage vessel;

			Filling of portable containers; Container storage areas; and Filling shed for portable containers.
	KS 1938-1:2012 KS 1938-2:2012 KS 1938-3:2012.	Kenya standards for handling, storage and distribution of liquefied petroleum gas in Domestic, commercial and industrial installations-code of practice. Part 1: Liquefied petroleum gas installations involving gas storage containers of individual capacity not exceeding 150 L and a combined water capacity not exceeding 3000L per installation second edition. Part 2: Transportation of LPG in bulk by road, rail and sea code of practice second edition. Part 3: LPG handling, storage and distribution in domestic, commercial.	The main aim of the project is to store and retail LPG of 60,000 Metric Tons and will be transported on Rail.
	KS ISO 16486-3:2012	Plastic piping systems, unplastic polyanide for supply of gaseous, with fusion joining and mechanical joints fittings.	LPG will be conveyed through pipes from the Port to the Terminal.
	KS ISO 16486-5:2012	Plastic piping systems, unplastic polyanide for supply of gaseous, with fusion joining and	LPG will be conveyed through pipes

		mechanical joints fitness for the purpose of system.	from the Port to the Terminal.
	KS ISO 16486-6:2012	Plastic piping systems, unplastic polyanide for supply of gaseous, with fusion joining and mechanical joints handling and installation.	LPG will be conveyed through pipes within the terminal.

## 2.4 Institutional Framework

The EIA process followed for this project is consistent with the regulations in Kenya and involves consultations throughout the life cycle of the Project with a number of governmental authorities which are likely have an interest in the project. These include ministries, departments and agencies as well as regional and local agencies.

The proposed project falls directly under the jurisdiction of the Ministry of Energy. The objectives of the Ministries are attained through the actions of their respective departments and agencies. The key agencies whose mandates will be triggered by the proposed Project are summarised in **Table 2-3** in relation to their respective Ministries.

**Table of Key sector agencies**

Institution	Role in Proposed Project	Project cycle stage Required
National Environment Management Authority (NEMA).	<ul style="list-style-type: none"> <li>i. Issuance of EIA license.</li> <li>ii. Inspections and monitoring compliance with license and approvals conditions.</li> <li>iii. Protect public interests.</li> </ul>	Throughout the Project Cycle.
Special Economic Zones Authority (SEZA).	<ul style="list-style-type: none"> <li>i. Issuance of SEZ operational license.</li> <li>ii. Inspections and monitoring compliance with license and approvals conditions.</li> <li>iii. Protect public interests.</li> </ul>	Throughout the Project Cycle.
Ministry of Industrialization and Enterprise Development.	<ul style="list-style-type: none"> <li>i. Carryout Quality Control including Industrial Standards development.</li> </ul>	Throughout the Project Cycle.
Directorate of Occupational Health and Safety.	<ul style="list-style-type: none"> <li>i. Registration of the facility as a work place.</li> <li>ii. Enforce compliance with OSHA No. 15 of 2007.</li> <li>iii. Registration of the construction site as a work place.</li> </ul>	Throughout the Project Cycle.

	iv. Enforcing compliance with Occupational Health and Safety Regulations at the construction site.	
Kenya Maritime Authority (KMA)	i. Development and provision of guidelines for the management of oil spills in the maritime environment.	Throughout the Project cycle.
Ministry of Energy and Petroleum (MOE&P)	i. MOE&P is in charge of formulating and implementing policies so as to create an enabling environment for efficient operation and growth of the sector. It sets the strategic direction for the growth of the sector and provides a long-term vision for all sector players.	Throughout the Project cycle.
The Petroleum Institute of East Africa (PIEA).	i. The Petroleum Institute of East Africa (PIEA) is the professional body for the oil and gas industry in the East Africa region. The mission of the PIEA is to provide a forum for expertise and excellence in the oil industry, promote professionalism and free enterprise in the petroleum business supported by the highest operations and business standards.	Throughout the Project cycle.
Energy & Petroleum Regulatory Authority (EPRA)	The EPRA is established under the Energy Act, 2019 with the following objectives and functions: i. Regulate the electrical energy, petroleum and related products, renewable energy and other forms of energy. ii. Protect the interests of consumer, investor and other stakeholder interests. iii. Maintain a list of accredited energy auditors as may be prescribed. iv. Monitor, ensure implementation of, and the observance of the principles of fair competition in the energy sector, in coordination with other statutory authorities.	Throughout the Project cycle.

## 2.5 International Conventions

Kenya is signatory to a number of international conventions that have been established by the United Nations or its specialized agencies to sustainably manage and/or protect the environment. The ones that should be considered for the Project are:

### 1) United Nations (UN) Convention on Biological Diversity 1994

The Convention on Biological Diversity (CBD) is an international legally binding treaty. The Convention has three main goals:

- a) conservation of biological diversity (or biodiversity);
- b) sustainable use of its components; and
- c) fair and equitable sharing of benefits arising from genetic resources

In other words, its objective is to develop national strategies for the conservation and sustainable use of biological diversity. It is often seen as the key document regarding sustainable development.

## **2) United Nations Framework Convention on Climate Change (UNFCCC)**

The United Nations Framework Convention on Climate Change (UNFCCC) provides the basis for global action to protect the climate system for present and future generations. The Convention on Climate Change sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognizes that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases. The Convention enjoys near universal membership, with 189 countries having ratified.

The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas (GHG) concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

Under the Convention, governments:

- i. Gather and share information on greenhouse gas emissions, national policies and best practices.
- ii. Launch national strategies for addressing greenhouse gas emissions and adapting to expected impacts, including the provision of financial and technological support to developing countries; and
- iii. Cooperate in preparing for adaptation to the impacts of climate change.

## **3) Stockholm Convention on Persistent Organic Pollutants**

Stockholm Convention on Persistent Organic Pollutants is an international environmental treaty, signed in 2001 and effective from May 2004, that aims to eliminate or restrict the production and use of persistent organic pollutants (POPs).

## **4) Basel Convention on the control of transboundary movements of hazardous wastes and their disposal**

This is an international treaty that was designed to reduce the movements of hazardous waste between nations, and specifically to prevent transfer of hazardous waste from developed to less developed countries (LDCs). It does not, however, address the movement of radioactive waste. The Convention is also intended to minimize the amount and toxicity of wastes generated, to ensure their environmentally sound management as closely as possible to the source of generation, and to assist LDCs in environmentally sound management of the hazardous and other wastes they generate.

## **5) Convention on Civil Liability for Oil Pollution Damage (CLC)**

The key Conventions under liability and compensation are the International Convention on Civil Liability for Oil Pollution Damage (CLC), 1992 and the International Convention



on the Establishment of an International Fund for Compensation for Oil Pollution Damage, (FUND) 1992. The CLC places liability for pollution damage in the event of oil spillage on the ship owner and ensures that compensation is paid for the destruction of the shoreline ecosystem as well as to affected victims such as fishermen, beach resort hotels and recreational facilities, restaurants etc.

However, in situations where the compensation paid under the CLC is inadequate, countries can access additional funding from the FUND, provided they are contracting parties to it. Through the initiative of the Kenya Maritime Authority, Kenya has ratified the CLC and the FUND Conventions and has become a beneficiary country which can claim international compensation for oil pollution damage.

#### **6) Convention on Limitation of Liability for Maritime Claims (LLMC), 1976**

The Convention provides the limit of liability for two types of claims – (i) claims for loss of life or personal injury, and (ii) property claims (such as damage to other ships, property or harbour works). The 1976 Convention, replaced the International Convention Relating to the Limitation of the Liability of Owners of Seagoing Ships, which was signed in Brussels in 1957, and came into force in 1968. This convention would be most applicable in the operational phase of the proposed project, when the ship traffic is expected to increase significantly.

#### **7) ILO Conventions**

Convention Concerning the Protection of Workers against Occupational Hazards in the Working Environment due to Air Pollution, Noise, and Vibration (ILO No. 148) 1977 Article 9 of the 1977 Convention of ILO states that as far as possible, the working environment shall be kept free from any hazard due to air pollution, noise or vibration, (a) by technical measures applied to new plant or processes in design or installation, or added to existing plant or processes; or, where this is not possible, (b) by supplementary organisational measures.

ILO Convention 29 (1930) Forced Labour - Article 5

No concession to companies shall involve any form of forced or compulsory labour.

ILO Convention 105 (1957) Abolition of Forced Labour - Article 1

Not make use of any form of forced or compulsory labour

ILO Convention 138 (1973) Minimum Age - Articles 1-3

Abolition of child labour and definition of national minimum age for labour not less than 18 years (depending on occupation).

ILO Convention 87 (1948) Freedom of Association and Protection of Right to Organise - Articles 2- 11

Freedom to join organisations, federations and confederations of their own choosing; with freely chosen constitutions and rules; measures to protect the right to organise.

ILO Convention 98 (1949) Right to Organise and Collective Bargaining - Articles 1-4  
Protection against anti-union acts and measures to dominate unions; established means for voluntary negotiation of terms and conditions of employment through collective agreements.

ILO Convention 100 (1951) Equal Remuneration - Articles 1-3

Equal remuneration for men and women for work of equal value.

ILO Convention 111 (1958) Discrimination (Employment and Occupation) Equality of opportunity and treatment in respect to employment and occupation; no discrimination on the basis of race, colour, sex, religion, political opinion, national extraction or social origin.

ILO Convention 97 (1949) Migration for Employment - Articles 1-9

Provision of information; no obstacles to travel; provision of health care; non-discrimination in employment, accommodation, social security and remuneration; no forced repatriation of legal migrant workers; repatriation of savings.

ILO Convention 143 (1975) Migrant Workers (Supplementary Provisions) - Articles 1- 12

Respect basic human rights; protection of illegal migrants from abusive employment; no trafficking in illegal migrants; fair treatment of migrant labour.

## 2.6 Relevant Legal Approvals – Permit/Licenses/Certificates

The relevant approvals required for the implementation of the Project are summarized in the table below. The list is indicative and will be updated as the project design progresses.

**Table of Key Regulatory Approvals**

Regulatory body	Permits/ licenses and certificates	Applicable	Project Phase	Remarks /Status
National Environmental Management Authority (NEMA).	EIA approval licence.	Yes	Prior to Construction Phase.	After acceptance of final ESIA by NEMA.
	Environmental acknowledgement letter/environmental compliance letter	Yes	Within 24 months of commencement of Operations.	After preparation of first EMP. Renewable every year.
Energy and Petroleum Regulatory Authority (EPRA).	Acquisition of provisional licence.	Yes	During the planning and design stage.	-
	Acquisition of siting clearance (siting permit).	Yes	Prior to commencement of construction works.	Requires Environmental Permit.
	Acquisition of construction work permit (authorization to construct).	Yes	Prior to commencement of construction works.	After obtaining Environmental Permit.

	Acquisition of operational licence.	Yes	Prior to commencement of operation.	After obtaining Environmental Permit.
Special Economic Zones Authority (SEZA).	Acquisition of operational licence.	Yes	Prior to commencement of project's setup.	Renewable on annual basis.
Directorate of Occupational Health and Safety.	Workplace permit / Certificate.	Yes	Prior to commencement of operation.	Renewable on annual basis.
Kenya Maritime Authority (KMA).	Marine Safety Permit.	Yes	Planning phase.	For all vessels including dredgers.
	Permit to operate in Kenyan waters.	Yes	Planning phase.	For all vessels including dredgers.
Energy and Petroleum Regulatory Authority (EPRA).	LPG Storage and Filling Plants construction licence.	Yes	Prior to commencement of construction.	During construction.
	Petroleum business licence.	Yes	Prior to commencement of operation.	Renewable on annual basis.

## CHAPTER 3

### 3.0 DESCRIPTION OF THE PROPOSED PROJECT

#### 3.1 Project description and Layout Plan

Taifa Gas Investment SEZ Limited propose to construct Liquefied Petroleum Gas (LPG) import and storage terminal and related facilities at Dongo Kundu Special Economic Zone. The proposed plant is designed to store Propane, Butane and LPG mix of various grades for domestic, commercial and industrial use.

The terminal shall consist of construction of 5 spheres with a maximum net capacity of 7,500 M3 each. This will provide a capacity for 20,000 tons, with an addition of 4 bullets to bring capacity to 30,000 tons. Facilities included in the project shall be an office block and other buildings, warehouses and those installations needed to process, repackage and export LPG including, bulk loading gantries, heating and compression stations, control rooms, firefighting and safety systems, security installations and other amenities.

The project will be located within Dongo Kundu SEZ on LR No. MOMBASA/MAINLAND SOUTH/BLOCK IV/247 – PORTION that covers an area of 3000 acres, demarcated (zoned) to support various economic activities to facilitate the integrated needs of manufacturing and processing industries. It includes areas set aside for industrial parks; a free port zone; a free trade zone; a Meeting, Intensive, Conference, and Exhibitions (MICE) zone to facilitate business and tourist related meetings, conventions, events and exhibitions; and various residential zones. Out of the 3,000 acres Taifa Gas Investment SEZ Limited will occupy 30 acres within the zone (**GPS latitude: - 4.0718250, longitude: - 39.617683**).

This space allows for sufficient safety separation distances of between LPG plant development and the utility facilities and also allows for suitable safety distances between the terminal and immediate neighbouring structures outside the facilities in compliance with the Kenyan LPG standard KS: 1938-2012 and international standard API 2510 for handling storage and distribution of LPG in domestic, commercial and industrial installations. Figure 1-1 shows the layout of SEZ master plan and the proposed location of Taifa Gas LPG storage plant

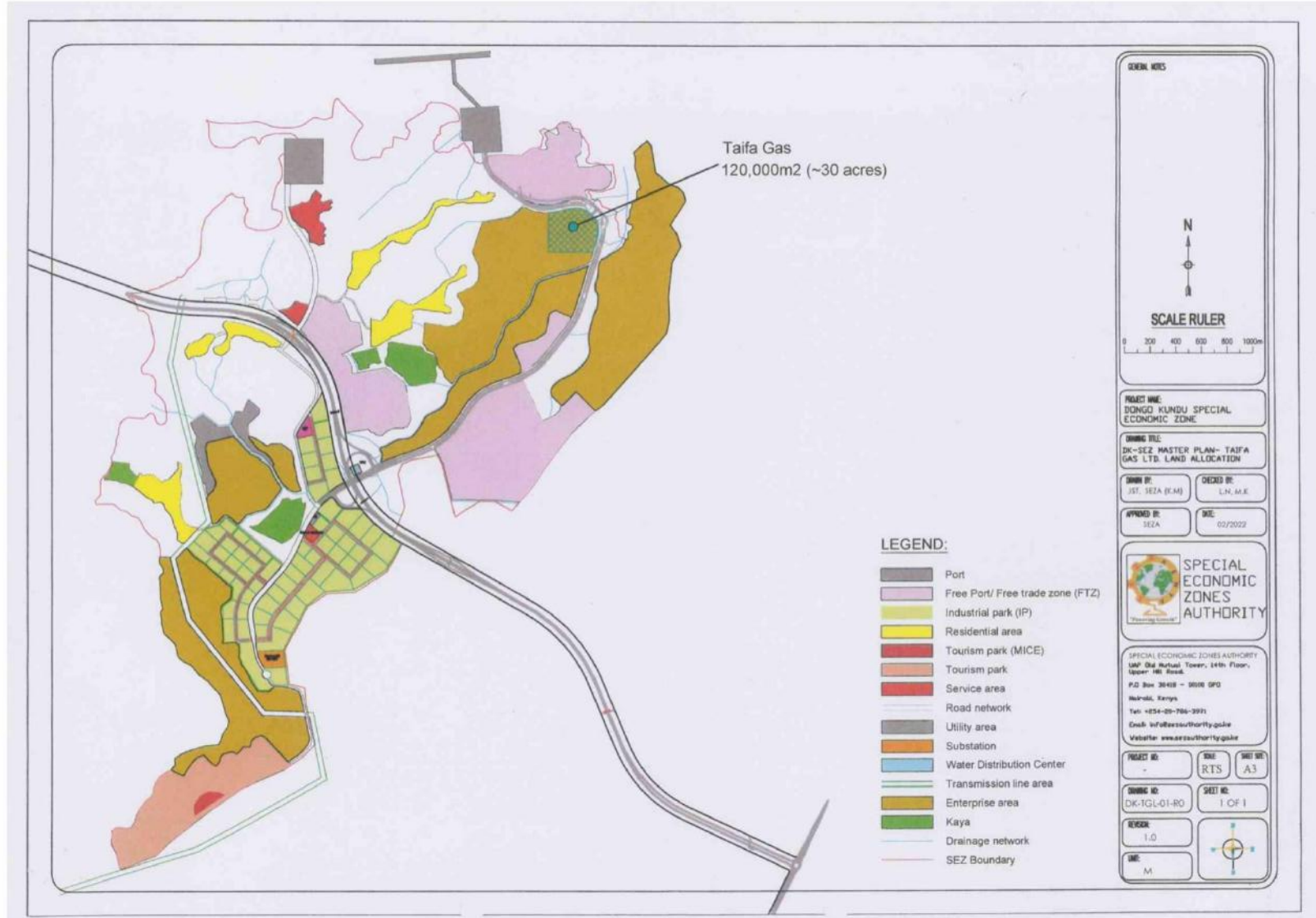


Figure 1: Layout of SEZ master plan and the proposed location of Taifa Gas LPG storage plant

### **3.2 Description of the proposed processes flow.**

Taifa Gas Investment SEZ Limited has taken into account future ship berth developments and preliminary zoning plans, together with the construction of the new island oil terminal. Accordingly, Taifa Gas Investment SEZ Limited wishes to have the LPG plant located close adjacent to the immediate backberth area in the Northern or North-Western part of the Dongo Kundu SEZ. Development in these areas would ensure safe zoning and distance taking into account prevailing SE and NE winds and other environmental conditions studies for which shall be done in accordance with the relevant Kenyan standards and codes of practice as part of the licensing and permitting requirements specific to this particular project. Figure 1-1 shows the layout of SEZ master plan and the proposed location of Taifa Gas LPG storage plant

Taifa Gas Investment SEZ Limited is currently in engaging with Kenya ports Authority, Kenya national Highways Authority and other relevant stakeholders in establishing of connection terminal and the routing of the proposed gas pipeline.

It is envisaged that the Liquefied Petroleum Gas upon delivery by ship shall be offloaded at the existing Kipevu oil Terminus (KOT) offloading base and pumped through 12" pipeline to the Taifa Gas storage terminal approximately 2.7km to the mainland. A dedicated LPG pipeline wayleave shall be acquired once the interconnection and the pipe routing details are determined. The is expected to cross the existing services i.e. roads and water pipelines. Figure 1-2 shows the general architectural impression of the process from the ship to Taifa gas LPG bulk storage.

Simplified process flow for Taifa Gas Investment SEZ Limited involves bulk importation of LPG by sea to the port of Mombasa, the LPG shall be offloaded as described above and pumped to through 12" pipeline to the spherical storage tanks. From the spheres, the gas shall be filled into the bulk gas carriers for transportation by road to other areas of consumption. The LPG shall also be filled into small gas cylinder for direct distribution to domestic and commercial consumers. Figure 1-3 shows presentation of Taifa Gas Investment SEZ Limited process flow.



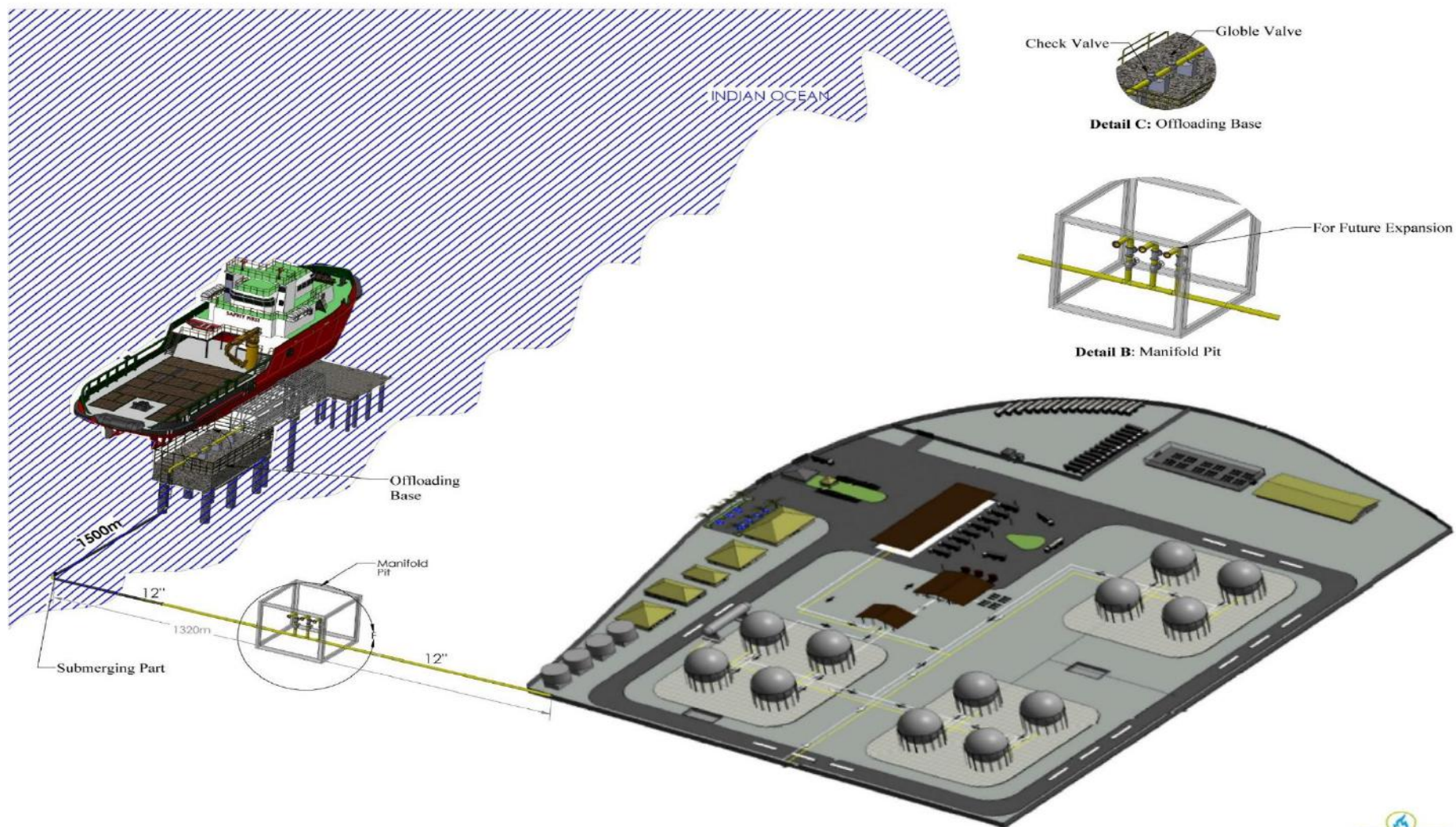


Figure 2: Architectural Impression of Taifa Gas LPG delivery system



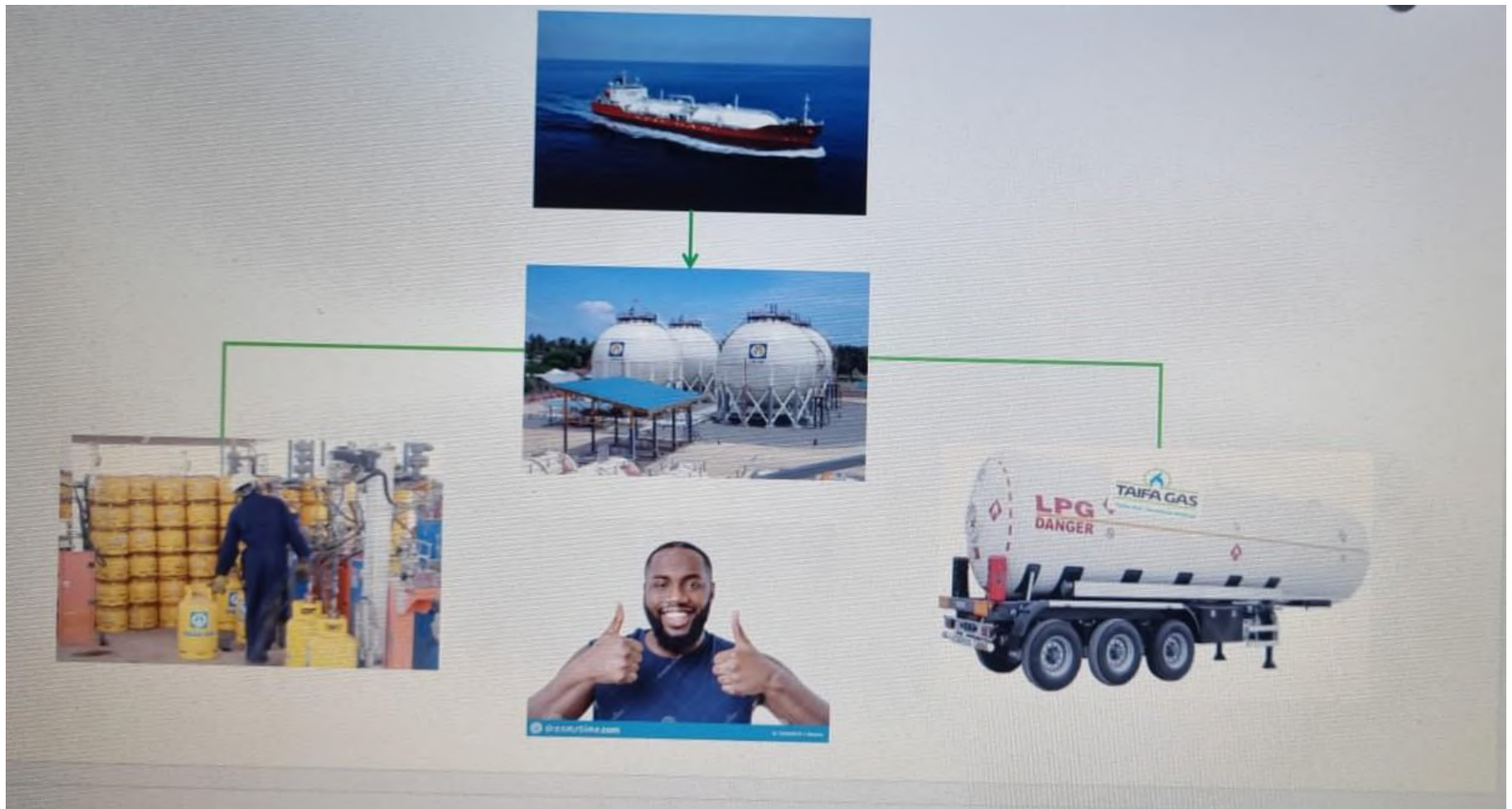


Figure 3: PSchematic representation of process flow from Bulk supply, storage, packaging to smaller units etc.

### 3.3 Preliminary Design Basis of the Dongo Kundu Terminal

#### 3.3.1 General

The site is proposed to be 30 acres that allows for sufficient safety separation distances of facilities (such as spheres, re-filling gantries, pumps, office buildings etc) within the site boundaries and also distances between the facilities' and neighboring structures outside the facility area as per the Kenyan LPG standard KS: 1938- 2012 i.e. clause 12.3d -75M away from outdoor places of public assembly (including school yards, athletic fields and playgrounds, busy thorough fares and side works) and international standard API 2510 for handling storage and distribution of LPG in domestic, commercial and industrial installations.

#### 3.3.2 Storage Capacity Considerations

The number and sizes of storage vessels has been planned as 5 spheres each having a net capacity of 7,500 Cubic Meter (CM). Allowance will be made for future expansion with additional spheres and bullets.

#### 3.3.3 Safety Considerations

Safety distances have been based on International and Kenyan Standards. Future engineering and other studies at the detailed design stage to check the layout and design of facilities with reference to credible LPG leak scenarios and the appropriate hazard analysis. Similarly, during the detailed design Final Lower Flammability Limit (LFL) contours would be determined via an assessment based upon the Fire and Explosion Risk model. Area classification will be developed during Front End Engineering Design (FEED) and earth and electrical isolation of storage will be provided according to the relevant standards.

#### 3.3.4 Vessels construction

Initial project phase will consist of construction of 5 spheres with a maximum net capacity of 7,500 m<sup>3</sup> each containing LPG with density of 540 Kg/m<sup>3</sup> at 30oC for LPG demand, total 20,000 Tons, with an addition 2 spheres and/or bullets to bring capacity to 30,000 tons. All pressure vessels, including spheres shall be fabricated and transported to site for erection and commissioning. A complete transport plan, inclusive lifting and on-land transport will be done during the Front-End Engineering Design (FEED) phase.

#### 3.3.5 Design Conditions

##### 3.3.5.1 Maximum operating temperature (MOT)

For mounded storage the effect of solar radiation may be ignored, hence there is no need to take the assessed temperature into account. The MOT is therefore the maximum temperature of the product on receipt into storage, which is the maximum of:

- a) Reception from ships: 37.3 °C.
- b) Reception from the Site: 40.5 °C.

##### 3.3.5.2 Maximum operating pressure (MOP)

The MOP is the vapor pressure of the product concerned corresponding to the MOT, which for LPG containing a maximum of 25% C<sub>3</sub> (propane) at 40.5°C MOP = 8.5 Bars absolute NOTE: Consideration to be given to 100% C<sub>3</sub> (propane) MOP.

### **3.3.5.3 Design pressure (DP)**

- a) 16 Bars at 50 deg Cent.
- b) Test pressure (water) 20 Bar

Minimum allowable absolute pressure, full vacuum.

The DP is taken equal to 110% of MOP, with a minimum of (MOP+1) to ensure full closure of the pressure relief valves (PRVs) when normal conditions have been restored after an overpressure situation. The DP is defined for the top of the vessel; hence the liquid static head shall be added for lower parts. Therefore DP = 9.5 Bars

### **3.3.5.4 Upper design temperature (UDT)**

The UDT is the temperature corresponding to the DP. For this case is 50°C

### **3.3.5.5 Lower design temperature (LDT)**

ABM C<sub>3</sub> = -42.0°C ABM C<sub>4</sub> = - 0.5°C

For LPG containing a maximum of 25% C<sub>3</sub> is - 10.0°C

### **3.3.5.6 Pressure Relief System**

The relief capacity shall be designed based on the greater of either the capacity required for abnormal operating conditions, e.g. liquid overfill, or for fire exposure. Uses of ESD system closing feed inlet to the storage vessel shall be considered for liquid overfill. Design to consider PRVs discharge to a new flare header connected to via a local knockout vessel.

### **3.3.6 Pipeline Design**

A pressure surge assessment will be calculated during the Detail Design Preparation phase however preliminary calculations allow for class 300# flange and Schedule XS piping system, selected for the design used for cost estimate, was found to be suitable for the maximum anticipated surge pressure as summarized below:

- a) Maximum surge pressure 110% x Bars (g) 38.8
- b) Design Pressure of 300# flange Bars (g) 51
- c) Schedule XS piping design pressure Bars (g) > 90
- d) ESD valve closure time seconds 30

The available pressure drop will be 5 Bars, allowing for elevation of the tanks and pressure build-up in the storage tanks. The unloading flow is based on 300 M<sup>3</sup>/hr with 12 Bars pressure at the ships rail. The cross-country pipeline is to be designed in accordance with The American Society of Mechanical Engineers (ASME) B31.4.

### **3.3.7 Storage Vessels**

Horton spheres are to be planned.

The main advantage of the spherical construction is that the stress concentration in a spherical shape will be minimal while storing pressurized gases as the stress resistance will be uniform over the total surface. Another advantage is the reduced exterior surface for a given storage volume as compared to all other possible shapes.

*Note: Because of the cold storage temperatures and the often, high ambient temperatures and humidity outside the sphere, it is a key requirement to have a well designed and installed thermal insulation system in place to keep the temperature inside the sphere consistent.*

The choice of Horton spheres for the construction is deemed adequate and economical considering it stores more products compared to cylindrical shaped containers.

### **3.3.8 Terminal Layout**

**3.3.8.1 General:** - Facilities are laid out to make the most efficient use of the area available, and to allow for future expansion. The design takes into consideration the requirements for subsequent development of the site.

**3.3.8.2 Safety Distances:** - The minimum safety distances will be based on KEBS KS1938-3 and API Standard 2510, International Standards or IP-Part 19 and local regulations. Where possible, larger safety distances will be provided, particularly for separation from areas where personnel tend to be present. The FEED will contain requirements for checking of the layout and design of facilities with reference to credible LPG leak scenarios and the appropriate hazard analysis during the detailed design stage.

**3.3.8.3 Gates and Security:** - For road vehicles, a double gate system is provided, where vehicles are allowed to pass the first gate into a pre-access area, only after a security check these vehicles are allowed to enter the site is proposed. In order to avoid the road to be blocked with road tankers waiting for access, the pre-access area is provided with space for at least 2 trucks from the main road. Entrance and exit are also located in the same vicinity in order to maintain a better control and to reduce manpower costs. Facility security is designed to guard against intruder entry and theft as well as to prevent acts of terrorism. Security measures include high security perimeter fencing, lighting, intruder alarms and a close circuit television (CCTV).

**3.3.8.4 General Requirements for Road Traffic and Parking:** - Traffic lane sizes, roadway bends and parking spaces will be designed to allow for the largest size of rigid, tractor semi-trailer, and rigid plus full (drawbar) trailer combination vehicles expected in the foreseeable future. Crossing of incoming and outgoing traffic lanes and contra-flow of vehicle movements will be avoided as much as practical. Entrance and exit roads will be wide enough to allow two traffic lines in each direction, so that stationary vehicles (e.g. those halting to collect documents) do not obstruct vehicles wishing to enter or to leave. Sufficient parking will be provided for empty loading vehicles queuing for a free loading place.

Electronic overhead display panels will be installed that instruct the driver which loading bay to proceed to. Sufficient parking space will be provided for loaded vehicles being parked so that drivers can collect documents etc. Slip or bypass roads around the loading facilities will be provided to allow vehicles to evacuate the loading area without

driving through the loading bays or crossing traffic in the event of an emergency. Workshops and weighbridges will be positioned to allow unobstructed traffic flow.

Parking area for the vehicles parked overnight will be provided so that the parked vehicles do not obstruct movement of vehicles in the loading area during night operations. Bulk road vehicle traffic flow will be separated from any other traffic.

#### **3.3.8.5 Road Dispatch Office**

The office will be located away from the parking space and the loading gantries. Supervision and documentation of road vehicle loading operations will be carried out most effectively from an office overlooking the loading operations and located near the installation boundary or between the incoming and outgoing vehicle streams. Office facilities provision has taken into account the higher-than-normal noise levels caused by nearby vehicles. The size also allows for accommodation of all personnel involved in order taking (bulk and packed), road vehicle routing, scheduling and dispatching, and stock control. A waiting room for drivers' inclusive toilet and shower facilities have also been allowed for.

#### **3.3.8.6 LPG road loading gantry**

General: - The number of loading bays specified is calculated to serve the demand of 2025. Space in the layout is provided for extensions.

Working Hours: - Working hours in Kenya are regulated by law, and are: 8 hours during weekdays / 4hours on Saturdays. There is a total of 12 Public holidays during the year. This results in a total of 275 working days or 2,200 working hours per year. These working hours have been used for the design. In case of increased demand as per 2025 this assumption should be reviewed and consideration should be given to extended working hours, two shifts operation and loading at night, which could eliminate the necessity for extensions of the facilities

Road Tankers: - Typical LPG road tankers in Kenya have a capacity of 25 Tons (46 M<sup>3</sup>). The system of loading is bottom loading and inlet connections are typical 3" diameter. Design pressure is 9 Bars absolute. Design is based on bottom loading and vapor return line.

Loading flow rates: - Loading flow rates for road tankers have been chosen as 60 M<sup>3</sup>/hr. Loading rates are set to this flow rate in order to optimize the number of loading gantries required. However, velocity through pipelines, equipment and hoses should not exceed 5 M/s.

Total loading time per truck: - Total loading time per road tanker is calculated assuming an average capacity of 25 Tons, and that the maximum safe filling level is 85%, allowing a maximum payload of 21.25 Tons per truck. The total loading time per road tanker is calculated as the sum of: Preparation time, drive into bay, stop, set meters, connect overfill/earth and connect. Loading time, consistent of:

- ❖ An initial low flow period to avoid sudden changes in pressure that can damage pump seals.
- ❖ An initial ramp to maximum flow during 1 min (average flow = 30 M<sup>3</sup> /hr).

- ❖ A period at maximum flow (60 M<sup>3</sup> /hr)
- ❖ A final low flow period in order to avoid overfilling.
- ❖ Final ramp to minimum flow during 1 min (average flow = 30 M<sup>3</sup> /hr).

### **3.3.8.7 LPG Demand and Demand Patterns**

Demand patterns and peak demands (monthly, daily, hourly) are not available. Therefore, the number of loading bays was calculated for average gantry occupancy of 60%. This is considered enough in all cases to satisfy peak demands.

Assessment of Loading Bays: - The assessment of number of loading bays required starts from the LPG demand scenarios, loading time per truck and truck capacity to calculate the average number of trucks per working day. An overall occupancy of 60% should ensure that the capacity will be enough to cope with peak demands with minimal queuing, assuming that LPG vehicles arrive reasonably well spaced throughout the available loading period (i.e. minimal early morning peak). Calculations are shown in the table below. A total number of 4 bays are provided to satisfy the initial demand.

Loading Pumps: -Three loading pumps rated for the maximum design flow rate per loading arm and a spill back (return) line is proposed. Consideration will be given to installing pumps with a variable speed drive. An electronic pump control system interlocked with the gantry loading automation system is provided whereby pumps are switched on in series based on product demand and only after certain safety conditions have been satisfied. The pumps are automatically stopped, with a time lag, when there is no further demand for product. Three loading pumps are provided, each one with following characteristics:

- ✓ Nominal flow: 60 M<sup>3</sup>/hr
- ✓ Diff. Pressure: 5 Bars

### **3.3.9 Safeguarding System**

In view of the potential consequences of an LPG liquid/vapor spill, systems for safeguarding the integrity of the plant and equipment are incorporated in the design to limit the quantity of released product. A fully automated system, in which product flow cannot start unless all safeguarding conditions are met (e.g. earth cable and loading arm connected properly) and shall be automatically halted during filling if one condition ceases to be acceptable (e.g. loading arm moves beyond safe limits) is provided. However, loading liquid and vapor hoses will be considered as a more cost-effective option based on maintenance. Remote controls to stop the loading/discharging operation and activate the emergency response procedure will be in place.

These controls will be installed at the control room and near the loading point as well as at safe locations nearby. Gas detectors will be installed in product transfer areas where connections are regularly made and uncoupled. The detectors will be set to trigger audible and/or visual alarms in the control centers and operating areas. The activation of the ESD controls would shut down the loading pumps and close the ESD (Emergency

Shutdown) valves protecting the transfer points. The fire pump start will follow the philosophy of the existing pumps and the opening of valves in fire mains/sprinklers/water curtains will be done by operator on identification of fire from control room, near the loading point and at a safe location nearby. It has to be noticed that the systems use both a coriolis mass meter and a weighbridge for safeguarding and custody transfer considerations. The overfilling protection will be subject to Safety Integrity Level (SIL) review and if classified to be (SIL) 1 or higher the custody transfer and safety sensors cannot be combined.

#### **3.3.9.1 Overfill Protection**

**Roto gauge is the preferred overfill protection.**

#### **Drive Away Prevention and Protection**

As the human element is involved in every filling and discharge operation there is a possibility that the vehicle could be driven away before the product transfer arm has been disconnected. Driving away with loading arms connected can cause damage to the plant and release of product with serious consequences. Drive-away prevention whereby the vehicle is prevented from moving until the loading arm/hose is disconnected will be used to avoid this situation. Breakaway couplings, which rupture before the loading arm/hose is damaged, will also be used to minimize the consequences of a drive-away. Breakaway couplings used on loading arms will be of a type in which the breakaway action, i.e. the separation of the two halves of the coupling, occurs just before the arm/hose is extended to the limit of its safe working envelope.

#### **3.3.9.2 Product Control - Equipment and Procedures**

The operating functions and controls will provide:

(a) **Interlocks:** - Interlocks will prevent product from flowing until all the various checks are satisfied and the control system indicates that loading can safely commence. Only then the product control valve is allowed to open and product flow will start. In the event of manual intervention, power failure, breakdown or defined irregularity the product flow will be stopped by automatically closing the valve and subsequently stopping the relevant pumps.

(b) **Earth / Bonding:** - Continuity between the bonding cable and the vehicle will be maintained. The product flow control valve (solenoid type or electro-pneumatic) will be interlocked into the earth circuit and will only remain in a permissive flow condition while this circuit is closed.

(c) **Barrier Arm:** - Before starting to load, the barrier arm will be lowered to prevent the vehicle from being driven off. A traffic light or flashing light will also be used. Once this condition has been satisfied the loading operation can start. As soon as the loading operation is finished, indicator lights at the loading bay would be used to signal that all post loading procedures have been correctly executed (e.g. loading arm/hose properly stowed, bonding link disconnected, etc.) and that the barrier arm may be raised.

(d) **Weighbridge Applications:** - A weighbridge is used to reconcile the amount of product loaded. See Custody Transfer

(e) **Product Temperature:** - The temperature of the product being loaded is measured accurately (to within 0.1 °C) by means of a platinum resistance probe inserted in the

product at the meters upstream of each loading arm. The loading control system monitors the probes (and all the other instrumentation devices) at regular intervals and can therefore relate the temperature to the volume flowing through the meter on a continuous basis, in order to calculate the average temperature, thence the volume at a standard temperature, and the safe filling volume.

(f) **Meter Applications:** - One of the functionalities of the DCS system is the Gantry control system. With this system the entire loading operation is monitored via the gantry control system, i.e. pre-setting of a safe filling volume and closure of the flow control valve in the event of abnormally low flow rates. The flow of product is 'ramped up' at the start of filling and 'ramped down' at the end of filling. The level and duration of flow restriction is re-programmable. Having recognized the driver and vehicle at the loading bay and the quantity of product to load, and having checked that the safety interlocks have been satisfied, the control system releases the correct meter to supply only the appropriate product. The flow of product may then be started (solenoid valve open and pump started). The Coriolis meter pulse unit transmits signals to the DCS system which records the volume metered and detects completion of the safe filling volume for loading, at which point the system shuts down. The Coriolis meter needs to have two separate pickups one going to the DCS for the above-mentioned function the other to the Safeguarding system for the overfilling protection. The overfilling protection setting will be calculated by the DCS and set to the Safety System. Verification of this setting is required and confirmed by the operator before loading can commence. After completion of loading, the vehicle is checked to confirm that it is not overfilled.

(g) **Leaving the gantry:** - Correct disengagement of all equipment and proper placement of loading arms into a stowed position is checked before the vehicle can drive away.

### **3.3.10 Custody Transfer**

Custody transfer is via filling on a weighbridge. This enables bulk vehicle filling time to be minimized by using high flow rates whilst still achieving a high degree of measurement accuracy. Weighbridges equipped with load cells have proven to be reliable and accurate and are used for this application. The weighbridge metering system produces a custody transfer ticket print for dispute handling purposes. The custody transfer data from/to weighbridge metering system and DCS is by serial link. Batch numbering for batch registration purposes will be from the DCS system and verified by the operator. The weighbridge metering system has a volt free normally energized trip contact for overfilling protection. This overfilling protection acts in parallel (1 out of 2) with the overfilling trip from the coriolis meter. The overfilling trip setting is provided from the DCS and is confirmed by the operator before the loading can commence. Consultation will be given for a weighbridge installed at each loading bay. This will reduce queuing at the custody transfer weighbridge. Each weighbridge will be linked into the terminal SCADA management system.

### **3.3.11 Emergency and Fire fighting**

Fire protection will be provided. There will be water sprinklers on the spheres. The truck filling area will be covered by a canopy roof with sprinklers in the roof area and at low level. The pump and compressor platform will have a canopy roof with sprinklers in the



roof area. The cylinder filling shed will have a water sprinkler system installed. The site will have a fire water ring main around the site perimeter with fire water monitors installed at regular intervals. This rising main shall have water through out with enough pressure to supply enough water in case of any fire emergency.

### **3.4 Design and Construction of the Project**

The initial phase for on-shore LPG storage and distribution terminal is for a storage capacity of 20,000 Tons. Two options are being considered storage in Horton spheres and mounded or buried bullets. Appendix A (drawing 6054-001) represents the proposed site layout with 5 x 4000 Tons spheres. The site layouts allow for LPG truck loading facilities for 4 loading bays with three future bays, vehicle inspection and parking bays, cylinder filling carousel building, fire water storage tank and sprinkler systems for the truck loading bays 16 and cylinder filling plant and a fire water hydrant system will run round the perimeter of the site. Storage of full and empty cylinders has been considered.

#### **3.4.1 Civil Structures**

##### **3.4.1.1 Buildings General**

The following new buildings are provided for the new facilities:

- a) Reception (Check-in and check-out facilities)
- b) Control Room (Operator room)
- c) Office (Administration)
- d) Warehouse
- e) Drivers waiting area inclusive prayers room, mess room and Canteen
- f) Substation
- g) Firefighting shed

Some of the above buildings may be combined. Buildings designed for (semi) permanent occupancy are air-conditioned. Other buildings would only be air-conditioned subject to the requirements of the housed equipment.

- a) Control Room: - A common control room for road and rail operations is planned. The control room should be highly protected to be accessed by only authorized personell.
- b) Laboratory: - Assumed Outsourced.
- c) Roads: - New roads and parking areas are constructed using heavy duty pavements, e.g. concrete. This design is strong enough to withstand the heavy machineries. Their building should be on a firm and strong basement to avoid breakage.
- d) Main Access Roads and Fencing: - Main site access is via new Mombasa southern bypass Highway. The security in Kenya requires a double set of gates/fences for truck security inspections. Space for an LPG truck in between the two sets of gates is provided. The second gate is managed by the check-in counter to register the incoming truck in accordance with the operating procedures. Two additional site access gates for railways are required at the north-eastern boundary. Both gates require simple security guard houses. Inside the facility boundary there is a second security fence parallel to the north eastern boundary to segregate the train loading activities from the storage and

truck loading activities. A gate for small trucks and a pedestrian gate across the road leading to the train loading point is also provided. *In this context, the main access road should be well blend with the Mombasa southern by-pass with all safety indications of tracks entering the facility and those leaving the facility.* Security checks for persons entering the facility should be high and anyone entering the facility should be provided with safety gears for protection.

- e) Paving On-plot Paved Area: - All on-plot (concrete) paving, inclusive of expansion joints, are hydrocarbon-resistant, with slopes designed in accordance with drainage requirements. This will allow for ease in drainage to the drainage channels. *The drainage should be designed to carry the worst-case scenario of overflow from the area as a result of variant climate change scenarios.*
- f) Off-plot Paving: - Off-plot paving is kept to a minimum, and is only provided for dedicated parking areas, access for fire-fighting, pump floors, manifolds, cleaning and material storage areas. All such areas are also hydrocarbon resistant, with slopes designed in accordance with drainage requirements.
- g) Parking Areas: - Parking/waiting areas are provided for products and LPG road tank cars awaiting loading and whilst attending to associated paperwork prior to dispatch. Limited parking space is provided adjacent to the new substation. *A specialized parking should also be provided for faulty LPG road tanks to be fixed so that its waste can be managed well to prevent pollution of environment.*
- h) Weighbridges: - Two weighbridges are required for the loading of road and cylinder filling.
- i) Fire fighting shed; The shed should have adequate number of fire hydrants with the capacity to supply water and high pressure at the shortest time possible. They should be easily accessible by firefighting tracks.

**The detailed drawings for the proposed project are attached at the annex.**



## CHAPTER 4

### 4.0 CONSIDERATION OF ALTERNATIVES

#### 4.1 Project alternative considerations

During the course of formulating the proposed project, several project alternatives were considered to ensure that the best option of project development was adopted. The consideration of alternatives is one of the more proactive approaches of environmental assessment. This process serves to enhance the project design through an examination of other feasible options instead of only focusing on the more defensive task of reducing adverse impacts of a single design. Project alternatives have been evaluated by the ESIA team to achieve project objectives while having least adverse environmental impacts. The alternatives assessed during this process include.

##### 4.1.1 Location for the LPG storage plant

The project site was selected based on the following:

- a) The land is available already owned by SEZA that is to be leased to Taifa Gas Investment SEZ Limited for the LPG plant.
- b) The available land is prime for such projects and underutilized.
- c) The location is zoned as an industrial area.

##### 4.1.2 Storage Type alternatives

During the initial conceptualization stages of the project, multiple storage mediums were considered based on several factors such as special constraints, environmental factors and economic benefits. The first step in selecting the storage type was to begin between determining which of the two below options would be utilized.

- a) Refrigerated Storage Tanks or
- b) Pressurized Storage Tanks

As per applicable standards and codes, refrigerated tanks are ideal for large capacities of approximately 42,000MT or more. Pressurized storage tanks are applicable for capacities less than 42,000MT and the proximity to the port (10 km away from the discharge). In this case, lag pipes will be used. Following the selection of the pressurized tanks, the next stage was to determine the ideal storage type within the proposed project site. Due to several factors such as large communities based in close proximity i.e. within 1km, to the site, as well as available space considerations, the following storage types were considered:

- i. Caverns;
- ii. Spherical Tanks;
- iii. Aboveground Tank; and
- iv. Mounded Bullets.

The cavern type of storage was not considered in great detail due to the required capacity not meeting the minimum threshold to utilize this form of storage. As for aboveground bullets, the site limitations in terms of space and excessive requirement of firefighting capacity mean that this too was eliminated before further analysis.

#### **4.1.3 Alternatives to site**

No alternative was considered in the study as the said land has been leased to Taifa Gas Investment SEZ Limited for the proposed project. The consulting team however carried out an evaluation within the project area taking records of observation. The evaluation was based on how the proposed project is likely to affect the neighboring community and the land use which is industrial zones.

#### **4.1.4 LPG Storage Technology alternatives**

Project has advocated the procurement of environment friendly LPG through import, in order to meet the primary and secondary demands of energy sector. Currently, the majority in the rural regions prefers inefficient wood fuel and charcoal for supply of heat energy. The technology alternatives for importation, refining, storage, handling and transportation of LPG are limited and have been greatly reduced after the only refinery in the region, Kenya Petroleum Refineries Limited (KPRL), ceased operations a couple of years ago. This therefore means that the only source of supply for LPG in the region is through imports. This is widely viewed as the most cost-effective option.

#### **4.1.5 Alternative to Additional Import Pipeline Design**

Alternative designs for various components of the pipeline and other infrastructure components have been subjected to cost benefit analysis to select the best option considering safety, environment and cost. The contractor will incorporate the LPG line with appropriate modifications. This will include enhanced monitoring, leak detection, fire suppression and firefighting. Enhanced evacuation mechanism will also be included in the safety procedures to be put in place to address occurrence of disaster.

#### **4.1.6 Do Nothing Alternative**

The 'do-nothing' alternative is the option of not establishing the proposed LPG project at the identified site at Dongo Kundu Special Economic Zone. 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.

## **CHAPTER 5**

### **5.0 BASELINE ENVIRONMENTAL AND SOCIAL CONDITIONS**

#### **5.1 Projects location**

The project is to be set up at SEZA in Dongo Kundu Mombasa County on LR.NO Mombasa/Mainland South /Block Iv/247- Portion. Bubu Sub-location, Mbuta Location, Likoni Sub-county, Mombasa County.

#### **5.2 Mombasa County**

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 of Dongo Kundu Likoni Subcounty of Mombasa County. Information was mainly obtained from the Mombasa County Integrated Development Plan 2018-2022).

#### **5.3 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 to the national household size of 3.9. 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.

#### **5.4 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.

#### **5.6 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. A transect walk across the project area showed diverse crops planted in the area: coconuts, beans, maize, and mangoes.



**Livestock Grazing in the Project Area**



**Coconuts Grown in the Project Area**

### **5.7 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 °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 averagetemperature 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.

### **5.8 Wind partners**

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.

## 5.9 Drainage and Hydrology

The major drainage of the coastal area of Kenya follows the general dip towards the east-south-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.

## 5.10 Water situation at the proposed project site

In regard to waste water, majority of the waste water is directed into the ocean thus marine pollution. The Coast Water Works Development Agency is overseeing the construction of Changamwe Repooling Sewer Network. The project intends to connect about 10,000Nr households and help to protect the environment.

Currently, the government is expediting the construction of the Mwache Multi-purpose dam in Kwale County in order to ensure it's able to meet 100 per cent demand in Likoni and adjacent areas. It is projected to be achieved in 2026 when the demand to Likoni and its neighbouring areas alone will increase to 10,500 litres a day. The Water supply to the Dongo Kundu Special Economic Zone is essentially the largest component for the successful implementation SEZ.

## 5.11 Water Infrastructure

### 5.11.1 Water Sourcing:

There are 3Nr drilled boreholes under Phase I of the implementation of water supply for Dongo Kundu Special Economic Zone area which is supplying 3000 cubic metres per day. The project largely involved construction and installation of the pipeline, air valves, section valves and washouts.

The 3Nr boreholes are

- Intake One:-Chai, Intake Two- Pongwe;
- Intake Two and Three- Dzangazangani located in the Tiwi and Waa locations of Matuga sub County in Kwale. Yields from the three intakes are 50, 11 and 36 cubic metres per hour equivalent to combined yield of 97 M<sup>3</sup>hr<sup>-1</sup> and 2,328 M<sup>3</sup> per day respectively.

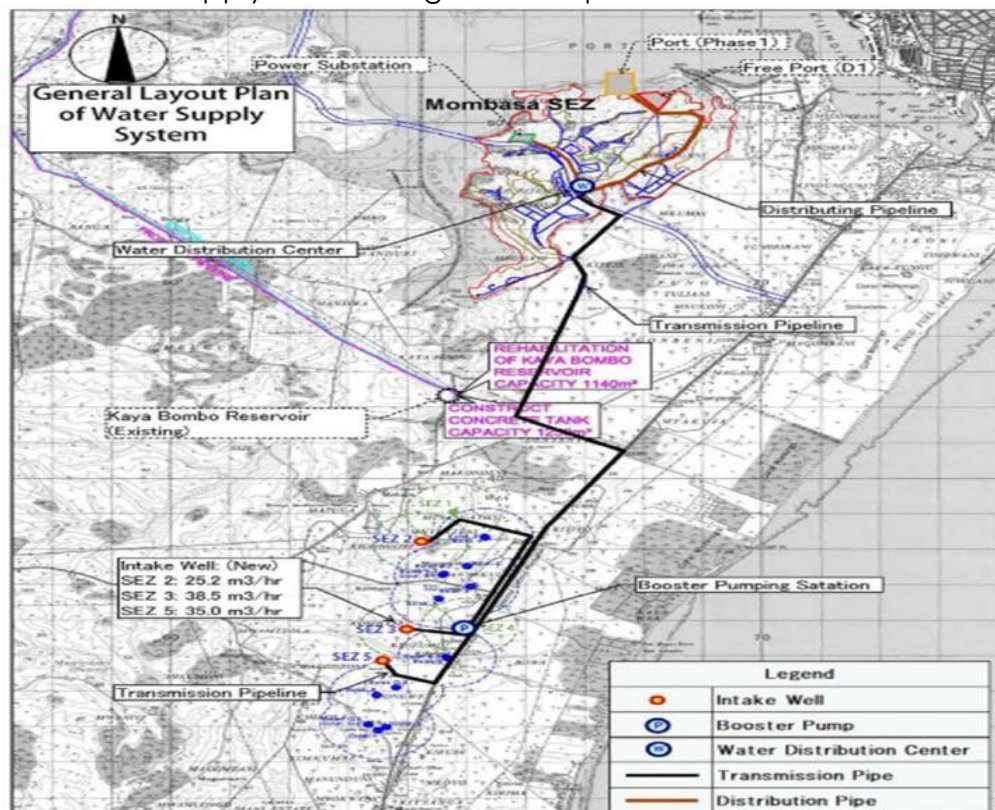
Boreholes	Location	Eastings	Northings
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Intake 1	Tiwi	563464.5	9534781.9
Intake 2	Waa	563852.2	9535723.1
Intake 3	Waa	564459.1	9538147.5

Table 1: SEZ Drilled Boreholes and unequipped Boreholes

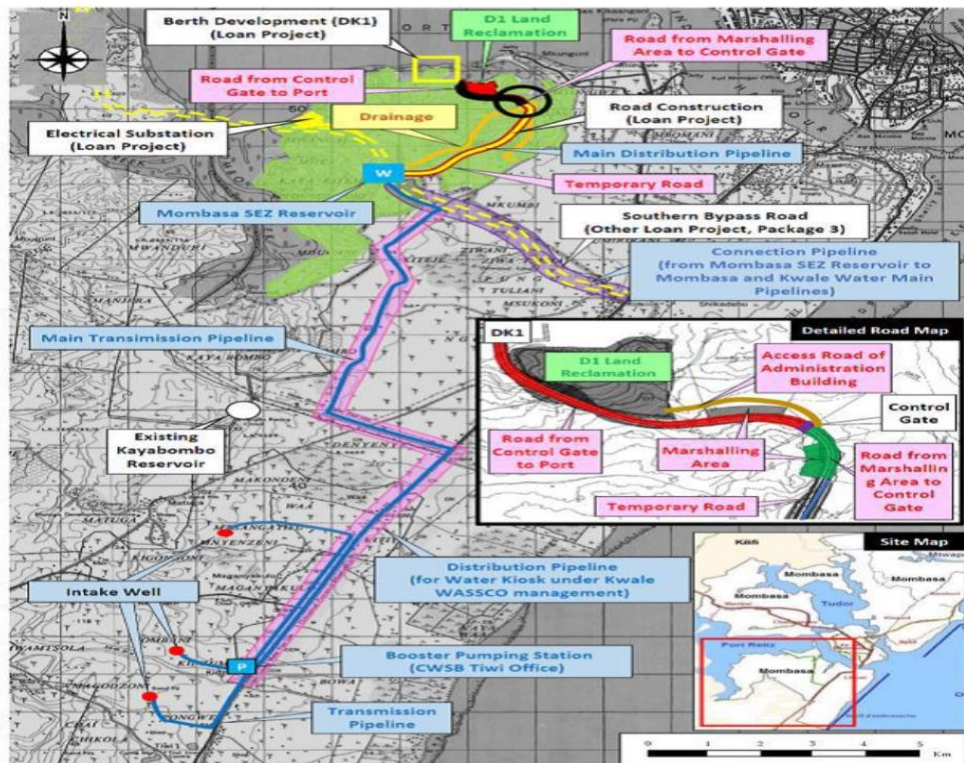
There is a water distribution network implemented with the SEZ land heading up to the port through 2Nr free ports. The figure below illustrates the implemented network under Phase I of the water supply to the Dongo Kundu Special Economic Zone.



**Figure 1-5: General layout Plan of the implemented Phase I of Water supply network for Dongo Kundu Special Economic Zone**

Phase II of the water supply network is currently on-going which intends to increase the capacity up to 10,500 cubic metres per day. It involves equipping the boreholes piping of about 3km. Water from the three wells are to be transmitted by pipelines to the proposed Coast Water Works Development Agency pumping station at Tiwi Water offices (Hosting Boreholes Nr 6.1, 6.2 and 3) and then will be pumped through a main distribution line to a proposed new reservoir to be constructed in the Dongo Kundu Special Economic Zone area.

The proposed of the 25kilometer transmission and distribution network development linking the intakes in Tiwi to the Dongo Kundu through proposed Tiwi pumping station. It transverses through the A7 road linking Mombasa to Tanzania, then runs through rural development roads and sections of Kwale County roads and sections of Coast Water works development agency land.



**Figure 1-6: Entire water supply infrastructure for Dongo Kundu Special Economic Zone**

In terms of storage, there is a proposed 1000m<sup>3</sup> capacity reservoirs to be constructed within the Dongo Kundu area from where it will be reticulated by gravity flow through a 12kilometer pipeline. There is a proposed additional 10km pipeline to connect the reservoir to Mombasa water pipeline to channel water to Likoni areas which borders Dongo Kundu area which has a receives less than 50 per cent of its demand.

## 5,12 Current Conditions of Water Supply System

Mombasa County does not possess any big surface water sources. It heavily relies on it neighbouring counties water sources to meet its potable needs. The main water sources for the Mombasa County is Baricho Well field, Marere Springs in Kwale, Tiwi well field and Mzima springs. Besides these sources are shallow wells and private owned boreholes (majority are salty just meeting the acceptable standards).

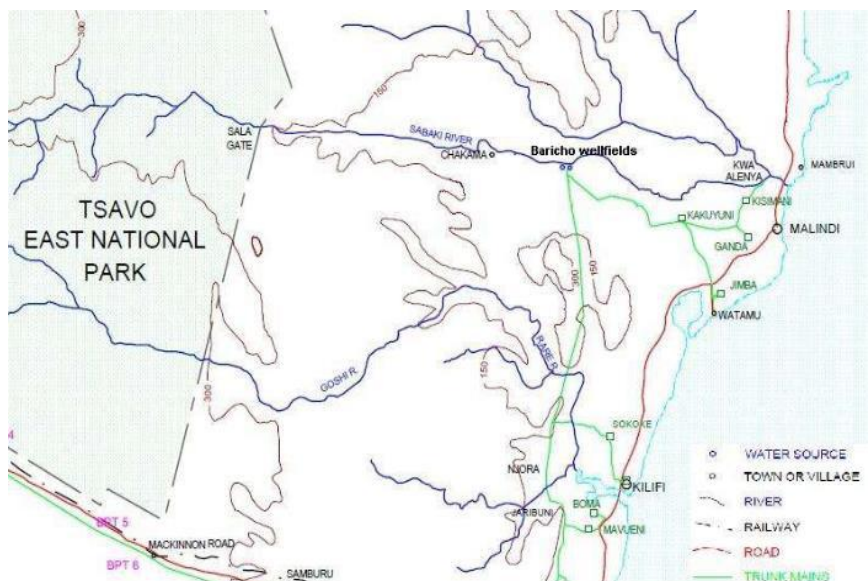
Major existing water sources serving Mombasa include:

- Marere Spring
- Tiwi Well field
- Baricho well field
- Mzima Springs



**Figure 1-7: Overall Main water sources for Mombasa County**

- Baricho Wellfield – Capacity 90,000 m<sup>3</sup>/d, serving Mombasa North Mainland and Island, as well as towns located in other counties (Malinda, Watamu, Kilifi, Mtwapa and enroute population); Baricho is nearly 100 km on the Sabaki River and requires pumping to a height of 150 m. In addition, the capacity of the pipeline Baricho severely limits the volumes sent to Mombasa.

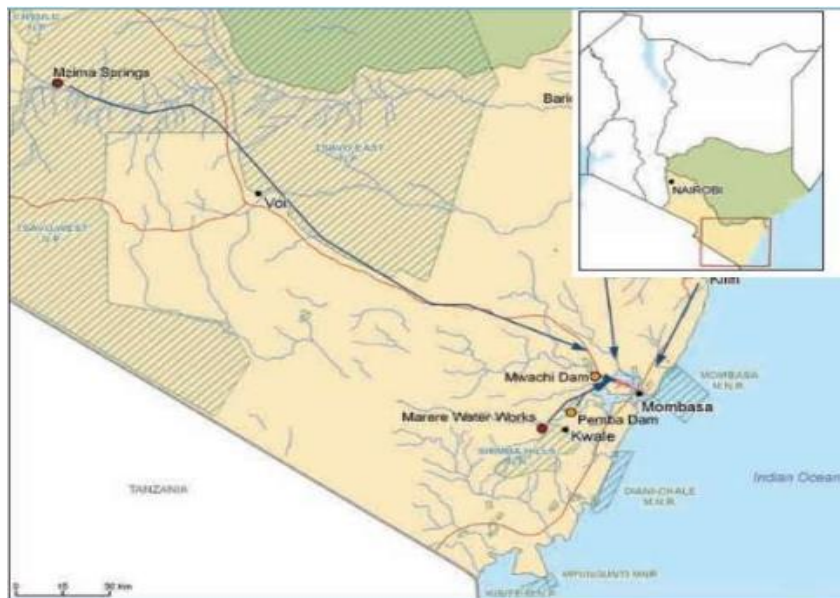


**Figure 1-8: Baricho well field existing Water trunk**

- Mzima Springs – Capacity 35,000 m<sup>3</sup>/d, serving Mombasa West Mainland & Island, as well as towns located in other counties (Voi, Maungu, Taru, Samburu, Mariakani,



Mazeras and enroute population); Mzima spring at the foot of Mount Kilimanjaro is more than 218 km away in the Tsavo West National Park West.



**Figure 1-9: Mzima Spring mains transmission water supply line**

- Marere Springs – Capacity 12,000 m<sup>3</sup>/d, serving Mombasa West Mainland, as well as towns located in other counties (Kwale, Kinango and enroute population);



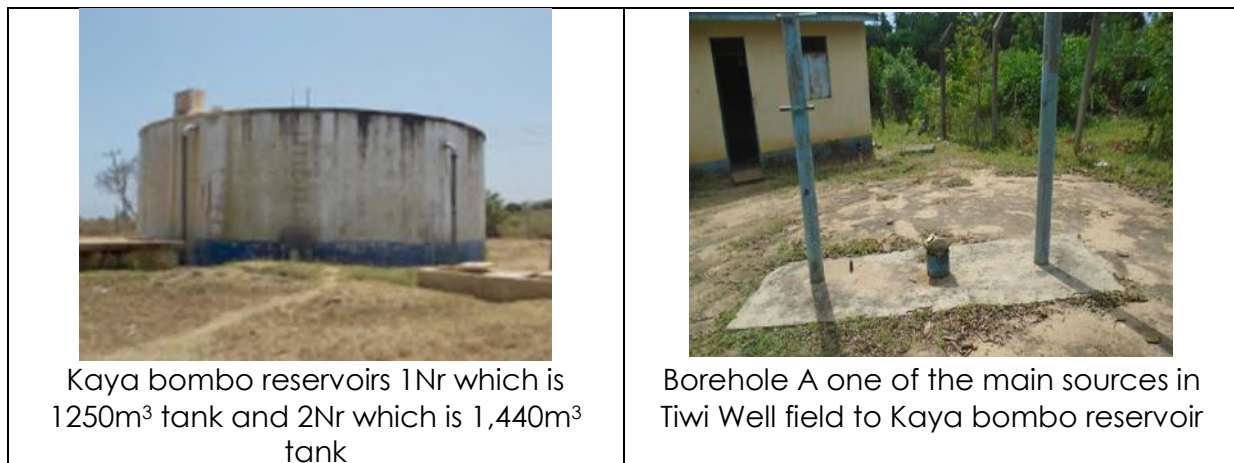
**Figure 1-10: Marere Spring Existing Networks**

- Tiwi Boreholes – Capacity 15,000 m<sup>3</sup>/d, serving Mombasa South Mainland (Likoni Area), as well as towns located in other counties (Ukunda, Tiwi and Matuga).



**Figure 1-11: Tiwi Well field existing network including kaya bombo reservoir**

The capacity of the existing sources is inadequate to meet the present water demand in the target service areas. The available volume of drinking water is currently under 50,000 m<sup>3</sup>. The figure below shows the existing water sources and storage reservoirs from the Tiwi well field used to supply water to Mombasa County.



**Figure 1-12: Tiwi well field used to supply Likoni area**

The Kaya bombo Reservoirs receives water from Marere Springs and Tiwi Well-field to supply to Likoni in the south of Mombasa. The current supply is not sufficient thus there is on-going works to increase the capacity by drilling new 2Nr boreholes and also to replace the worn out Marere pipeline to increase capacity and as well minimise losses. The reservoirs however are not in proper structural state however will be rehabilitated under the same works contracts.

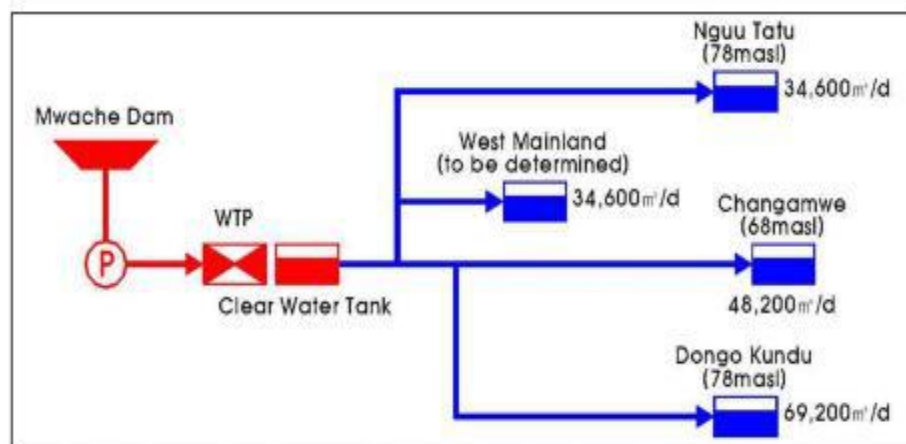
The major challenges regarding water supply within the Dongo Kundu areas and its adjacent are: -

1. Inadequate water sources
2. Groundwater pollution
3. Encroachment of ground water recharges areas.
4. Salinity of groundwater
5. High levels of Non-revenue water
6. Low development of infrastructure development and generally old facilities

Currently, half of the population is connected to the network and the informal distribution is thriving. Neither the port, nor the airport now has the volumes required for normal activity. The situation can be considered critical, in particular in Likoni (South Mainland) area where the water availability is often below 2.5 l/d/inhabitant.

### 5.13 On-going Works Contract:

There is a major multi- donor funding for the Mwache Multi-purpose dam that is currently on-going. It is situated across the Mwache River at the Fulugani village in Kinango Sub-County in Kwale County. The Mwache multi-purpose dam has an 87.5-meter-tall concrete gravity dyke, impounding 118 million cubic meters of water with a daily supply of 186,000 cubic meters of water. These separate pipelines will transmit bulk water to main service reservoirs by gravity. The new Dongo Kundu service reservoir tank (supply volume 69,200 m<sup>3</sup>/d, tank capacity 23,000 m<sup>3</sup>) will be located near the Dongo Kundu Special Economic Zone. The water allocation to each service reservoir is based on the Water Supply Master Plan as shown in figure below: -



**Figure 1-13: Proposed water supply allocation for Mwache multipurpose dam through Hydraulic Concept of Water Transmission Facilities**





- iii. On the Kilindini sands are also found areas with very deep soils of varying drainage conditions and colour, variable consistency, texture, and salinity.
- iv. 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.
- v. On the coastal uplands, composed of the raised areas in Changamwe and western parts of Kisauni, two soil types are dominant
- vi. 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.
- vii. 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 humic topsoil and a sodic deeper subsoil.
- viii. Soil sampling was conducted on 23-24 April 2022 in accordance to the USEPA SOP on Field Sediment Sampling. The soil samples were collected from 4 predetermined locations. The samples were collected from the ground at a depth of 0.2 meters directly using a manual hand held trowel. The samples were placed in zip bags and then cooled by ice packs in a cool box at a temperature of 4° C and transported to the laboratory for analysis using standard approved methodologies.
- ix. Water sampling was done on 23-24 April 2022; water samples were collected from different sampling points as shown in diagram 4. The samples were collected by use of sampling bottles, preserved in cool boxes, transported to the laboratory for analysis using standard approved methodologies.
- x. The results of the water parameters tested were within the acceptable limits as stipulated in the EMCA (Water Quality Regulation), 2006 Legal Notice 120 of for Quality Standards for Sources of Domestic Water (First schedule). These results could have been influenced by seasonality i.e rainy and dry seasons.
- xi. The analysis results indicates that the soil quality with reference to the measured parameters values of heavy metals are within the guideline values in accordance to the Standard Chemical Compound Values Based on Dutch standard. Oil & Grease was not detected in all the sampling points.

### **5.15 Noise**

The measurements were performed using Noise Meter complying with international standards for sound level meter specifications IEC 61672:1999, IEC 61260:1995 and IEC 60651, as well as ISO 19961:2003 and ISO 3095:2001 for the measurement and assessment of environmental noise.

Significant noise was emitted from various sections of the environment. The highest level was measured at the drilling area. Most of site areas registered low values below the



Kenyan Regulatory limits stipulated in the Factories and other places of work (Noise Prevention and Control) Rules 2005, Environmental noise were also above the Environmental Management and Coordination (Noise and Excessive Vibrations) Regulations, 2009 for commercial zone of 60dB during day and 35dB at night which were influence with external sources especially at night.

A baseline noise survey was conducted during the field survey in ten areas monitoring points as shown in the map below. The survey data was gathered to calculate an average daytime and nighttime noise level for each of the chosen locations.

#### **5.16 Bio-physical Environment of the study area**

The proposed project will be established in Dongo Kundu 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. Vegetation to be cleared will mainly be not endangered

#### **5.17 Social economic conditions, national and regional land use policies**

The proposed project land use zoned as an industrial land, there are numerous shipping companies near the proposed site. The architectural plans must be approved by The Mombasa county council. The national land planning policy in Kenya is to achieve sustainable development and is generally viewed in the context of resource exploitation, poverty eradication, conflict resolutions, public participations, equality and policies to achieve regional balance. LPG storage and filling plant is ideal for this proposed site.

#### **5.18 Information, Communication and Technology (ICT)**

ICT is important in all sectors of development: health management, natural resources management, partnership, education, rural women empowerment, youth empowerment and sustainable poverty reduction etc. The SEZA, the communication network in the entire project area is fairly developed with 3 networks (Safaricom, Airtel and Telkom.). According to Mombasa County Annual Development Plan 2020/2021, the mobile phone network coverage is 87%, with Safaricom network having the largest coverage. Other services available include radio and television waves.

#### **5.19 Accessibility to the Project Area**

The project area can be accessed through the Port Access Road currently being constructed by Kenya National Highways Authority (KeNHA).

#### **5.20 Energy Availability**

The project area is connected to the Kenya Power and Lighting Company (KPLC) and some of the households within the project area are connected to the grid. The Project Area has a huge potential for other energy sources that include: wind, solar and bio-fuels whose exploitation has been significant. Other sources of energy in the project area are

fuel wood, charcoal and paraffin. The most commonly used among these is fire wood and charcoal and no one is using Liquified Petroleum Gas (LPG).

### **5.21 Health Facilities**

The health sector is an important development segment for the empowerment and well-being of a society. Mbuta Model Health Center is 2.5km from the project area and serves the SEZA community.



**A health Facility in the Project Area**

### **5.22 Education Facilities**

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.

Education sector is critical in providing the skills that will be required to steer the location to the economic and socio goals of vision 2030. Although the sector has faced serious challenges over the years relating to access, equity, quality, financing, and relevance, significant achievements have been made over the years. There are two institutions within the project area: Mwangala Primary School and Bububu Secondary school which are located approximately 2.3 kms from the project area. Tertiary institutions are located in Likoni.



**Educational Institutions within the Project Area**

### **5.23 Tenure System and Land Use**

SEZA is public land owned by the government according to the article 62 of the Kenyan constitution. The main land use in the in the project area is residential and partly farming which changes to industrial with the development of the Taifa LPG Storage Plant.

### **5.24 Housing Structures**

The type of housing that exists in the project area consists of semi-permanent and permanent houses. Most of the permanent structures are made of stones, bricks, tiles, iron sheets and mud wall. The sample type of housing distribution in the project area is given in Plate 4 below.



### **5.25 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.

## **CHAPTER 6**

### **6.0 STAKEHOLDER CONSULTATIONS**

Stakeholder participation during project planning, design and implementation is widely recognized as an integral part of environmental and social impact assessment for projects. It is a two-way flow of information and dialogue between project proponents and stakeholders, which is specifically aimed at developing ideas that can help shape project design, resolve conflicts at an early stage assist in implementing solutions and monitor ongoing activities. Stakeholder consultation is a process and would continue through project implementation to provide information to identified stakeholders.

#### **6.1 Objectives of the Stakeholder Engagement**

The main objective of the consultations with stakeholders is to discuss the proposed project and the associated environmental and social implications and to identify alternatives and avenues for feedback and grievance redress. Specifically, the consultations seek to achieve the following objectives:

- i. Identify and categorize the stakeholders of the Project based on their level of interest and influence, and extent to which they are impacted by the project;
- ii. Provide information about the proposed project and develop an effective two-way
- iii. communication channel between project proponents and stakeholders;
- iv. Effectively communicate key project information such as construction timelines and work schedules to stakeholders, particularly project affected communities and persons;
- v. Provide opportunities for stakeholders to express their views and make inputs into the project through continuous involvement and providing feedback on their contributions;
- vi. To provide and discuss with stakeholders the alternatives considered to reduce anticipated impacts;
- vii. To identify and verify significance of environmental, social and health impacts;
- viii. To inform the process of developing appropriate mitigation and management options; and
- ix. Establish a mechanism for receiving and addressing grievances in a timely manner.

#### **6.2 Guiding Principles of the Stakeholder Engagement Plan**

The stakeholder engagement plan for the Project is in accordance with the requirements of EMCA Act 2009 (amended, 2015). The stakeholder consultation was carried out in a manner that: -

- a) Targeted those most likely to be affected by the project;
- b) Early enough that key issues were scoped and their effect to the project discussed;
- c) Key information about the proposed project was delivered in a meaningful and in a readily understandable format and the techniques used were appropriate;

- d) The engagement was a two-way so that both sides have the opportunity to exchange views and information, to listen, and to have their issues addressed;
- e) Localized to reflect appropriate timeframes, context, and local languages;
- f) Free from manipulation or coercion;
- g) Documented to keep track of who has been consulted and the key issues raised;
- h) Reported back in a timely way to those consulted, with clarification of next steps; and
- i) Ongoing as required during the life of the project

### **6.3 Stakeholder Identification**

In order to gain public views, concern and values with regard to the proposed Taifa Gas Investment SEZ Limited project, public living within and in close proximity to Special Economic Zone Authority (SEZA) and other key stakeholders were identified and consulted. Through this, it is anticipated that there might be possible conflicts between the key stakeholders, Project Affected Persons (PAPs), community members living in close proximity to the Taifa LPG Gas project, interested parties, mandated government agencies, among others, would be addressed and solved at an earlier stage. Possible delays in project implementation and extra costs will be avoided.

### **6.4 Stakeholders Engagement Plan (SEP)**

#### **6.4.1 Overview of the SEP**

The goal of this Stakeholder Engagement Plan is to build an informed stakeholder support base, ownership and provide adequate stakeholder participation space and modes of communication for the successful implementation of the project. Key objectives of this Stakeholder Engagement Plan are to:

- i. Identify project stakeholders and understand their interests, concerns and influence in relation to project activities;
- ii. Provide stakeholders with timely information about the project;
- iii. Give stakeholders the opportunity, through consultation and other feedback mechanisms, to express their opinions and concerns about the project;
- iv. Assist in building strong relationships with the local community and reduce the potential for delays through the early identification of issues to be addressed as the project progresses.
- v. Document practical engagement strategies, achievements and lessons learnt.

The rationale for this Stakeholder Engagement Plan (SEP) is to ensure that the stakeholders' involvement, participation and commitment in making decision in the project activities is well implemented.

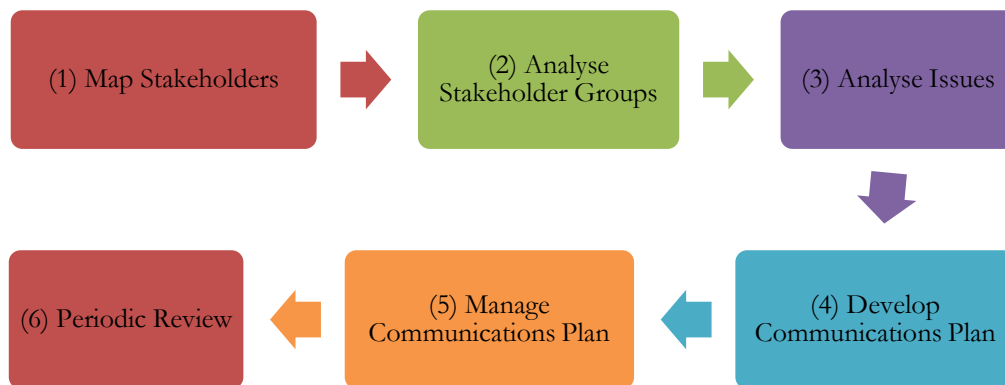
Communication is critical to transmission of clear concise and factually correct information, either through inter-personal communication or communication with a group of persons.

Some of the key risks to poor communication for this phase of the project include:

- a) Reduced community buy-in on critical project needs such as material sources;
- b) Misinformation on project activities, impacts and outcomes resulting in disagreement and in heightened cases, demonstrations (non-violent and violent) by aggrieved communities;
- c) Growing opposition to the project and its staff;
- d) Increased costs and serious delays in project implementation due to stakeholder and community objections to the project.

#### 6.4.2 Stakeholder Involvement Process

The Consultant developed a stakeholder engagement strategy which ensures that all stakeholder interfaces are managed based on their needs, interests, and influence during this assignment. The strategy focuses on both formal stakeholder engagement and day-to-day relationship management as outlined in Figure 1-19.



**Figure 1-19 : Stakeholder Management Process**

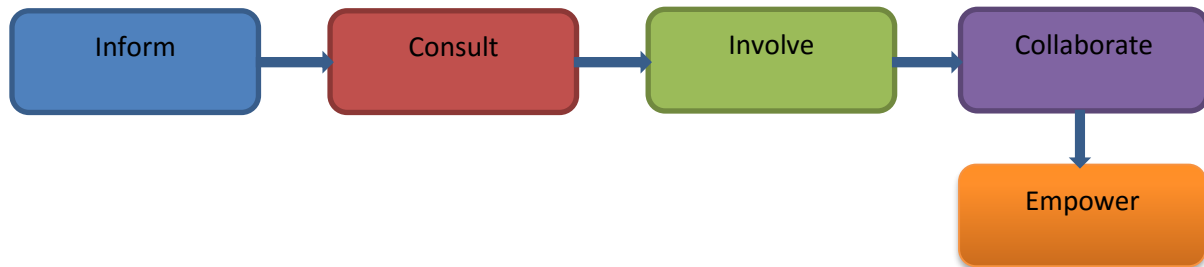
The benefits of this approach include:

- a) Gaining a full understanding of all the stakeholders, their needs and appropriate communication channels can increase the likelihood of the project's success.
- b) Having clear 'owners' and strategies for key stakeholders helps get closer to their needs and ensures that messages are consistent and appropriate.
- c) It provides a structure that can then be reviewed regularly, enabling the approach to be flexed to achieve overall project success.

#### 6.4.3 Stakeholder Consultation Process

For setting up the Taifa Gas Investment SEZ Limited project, the potential impacts and the types and needs of stakeholders, the Consultant adopts a number of levels and strategies of engagement across this spectrum using a variety of different tools as presented in Figure 1-20 below





1. Inform: Provide stakeholders with balanced and objective information to help them understand the project, the problem, and the solution alternatives. (There is no opportunity for stakeholder input or decision-making.). This is done through the various stakeholder engagement meetings held.
2. Consult: Gather feedback on the information given. Level of input can range from minimal interaction (online surveys, etc) to extensive. Can be a one-time or ongoing/ iterative opportunity to give feedback to be considered in the decision-making process. This is done through the various stakeholder engagement meetings held.
3. Involve: Work directly with stakeholders during the process to ensure that their concerns and desired outcomes are fully understood and taken into account at each stage. Final decisions are still made by the consulting organization, but with well-considered input from stakeholders through public participations.
4. Collaborate: Partner with stakeholders at each stage of the decision-making, including developing alternative solution ideas and choosing the preferred solution together. Goal is to achieve consensus regarding decisions. Achieved through presentations to Taifa Gas Investment SEZ Limited.
5. Empower: Place final decision-making power in the hands of stakeholders. This level of stakeholder engagement is rare and usually includes a small number of people who represent important stakeholder groups. A final report being submitted to Taifa Gas Investment SEZ Limited.

#### **6.4.4 Project Stakeholder Identification Process**

The Primary stakeholders consulted during the ESIA study include the following groups:

- i. Project Affected Persons (PAPs) i.e., persons leaving on the project site;
- ii. The SEZA Committee in place;
- iii. Kenya Power and Lighting Company (KPLC);
- iv. Mombasa Water Supply and Sewerage Company (MWSC);
- v. The Kenya Forest Services (KFS);
- vi. The Kenya Wildlife Services (KWS);
- vii. Special Economic Zones Authority (SEZA);
- viii. Kenya National Highways Authority (KeNHA-Port Access Road).
- ix. Kenya Ports Authority (KPA);

- x. Kenya Maritime Authority (KMA);
- xi. Kenya Navy Services (KNS);
- xii. Energy and Petroleum Regulatory Authority (EPRA)
- xiii. National Government-Ministry of Industrialization;
- xiv. National Government-Ministry of Energy;
- xv. Mombasa County Government;
- xvi. Mombasa County Government –Ministry of Industrialization;
- xvii. Mombasa County Government –Ministry of Energy;
- xviii. National Land Commission (NLC);
- xix. National Environmental Management Authority (NEMA);
- xx. Energy Regulatory Authority (ERA);
- xxi. Directorate of Occupational Health and Safety (DOSHS).

The secondary stakeholders to be consulted include:

- i. Water Resource Authority (WRA);
- ii. National Government (CC, DCC, ACC, Mbuta Location Chief);
- iii. Mombasa County Government -Gender and Social Services Department;
- iv. Mombasa County Government -Livestock and Fisheries department; and;
- v. Civil Societies Organizations identified;
- vi. Non-Governmental Organizations (NGOs) in the project area;
- vii. Community Based Organizations (CBOs) in the project area;
- viii. Self Help Groups in the project area;
- ix. Religious Leaders in the project area;
- x. Structures next to the project site (Businesses and homesteads);
- xi. Any other Person of Relevance to the Project.

#### **6.4.5 Stakeholder's Relevance to the Project**

Once the above stakeholders have been identified on the ground, a further analysis will be done to better understand their relevance and the perspective they offer, to understand their relationship to the project issues and each other, and to prioritize based on their relative usefulness for this engagement. Table 6-1 outlines the overall project Stakeholder's relevance to the project.

**Table 6-2 : Stakeholder Engagement Plan**

S/N	Stakeholder	Impact	Influence	Relevant Roles in the Project Context	Engagement Strategy	
					Approach	Frequency
1	SEZA	High	High	Issuance of leasing agreement to Taifa Gas Ltd Renewal of the leasing agreement	Consult	Regular Meetings
2	KFS	Medium	Medium	Protection of the indigenous trees in the project area.	Consult	Consultative Meeting
3	KeNHA	Medium	Medium	Provision of the access to the project area through the Port Access Road.	Consult	Consultative Meeting
4	KWS	Low	Low	Protection of the wildlife in the project area	Consult	Consultative Meeting
5	Mombasa Water and Sewerage Supply Company	Medium	Medium	Provision of piped water in the project area	Consult	Regular Meetings
6	KPLC	High	High	Provision of electricity to the project area.	Consult	Regular Meetings
7	The SEZA Committee in place	Medium	Medium	Compliance to the MoU in place Provision of human resources	Consult	Consultative Meeting
8	Kenya Navy Services	Medium	Medium	Provision of navigations charts	Consult	Consultative Meeting
9	Structures next to the project site (Businesses and homesteads)	Medium	Medium	Provision of harmonious working environment for the project to achieve its objectives.	Consult	Consultative Meeting
10	Project Affected Persons (PAPs)	Medium	Medium	Relocate and pave way for the project	Consult	Consultative Meeting
11	Ministry of Industrialization (National and County Government)	High	High	Approvals for the operation of the project.	Consult	Consultative/ Regular Meetings
12	Ministry of Energy	High	High	Provision of guidelines on how to operate the company.	Consult	Consultative/ Regular Meetings

	(National and County Government)					
<b>13</b>	Mombasa County Government	High	High	Integration and harmonization of design with county government development plans.	Consult	Consultative Meeting
<b>14</b>	National Government (County Commissioner's Office)	High	High	<ul style="list-style-type: none"> <li>• Mobilization of the enumerators, households, project affected persons during the socio-economic baseline survey and for public meetings.</li> <li>• Provision of relevant documents for project implementation.</li> </ul>	Consult	Consultative Meeting
<b>15</b>	WRA	High	High	Provision of relevant data and licence for hydrological analysis	Consult	Consultative Meeting
<b>16</b>	NEMA	High	High	Approval of the ESIA Licence Approval of the Annual Audits	Consult	Consultative/ Regular Meetings
<b>17</b>	Energy Regulatory Authority (ERA)	High	High	Provision of the permit to operate the project.	Consult	Consultative/ Regular Meetings
<b>18</b>	Mombasa County Government - Gender and Social Services Department	Low	Low	Inclusion of women and youth in the project.	Consult	Consultative Meeting
<b>19</b>	Mombasa County Government - Livestock and Fisheries department	Low	Low	Management of fishermen in the project area, livelihood restoration.	Consult	Consultative Meeting
<b>20</b>	EPRA	High	High	Regulatory entity	Consult	Consultative/ Regular Meetings
<b>21</b>	Kenya Ports Authority (KPA)	High	High	Provision of harbour services	Consult	Consultative/ Regular Meetings
<b>22</b>	Kenya Maritime Authority	Medium	Medium	Protection of the marine life	Consult	Consultative/ Regular Meetings
<b>23</b>	Directorate of Occupational	High	High	Registration of the workplace and ensuring the injured workers are compensated	Consult	Consultative/ Regular Meetings

	Health and Safety (DOSH)					
<b>24</b>	Religious Leaders in the project area	Low	Low	Part of the SEZA Committee Inclusion In the project life cycle	Consult	Regular Meetings
<b>25</b>	Civil Societies identified Non-Governmental Organizations (NGOs), Community Based Organizations (CBOs) and Self Help Groups in the project area	Low	Low	Watch dog for the community	Consult	Regular Meetings

#### 6.4.6 The Public Consultation

The public has been consulted through five (5) consultative forums as indicated in Table 6-2 below. Minutes and attendance list are attached as appendix one and two of this report.

**Table 6-3: Summary of the Engagement Meetings Conducted**

Date	Venue	Type of Meeting	No. of Participants
29/03/2022	At the Project Site	Introductory site visit	20
06/04/2022	Bahari Beach Hotel	Elders Meeting	5
08/04/2022	Bahari Beach Hotel	Meeting opinion leaders/SEZA Committee	32
09/04/2022	SEZA on site	Meeting PAPs	13 (F3)
12/05/2022	Mombasa Beach Hotel	Public participation meeting	51

**Stakeholder's engament photos of the project are presented below.**



**Plate 1: Introductory Site Visit Photos (29/3/2022)**





**Plate 2: Meeting at Bahari Beach Hotel with Elders (6/4/2022)**



**Plate 3: Meeting the SEZA Committee at Bahari Beach Hotel (8/4/2022 )**





**Plate 4: Multi-stakeholder Engagement at the Mombasa Beach Hotel ( 12/05/2022)**

#### **6.4.7 Community perceptions on the Project**

During the consultative sessions it was evident that the community embraced the Project and are appealing to the government to let their youths be involved in the construction activities and be resettled in time.

SEZA should ensure that all the persons living in the project area have been fully relocated and compensated for their structures.

It was clarified that the project will be connected the KOT.

On land ownership, there had been meetings in the months of April and May 2022 between KPA and the SEZA committee and that a Replacement Action Plan (RAP) was already in place which had been adopted by the Government of Kenya that states that the community will be resettled within Dongo Kundu. It was noted that the SEZA master plan had not factored in the RAP and that an updated master plan was needed to include the 367 Acres identified for resettlement of the local community, which would result in the amalgamation of gazetted land in Dongo Kundu.

Kenya Navy raised concerns of safety with particular interest to the navigation of vessels (in charting) and that notifications are usually given to the UK Hydrographic Office for changes to charts. It was noted that any adjustments made to the designs, especially in the laying of the pipeline should be communicated to the Navy for updating.

**Other information with regards to stakeholder's engagement activity are in the social reports and minutes from the meetings that are attached at the annex.**



## CHAPTER 7

### 7.0 IMPACT ANALYSIS APPROACH AND METHODOLOGY

This chapter presents the methodology used to assess the significance of impacts that may result from the Taifa Gas investment SEZ Limited Liquid Petroleum Gas (LPG) Storage Plant project. It outlines general assessment methods and presents the criteria for determining receptor sensitivity, impact magnitude and impact significance.

### 7.1 Impact Assessment

The impact assessment for this study includes;

- i. Identification of Potential Environmental and Social Issues and Impacts;
- ii. Evaluation and interpretation of impacts; and
- iii. Impact Mitigation and Control.

#### 7.1.1 Identification of Potential Environmental and Social Issues and Impacts

The potential environmental and social impacts of the proposed project have been identified and assessed as positive/beneficial or negative/adverse. The potential impacts of the Project have been identified and described for the various phases of the Project including impacts resulting from:

1. Preparatory/planning phase activities;
2. Construction phase activities;
3. Operational phase activities; and
4. Decommissioning phase activities.

#### 7.1.2 Evaluation and Interpretation of Impacts

The significance of each impact has been evaluated and compared with national, international as well as applicable industry standards. The methodology for evaluating an impact is outlined below:

##### 7.1.2.1 Impact Identification and Characterisation

Impacts are described in terms of their characteristics, including the impact's type and the impact's spatial and temporal features (namely extent, duration, scale and frequency). The definitions of the terms used are described in Table 7-1.

**Table 7-1:- Terms used**

Characteristic	Definition	Terms
Type	A descriptor indicating the relationship of the impact to the Project (in terms of cause and effect).	Direct - Impacts that result from a direct interaction between the Project and a resource/receptor (e.g., between occupation of a plot of land and the habitats which are affected).

		<p>Indirect - Impacts that follow on from the direct interactions between the Project and its environment as a result of subsequent interactions within the environment (e.g., viability of a species population resulting from loss of part of a habitat as a result of the Project occupying a plot of land).</p> <p>Induced - Impacts that result from other activities (which are not part of the Project) that happen because of the Project.</p> <p>Cumulative - Impacts that arise because of an impact and effect from the Project interacting with those from another activity to create an additional impact and effect</p>
Duration	The time period over which a resource / receptor is affected.	<p>Temporary - (period of less than 3 years - negligible/associated with the notion of reversibility)</p> <p>Short term - (period of less than 5 years i.e. production ramp up period)</p> <p>Long term - (period of more than 5 years and less than 15 years i.e. life of plant)</p> <p>Permanent - (a period that exceeds the life of plant – i.e. irreversible. Or may last for a very long time)</p>

Extent	The reach of the impact (i.e. physical distance an impact will extend to)	<p>On-site - impacts that are limited to the Project site.</p> <p>Local - impacts that are limited to the Project site and adjacent properties.</p> <p>Regional - impacts that are experienced at a regional scale, i.e. beyond adjacent properties, covering the metropolis and beyond.</p> <p>National - impacts that are experienced at a national scale.</p> <p>Trans-boundary / International - impacts that are experienced outside of Kenya</p>
Scale	Quantitative measure of the impact (e.g. the size of the area damaged or impacted, the fraction of a resource that is lost or affected, etc.). or the professional viewpoint of the measure of impact	Quantitative measures as applicable for the feature or resources affects/ professional viewpoint of expert as applicable for the feature or resource in terms of severity of impact measure (i.e. minor, moderate, severe)
Frequency	Measure of the constancy or periodicity of the impact	No fixed designations; intended to be a numerical value or a qualitative description
Likelihood	Characteristic that pertains to unplanned events determined either qualitatively or quantitatively estimated on the basis of experience and/or evidence that such an outcome has previously occurred.	<p>Unlikely – The event is unlikely but may occur at some time during normal operating conditions.</p> <p>Possible – The event is likely to occur at some time during normal operating conditions.</p>

		Likely - The event will occur during normal operating conditions (i.e., it is essentially inevitable)
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#### 7.1.2.2 Determining Impact Magnitude

Once an impact's characteristics are defined, the next step in the impact assessment phase is to assign each impact a 'magnitude'. Magnitude is typically a function of some combination (depending on the resource/receptor in question) of the following impact characteristics:

1. extent;
2. duration;
3. scale; and
4. frequency.

Magnitude (from small to large) is in practice a continuum, and evaluation along the spectrum requires the exercise of professional judgement and experience. Each impact is evaluated on a case-by-case basis, and the rationale for each determination is noted. The universal magnitude designations, for negative effects, are: negligible, small, medium and large. The magnitude designations themselves are universally consistent, but the definition for the designations varies by issue. In the case of a positive impact, no magnitude designation has been assigned as it is considered sufficient for the purpose of the impact assessment to indicate that the Project is expected to result in a positive impact.

#### 7.1.2.3 Determining Receptor Sensitivity

The other principal step necessary to assign significance for a given impact is to define the sensitivity of the receptor. There are a range of factors to be taken into account when defining the sensitivity of the receptor, which may be physical, biological, cultural or human. As in the case of magnitude, the sensitivity designations themselves are universally consistent, but the definitions for these designations will vary on a resource/receptor basis. The sensitivity of receptor used is low, medium and high as shown in Table 7-2: Sensitivity Criteria.

**Table 7-2: Sensitivity Criteria**

Value / Sensitivity	Low	Medium	High
Biological and Species Value / Sensitivity Criteria			

Criteria	Not protected or listed as common / abundant; or not critical to other ecosystem functions (e.g. key prey species to other species).	Not protected or listed but may be a species common globally but rare in Kenya with little resilience to ecosystem changes, important to ecosystem functions, or one under threat or population decline.	Specifically protected under Kenyan legislation and/ or international conventions.
<b>Socio-Economic Sensitivity Criteria</b>			
Criteria	Those affected are able to adapt with relative ease and maintain pre-impact status.	Able to adapt with some difficulty and maintain preimpact status but only with a degree of support.	Those affected will not be able to adapt to changes and continue to maintainpre impact status.
<b>Physical Sensitivity Criteria</b>			
Criteria	The resource remains unaffected and maintains pre-impact status.	Pre-impact status is temporarily altered. May be restored over time naturally or through specific interventions.	Pre impact status is permanently altered by the development. Receptor or resource is held in high-esteem by stakeholders

#### 7.1.2.4 Assessing Significance

Once magnitude of impact and sensitivity of a receptor have been characterised, the significance can be determined for each impact. The impact significance rating was determined, using the matrix provided in Table 7-3.

**Table 7-3: Impact Significance**

		<b>Sensitivity / Vulnerability of Resource / Receptor</b>		
		Low	Medium	High
Magnitude of Impact	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

**Impact Minor Significance**

An impact of minor significance, hereafter referred to as a 'minor impact' is one where an effect will be experienced, but the impact magnitude is sufficiently small and well within accepted standards, and/or the receptor is of low sensitivity/value. The repercussions on the environment are not significant and may or may not require the application of mitigation measures.

**Moderate Significance**

An impact of moderate significance hereafter referred to as a 'moderate impact', will be within accepted limits and standards. Moderate impacts may cover a broad range, from a threshold below which the impact is minor, up to a level that might be just short of breaching an established (legal) limit. The repercussions on the environment are substantial but can be reduced through specific measures.

**Major Significance**

An impact of major significance, hereafter referred to as a 'major impact' is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. The repercussions on the environment are very strong and cannot easily be reduced.

**7.1.3 Mitigation and Control**

All significant impacts identified have been considered for mitigation and control through preventive, reductive/enhancement and curative strategies and control measures. Measures have been identified, described and recommendations incorporated into the proposed development to minimise or avoid the key impacts. Where the effectiveness of mitigation measures is uncertain, or depends on assumptions about operational procedures, monitoring programmes and/or operations/management procedures will define the required practice.

An Environmental and Social Management Plan (E&SMP) has been developed for the project and its facilities in accordance with the Environmental Management and Co-Ordination Act, 1999 (amended 2015). An Environmental Monitoring Plan section of the E&SMP presents detailed plans to monitor the implementation of mitigating measures and the identified impacts of the project during the construction and operation phases. The plan includes an estimate of capital and operating costs.

## **CHAPTER 8**

### **8.0 POTENTIAL IMPACT IDENTIFICATION AND ASSESSMENT**

This Chapter discusses potential impacts that have been identified through baseline assessments carried out in specific relation to the works/ activities anticipated.

#### **8.1 Introduction**

The ESIA serves principally to identify those impacts most likely to be significant and therefore needs to be addressed. In undertaking the ESIA, the team has drawn upon:

- i. its knowledge of sources of potential impacts associated with Liquid Petroleum Gas (LPG) Storage Plant project developments;
- ii. an identification of the main environmental and social resources and receptors from the
- iii. preliminary baseline data collection work; and
- iv. the results of the initial scoping stakeholder engagement.

#### **8.2 Project Activities of Environmental and Social Concern**

##### **8.2.1 Preparatory Phase Activities**

Preparatory phase activities of environmental concern include among others:

- i. Survey works and feasibility studies to determine the projects design and location setup ;
- ii. Stakeholder consultations;
- iii. Statutory permitting activities from relevant authorizes i.e Mombasa County, EPRA, SEZA, NEMA etc.

##### **8.2.2 Construction Phase Activities**

Construction phase activities of environmental/social concern include among others:

- i. Procurement of labour;
- ii. Construction of site office, work camp and storage facilities;
- iii. Site preparation: vegetation clearing & topsoil removal and storage;
- iv. Equipment/material/ worker transport;
- v. Resource utilisation;
- vi. Pipeline installation: trenching and backfilling;
- vii. Pipeline installation: horizontal directional drilling;
- viii. Construction of mooring and floating infrastructure (in reference to impact piling);
- ix. Dredging;
- x. Supply of quarry materials to the site;
- xi. Under water blasting (if it becomes an optional during dredging);
- xii. Disposal of dredge materials;
- xiii. Extension of breakwater;
- xiv. Hydrostatic testing;
- xv. Stream crossings;
- xvi. Post –construction activities including dismantling of construction work camps;
- xvii. Road crossings; and

xviii. Waste storage and disposal.

### **8.2.3 Operational and Maintenance Phase Activities**

Operational and maintenance phase activities of environmental/social concern include:

- a) Loading/offloading of LPG;
- b) General maintenance of LPG Plant;
- c) General maintenance of pipeline;
- d) Venting and flaring;
- e) Pipeline management;
- f) Wastewater treatment, storage and disposal;
- g) Solid waste generation and disposal;
- h) Maintenance dredging ;
- i) Resource utilisation; and
- j) Emergency response.

### **8.2.4 Decommissioning Phase Activities**

Decommission activities to potentially impact on the environment during post construction and post operational phase activities include:

- a) Post construction: Dismantling of construction work camps, relocation of equipment and disposal of wastes.
- b) Post operation/maintenance: Dismantling and relocation of infrastructure and waste disposal.

## **8.3 Evaluation of Potential Positive Impacts**

The potential positive impacts from the setup of the project include: -

### **8.3.1 Employment Opportunities, Local resource use and Improved Local Economy**

The different phase of the project would result to employment opportunities. Local workshops will also be engaged to help repair machines/equipment and components if necessary. The hospitality industry will also benefit from the presence of expatriates/foreign workers. There is also the possibility of economical growth effects that would result from the use of local goods and service opportunities within the project location. The goods and services to be utilized 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. Increased income in an area usually results in enhanced purchasing power for goods and services. The project will also utilize the local labour employment opportunities this is likely to have a positive impact on local communities and have downstream impacts on household income, education, and other social aspects.

### **8.3.2 Availability of LPG and Clean energy accessibility and improved environmental protection**



The proposed project is expected to help the nation to meet its LPG demands. Reliable supply LPG/Reduction of Reliance on Wood Fuel and Charcoal LPG supply is currently not meeting the high demand, this has resulted in price fluctuation, therefore, the proposed project will result in stabilized prices. Also, there is increased demand for clean fuel in Kenya. This will lead to steady and competitive supply of LPG hence, reduce reliance on wood fuel and Charcoal thus protecting our environment from degradation and deforestation.

### **8.3.3 Improved Institutional & National Revenue**

Revenue will accrue to the Kenyan government and the County of Mombasa in the form of tax deductions from wages of workers and Contractor fees. Government agencies e.g., Energy Commission and EPRA will charge processing and permit fees, which will increase the revenue base of these institutions. In the medium to longer term, government will earn tax revenue both directly from the project and indirectly from the expanded industrial and commercial activities.

### **8.3.4 Transfer of skills**

In various stages or phases of the project there will be enhanced interaction between the experts and hired locals in their areas of expertise. Such interactions will result in skills transfer or enhancement. During stakeholder engagement meetings, it was revealed that the residents in the area have a range of skills from various fields' i.e machinery operators, drivers, electricians, plumbers, masons, carpenters etc. The setup of the proposed project will provide an opportunity to utilize these skills.

### **8.3.5 Improvement of the areas infrastructure and land value**

The setup of such project in an area would result to the improvement of the areas' infrastructure i.e improvement of the areas drainage system, set up of water reticulation system, installation of security facilities (security lights), and set up of transportation networks. The improvement of infrastructure in an area will also lead to increase of the land value.

## **8.4 Evaluation of Adverse Impacts from the Proposed Project**

The evaluation of the adverse environmental and social issues which could possibly arise from the implementation of the proposed project are described in Table 8-1 with respect to the planning/preparatory phase activities, construction phase activities, operational phase and decommissioning phases. The magnitude, sensitivity and significance rating have been determined as per Table 7-3, and the impact ratings are prior to mitigation being applied.

## CHAPTER 9

### 9.0 Potential impact and mitigation measures

Anticipated Environmental and Social Impacts	Receptor(S)	Proposed Mitigation and Management Measures
Project site Acquisition	All institutions within the project site	<ul style="list-style-type: none"> <li>viii. Ensure all stakeholders are engaged in the early stage of the project.</li> <li>ix. Project plans and designs must be discussed and agreed by location owners.</li> <li>x. All permits and necessary documentation needed for acquiring the site must be approved.</li> <li>xi. Prepare and implement a livelihood restoration plan which will also include compensation for potentially affected persons.</li> <li>xii. Ensure affected persons are well informed to relocate prior to the start of construction.</li> <li>xiii. Taifa Gas SEZ Investment Limited and the Contractor will liaise with the county to access the option of providing a toilet facility for use to prevent open defecation if necessary.</li> <li>xiv. Disclose public information of the project.</li> </ul>
Anxiety on the part of potentially affected persons/institutions	Institutions /Potentially affected persons	<ul style="list-style-type: none"> <li>v. Stakeholder interactions to educate all on proposed project activities, impacts and proposed mitigation measures.</li> <li>vi. Will develop and implement grievance mechanism as a part of a wider Stakeholder Engagement Plan enabling community concerns to be documented and resolved in a timely fashion.</li> <li>vii. Will ensure liaison with all stakeholders and nearby communities in the project area is maintained throughout project life.</li> <li>viii. The Mombasa county government and people of Dongo Kundu will be consulted prior to the commencement of work to ensure that all the</li> </ul>

		necessary concerns and issues are address to ensure peaceful coexistence.
Occupational health and safety	Taifa Gas Investment SEZ Company Staff,contractors and consultants	<ul style="list-style-type: none"> <li>v. The various contractors to be engaged will be required to comply with the Kenyan Occupational Health and Safety Policy when working within the project site.</li> <li>vi. The contractor will be required to provide first Aid Kits on site to treat minor ailments and cuts. However, major cases will be referred for treatment to well equipped and developed hospital such as Mombasa General Hospital.</li> <li>vii. The owner as well as their various contractors will be required to provide the appropriate personal protective equipment such as safety boots and coats, hand gloves, earplugs and nose masks when carrying out their studies. Supervisors will be mandated to ensure the use of these protective devices and implement sanctions when necessary.</li> <li>viii. Ensure that well-trained workers will be engaged for the various construction roles.</li> </ul>
<b>Construction Phase Impacts</b>		
Air Quality Deterioration	Workers/ Local communities and road users	<ul style="list-style-type: none"> <li>vi. Dust emissions from trucks, will be controlled and minimized by the use of designated routes in order to minimize impacts to residents, construction workers, users and institutions along the transport route.</li> <li>vii. Ensure vehicular speed limits of 30mph over any unpaved landscape to minimise dust generation. Material dumping will be regulated to reduce dust emissions.</li> <li>viii. Owners / operators of construction equipment and vehicles will implement the manufacturer recommended engine maintenance</li> </ul>

		<p>programmes to minimize the emission of fumes into the environment.</p> <p>ix. Contractor will monitor dust and remedial action will be taken whenever dust generating activities take place.</p> <p>x. Dust-related grievances will be investigated and managed as part of the Grievance Mechanism.</p>
Vibration and noise nuisance	Workers/ Local communities and road users	<p>v. The contractor should employ standard noise abatement measures and engineering best practices to ensure that the impact of these issues is minimized and reduced to acceptable limits.</p> <p>vi. The contractor should ensure that earthworks and other construction activities will be phased out or controlled to reduce noise generation during construction.</p> <p>vii. All equipment and vessels shall be operated and maintained in accordance with appropriate industry and equipment standards including specifications for noise levels and manufacturer's specifications (including regular checks and maintenance).</p> <p>viii. Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum.</p>
Loss of vegetation and impacts on flora and fauna	Terrestrial Flora, Fauna	<p>vii. Undertake pre-clearing survey and assessment of the flora to be impacted especially if construction will be carried out in the rainy season to help identify sensitive areas such as vegetation with active nesting.</p> <p>viii. The contractor will develop construction code of practice and ensure critical areas is avoided.</p> <p>ix. Allow an appropriate buffer distance between any construction activity and remnant native vegetation, where practicable.</p> <p>x. Limit construction activities to only designated places and clearly mark out all vegetation, which will not be</p>

		<p>cleared, so that they are clearly visible as “no-go areas” to construction staff and vehicles.</p> <ul style="list-style-type: none"> <li>xi. Dismantle and remove all equipment and machinery after construction from site.</li> <li>xii. Rehabilitate trenches and disturbed areas as soon as possible.</li> </ul>
Sanitation/Waste Generation concerns	Soil, Roads	<p><u>General Waste</u></p> <ul style="list-style-type: none"> <li>v. The contractor must appoint a waste management coordinator. The coordinator shall prepare and implement a Waste Management Plan which specifies procedures and, incorporates the existing waste management plan for the proposed project. This is to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed.</li> <li>vi. Waste remaining after implementation of the waste hierarchy measures will be collected by private waste management companies operating at the port for onward disposal.</li> <li>vii. The contractor should provide adequate waste bins at the temporary work camps to minimise littering of the project site and also littering along the pipeline route. The collected refuse will then be transferred to the approved disposal site.</li> <li>viii. Good site practices shall be implemented to avoid waste generation and promote waste minimisation.</li> </ul> <p><u>Construction Waste</u></p> <ul style="list-style-type: none"> <li>v. All scraps or other solid wastes will be disposed of at the approved disposal site.</li> <li>vi. Excavated soils/concrete will be reused as much as possible for backfilling trenches dug during construction.</li> </ul>

		<p>vii. Contaminated soil will be considered as waste material and disposed of accordingly at the authorised Landfill Site.</p> <p>viii. Excavated material shall be used on site to the extent practical.</p> <p><u>Hazardous Waste</u></p> <p>iv. All hazardous waste (e.g. oily waste) generated during construction/installation will be appropriately stored as per manufacturer's instructions. For onward recycling, treatment or disposal, NEMA approved hazardous waste collectors will be engaged for collection and disposal of all hazardous waste.</p>
Labour influx issues	Local communities	<p>v. Taifa Gas SEZ Investment Limited will implement a labour influx management plan to holistically address labour influx issues.</p> <p>vi. Taifa Gas SEZ Investment Limited will implement a stakeholder engagement plan that will include:</p> <ul style="list-style-type: none"> <li>e) informing stakeholders of increases in workforce and potential for influx.</li> <li>f) Engaging with local government/traditional authorities on issues, risks and opportunities regarding labour influx</li> <li>g) Engaging local communities to understand their concerns, raise awareness of risks and opportunities, and identify solutions to issues relating to labour influx</li> <li>h) Developing a feedback and grievance mechanism to collect any feedback or complaints related to labour influx associated with the project.</li> </ul>
Occupational Health and Safety Concerns and Labour Issues	Workers	<p><u>Adoption of Health and Safety Policies</u></p> <p>ii. The contractor will be required to prepare and implement health, safety and environmental protection</p>

		<p>at the workplace to guide the construction activities in compliance with the policy of OSHA. The responsibility for implementing this policy lies directly and personally with the contractor through its workers. The policy objectives shall include the following:</p> <ul style="list-style-type: none"> <li>f) Conduct activities in the project site in accordance with relevant national and international laws and regulations on occupational health and safety. This includes The Labour Relations Act, 2007; The Work Injury Benefits Act, 2007; The Employment Act, 2007; The public Health Act (Cap 242); The Factories and other Places of Work Act (Cap 514); Building Code (2002); The World Commission on Environment and Development; The Rio Declaration on Environment and Development; establish regulatory and organizational framework for the efficient and effective management of occupational health, safety and environment issues;</li> <li>g) maintain safe plant, machinery and equipment;</li> <li>h) maintain incident and injury-free working environments;</li> <li>i) prevent occupational related diseases/ illness among workers; and</li> <li>j) promote and maintain a clean, healthy and hygienic environment.</li> </ul> <p><u>The Contractors Occupational Health and Safety Plan (OHSP)</u></p> <ul style="list-style-type: none"> <li>v. The contractor will be required to develop an Occupational Health and Safety Plan (OHSP), including requirements for PPE, task risk assessment, mandatory training, audit and monitoring, incident reporting etc.</li> </ul>
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		<ul style="list-style-type: none"> <li>vi. The Contractor will apply the hazard hierarchy when planning work to avoid/eliminate risks and reduce risk to as low as reasonably practical.</li> <li>vii. The contractors will educate workers on its health and safety policy. Workers will therefore be required to follow the health and safety policy developed prior to commencement of the works. The adoption of the health and safety policy at site will serve as a precautionary measure to prevent/ minimize the possibility of accidents and reduce health associated risks.</li> <li>viii. The contractors will train selected workers as first aid givers and provide adequate first aid kits at the construction areas to treat minor ailments and cuts. However, major cases will be referred well developed medical hospitals such as the Mombasa General Hospital.</li> </ul> <p><u>Use of Experienced Personnel</u></p> <ul style="list-style-type: none"> <li>v. The contractors will ensure that well-trained workers will be engaged for the various construction roles. Only drivers with the requisite licenses will be allowed to handle vehicles and earth-moving equipment into the port. Initial training and testing in machine/ equipment handling and safe working procedures will be given to all new drivers, operators and other field workers to help minimize the occurrence of accidents on site.</li> <li>vi. The contractors will ensure that regular defensive driving training sessions are organized for the drivers to ensure their safety and the safety of the general public.</li> <li>vii. Provision of Personal Protective Equipment (PPE)</li> <li>viii. The contractor will ensure that workers are provided with the appropriate personal protective equipment such as safety boots and coats, hand gloves, earplugs and nose masks. Supervisors will be mandated to ensure the use of these protective devices and implement sanctions when necessary.</li> </ul>
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		<p><u>Phasing out of Material Movements/ Scheduling Material Movements</u></p> <p>ii. Movement of tanks, pipes and other construction materials to site or storage areas will be carried out in phases and properly regulated to control the number of cargo vehicles coming into the project site at any given time to reduce the risk of accidents. Taifa Gas Investment SEZ Limited intends to carefully plan materials movement to minimise these impacts. Materials and equipment will be transported to the sites during off peak periods.</p> <p><u>Use of Equipment</u></p> <p>ii. All equipment's to be used will be in good condition and scheduled regular maintenance will be ensured to reduce/minimize of accidents.</p> <p><u>Worker Rights and Wellbeing</u></p> <p>ii. The Contractor will develop and implement a Human Resource Policy and plan that adheres to the requirements of the policy, including requirements for workers to have contracts, Workers Grievance Mechanism and develop retrenchment plans if there is a requirement for collective dismissals.</p>
Public Health and Safety, and Security Impacts	Public/Communities	<p><u>Restriction of Access</u></p> <p>iii. Taifa Gas Investment SEZ Limited security personnel will maintain security at the proposed site to ensure that only authorised persons are allowed into the construction area.</p> <p>iv. The security personnel will be trained to respect the human rights of the local people.</p> <p><u>Public Health /Toilet facilities</u></p>

		<ul style="list-style-type: none"> <li>v. The contractor will provide mobile toilet facilities for workers during construction of the project.</li> <li>vi. Uncovered trenches or deep excavations will be protected using indicator linings or illustrative warning notices or wire mesh (whichever best suits the situation) to prevent fall hazards. All trenches and excavation will be covered as soon as possible.</li> <li>vii. As much as possible the contractor will adopt progressive opening of trenches to reduce risks to as low as reasonably practicable</li> <li>viii. Caution/warning signs should be placed at vantage points around the project site</li> </ul> <p><u>Scheduling of Work</u></p> <ul style="list-style-type: none"> <li>iii. The contractor will analyse traffic flows and ensure that the transport of equipment is carried out during low peak periods.</li> <li>iv. Announcement and Notification of Work</li> </ul> <p><u>Transport of Equipment and Materials</u></p> <ul style="list-style-type: none"> <li>v. Traffic impacts resulting from carting of equipment and materials will be limited to the selected project roads and will be managed in line with the Traffic Management Plan to be prepared by the contractor for the movement of materials.</li> <li>vi. The traffic management plan will be prepared in consultation with SEZA and Mombasa County Government in order to minimise congestion on roads within the project site.</li> <li>vii. All the vehicles to be used for the project and especially in transporting equipment and materials will be serviced regularly and all the drivers to be engaged/assigned, would be required to hold the requisite driver's license as prescribed by the National Transport and Safety Authority (NTSA), and would be educated on public</li> </ul>
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		<p>safety issues. Adequate traffic management measures will be instituted to caution the public and to create safety awareness.</p> <p>viii. Some adequate measures and conditions to be instituted by the contractor in the transport of materials include the following:</p> <ul style="list-style-type: none"> <li>g) Haulage of materials including quarry products to the project site will be limited to off-peak hours;</li> <li>h) Trucks transporting quarry products and other friable materials to the project site will be covered;</li> <li>i) Road worthy dump trucks will be used;</li> <li>j) Very experienced drivers will be engaged;</li> <li>k) Traffic wardens will monitor dump truck movements and ensure public and traffic safety; and</li> <li>l) Carry out regular inspections of haulage roads. In the event truck failure along haulage routes, such trucks will be towed within 24 hours.</li> </ul>
Road crossing and traffic impact	Commercial vehicles and private vehicles	<p>iv. The contractor will be required to schedule its work such that crossing of the untarred access road is done when traffic is low to minimize inconvenience to motorists.</p> <p>v. Where the untarred access road has to be blocked for work to proceed smoothly, adequate signs and notices will be strategically placed at diversion routes.</p> <p>vi. Any damaged sections of the roads will be reinstated by the contractor</p>
Loss of livelihood and access to land	Affected persons / individuals	<p>iii. SEZA (with relevant governments lead agents) being the land leaser for Taifa Gas Investment SEZ Limited, will implement a livelihood improvement plan for potentially project affected persons that will take care of compensation, relocation, and livelihood assistance arrangements as required</p> <p>iv. Monitoring will be undertaken to determine potential compensation/livelihood assistance measures required and verify they have been effective.</p>

General Disturbance of Port Operations	Port users	<p><u>Trenching</u></p> <ul style="list-style-type: none"> <li>iv. Restricting trenching times, particularly during periods of high wave/wind activity</li> <li>v. To reduce turbidity and spill, design and implement a trenching management plan which is informed by geotechnical and geophysical knowledge of the pipeline route</li> <li>vi. Install appropriate silt curtains around offshore works</li> </ul> <p>Oil spills</p> <ul style="list-style-type: none"> <li>ii. The contractors, prepare a spill prevention and control plan, incorporating measures outlined in the emergency response plan of the proposed project, to minimize increased turbidity and surface pollution through oil spills. Monitoring and spill prevention drills will be required to ensure impacts are avoided to the maximum extent practical.</li> </ul>
<b>Operations and Maintenance Phase Impacts</b>		
Air Pollution	Workers and other users	<ul style="list-style-type: none"> <li>iii. Terminal operator will incorporate the Air Quality Management Plan into standard operations. The plan will include the following: <ul style="list-style-type: none"> <li>h) dust from vehicular movement</li> <li>i) dust from cleaning activities</li> <li>j) exhaust emission from vehicles and machinery</li> <li>k) fumes from chemicals and welding</li> <li>l) VOCs from fuel storage and dispensing areas</li> <li>m) noise from operation of machinery</li> <li>n) monitoring</li> </ul> </li> <li>iv. Regular maintenance of machinery/ equipment in accordance with manufacturers' specifications to ensure minimum levels of emission from the terminal operations.</li> </ul>

Waste Management	Workers and users	<p><u>Education campaigns</u></p> <p>ii. The terminal operator will ensure proper management and disposal of waste generated and will continue to educate workers on its waste management plan.</p> <p><u>Waste Collection and Disposal</u></p> <p>iv. The terminal operator will appoint a waste management coordinator. The coordinator shall prepare and implement a Waste Management Plan which specifies procedures and, incorporates the existing waste management plan for the project. This is to facilitate tracking of loads, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed</p> <p>v. Ensure different types of waste are segregated in different containers or skip to enhance recycling of material and proper disposal of waste.</p> <p>vi. Ensure chemical wastes are stored, handled and disposed of in accordance with the Waste Management Regulations (2006)</p>
Noise Nuisance	LPG storage plant users/ workers	<p>v. The project operators will ensure that silent equipment (low noise versions, which may cost a little extra) are used in the project. Additionally, silencers, mufflers and other appropriate engineering control devices shall be used on the noise generating equipment. Where possible, electrical instead of diesel or diesel-electric moving equipment will be used.</p>

		<ul style="list-style-type: none"> <li>vi. Reduce noise levels through optimizing the plant's layout</li> <li>vii. Regular site inspections will be carried out to audit the compliance with regard to noise control.</li> <li>viii. The project operators will provide appropriate PPEs for workers use.</li> </ul>
Occupational Health and Safety Concerns and Labour Issues	LPG storage plant workers and subcontractors	<p><u>Training in equipment and chemical handling</u></p> <ul style="list-style-type: none"> <li>iii. Risk assessments will be undertaken and avoidance / elimination of hazards prioritised to reduce the need for manual handling of chemicals.</li> <li>iv. The plant's operator will also ensure that workers handling fuels, chemicals, machinery and equipment are well trained. Such workers will be provided with the necessary documentations including Material Safety Data Sheet (MSDS) to serve as reference sources on the dangers and ways of handling these chemicals, fuels etc.</li> </ul> <p><u>Provision of appropriate PPEs</u></p> <ul style="list-style-type: none"> <li>iv. The LPG Storage Plant operators will ensure that the Management of the various terminals provide workers with adequate personal protective equipment including overalls, earplugs, overalls and anticorrosive gloves etc. as their particular operations would require.</li> <li>v. Non-conductive hand tools rated for the voltage at which live electrical work is being performed at a section will be provided.</li> <li>vi. Caution/warning signs should be placed at vantage points around the site</li> </ul> <p><u>Preventive Measures</u></p> <ul style="list-style-type: none"> <li>iii. The LPG Storage Plant operator will prepare comprehensive maintenance programme on commencement of operations to put in place measures to avert any serious</li> </ul>

		<p>breakdowns or failures. The required maintenance for the systems will include among others:</p> <ul style="list-style-type: none"> <li>g) Environmental incident/accident investigation;</li> <li>h) Routine equipment maintenance/inspection schedule;</li> <li>i) Annual equipment inspection and maintenance record;</li> <li>j) Procedure for pre-arranged repair service;</li> <li>k) Procedure for preventive maintenance; and</li> <li>l) Regular calibration of equipment.</li> </ul> <p>iv. The following safety precautions will be implemented to minimise danger of electrocution at the LPG Storage Plant:</p> <ul style="list-style-type: none"> <li>f) As much as possible avoid working on live electrical parts except when de-energizing the equipment creates additional hazards or when the equipment must be energized to allow for testing that can only be performed live.</li> <li>g) Permit to work system will also be implemented for hot works, electrical works and work at height.</li> <li>h) Prior to initiation of hot works, it will be checked that there is no flammable material, gas or dry woodwork which could catch fire; and that surfaces which have been in contact with hydrocarbons or toxic substances are completely clean.</li> <li>i) Ensure that all staff working on live equipment or lines will be without conductive apparel (watches, bracelets, rings, key chains, necklaces, zippers, cloth with conductive thread, etc.)</li> <li>j) Provide barricades and signage for all live electrical equipment</li> </ul> <p><u>Emergency Provisions</u></p> <p>ii. The LPG Storage Plant operators will implement its emergency response plan (to be developed from the framework plan to be provided). The plan which will</p>
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		<p>incorporate the emergency response plan set by Taifa Gas Investment SEZ Limited Company and it will include information on how all emergency situations will be handled including fire, mechanical failures etc. that will arise from operations to minimize any hazards to humans and the environment. Management will ensure a yearly review of the plan.</p> <p><u>Housekeeping</u></p> <p>ii. Good housekeeping practices will be an integral part of LPG Storage Plant operations to maintain a well laid out working space and avert accidents resulting from slippage, fires from torn electrical wires, cobwebs etc.</p>
Public Health, Safety and security	LPG Storage Plant Users, Local communities, General Public	<p>xi. The design of the facilities has incorporated adequate safety and security considerations as provided in Section on project description in this ESIA Study, and the operations of the LPG Storage Plant will incorporate a scheduled inspection, monitoring and maintenance regime to avoid accidents.</p> <p>xii. Taifa Gas Investment SEZ limited will collaborate with its selected security personnel to maintain security of the facilities within the project site environment to ensure that only authorised persons have access to the facilities.</p> <p>xiii. Taifa Gas Investment SEZ Limited will engage private security firms and also involve key local community members in maintaining security of the facilities.</p> <p>xiv. The security firm and the key community members will be hired and trained to comply with required security protocols for operations of such facilities. The security people will also be trained to respect human rights of the local people to avoid conflicts and human right abuses.</p> <p>xv. Taifa Gas Investment SEZ Limited Will define a protocol for community reporting of observed incidents (e.g. sight, smell or sound of pipeline leaks and procedures for community grievance redress mechanism.</p>



		<ul style="list-style-type: none"> <li>xvi. Taifa Gas Investment SEZ Limited will identify emergency scenarios and develop emergency preparedness and response plans with allocation of responsibilities to local communities and authorities, (where appropriate)</li> <li>xvii. Taifa Gas Investment SEZ Limited will continue safety awareness and education programs for impacted communities.</li> <li>xviii. Taifa Gas Investment SEZ Limited will develop clear guidelines as to what level of public access and activity along the project site is acceptable for maintaining pipeline safety and integrity, and ensure that this is enforced to help avoid encroachment and other potentially dangerous activities.</li> <li>xix. Taifa Gas Investment SEZ Limited will carry out community awareness /sensitization on the above guidelines to be developed regarding public access/use restrictions and safety.</li> <li>xx. Taifa Gas Investment SEZ Limited will organise, in collaboration with the respective local community representative members i.e. chiefs and elders and the County Government Health Department, awareness creation seminars and educational programmes for all workers and the general public on the behavioural changes required to prevent the spread of HIV/AIDS and other STDs.</li> </ul>
Accidental Events and impacts on Terrestrial ecology and property	LPG Storage Plant users, Local communities	<ul style="list-style-type: none"> <li>iii. The design of the facilities has incorporated adequate safety and security considerations as provided in the project description section of the study, to minimize potential accidents.</li> <li>iv. Taifa Gas investment SEZ Limited will develop and implement an emergency preparedness and response plan in collaboration with relevant stakeholders including relevant government authorities as it is deemed appropriate.</li> </ul>

Sustainability of the Taifa Gas Investment SEZ Company LPG Storage Plant Project	County government of Mombasa / ministry of industrialization / LPG Storage Plant users/workers	<p>vii. The Management of Taifa Gas investment SEZ Limited will seek to operate profitably by implementing a system to collect appropriate user charges to cover the running and maintenance cost of its facilities.</p> <p>viii. The LPG Storage Plant will develop and implement an emergency response plan to handle all emergencies including gas leaks, fire, and oil spills that will arise from all its operations to minimize any hazards to humans and the environment. Management will ensure a periodic review of the plan.</p> <p>ix. A comprehensive maintenance programme will be put in place to avert any serious breakdowns or failures or accidents. The required maintenance for the systems will include among others:</p> <ul style="list-style-type: none"> <li>i) Environmental incident / accident investigation;</li> <li>j) Carry out mock spill response drills;</li> <li>k) Routine equipment maintenance/inspection schedule;</li> <li>l) Annual equipment inspection and maintenance record;</li> <li>m) Procedure for pre-arranged repair service;</li> <li>n) Procedure for preventive maintenance;</li> <li>o) Procedures for handling materials; and</li> <li>p) Regular calibration of equipment;</li> </ul> <p>x. Coordinate with other agencies and organizations to provide technical assistance to inform activities and programs that can support the project</p> <p>xi. Ensure resource use efficiency influencing supply chain sustainability</p> <p>xii. Adopt a comprehensive monitoring plan to ensure effective implementation of mitigation and management measures.</p>
Decommisioning Phase		

<b>Post construction phase</b>		
Loss of jobs after preparatory and construction phases	Preparatory and construction phase workers	iii. All workers to be engaged by the Contractor will be informed that their engagement is temporary and ends after construction, and that their engagement is not a guarantee for reemployment during the operational phase.
		iv. The contracts for all consultants to be involved during the preparatory and construction phase will clearly indicate the duration of their assignment.
Occupational health and safety	Similar to construction phase	ii. Apply mitigation measures for construction phase
Public safety and traffic issues	Similar to construction phase	ii. Apply mitigation measures for construction phase
Waste disposal	Similar to construction phase	ii. Apply mitigation measures for construction phase
Air pollution	Similar to construction phase	ii. Apply mitigation measures for construction phase
<b>Post operation phase</b>		
Loss of job	Operation and decommissioning phase workers	ii. A retrenchment policy will be developed and included in the condition of service/service agreement for workers for them to know what they will be entitled to during retrenchment and closure of the affected company/ operator.
All other impacts	Bio-physical and social environment	ii. A detailed EIA will be carried out for approval and permitting by the operator before final decommissioning of both offshore and onshore facilities

		to confirm all impacts and appropriate mitigation measures to be implemented
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## **10.0 CHAPTER 10**

### **ENVIRONMENTAL MANAGEMENT PLAN**

#### **Introduction**

This section describes the proposed measures to be implemented by the project management to mitigate the negative impacts identified. It forms the Environmental Management Plan document for use in Monitoring and Evaluation as well. After identifying environmental effects, mitigation measures to lessen or compensate for potential adverse impacts are identified. An EMP for development projects provide a logical framework within which identified negative environmental impacts can be mitigated and monitored. In addition, the EMP assigns responsibilities of actions to various actors and provides a timeframe within which mitigation measures and monitoring can be done.

EIA is an environmental management tool and EMP is its vital output providing a checklist for project monitoring and evaluation. The EMP outlined herein addresses the identified potential negative impacts and mitigation measures of the proposed project and serves as a guide for enforcement and compliance to environmental management.

The Environmental Management Plan therefore endeavors to achieve the following:

- i. Compliance with legal requirements and voluntary commitments.
- ii. Minimizing or preventing pollution.
- iii. Continual improvement in environmental performance, including areas not subject to regulations.

It is recommended that the Project Proponent incorporates these measures gradually; prioritizing mitigation of impacts considered most significant (adverse impacts) and progress to the less severe ones in the project planning phases for the proposed project EMP.

### Environmental Management Plan for The Proposed Project

		Activity	Negative Impact	Mitigation Measure	Responsibility	Performance Indicators	Cost (KShs)
		<b>Design Phase</b>					
1.		Proposed Project	Landscape visual impact	- Design of infrastructure that conforms with the project site features (topography and aesthetics)	Taifa Gas Investment SEZ Limited  Design Consultant	Site infrastructure design blending with host environment	Approx. 500,000/=
2.		Proposed Project Sanitation Facilities	Soil and water contamination	- Design appropriate containments for oils/other construction chemicals and sanitary waste from the contractor's camp.	Taifa Gas Investment SEZ Limited  Design Consultant	Availability of sanitary facility and paved containments in the design	Approx. 700,000/=
3.		Proposed Project Mangrove Vegetation Cover	Removal of existing Vegetation	- Design of appropriate construction that provides for incorporation of existing mangrove vegetation	Taifa Gas Investment SEZ Limited  Design Consultant	Site infrastructure incorporating mangrove vegetation	Approx. 200,000/=
		<b>Pre-Construction Phase</b>					

1.		SEASCAN Energy Ltd Project Facts	Potential lack of support From project area community	Timely dissemination of project facts to community and stakeholders Convening of meetings with Community and Stakeholders to carry out sensitization and disseminate project facts	Taifa Gas Investment SEZ Limited PR Firm	Feedback information and forms from project area community	Approx. 500,000/=
2.		Clearing of Proposed Project site vegetation	Vegetation damage, and invasion by exotic species	- Maintain native mangrove cover by selective removal of trees which cannot be incorporated in the project design by use of manual clearing technics;  This is in line with:  Environmental Management and Coordination Act (EMCA), 1999 Amended 2015 OP 4.01 Environmental Assessment	Taifa Gas Investment SEZ Limited Contractor	Existing mangroves incorporated in the Constructed Site area	Approx. 600,000/=
3.		Clearing of Proposed site Project vegetation	Generation of Solid Waste	Contractor to provide strategically located solid waste collection container (skip); Collect together all generated waste from site clearing; Transport and dispose all waste away from site; Liaise with the County government on suitable dumping site for spoils; This is in line with:  Environmental Management and Coordination Act (EMCA), 1999 Amended 2015, Water Act 2012 and Public Health Act, Cap 242 OP 4.01 Environmental Assessment	Taifa Gas Investment SEZ Limited Contractor	Presence of waste collection bins Contract with NEMA Registered Waste Disposal Firm	Approx. 100,000/= for waste collection bins  10,000/= per month for Waste Disposal

4.		Clearing of Proposed site and Project vegetation	Noise pollution (excess noise and vibration)	<p>Use of noise reduction/ hearing protection devices when working with noisy equipment;  Use of serviceable chain saws (low noise emission);  Instruct machinery operators to avoid revving of engines;  Carry out site preparation activities during the day;  This is in line with</p> <p>Environmental Management and Coordination Act (EMCA), 1999 Amended 2015;  Environmental Management and Coordination (Noise and Excessive Vibration Pollution) (Control) Regulations, 2009  OSHA Act, 2007.  OP 4.01 Environmental Assessment</p>	<p>Taifa Gas Investment SEZ Limited</p> <p>Contractor</p>	<p>Records of machine and vehicle maintenance</p> <p>Availability and use of Ear Muffs</p>	<p>Approx. 200,000/= for Provision of noise pollution</p>
5.		Clearing of Proposed site and Project vegetation	Sanitary other Domestic Waste	<p>Provide site clearing workers with solid waste bins for their use;  Ensure site has toilet facilities;  Sensitize workers on site cleanliness and hygiene  This is in line with:</p> <p>Environmental Management and Coordination Act 1999 Amended 2015  Water Act 2012  OP 4.01 Environmental Assessment  Public Health Act, Cap 242</p>	<p>Taifa Gas Investment SEZ Limited</p> <p>Contractor</p>	<p>Presence of waste bins and Toilets for use by workers</p>	<p>Approx. 400,000/= for provision of Sanitary and waste collection facilities.</p>



Construction Phase								
1		Soil Excavation at Proposed Project site	Soil Erosion	Excavated soil is to be used for backfilling excavated areas while excess soil is disposed of off-site; Soils are not to be left exposed to wind/water; Soil erosion is to be reduced and river valley protection enhanced. This is in line with:  □ Environmental Management and Coordination Act 1999 Amended 2015  Water Act 2012, OP 4.01 Environmental assessment  Sinking of a borehole for water abstraction at the site.	Taifa Gas Investment SEZ Limited  Contractor	Ground cover in constructed areas  Quality of surface water at the site and in the neighboring rivers,  Water abstraction permit.	Part of Construction Obligation	
2.		Construction of the Proposed Project site	Air Pollution (dust, fuel and smoke emissions)	Control speed of vehicles and Prohibit idling; Spray water during construction; Maintenance vehicles & equipment regularly; Provision of dust masks for use in dusty conditions; Use serviceable vehicles/machinery to reduce smoke; This is in line with:  Environmental Management and Coordination Act 1999 Amended 2015 Occupational Safety and Health Act (OSHA) 2007 OP 4.01 Environmental Assessment; Public Health Act, Cap 242	Taifa Investment Limited Contractor	Gas SEZ Records of machine and vehicle maintenance  Availability and use of Noise Masks  Low dust generation during construction	Approx. 500,000/= for air pollution prevention	

3.		Construction of the Proposed Project site	Excess noise and vibration	<p>Use noise hearing protection devices when working with noisy equipment or noisy environment;  Use serviceable equipment with low noise emission;  Instruct truck/machinery operators to avoid raving engines;  This is in line with:</p> <p>Environmental Management and Coordination Act 1999 Amended 2015 Noise and Excessive Vibration Pollution) (Control) Regulations, 2009</p> <p>Occupational Safety and Health Act (OSHA) 2007  OP 4.01 Environmental Assessment</p>	Taifa Investment Limited Contractor	Gas SEZ	<p>Records of machine and vehicle maintenance</p> <p>Availability and use of Ear Muffs</p>	Approx. 300,000/= for Provision of noise pollution
4.		Construction of the Proposed Project site	Generation of Solid Waste	<p>Provide communal solid waste collection containers (skip) for the collection and storage prior to appropriate disposal;  County Government/NEMA to provide waste dumping site;  Engage a NEMA Registered Waste Collection Firm;  Excavation activities to be done during the dry season to avoid soil erosion and siltation of streams;  Site soil to be used to backfill excavated sites;  This is in line with:</p> <p>Environmental Management and Coordination Act 1999 Amended 2015, Waste Management Regulations, 2006  Water Act 2012</p>	Taifa Investment Limited Contractor	Gas SEZ	<p>Clean, Organized, Neat Site</p> <p>Presence of waste collection receptacles</p> <p>Contract with NEMA Registered Waste Disposal Firm</p>	<p>Approx. 200,000/= for waste containers</p> <p>10,000/= per month for waste collection and disposal</p>

				Public Health Act, Cap 242 OP 4.01 Environmental Assessment			
5.		Construction of the Proposed Project site	Generation of Liquid Waste – used oil and other Chemicals (Hazardous Waste)	Construct a paved containment for storage of oils and other liquid chemicals being used in the construction site; Provide containers for storage of used oils from vehicles /machines/equipment being used at the construction site; Engage a NEMA Registered Firm for the collection, transportation and appropriate disposal of used oil;  This is line with;  Environmental Management and Coordination Act 1999, Amended 2015  Waste Management Regulations, 2006  Water Act 2012  Public Health Act, Cap 242 and Environmental Assessment	Taifa Gas Investment Limited Contractor NEMA Registered Used Oil Collection and Disposal Firm	SEZ Presence of a paved area for storage of oils and other chemicals Presence of used oil containers.	Approx. 400,000/= for paved containment & used oil containers.  10,000/= per month for collection and disposal of used oil.
6.		Construction of the Proposed Project site	Risk of fire	Provide firefighting equipment at the construction site area; Contractor staff to be sensitized on firefighting equipment use; No burning of materials is to be permitted at the site. This is in line with:  Occupational Safety and Health Act (OSHA) 2007 Public Health Act, Cap 242 OP 4.01 Environmental Assessment	Taifa Gas Investment Limited Contractor	SEZ Performance records Presence of Fire Extinguishers at construction site	Approx. 300,000/= for fire extinguishers

7		Construction of the Proposed Project Site	Potential pollution of Surface and Groundwater	<p>No disposal of domestic waste at the project site;  Provision of used oil containers at a central point;  Use of waste bins/proper wastes management;  Pave parking area for trucks and direct drainage to containment;  Analysis of water at the site area 2 times year  This is in line with;  Environmental Management and Coordination Act (EMCA), 1999 Amended 2015,  Public Health Act Cap 242  OP 4.01 Environmental Assessment</p>	Taifa Investment Limited Contractor	Gas SEZ	Water Quality Report Waste Presence of Bins	Approximately 50,000/- for communal waste containers  200,000/- Per year.
8.		Construction of the Proposed Project site	Safety of Workers and other visitors to construction site	<p>Use of construction site barrier tapes to isolate the site(working) area to bar intruders from accessing the area in case of a dropping object;  Appropriate head, hand and foot protection (PPE) during the manual clearing of vegetation and construction activities;  Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa. Maintain work productivity;  Construction site visitors require appropriate safety Gear.  This is in line with:   Occupational Safety and Health Act (OSHA) 2007  Environment Management and Coordination Act (EMCA), 1999 Amended 2015  OP 4.01 Environmental Assessment</p>	Taifa Gas Investment SEZ Limited Contractor		Workers have Safety Gear Medical records Emergency contacts for Hospital and Police available	Approx. 300,000/= safety gear

				Public Health Act Cap 242				
9.		Construction of the Proposed Project site	Working at heights	Testing of structures for integrity prior to undertaking work; Implementation of fall protection including induction on climbing techniques and use of fall protection measures,	Taifa Investment Limited Contractor	Gas SEZ	Medical Records and Training records Availability and use of proper PPE	Approx. 500,000/= for special safety equipment
				Provision of harnesses and scaffolds for working at heights; Inspection, maintenance, and replacement of fall protection equipment; Use of helmets and other protective devices that are going to mitigate against scratches, bruises; lacerations and head injuries due to dropping objects Provide first aid facilities at the site; This is in line with:  Occupational Safety and Health Act (OSHA) 2007 OP 4.01 Environmental Assessment Public Health Act Cap 242			Availability of Fall Protection Equipment at the Construction Site	
10.		Construction of the Proposed Project site	Health issues of construction workers and Community	Occupational Safety and Health Act (OSHA) 2007 OP 4.01 Environmental Assessment	Taifa Investment Limited Contractor Ministry of Health NGOs and Donor Agencies Local Administration	Gas SEZ	Pamphlets on Health Matters  Records of disease incidences /prevalence	500,000/= for sensitization and provision Of condoms.

							Health facility cost to be determined
11.		Construction of the Proposed Project site	Community misconceptions	Awareness creation amongst the Community on project facts; Community issues to be responded to promptly; Project progress reports and monitoring reports to be prepared and recommendations implemented;	Taifa Gas Investment SEZ Limited Local administratio n Local Leaders	Records of Meetings with Community  Records of community issues recorded and responses.	Approx. 100,000/= for convening meetings
12.		Construction of the Proposed Project site	Increase in social vices/ Security Concerns	Conduct Information Education and Communication; (IEC) amongst the community and the project staff; Hold meetings between Contractor Staff and Community; Have regular police patrols at the beginning of project development; Collect information on persons coming into the project area to settle during project implementation.	Taifa Gas of Investment SEZ Limited  /Ministry Education  Local Police Local Administratio n Local Leaders	Meeting reports  Police records on project area security	Approx. 300,000/= for convening meetings

13.		Construction of the Proposed Project site	Surface runoff and sedimentation from construction activities	Construction of effective drainages and culverts; Plant soil binding grasses and other native plants This is in line with:  □ Environmental Management and Coordination Act 1999 Amended 2018  Water Act 2012 OP 4.01 Environmental Assessment	Taifa Gas Investment SEZ Limited Contractor	Surface runoff water impact protection facilities in the project area	Construction Obligation
14.		Construction of the Proposed project site	Sanitary facilities for construction workers	Installation of appropriate sanitary facilities; Having a monitoring programme for the septic tanks to ensure no overflow takes place This is in line with: Environment Management & Coordination Act (EMCA), 1999 Amended 2015, Waste Management Regulations, 2006	Taifa Gas Investment SEZ Limited Contractor	Presence of Toilet Facilities for Workers and Visitors to the Construction site	Construction obligation
15.		Construction of the Proposed Project site	Dangers of having Child Labour issues arising	Contractor to be strictly advised not to engage any underage persons (under 18 years of age) to perform any form of work at the site during construction Contractor will be required to comply with the Employment Act, 2007 This is in line with  Employment Act, 2007	Taifa Gas Investment SEZ Limited Contractor	List of workers that does not contain underage persons	Construction Obligation
Operational Phase							

1.		Operation of Proposed Project Facility	Maintenance of facilities  Working at heights	Use of protective devices to mitigate against injury; Provide first aid facilities at the site; This is in line with  Occupational Safety and Health Act (OSHA) 2007  OP 4.01 Environmental Assessment	Taifa Gas Investment SEZ Limited  Site manager	Use of Proper PPE and Equipment  Handouts on safety	Approx. 200,000/=
2.		Operation of Proposed Project Facility	Risk of Fire	Sensitization of Workers on Fire Safety Risks; No burning of any materials near or in the site This is in line with:  Occupational Safety and Health Act (OSHA) 2007 Environmental Management and Coordination Act 1999 Amended 2018 OP 4.01 Environmental Assessment	Taifa Investment Limited manager County government	Gas SEZ site Handouts on Fire Hazards and Safety	Routine Site Operation Activity
3.		Operation of Proposed Project Facility	Pollution of surface water and Waste management	Ensure solid waste is collected and appropriately disposed of; Ensure that used oil from trucks are not released to the ground; Used oil is to be put into containers and appropriately disposed of by a NEMA approved agent; Provision of used oil containers for use by truck drivers; This is in line with:  Environment Management and Coordination Act (EMCA), 1999 Amended 2018, Water Act 2012 Public Health Act Cap 242	Taifa Investment Limited manager	Gas SEZ site Presence of solid waste containers  Containers for storage of used oil recovered from trucks	Approx. 20,000/= for provision of used oil containers



				OP 4.01 Environmental Assessment				
4.		Operation of Proposed Project Facility	SEASCAN Site Solid Waste Management during Operation	<p>Provision of communal solid waste containers (skip);</p> <p>Provision of secured solid waste collection containment where waste container (skip) is to be placed;</p> <p>Regular disposal waste depending rate fill up.</p> <p>This is In line with:</p> <p>Environment Management and Coordination Act (EMCA), 1999 Amended 2015,</p> <p>Waste Management Regulations, 2006</p> <p>Water Act 2012</p> <p>Public Health Act Cap 242.</p>	Taifa Investment Limited manager	Gas SEZ site	Waste Collection and Disposal Reports  Presence of Waste Bins	<p>Approx. 20,000/= for Waste Containers 10,000/= per month for waste disposal by NEMA Approved Firm</p>
5.		Operation of Proposed Project Facility	Health issues of Facility Workers, Truck Drivers and Community	<p>Sensitize workers and community on sexually transmitted diseases especially STIs and HIV/AIDS which is spread through socialization and unprotected sex;</p> <p>Provide workers and community with condoms.</p> <p>Encourage Workers, Truck Drivers and Community to go for HIV Testing and Counselling in order to live a productive life;</p> <p>This is in line with:</p> <p>Public Health Act Cap 242</p> <p>Occupational Safety and Health Act (OSHA) 2007</p>	Taifa Investment Limited Ministry of Health Local Administration	Gas SEZ	<p>Presence of a HIV Programme at the Facility</p> <p>Records of disease incidences /prevalence (URTI, HIV/AIDS, Water Borne Diseases etc.</p>	<p>100,000/= for sensitization and provision Of condoms.</p>

6.		Operation of Proposed Project Facility	Monitoring and Evaluation of the effectiveness of project Mitigations	Implementation of monitoring of facility operations and success of proposed mitigations Health Trends (URTI, Malaria, STIs and HIV/AIDS); Livelihood and socio-economic status of project area community; Community perception on the SEASCAN Energy Limited facility Any new emerging issues, threats and benefits of the LPG Storage Facility	Taifa Investment Limited manager Local Administration	Gas SEZ site	Quarterly Reports on Facility performance	Routine Operation of the Facility
<b>Decommissioning Phase</b>								
1.		Decommissioning of Proposed Project Facility	Air Pollution (dust, smoke, fuel emissions)	Control of demolition vehicle speeds; Prohibition of idling of vehicles; Water is to be sprayed on building undergoing demolition during decommissioning to reduce dust emission; Regular maintenance of vehicles and equipment;  Provision of dust masks for use in dusty conditions. Use of serviceable vehicles and machinery to avoid excessive smoke emission These is in line with:  Environmental Management and Coordination Act 1999 Amended 2018 Occupational Safety and Health Act (OSHA) 2007	Taifa Investment Limited Decommissioning Contractor	Gas SEZ	Decommissioning Records	Approx. 200,000/= for nose protection equipment (dust masks)

2.		Decommissioning of Proposed Project Facility	Noise pollution	Noise reduction/ hearing protection devices when working with noisy equipment; Use of serviceable equipment with low noise level; Instruction to truck/machinery operators to avoid raving engines; Use of noise protection (ear muff) during demolition; This is in line with:  Environmental Management and Coordination Act 1999 Amended 2015. Occupational Safety and Health Act (OSHA) 2007.	Taifa Investment Limited Gas SEZ Decommissioning Contractor	Decommissioning Records	Approx. 200,000/= for noise pollution mitigation
3.		Decommissioning of Proposed Project Facility	Potential Injury to Workers	Use of appropriate head, hand and feet protection (PPE) during demolition of structures Adopting ergonomic work flow designs that fit physical tasks to employees and not vice versa while maintaining a balance with productivity; This is in line with:  Occupational Safety and Health Act (OSHA) 2007	Taifa Investment Limited Gas SEZ Decommissioning Contractor	Availability of appropriate gear/Records Use of Proper PPE	Approx. 200,000/= for PPE and other safety equipment
4.		Decommissioning of Proposed Project Facility	Working at heights	Use construction site barrier tape to isolate the site to guard site visitors from accidents and injuries; Implement a fall protection program that includes training in climbing techniques and use of fall protection measures, Provide Harnesses;	Taifa Investment Limited Gas SEZ Decommissioning Contractor	Availability of appropriate Safety Gear/Records Proper use of PPE	Approx. 100,000/= for PPE and other safety equipment

				<p>Use of helmets and other protective devices  i to mitigate against injury,  Provide first aid facilities at the site  This is in line with:</p> <p>Occupational Safety and Health Act  (OSHA) 2007</p>			
--	--	--	--	---	--	--	--

## CHAPTER 11

### 11.0 CONCLUSION

**Taifa gas investment SEZ Limited** is fully aware of its responsibility to sound environmental practices, and will undertake this project in compliance with Kenyan laws and in accordance with good international industry practice. The construction activities and operation of the facilities will satisfy the relevant local environmental protection laws and international conventions.

The major potential environmental and social risks and impacts associated with the proposed project have been identified and duly assessed in this ESIA Report. The major environmental, safety risks and impacts associated with the Project during both construction and operation stages include noise nuisance, air pollution, water pollution, erosion and accretion, occupational health/safety risks, sanitation problems, traffic impacts/public safety concerns, solid waste generation/disposal problems, and security risks.

Mitigation and management measures for the identified impacts have been recommended and will be implemented in order to minimize significant adverse effects. An environmental monitoring programme to help detect changes arising from the predicted adverse impacts and to help maintain environmental quality within acceptable guidelines has also been prepared for implementation. A stakeholder engagement program and grievance redress mechanism will be implemented to ensure that stakeholder concerns and grievances are managed effectively to minimize potential conflicts during project implementation.

The implementation of the proposed project will significantly improve the utilization of LPG as it will increase availability. The project will provide competitively priced LPG from the global market to displace expensive liquid fuels and environmental unsafe fuel sources currently being used in houses and industrial setup i.e. fossil fuel, wood charcoals. In addition to direct cost benefits, the project will also improve the diversity fuel supply sources, improve environmental performance (lowest emission fossil fuel) and improve security of supply for LPG in Kenya.

Generally, stakeholders are willing to participate in project implementation where necessary to help ensure that the project is implemented in an environmentally friendly and socially acceptable manner to the benefit of the country. The local communities and PAPs however expect that appropriate measures will be put in place to address the issues that they raised which is captured in the stakeholders report. The proponent is also required to comply with all the relevant authorities that govern its operations i.e. NEMA, EPRA, SEZA, WRA etc.

## ATTACHMENTS

## 1. Letter of Offer



**SPECIAL  
ECONOMIC  
ZONES  
AUTHORITY**

DAF Old Mutual tower, 14th Floor, Upper Hill Road  
P.O Box 30418-00100, GPO  
Nairobi, Kenya  
Tel: +254 20 7863971  
Email: [info@sezaauthority.go.ke](mailto:info@sezaauthority.go.ke)  
Website: [www.sezaauthority.go.ke](http://www.sezaauthority.go.ke)

**REF: SEZA/CONF/DK-LEASE/PCN0.Block IV/247**

**Date 28<sup>th</sup> February 2022**

**Taifa Gas Investment SEZ Limited**  
P O Box 40462-0100  
**NAIROBI**

**RE: LETTER OF OFFER FOR LEASE OF LAND REFERENCE No.  
MOMBASA/MAINLAND SOUTH/BLOCK IV/247 – PORTION**

Following confirmation of your interest to lease the above-mentioned premises, we set out below the terms and conditions upon which the Authority will grant you a lease.

**LESSOR:** **Special Economic Zones Authority**  
P.O. Box 30418-00100  
NAIROBI

**LESSEE:** **Taifa Gas Investment SEZ Limited**  
P O Box 40462-0100  
NAIROBI

**DEMISED PREMISES:** Part of the land known as L.R. NO. Mombasa/Mainland South/Block IV/247 Portion Marked in Dongo Kundu SEZ master plan (Annex 1) measuring approximately 12 hectares (Ha) or thereabout. Beacons for this parcel of land will be done in due course.

**LEASE TERM:** The term of Lease will be fifty (50) years commencing on a full exclusive rent with effect

July 2022.

from 1<sup>st</sup> July 2022.

uses will  
storage  
the amount  
of 20000

**USE:**

The premises will be used to put up a facility for handling, storage and distribution of LPG subject to terms and conditions of the License by the Special Economic Zones Authority.

**RENT:**

The rent payable shall be United States Dollars three Thousand (US \$ 3,000.00) per Hectare per annum exclusive of service charge payable in advance on the 1<sup>st</sup> day of July 2022 by way of bank transfer to the Lessor's bank account.

**RENT  
ESCALATION:**

The Annual rent payable SHALL escalate at a rate of not exceeding based on assessment of **Ten per cent (10%)** every five years.

**INITIAL ONE TERM  
PAYMENT:**

That you shall make an initial one term payment to the Authority of United States Dollars Ten Thousand only per Hectare you wish to lease (US \$ 10,000.00) which amount shall be non-refundable.

**SERVICE  
CHARGE:**

In addition to the rent, which will be payable annually in advance, service charge will be levied to cover all Lessor's outgoings, operations and overheads (excluding water and electricity charges, which shall be the Lessee's sole responsibility).

The service charge will be based on the assessment of Ten percent (10%) of the amount of rent payable, which will be levied annually in advance on the same days as the rent.

**DEPOSIT:**

Upon acceptance of this offer, you shall be required to pay a 30% of the annual rent amount for the leased parcel as deposit. This deposit shall be refundable at the expiry of the lease period.

**ANNUAL  
RENT PAYMENTS:**

The first annual rent and Service Charge shall be





payable on or before the 1<sup>st</sup> day of the month which the lease comes in force.

**DEVELOPMENT PERIOD:**

You shall be required to develop the premises within 24 months from the date of the commencement of the lease in accordance with the requirements of the Special Economic Zones Act No.16 of 2015 of the Laws of Kenya failure to which the Authority shall repossess the land.

**STANDARD LEASE:**

The standard lease will include all the terms referred to in this letter in addition to the standard clauses set out therein.

**EXECUTION OF LEASE/BREACH OF THE COVENANTS:**

Until such time as the standard form of lease hereafter referred to has been executed and registered, all the covenants and conditions and the rent agreed shall be deemed to be incorporated in this letter.

You will undertake to maintain the premises to the highest possible standard and the Lessor reserves the right to specify such standards and implement the same. If you will not comply, you may be required to vacate the premises.

If the rent agreed or any part thereof shall at any time remain unpaid for seven (7) days after becoming payable (whether lawfully demanded or not), or if at any time hereafter you are in breach of any covenants or conditions referred to in the standard lease, it shall be lawful for the Lessor to re-enter the premises or any part thereof in the name of whole and thereupon this Agreement of Lease shall be terminated absolutely.

*Signature*

1. The Lessee will  
2. The Lessee will  
3. The Lessee will  
4. The Lessee will  
5. The Lessee will

**UTILITIES**

The Lessee will pay to the suppliers for water, telephone, internet, and electricity consumed at or in relation to the premises. It shall be the responsibility of the Lessee to meet the costs of installing meters for electricity and water at the demised premises.

**SUB-LETTING:**

The Lessee shall not transfer, assign, sub-let or part with possession of the premises or any part thereof.

**GUARANTEE:**

The guarantors to the Lease shall be the directors of **Taifa Gas Investment SEZ Ltd.** They (the guarantors) shall be required to join in the Lease to guarantee payments and fulfilment of your obligations as stipulated therein.

**VALIDITY OF OFFER:**

This offer is valid until **ONE MONTH FROM THE DATE OF OFFER** after which the same will lapse and the land will be available for lease to other Lessees.

If the above terms and conditions are acceptable to you, kindly sign and return to us the attached copy of this letter.

Your faithfully



Dr. Meshack Kimeu, PhD  
**AG. CHIEF EXECUTIVE OFFICER**

We confirm that the above terms and conditions are acceptable to us.

Signature



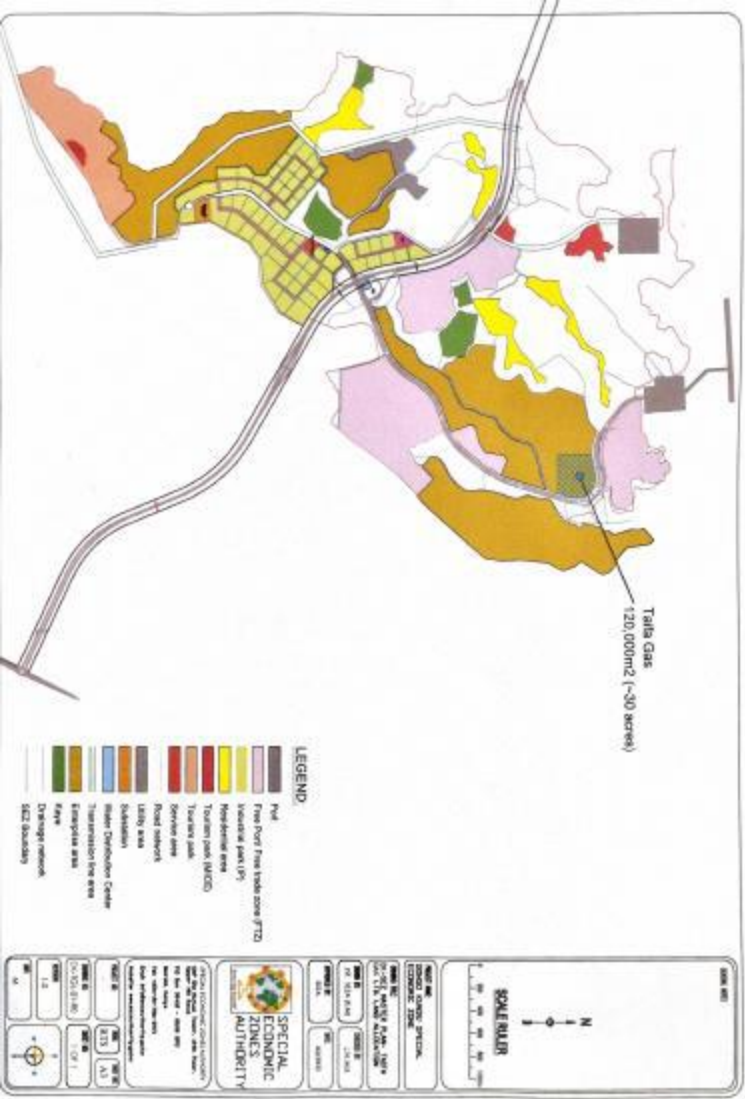
Director's Name

Hamisi RAMADHAN MSAGHAA





Date

28/02/2022

**Taifa Gas Investment SEZ Limited**



## 2. Title Deed

<div style="text-align: center;">               REPUBLIC OF KENYA  <hr style="width: 20%; margin: 5px auto;"/>              THE REGISTERED LAND ACT              (Chapter 300)         </div> <div style="text-align: center; margin-top: 20px;"> <h3>Certificate of Lease</h3> </div>	<div style="text-align: center;">               REPUBLIC OF KENYA  <hr style="width: 20%; margin: 5px auto;"/>              THE REGISTERED LAND ACT              (Chapter 300)         </div> <div style="text-align: center; margin-top: 20px;"> <h3>Certificate of Lease</h3> </div> <div style="margin-top: 20px;"> <p><b>TITLE No.</b> <u>MOHABA/MAINLAND SOUTH/BLOCK IV/247</u></p> <p><b>LESSOR</b> <u>THE GOVERNMENT OF KENYA</u></p> <p><b>RENT</b> <u>KSHS. 72/= P.A (REV.)</u></p> <p><b>TERM</b> <u>99</u> YEARS FROM <u>1/10/97</u></p> </div> <div style="margin-top: 20px;"> <p><i>This is to certify that</i> <u>KENYA PORTS AUTHORITY</u></p> <p><u>P.O. BOX 95009, MOHABA</u> .....</p> <p>.....</p> <p>.....</p> </div> <div style="margin-top: 20px;"> <p>is (<del>was</del>) now registered as the proprietor(s) of the leasehold interest above referred to, subject to the agreements and other matters contained in the registered lease, to the entries in the register relating to the lease and to such of the overriding interests set out in section 30 of the Registered Land Act as may for the time being subsist and affect the land comprised in the lease.</p> </div> <div style="text-align: right; margin-top: 20px;"> <p>GIVEN under my hand and the seal of the</p> <p><u>MOHABA</u> District Registry</p> <p>this <u>2ND</u> day of <u>DECEMBER</u>, 19<u>98</u></p> <div style="text-align: center; margin-top: 10px;">                 Land Registrar         </div> </div>
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At the date stated on the front hereof, the following entries appeared in the register relating to the land:—

[illegible][illegible]

  
Lead Registrar

### 3.Certificate of incorporation


No. PVT-ZQULRAPG

## CERTIFICATE OF INCORPORATION

I hereby **CERTIFY** that,

## TAIFA GAS INVESTMENT SEZ LIMITED


is on this date 11 Nov 2021 incorporated under the Companies Act, 2015 and that the Company is a **PRIVATE LIMITED COMPANY**.



  
\_\_\_\_\_  
**Registrar Of Companies**

This is a system generated certificate. To validate this document send the word **BRS** to **21546**

## 4.TOR APPROVAL



**nema**  
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Mobile Lines: 0724-253 398, 0723-363 010, 0735-013 046  
Telkom Wireless: 020-2101370, 020-2183718  
Incident Lines: 0786-101100, 0741-101100

P.O. Box 67839, 00200  
Pogo Road, Nairobi, Kenya  
E-mail: [dgnama@nema.go.ke](mailto:dgnama@nema.go.ke)  
Website: [www.nema.go.ke](http://www.nema.go.ke)

**NEMA/TOR/5/2/416**

**11<sup>th</sup> April, 2022**

**The Manager,  
Taifa Gas Investment SEZ Limited,  
P.O. Box 40462-00100  
NAIROBI.**


**RE: ACKNOWLEDGEMENT AND APPROVAL OF TERMS OF REFERENCE (TOR)  
FOR ENVIROMENTAL IMPACT ASSESSMENT**

---

We acknowledge the receipt of TOR for the above subject.


Pursuant to the Environmental Management and Coordination Act, 1999, the Environmental (Impact Assessment and Audit) Regulations 2003 and Legal notice 31 & 32 of 2019, your terms of reference for the Environmental Impact Assessment (EIA) for the proposed **LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU, MOMBASA COUNTRY**, has been approved.

You shall submit ten (10) copies, a soft copy summarised version of the ESMP in **WORD** form and one electronic copy of your report prepared by a registered expert to the Authority.



**REAGAN AWINO  
HEAD EIA SECTION**

*Our Environment, Our Life, Our Responsibility*



ISO 9001:2015 Certified

## 5.KRA PIN



www.kra.go.ke

## PIN Certificate

For General Tax Questions  
Contact KRA Call Centre  
Tel: +254 (020) 4999 999  
Cell: +254(0711)000 999  
Email: callcentre@kra.go.ke

Certificate Date 23/11/2021

 Personal Identification Number  
P052071961V

This is to certify that taxpayer shown herein has been registered with Revenue Authority

## Taxpayer Information

<b>Taxpayer Name</b>	TAIFA GAS INVESTMENT SEZ LIMITED
<b>Email Address</b>	SEZ@TAIFAGASWORLD.COM

## Registered Address

<b>L.R. Number :</b>	<b>Building</b> PLAZO INDUSTRIAL PARK
<b>Street/Road</b> MOMBASA ROAD	<b>City/Town :</b> NAIROBI
<b>County :</b> Machakos	<b>District</b> Athi River District
<b>Tax Area</b> Athi River	<b>Station</b> Machakos
<b>P. O. Box</b> 40462	<b>Postal Code</b> 00100

## Tax Obligation(s) Registration Details


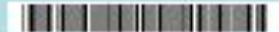
Sr. No.	Tax Obligation(s)	Effective From Date	Effective Till	Status
1	Income Tax - Company	18/11/2021	N.A.	Active

The above PIN must appear on all your tax invoices and correspondences with Revenue Authority. Your accounting end month is December unless a change has been approved by the Commissioner-Domestic Taxes Department. The status of Tax Obligation(s) with 'Dormant' status will automatically change to 'Active' on date mentioned in "Effective Till Date" or any transaction done during the period. This certificate shall remain in force till further updated.

**Disclaimer :** This is a system generated certificate and does not require signature.



## 5.CR12

 THE REPUBLIC OF KENYA		BUSINESS REGISTRATION SERVICE P. O. BOX 30031 NAIROBI 11 NOV 2021		
<b>To</b> The Director(s) TAIFA GAS INVESTMENT SEZ LIMITED P.O. Box 40462 00100 - G.P.O NAIROBI				
<b>THE COMPANIES ACT, 2015</b>				
Records relating to the below company held by the Companies Registry as at 11 Nov 2021				
COMPANY	TAIFA GAS INVESTMENT SEZ LIMITED			
COMPANY NUMBER	PVT-ZQULRAPG			
NOMINAL SHARE CAPITAL	100,000.00			
NUMBER AND TYPE OF SHARES (VALUE PER SHARE)	ORDINARY: 100 (KES 1,000.00 EACH)			
DATE OF REGISTRATION	11 NOV 2021			
REGISTERED OFFICE	P.O BOX 40462, G.P.O NAIROBI TELEPHONE: +254745116876, EMAIL: SEZ@TAIFAGASWORLD.COM COUNTY: NAIROBI, DISTRICT: EMBAKASI DISTRICT, LOCALITY: EMBAKASI STREET: MOMBASA ROAD ATHE RIVER, BUILDING: PLAZO INDUSTRIAL PARK			
POSTAL ADDRESS	P.O BOX 40462 G.P.O NAIROBI			
ENCUMBRANCES				
Name of Directors and Shareholders of the above company with their particulars are as follows				
NAME	DESCRIPTION	ADDRESS	NATIONALITY	SHARES
ROSTAM AZIZI	DIRECTOR/SHAREHOLDER	P.O BOX P.O BOX 77578 DAR ES SALAAM, TANZANIA	TANZANIA	ORDINARY: 98
JEHANGIR ABDULRASOOL AZIZ	DIRECTOR/SHAREHOLDER	P.O BOX P.O BOX 77578 DAR ES SALAAM, TANZANIA	TANZANIA	ORDINARY: 2
HUWEL JAMAL SALEH	DIRECTOR	P.O BOX P.O BOX 40462-00100	TANZANIA	
MSAGHAA HAMISI RAMADHANI	DIRECTOR	P.O BOX P.O BOX 77578 DAR ES SALAAM, TANZANIA	TANZANIA	
TOTAL				100
Yours Faithfully, REGISTRAR OF COMPANIES		 REF NO: PVT-ZQULRAPG		
<small>DISCLAIMER: THIS IS A SYSTEM GENERATED CERTIFICATE AND DOES NOT REQUIRE A SIGNATURE</small>				

## 6.Noise Survey Report

### ENVIRONMENTAL NOISE MEASUREMENT REPORT FOR TAIFA GAS SEZ LIMITED



**APRIL 2022**

**BY**

**GLAKES CONSULTING LIMITED**

## EXECUTIVE SUMMARY

This specialist, Mr Philip Abuor, an Approved Air Quality Monitor was contracted by Taifa Gas Limited to carry out a noise assessment audit. The assessment was commissioned by Glakes Consulting Limited to carry out noise level measurements in the proposed master plan of the industrial park, in Mombasa. The audit of Noise levels was carried out on 23 -24 April 2022 at the proposed facility.

The measurements were performed using Noise Meter complying with international standards for sound level meter specifications IEC 61672:1999, IEC 61260:1995 and IEC 60651, as well as ISO 19961:2003 and ISO 3095:2001 for the measurement and assessment of environmental noise.

Significant noise was emitted from various sections of the environment. The highest level was measured at the drilling area. Most of site areas registered low values below the Kenyan Regulatory limits stipulated in the Factories and other places of work (Noise Prevention and Control) Rules 2005, Environmental noise were also above the Environmental Management and Coordination (Noise and Excessive Vibrations) Regulations, 2009 for commercial zone of 60dB during day and 35dB at night which were influence with external sources especially at night.

## CERTIFICATION

REPORT TITLE	AMBIENT NOISE MEASUREMENT
REPORT REFERENCE NUMBER	GKCL/NM/03/22/001
MEASUREMENT DATE	23 -24 APRIL 2022
PURPOSE OF MEASUREMENT	REGULATORY ASSESSMENT
OPERATING CONDITIONS	FULL OPERATION
NAME AND ADDRESS OF CLIENT	GLAKES CONSULTING LIMITED
CONTACT PERSON	
PREPARED BY	GLAKES COSULTING LIMITED  SIGNED: _____  APPROVED AIR QUALITY MONITOR  CERTIFICATE NO.: <b>OSH/AQM/003</b>
STATUS	FINAL REPORT

### Terminologies and Acronyms

Decibel (dB)	Unit of measuring for sound levels, based on a logarithmic scale.
DbA	Unit representing the sound level measured with the A weighting network of a sound level meter. A- Weighted filter is an electronic circuit whose sensitivity to sound pressure levels varies in the same way as the human ear.
Attenuation	Reduction of noise level.
Exposure Action Value	The level of daily exposure any worker which, if reached or exceeded, requires specified action to be taken to reduce risk
IFC	<a href="#">International Finance Corporation</a>
ISO	International Organization for Standardization
TWA (Time Weighted Average)	The average of the sampled sound over an eight-hour period.
Noise Reduction Rating (NRR)	Measure of the estimated attenuation capacity of a hearing protector.
Impulse noise	This is noise characterized by sharp rise and rapid decay in sound levels and is less than one second in duration.
Frequency	Pitch or the number of cycles that a sound wave completes per second. Measured in Hertz or cycles per second (CPS).
WHO	<a href="#">World Health Organization</a>

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## 1.0. INTRODUCTION

Taifa Gas limited, formerly called Mihan Gas, is the largest LPG supply company in Tanzania. The company, which has built 35 plants and storage facilities in Tanzania mainland and Zanzibar, is one of the companies founded and controlled by Rostam Aziz. Taifa Gas Limited Experienced is a Corporate Management with a demonstrated history of working in the Oil & Gas Industry. The company has skilled Management, Teamwork and Engineering, Strategic Planning, Investment analysis and financial management.

The noise level assessment was commissioned by Glakes Consulting Limited to carry out site noise level measurements in the proposed site, in Kilifi County. The report presents the finding of the Noise level measurements carried out on 23-24 April 2022.

### 1.1. PROPOSED PROJECT

Taifa Gas Kenya Limited (TGKL) has expressed interest in developing and installing Liquefied Petroleum Gas (LPG) Storage and Filling Plant, and Single Mooring Point (SMP) at Kilifi county . The proposed project involves the installation of large LPG spherical tanks (Horton Spheres), an Ex rated LPG pump, operational office and main office, bulk tanker loading points with deluge systems, trucks parking area, fire water tank, water sprinkler system. Other auxiliary facilities and site features will include the saddles for the tanks, chamber vapor trap and a clear site drainage. The project will also involve the construction of an offshore Single Mooring Point (SMP) to remove the product from ships into the storage facility.

### 1.2. MAIN OBJECTIVES OF THE ASSESSMENT

The prime objectives of the noise survey were as follows:-

- To identify the major sources of noise i.e. noise producing sources and noisy processes;

- To generate baseline data with regard to different noise sources;
- To identify where workers are exposed to noise harmful to their hearing;
- To assess the possible health effect on the workers exposed to harmful noise;
- To provide information to determine corrective actions, this may include a hearing conservation and noise control program.

### 1.3 Terms of Reference

The terms of reference for Environmental noise survey were:

- To establish environmental noise levels at the quarry site and surrounding sensitive receptors;
- Compile achieved results and compare with the national and international standard and regulations.

### 1.4 Quality Control

The acoustic equipment used during the measurements was duly calibrated to a traceable standard. Field checks were performed before and after each monitoring session. The full details of the noise level meter and noise level meter calibrator is provided along with the current calibration certificates. Identification of each of the measurement location is as located in the photographic report.

### 1.5 Prevailing Meteorological conditions at the time of measurement

The prevailing weather conditions during the sampling period was characterized by gentle breezes of south westerlies with wind speeds of 07 knots on the Beaufort scale which were diffused during the morning hours. The sky was cloudy with cumulus clouds to the extent of 6-7 oktas with a temperature of 25-21°C. The relative humidity was 50-80%. Stable and light winds blowing towards the receiver from the source of noise has a potential to increase noise levels. For this reason, the effect of wind was considered when it featured in the assessment region.

## 1.6 DESCRIPTION OF MEASUREMENT POINTS

The area of study was within the project's property and its surroundings. The criteria for choosing the sampling points/location were: -

1. Proximity to the Sensitive Receptors (AQSR and NSRs)
2. Prevailing Wind Direction/Speed (Meteorological information)
3. The standard methodologies and the regulatory requirements e.g. EMC Air Quality Regulations, 2014; EMC Noise and Excessive Vibrations, 2009; Occupational Noise Regulations, 2005 and IFC/WHO Guidelines.

## 2.0 REGULATIONS AND STANDARDS

**THE ENVIRONMENTAL MANAGEMENT AND COORDINATION (NOISE AND EXCESSIVE VIBRATION POLLUTION) (CONTROL) REGULATIONS, 2009. LEGAL NOTICE NO. 61.**

### 2.1. General Prohibitions.

(1) Except as otherwise provided in these Regulations, no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment.

(2). In determining whether noise is loud, unreasonable, unnecessary or unusual, the following factors may be considered-

(a) time of the day;

(b) proximity to residential area;

(c) whether the noise is recurrent, intermittent or constant;

(d) the level and intensity of the noise;

(e) whether the noise has been enhanced in level or range by any type of electronic or mechanical means; and,

(f) whether the noise can be controlled without much effort or expense to the person making the noise.

(3). any person who contravenes the provisions of this Regulation commits an offence

## **2.2. Permissible noise levels.**

No person shall make, continue or cause to be made or continued any noise in excess of the noise levels set in the First Schedule to these Regulations, unless such noise is reasonably necessary to the preservation of life, health, safety or property.

## **2.3 Measurement and control.**

- (1) No person shall cause noise from any source which exceeds any sound level as set out in the applicable column in the First Schedule to these Regulations.
- (2) Measurements shall be taken by the relevant lead agency.
- (3) In any cases where there is no relevant lead agency to take the measurements, or where the lead agency has failed to take action after being given reasonable notice by the Authority, the measurement shall be taken by a person duly authorized by the Authority, who is knowledgeable in the proper use of the measuring equipment.
- (4) The Authority in consultation with the relevant lead agency may issue guidelines for the measurement of noise and excessive vibration. (5) Any person who makes noise in excess of the prescribed levels commits an offence.

**Table 4: Maximum permissible noise levels**

		Day	Night	Day	Night
A.	Silent Zone	40	35	30	25
B.	Places of worship	40	35	30	25
C.	Residential : Indoor	45	35	35	25
	: Outdoor	50	35	40	25
D.	Mixed residential (with some commercial and places of entertainment)	55	35	50	25
E.	Commercial	60	35	55	25

Time Frame

Day: 6.01 a.m. –8.00 p.m.(Leq, 14h)

Night: 8.01 p.m. – 6.00 a.m. (Leq, 10h)

## 2.4 INTERNATIONAL GUIDELINES

These guidelines dictate generally acceptable noise levels in given environments at different times of the day. This is the approach provided by the WHO and WB which specify a limit of 55 dBA during the day and 45 dBA during the night for residential purposes, determined over any hour.

**Table 5: World Health Organisation (WHO) Guidelines for Ambient Sound Levels**

Environment	Ambient Sound Level (dBA)			
	Daytime (06:00 to 22:00)		Night-time (22:00 to 06:00)	
	Indoor Space	Outdoor Space	Indoor Space	Outdoor Space
Dwellings	50	55		
Bedrooms			30	45
Schools	35	55		
Hospitals (general)	35		35	45

**Table 6 : World Bank (WB) Guidelines for Ambient Sound Levels**

Receptor	Maximum Allowable Ambient Noise Levels (1-hour)	
	Daytime (07:00 to	Night-time (22:00 to 07:00)
Residential, Institutional,	55	45
Industrial, commercial	70	70

### 3.0. MEASUREMENT METHODOLOGY

#### 3.1. Noise monitoring methodology

The environmental noise level measurements were carried out with respect to the ISO 1996, Acoustics – Description and Measurement of Environmental Noise, comprising the following:

- Part 1: Basic quantities and procedures;
- Part 2: Acquisition of data pertinent to land use and
- Part 3: Application to noise limits.

A duly calibrated Type 1 Precision impulse integrating Sound level meter set at fast response was used. Field calibration checks was done before and after each measurement schedule. Monitoring points were identified for measurements to determine the environmental noise. Measurements were done in both the diurnal (daytime) schedule.

- The measurements were done for a period of 15 minutes at each of the monitoring locations and sessions logs done after every ten seconds. For each session, the Ln, LAeq, LAMax, LAMin, LA peak (max) and sources of noise were recorded.

#### 3.2. Measurement Equipment

The noise monitoring was based on noise measurements obtained via the use of a sound level meter, in accordance with international standards for sound level meter specifications IEC 61672:1999, IEC 61260:1995 and IEC 60651., as well as ISO 19961:2003

and ISO 3095:2001 for the measurement and assessment of environmental noise. The measurements were performed using Sound Level Meter with data-logging system, model 8005.

**Table 7: Sound Level Measurement Instrumentation**

Instrument	Type	Serial No.
1. Precision Integrating Sound Level Meter	CR-264A	B220458B

#### 4.0. MEASUREMENTS RESULTS

##### 4.1 Noise Results

The noise levels (LAeq) for each measurement location are as indicated in Table 4 below. The measurement results are expressed in terms of dB(A).

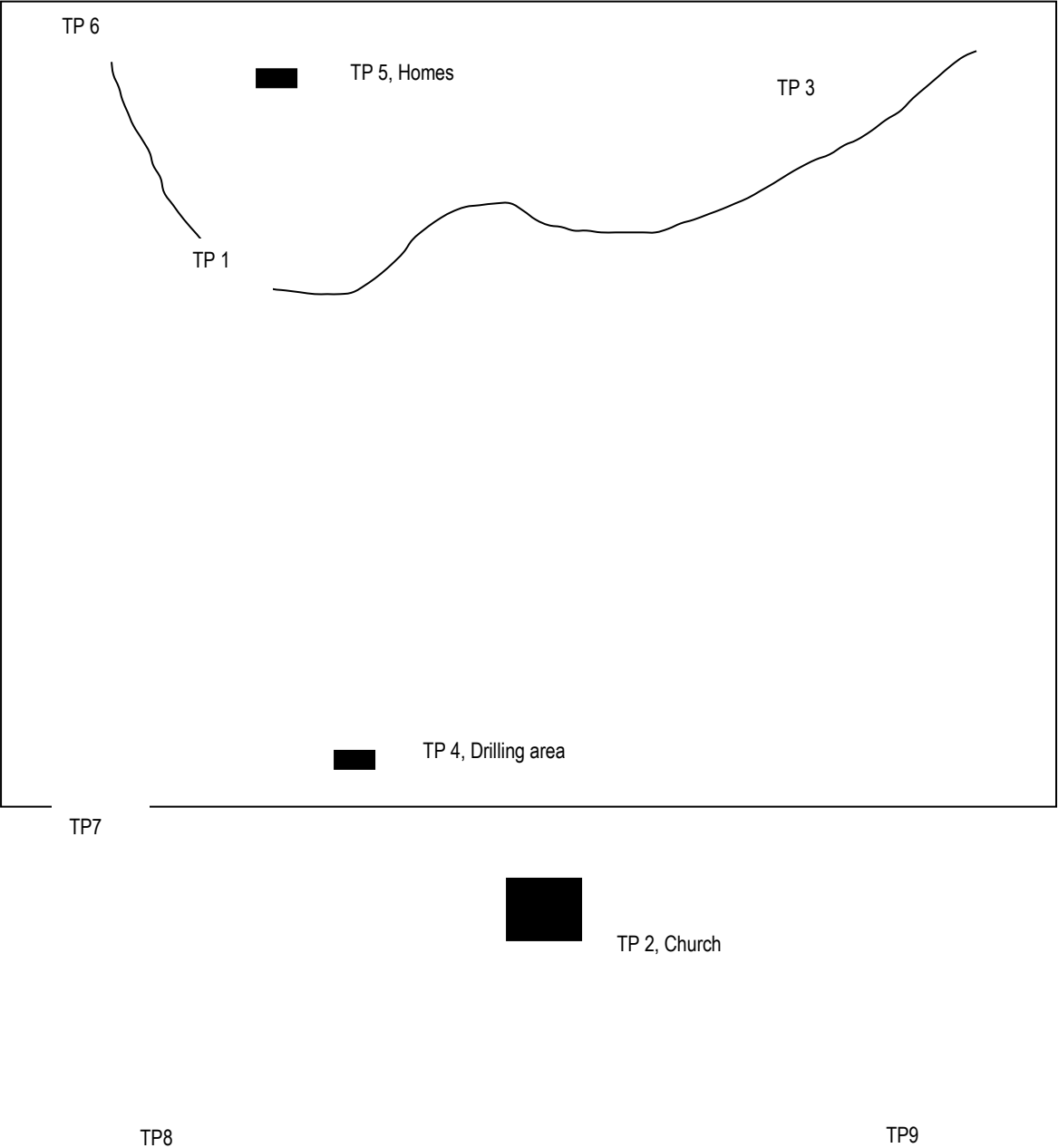
**Table 8: Results Summary Table for Noise Measurements**

No	LOCATION	AREA	ACTUAL	Limits dB(A)
1	Measurement point 1	Along the seasonal river	42.3	60
2	Measurement point 2	Church house	56.9	60
3	Measurement point 3	River point	45.3	60
4	Measurement point 4	Drilling Area, ON	90.2	60
		Drilling Area, OFF	41.5	60
5	Measurement point 5	Homes	50.7	60
6	Measurement point 6	Road side	38.6	60
7	Measurement point 7	Shrubs	36.3	60



8	Measurement point 8	Shrubs	36.1	60
9	Measurement point 9	Tree's	32.6	60
10	Measurement point 10	Plantation and trees	35.2	60

AREA SAMPLING POINTS



TP10, plantation

## **5.0. DISCUSSION OF THE FINDINGS, CONCLUSION AND RECOMMENDATIONS**

### **5.1. Discussion of the Findings**

Significant noise was emitted from areas around drilling machine. The drilling was the main source of noise in the entire area. When measurements were done, when the drilling machine was off, the noise level went down from 90.2 dB to 41.5 dB. The second highest noise area was around Test point 2, near the church area. The main source of noise were the congregation mostly women and children that had gathered around this place to worship. The lowest noise was picked at around test point 9, which was the plantation area, recorded average 32.6 dB This area is hilly in comparison to other areas and had very few people.

The noise were above the regulations because of the temporary drilling that was taking place near the measured points and traffic at the main gate also contributed to the high noise levels during the diurnal measurements.

### **5.2. Conclusion**

The ambient noise levels in the project area were within the regulatory limit of 60 dB (A) except the Church area that recorded the high noise levels due to the church activities.

## 6.0. REFERENCES

1. IFC/World Bank, Environmental, Health and Safety Guidelines
2. Environmental Management and Coordination (Noise and Excessive Vibrations) Regulations, 2009.
3. Singal, S.P.1997.Noise Pollution: Standards and Control. In Environmental Resource Management .Ed.N.K Shastri.Anmol Publications Pvt Ltd, New Delhi.173-215
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7. Government of Kenya.(2005). The Factories and Other places of Work (Noise Prevention and Control) Rules, 2005. Nairobi: Government Printer
8. Government of Kenya. (2005). The Factories and Other places of Work (Medical

Examination) Rules, 2005 Nairobi: Government Printer

9. ILO Encyclopedia of Occupational Safety and health Vol. II, Geneva 1983.
10. ILO Occupational Safety and Health Services No. 33: Noise and Vibration in Working Environment, ILO office, 1976.
11. Occupational Noise Surveys April 2007, Work safe BC
12. Occupational Noise Management Revised July 2003. NT Work Safe, Department of Employment, Education and Training, Northern Territory Government

## 7.0. APPENDICES

### Appendix 1: Reducing Noise and Noise Exposure

There are many ways of reducing noise and noise exposure and often a combination of methods works best. First think about how to remove the loud noise altogether. If that is not possible, do all you can to control the noise at source, consider redesigning the workplace and reorganizing working patterns. Take measures to protect individual workers if you need to. Consider the following:

- Use a different, quieter process or quieter equipment, e.g.:
  - ✓ Can you do the work in some other quieter way?
  - ✓ Can you replace whatever is causing the noise with something that is less noisy?
  - ✓ Introduce a low-noise purchasing policy for machinery and equipment.
- Introduce engineering controls:-
  - ✓ Avoid metal-on-metal impacts, e.g. line chutes with abrasion-resistant rubber, and reduce drop heights;
  - ✓ Vibrating machine panels can be a source of noise – add material to reduce vibration ('damping');
  - ✓ Isolate vibrating machinery or components from their surroundings, e.g. with anti-vibration mounts or flexible couplings;
  - ✓ Fit silencers to air exhausts and blowing nozzles.
- Modify the paths by which the noise travels through the air to the people exposed, e.g.:-

- ✓ Erect enclosures around machines to reduce the amount of noise emitted into the workplace or environment;
- ✓ Use barriers and screens to block the direct path of sound;
- ✓ Position noise sources further away from workers.
- Design and lay out the workplace for low noise emission, e.g.:
  - ✓ Use absorptive materials within the building to reduce reflected sound, e.g. open cell foam or mineral wool;
  - ✓ Keep noisy machinery and processes away from quieter areas;
  - ✓ Design the workflow to keep noisy machinery out of areas where people spend most of their time.
- Limit the time spent in noisy areas – every halving of the time spent in a noisy area will reduce noise exposure by 3 dB.
- Proper and regular maintenance of machinery and equipment is essential as it will deteriorate with age and can become noisier. Listen out for changes in noise levels – it may be time to replace worn or faulty parts

### Appendix 3: Photographic Report



The noise measurements area



The drilling area

## Appendix 4: Equipment Calibration Certificate

ORIGINAL

Kenya Bureau of Standards  
P.O Box 54974-00200  
NAIROBI  
Tel: (+254 020) 6948000  
info.metrology@kebs.org  
Website: www.kebs.org



Calibration Certificate

Page 1 of 3 Pages

BS/MET/19/15/3/9/02

REQUESTED BY:	NEW SONIC QUALITY INSPECTORS
ADDRESS:	P.O. BOX 73870-00200 NAIROBI
EQUIPMENT:	SOUND LEVEL METER
TYPE/MODEL:	CR:264A
SERIAL NO.:	B22045FB
MANUFACTURER:	CIRRUS RESEARCH PLC
LAB. NO.:	ACOUSTICS AND VIBRATION-NP 15
DATE:	2021-07-06
CERTIFICATE NO.:	BS/MET/19/15/3/9/02
STICKER SERIAL NO.:	69390



**1.0. STANDARDS AND REFERENCE EQUIPMENT USED**  
Multifunction Acoustic Calibrator Type 4226 S/No. 2532059 with a standard uncertainty of  $\pm 0.075$  dB was used in the calibration process.

**2.0. METROLOGICAL TRACEABILITY**  
This calibration certificate documents traceability to the national measurement standards, and to the units of measurement realized at KEBS, or other recognized national standards laboratories according to the International System of Units (SI). KEBS is a signatory of the CIPM Mutual Recognition Arrangement (CIPM MRA) and where there is no published Calibration and Measurement Capabilities (CMCs), KEBS has documented the traceability of the standard equipment used in 1.0 above.

**3.0. CALIBRATION PROCEDURE**  
The Sound Level Meter was calibrated using Kenya Bureau of Standards Laboratory Procedure MET/15/CP/02: *Sound level meter calibration*.

Prepared By: Collins Taiti Date: 2021-07-06

Checked By:  Date: 2021-07-06

Signed:  Date: 2021-07-06

For: Director Metrology and Testing

Calibration certificate without signature and official stamp is not valid. This certificate has been issued without any alteration and may not be reproduced other than in full except with the approval of the Managing Director KEBS.



Page 2 of 3 pages

BS/MET/19/15/3/9/02

#### 4.0. CALIBRATION RESULTS

##### 4.1 Reading at Reference

Function	Standard Sound Pressure Output (dB)	Reading Before Adjustment (dB)	Reading After Adjustment (dB)	Expanded Uncertainty (dB)
FAST	93.9	93.9	NOT ADJUSTED	0.2

##### 4.2 Frequency Response (Inverse A)

Nominal Frequency(Hz)	Expected Sound Pressure Level(dB)	DUT Reading (dB)	Acceptable Tolerance ( $\pm$ dB)	Expanded Uncertainty (dB)
31.5	93.9	94.6	3.5	0.2
63	93.9	93.9	2.5	0.2
125	93.9	93.9	2.0	0.2
250	94.0	93.9	1.9	0.2
500	93.9	93.9	1.9	0.2
1000	93.9	93.8	1.4	0.2
2000	93.9	93.6	2.6	0.4
4000	94.0	92.7	3.6	0.7

##### 4.3 C - Frequency Weighting Response

Nominal Frequency(Hz)	Expected Sound Pressure Level(dB)	DUT Reading (dB)	Acceptable Tolerance ( $\pm$ dB)	Expanded Uncertainty (dB)
31.5	110.9	111.0	3.5	0.2
63	113.1	113.2	2.5	0.2
125	113.7	114.0	2.0	0.2
250	113.9	114.2	1.9	0.2
500	113.9	114.1	1.9	0.2
1000	113.9	114.0	1.4	0.2
2000	113.7	113.6	2.6	0.4
4000	113.1	112.0	3.6	0.7

ORIGINAL

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Tel: (+254 020) 8948000  
info metrology@kebs.org  
Website: www.kebs.org



## Calibration Certificate

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BS/MET/19/15/3/9/02

## 4.4 Level Linearity at 1 kHz (Frequency Weighting A, Time Weighting Fast)

Range	Level(dB)	DUT Reading(dB)	Expanded Uncertainty (dB)
30 – 100	93.9	93.8	0.2
40 – 110	93.9	93.9	0.2
50 – 120	93.9	93.9	0.2
50 – 120	113.9	113.8	0.2
60 – 130	93.9	93.9	0.2
60 – 130	113.9	113.8	0.2
70 – 140	113.9	114.0	0.2

## 4.5 Time-Weightings

Detector Characteristic	(a) DUT Primary Indicator Range Reading (dB)	(b) DUT Primary Indicator Range F50 - 4 dB (dB)	Deviation = (a) - (b)	Maximum Response
F	105.3	106.0	-0.7	-1.0

## 5.0 REMARKS

- 5.1 Calibration was conducted at a temperature of  $(23 \pm 1) ^\circ\text{C}$ , relative humidity of  $(56 \pm 10) \% \text{RH}$  and pressure of  $(840 \pm 5) \text{ mbar}$ .
- 5.2 The reference for the dB scale is sound pressure level of 20  $\mu\text{Pa}$  at 1 kHz.
- 5.3 The uncertainty of measurement has been determined in accordance with Publication JCGM 100:2008 "Evaluation of measurement data-Guide to the expression of uncertainty in measurement" and represents the expanded value after multiplying by a coverage factor of 2 for a level of confidence of 95 %.
- 5.4 This certificate is valid until July 2022.

End

Calibration certificate without signature and official stamp is not valid. This certificate has been issued without any alteration and may not be reproduced other than in full except with the approval of the Managing Director KEBS.

## Appendix 5: Workplace Registration Certificate

## Appendix 6: DOSH Registration Certificate

MeL/DOSH 4



**REPUBLIC OF KENYA**

**The Occupational Safety and Health Act, 2007**

**CERTIFICATE OF APPROVAL OF AIR QUALITY MONITOR**

I hereby approve **Mr. Philip Otieno Abuor**, holder of **National ID No. 5967315** of P.O. Box **55533 - 00200 Nairobi**, to carry out **Air Quality Measurements** of workplaces for the purpose of Rules 16 and 17 as read with Rule 2 of Factories and Other Places of Work (Hazardous Substances) Rules (Legal Notice No. 60/2007) under the Occupational Safety and Health Act, 2007, Laws of Kenya.

This certificate is valid from **1<sup>st</sup> July 2021** to **30<sup>th</sup> June 2022**, unless revoked by the Director of Occupational Safety and Health Services any time earlier.

Certificate No. **OSH / AQM 003**

Date of Issue 29/07/2021



Director of Occupational Safety and Health Services

Conditions

1. The authority to carry out air quality monitoring cannot be delegated.
2. This certificate does not allow the holder to carry out Air Quality Monitoring in his/her place of work or employment.
3. The holder of this approval certificate must continually upraise him/herself of the safety and health legislation in this country.
4. The holder of this approval certificate undertakes to notify the director's office of any air quality measurements two weeks prior to executing the said work.
5. A copy of the report of the results of measurements must be sent to the relevant offices of the DOSHS within fourteen days of the completion of measurements.
6. To verify the authenticity of this certificate the occupier should endeavour to visit [www.dosh.go.ke](http://www.dosh.go.ke) the official website of the Directorate of Occupational Safety and Health Services or call 0202667722 for the updated list of approved Air Quality Monitors.



Signature of Approved Person

Date 29/07/2021

## 7.Ambient Air Quality Report


TAIFA GAS INVESTMENT SEZ LIMITED



AMBIENT AIR QUALITY REPORT

PREPARED BY  
GLAKES CONSULTING LIMITED

### CERTIFICATION

<b>CLIENT</b>	<b>Taifa Gas Investment Ltd</b>
<b>PROJECT TITLE</b>	<b>Ambient Air Quality Measurement Report</b>
<b>PROJECT NAME</b>	<b>TAIFA GAS INVESTMENT ON THE PROPOSED SITE TO BE LOCATED AT THE SPECIAL ECONOMIC ZONE IN DONGO KUNDU, MOMBASA COUNTY</b>
<b>MEASUREMENT DATE:</b>	<b>23-24 April 2022</b>
<b>PURPOSE OF THE MEASUREMENT</b>	<b>Internal &amp; Regulatory Assessment</b>
<b>APPROVED BY:</b>	 <b>Philip Abuur</b> <b>Principle Consultant</b> <b>GLAKES CONSULTING LIMITED</b>
<b>NAME AND SIGNATURE: (Client Representative)</b>	<p>.....</p> <b>Taifa Gas Investment SEZ Ltd</b>

**Disclaimer**

*This ambient air quality assessment report has been carried out to the best of our knowledge and ability and within the terms of contract with the client and is limited to the exercise of reasonable care. This report is not intended to relieve the Establishment from their contractual obligations. This report reflects our findings at the time and place of intervention and is issued under the company's standard terms and conditions of service.*

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## ABBREVIATIONS

<b>EMCA</b>	<b>Environment Management and Co-ordination Act</b>
<b>ILRI</b>	<b>International Livestock Research Institute</b>
<b>m<sup>3</sup></b>	<b>Cubic metres</b>
<b>µg/m<sup>3</sup></b>	<b>Micrograms per Cubic Metre</b>
<b>Mg</b>	<b>Milligrams</b>

<b>mg/m<sup>3</sup></b>	<b>Milligrams per Cubic Metre</b>
<b>Mins</b>	<b>Minutes</b>
<b>AAQ</b>	<b>Ambient Air Quality</b>
<b>NO<sup>2</sup></b>	<b>Nitrogen Dioxide</b>
<b>CO</b>	<b>Carbon Dioxide</b>
<b>SO<sup>2</sup></b>	<b>Sulphur Dioxide</b>

## **EXECUTIVE SUMMARY**

**Taifa Gas Limited contracted Glakes Consulting Limited to undertake Ambient Air Quality Measurement as part of an Environmental Impact Assessment for the TAIFA GAS INVESTMENT GEZ ON THE PROPOSED SITE TO BE LOCATED AT THE SPECIAL ECONOMIC ZONE IN DONGO KUNDU, MOMBASA COUNTY. Air Quality measurement was carried out on 23-24 April 2022.**

The measurements for air quality was done as per the Kenyan (NEMA) Air Quality Regulations and WB/IFC Guidelines with specific parameters being SO<sub>2</sub>, NO<sub>X</sub> and Total Suspended Particulate Matters (TSP, PM<sub>10</sub>, and PM<sub>2.5</sub>) undertaken to establish ambient air gases at two locations along the proposed project boundaries adjacent to key receptors.

The main objective of the monitoring was to: Measure the ambient air quality around in the sensitive receptors near the proposed site and establish a baseline; prepare an air quality assessment report and compare the results of the measurement with the Kenyan air quality regulations of 2014.

The assessment utilized an air quality monitor to carry out the measurements. The sensors are housed within an interchangeable cartridge that attaches to a monitor base. For this study, Nitrogen Dioxide, Carbon Dioxide and Sulphur Dioxide sensor heads were used. The calibration documents and sensor specifications are attached in the appendices – equipment calibration section.

## INTRODUCTION

Taifa Gas Limited contracted Glakes Consulting Limited to undertake Ambient Air Quality Measurement as part of an Environmental Impact Assessment for proposed TAIFA GAS INVESTMENT GEZ ON THE PROPOSED SITE TO BE LOCATED AT THE SPECIAL ECONOMIC ZONE IN DONGO KUNDU, MOMBASA COUNTY. Air Quality measurement was carried out on 23-24 April 2022.

The measurements for air were done as per the Kenyan (NEMA) Air Quality Regulations and WB/IFC Guidelines with specific parameters being SO<sub>2</sub>, NO<sub>2</sub> and Total Suspended Particulate Matters (TSP, PM<sub>10</sub>, and PM<sub>2.5</sub>) undertaken to establish ambient air gases at two locations along the proposed project boundaries adjacent to key receptors.

### 3.0 Monitoring Objectives

3.1 The main objective of the monitoring was to:

- Measure the ambient air quality along the property boundary adjacent to key receptors;
- Prepare a baseline Air Quality Assessment Reports.
- Compare the results of the measurement of results with EMCA Air Quality Regulations, 2014.

### 3.2 Description of the assessed areas

**The criteria for choosing the sampling points/location were: -**

- **Proximity to the Sensitive Receptors – Air Quality Sensitive Receptor**
- **The standard methodologies and the regulatory requirements e.g. EMCA Air Quality Regulations, 2014;**

**Figure 1:** Aerial view of the proposed special economic zone and bypass in Dongo Kundu, Mombasa



Bridge construction near the proposed site

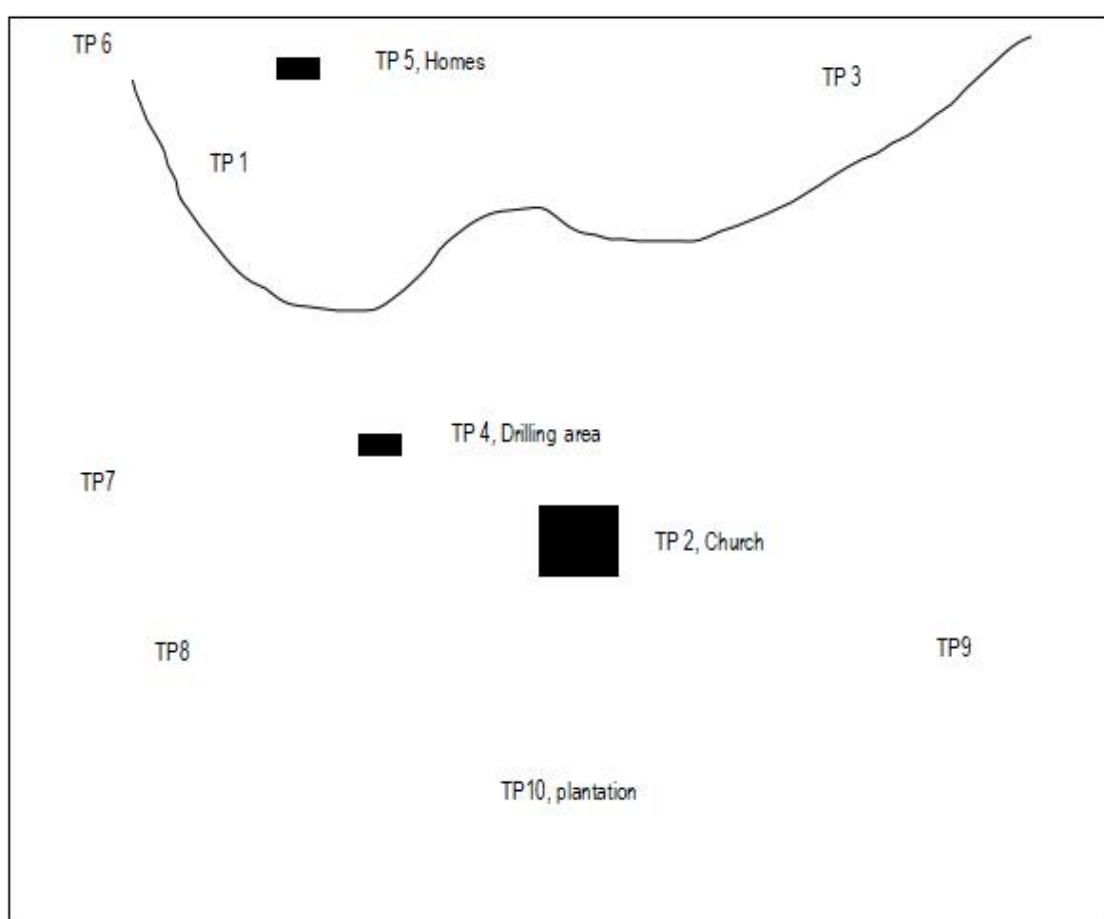


Pictorial view of the sampling area

**Table 2:** Measuring location and their description

No	Sampling / Testing Point	Area	Location
1	TP1	Along the seasonal river	- 4.049513, 39.6481107
2	TP2	Church area	- 4.033329, 39.605511
3	TP3	Upper site of the river	- 4.0716546, 39.63617
4	TP4	Drilling area	- 4.033389, 39.6055108
5	TP5	Homes	- 4.0386656, 39.5961486
7	TP7	Shrubs	- 4.0386656, 39.5961486
10	TP10	Plantation and trees	-4.05466, 39.66359

Figure 1: **Measuring location map**



## 4.0 LEGISLATION AND GUIDELINES

The Air Quality Regulations, 2014 is the local standard used to evaluate Ambient Air Quality in the country. Kenya has imposed an air quality regulation to address air pollution known as Environmental Management and Co-ordination Act (Air Quality) Regulations, 2014. Therefore, the standards used to evaluate the measured values are derived from the EMC (Air Quality) Regulations 2014 air quality standards.

### 4.1 EMCA (AIR QUALITY) REGULATIONS 2014

The objective of the Regulations is to provide for prevention, control and abatement of air pollution to ensure clean and healthy ambient air. It provides for the establishment of emission standards for various sources such as mobile sources (e.g. motor vehicles) and stationary sources (e.g. industries) as outlined in the Environmental Management and Coordination Act. It also covers any other air pollution source as may be determined by the Minister in consultation with the Authority. Emission limits for various areas and facilities have been set. The regulations provide the procedure for designating controlled areas, and the objectives of air quality management plans for these areas.

These rules under the property boundary states that No person, operator or owner of any facility shall cause or allow fugitive emissions to cause the ambient air quality at its property boundary to exceed the limits prescribed under the First Schedule. It further states that, No person, owner or operator of a facility shall cause or allow the emission of air pollutants in excess of the limits stipulated under the Third Schedule.



*(The table below is an excerpt from EMC, Air Quality Regulations, 2014)*

### 4.3 Table 9: EMC (Air Quality) Regulations 2014: Ambient Air Quality Tolerance Limits

#### FIRST SCHEDULE AMBIENT AIR QUALITY TOLERANCE LIMITS

Table 1: Ambient Air Quality Tolerance Limits

	Pollutant	Time weighted Average			
			Industrial area	Residential, Rural & Other area	Controlled areas***
1.	Sulphur oxides (SO <sub>x</sub> );	Annual Average*	80 µg/m <sup>3</sup>	60 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>
		24 hours**	125 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
		Annual Average		0.019 ppm/50µg/m <sup>3</sup>	
		Month Average			
		24 Hours		0.048ppm /125µg/m <sup>3</sup>	
		One Hour			
		Instant Peak		500 µg/m <sup>3</sup>	
		Instant Peak (10 min)		0.191 ppm	
2.	Oxides of Nitrogen (NO <sub>x</sub> );	Annual Average*	80 µg/m <sup>3</sup>	60 µg/m <sup>3</sup>	15 µg/m <sup>3</sup>
		24 hours**	150 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	30 µg/m <sup>3</sup>
		8 hours			
		Annual Average		0.2 ppm	
		Month Average		0.3 ppm	
		24 Hours		0.4 ppm	
		One Hour		0.8 ppm	
		Instant Peak		1.4 ppm	
3.	Nitrogen Dioxide	Annual Average	150 µg/m <sup>3</sup>	0.05 ppm	
		Month Average		0.08 ppm	
		24 Hours	100 µg/m <sup>3</sup>	0.1 ppm	
		One Hour		0.2 ppm	
		Instant Peak		0.5 ppm	
4.	Suspended Particulate	Annual Average*	360 µg/m <sup>3</sup>	140 µg/m <sup>3</sup>	70 µg/m <sup>3</sup>

	<b>Pollutant</b>	<b>Time weighted Average</b>			
	matter (SPM)				
		24 hours**	500 $\mu\text{g}/\text{m}^3$	200 $\mu\text{g}/\text{m}^3$	100 $\mu\text{g}/\text{m}^3$
			<b>Industrial area</b>	<b>Residential, Rural &amp; Other area</b>	<b>Controlled areas***</b>
		mg/Kg			
		Annual Average****		100 $\mu\text{g}/\text{m}^3$	
		24 hours***		180 $\mu\text{g}/\text{m}^3$	
5.	Respirable Particulate Matter (<10 $\mu\text{m}$ ) (RPM)	Annual Average*	70 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$	50 $\mu\text{g}/\text{m}^3$
		24 hours**	150 $\mu\text{g}/\text{Nm}^3$	100 $\mu\text{g}/\text{Nm}^3$	75 $\mu\text{g}/\text{Nm}^3$
6.	PM <sub>2.5</sub>	Annual Average	35 $\mu\text{g}/\text{m}^3$		
		24 hours	75 $\mu\text{g}/\text{m}^3$		
7.	Lead (Pb)	Annual Average*	1.0 $\mu\text{g}/\text{Nm}^3$	0.75 $\mu\text{g}/\text{Nm}^3$	0.50 $\mu\text{g}/\text{m}^3$
		24 hours**	1.5 $\mu\text{g}/\text{m}^3$	1.00 $\mu\text{g}/\text{m}^3$	0.75 $\mu\text{g}/\text{m}^3$
		Month Average		2.5	
8.	Carbon monoxide (CO)/ carbon dioxide (CO <sub>2</sub> )	8 hours**	5.0 mg/m <sup>3</sup>	2.0 mg/m <sup>3</sup>	1.0 mg/m <sup>3</sup>
		1 hour	10.0 mg/m <sup>3</sup>	4.0 mg/m <sup>3</sup>	2.0 mg/m <sup>3</sup>
		mg/Kg			
		24 hours**			
9.	Hydrogen Sulphide	24 hours**	150 $\mu\text{g}/\text{m}^3$		
10.	Non-methane hydrocarbons				
		instant Peak	700ppb		
11.	Total VOC	24 hours**	600 $\mu\text{g}/\text{m}^3$		
12.	Ozone	1-Hour	200 $\mu\text{g}/\text{m}^3$	0.12 ppm	
		8 hour (instant Peak)	120 $\mu\text{g}/\text{m}^3$	1.25 ppm	

## 5.0 METHODOLOGY

### Sampling of Particulate Matter

Sampling of Particulate matter was done using portable air quality monitor for ambient environmental monitoring (See figure below). The monitor allows for real-time data collection for PM10 and PM2.5.



Measuring equipment



Proposed site



Drilling measurement area

**Figure 3:** Ongoing particulate matter measurements

## 6.0 Sampling and analysis of VOCs, SO<sub>2</sub> and NO<sub>2</sub>

Sampling was done using passive sampling tubes diffusive sampler, for the gaseous pollutants of concern (SO<sub>2</sub>, NO<sub>x</sub> and VOCs). Figure 4 shows the assembly of the diffusive sampler as used in the field.



Figure 4: Diffusive Sampler

The pollutants were passively sampled onto diffusion tubes packed with adsorbents. Absorption cartridges for the gases were mounted at  $\geq 1 \frac{1}{2}$  m above the ground surface .

The diffusive sorbent samplers were used for the ambient concentration of NO<sub>2</sub>, and SO<sub>2</sub> in the sensitive receptors adjacent to the project area i.e. the dispensary and the school.





#### 6.1 NO<sub>2</sub> Description:

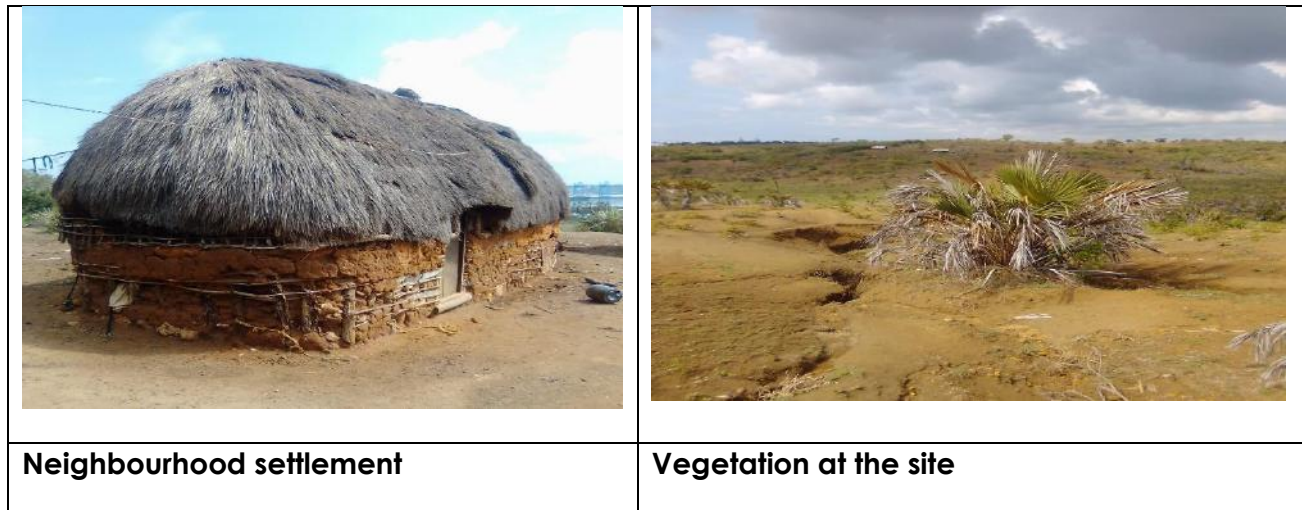
**Acrylic tube fitted with colored and white thermoplastic rubber caps. The colored cap contains the absorbent. The concentrations of Nitrite ions and hence NO<sub>2</sub> chemically adsorbed are quantitatively determined by UV/ Visible Spectrophotometry with reference to a calibration curve derived from the analysis of standard nitrite solutions (UKAS Accredited Methods).**

#### 6.2 SO<sub>2</sub> Description:

**Fluorinated ethylene polymer tube fitted with purple and white thermoplastic rubber caps. The colored cap contains the absorbent. A one-micron porosity filter is fitted to prevent the ingress of particulates loaded with Sulphur i.e., diesel fumes. The concentrations of sulphate ions chemically adsorbed are quantitatively determined by Ion Chromatography with reference to a calibration curve derived from the analysis of standard sulphate solutions (U.K.A.S. Accredited Methods).**



	
<p><b>Air quality measurement setup</b></p>	<p><b>Swampy area</b></p>
	
<p><b>River point area</b></p>	<p><b>Trees at the site</b></p>



**Figure 5:** Ongoing Air Quality Measurement

## 7.0 MEASUREMENT RESULTS

### 7.1 RESULTS OF THE VOC

The concentrations of the measured at the monitoring location for a period of 24 hours are reported. The results of the identification and concentrations are as shown in Fig 3.

**Table 3: Identification and estimation of ng on tube in accordance with ISO16000-6**

No	Parameter Top 15 VOC	Sample 1,	Sample 2, Test point 2	Sample 3,	Sample 4, Test point 4	Sample 5, Test point 5
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		Test point 1		Test point 3		
1	Toluene	125.535	156.813	121.813	177.001	125.535
2	m/p-Xylene	120.506	131.112	114.550	173.430	120.506
3	Ethylbenzene	113.860	129.242	113.433	133.772	113.860
4	o-Xylene	56.097	76.065	55.780	31.66	56.097
5	Benzene, 1,2,4-trimethyl-	2.177	3.733	2.988	3.880	2.177
6	Benzene, 1-ethyl-3-methyl-	1.420	3.403	2.870	2.860	1.420
7	Octane	6.67	5.88	4.71	4.44	6.67
8	2-Butoxyethanol	6.55	8.22	4.77	4.59	6.55
9	Benzene, 1,3,5-trimethyl-	5.83	5.99	4.48	5.66	5.83
10	Benzene, 1-ethyl-4-methyl-	5.69	5.44	4.34	5.54	5.69
11	Benzene, 1-ethyl-2-methyl-	4.52	4.66	4.06	4.58	4.52
12	Propylbenzene	4.49	4.88	4.27	4.55	4.49
13	Benzene, 1,2,3-trimethyl-	3.72	3.03	2.94	3.77	3.72
14	Undecane	4.15	3.12	3.10	4.42	4.15
15	Benzene, 1-ethyl-3,5-dimethyl-	3.18	2.99	2.72	3.08	3.18
16	Total	<b>460.675</b>	<b>544.578</b>	<b>446.824</b>	<b>563.233</b>	<b>460.675</b>

The results indicate that the total concentration of different parameters were found to below the 600 µg/m<sup>3</sup> ambient air quality tolerable limits provided by the EMCA (Air Quality) Regulations, 2014.

## 7.2 RESULTS OF PARTICULATE MATTER

**Table 5:** Results of particulate matter

	Measure ment points	Location	PM <sub>2.5</sub> (mg/m <sup>3</sup> )	PM <sub>2.5</sub> mg/m <sup>3</sup> OELs	PM <sub>10</sub> (mg/m <sup>3</sup> )	PM <sub>10</sub> mg/m <sup>3</sup> OELs
1	TP1	Along the seasonal river	0.32	5	0.68	10
2	TP2	Church area	0.43	5	0.73	10
3	TP3	Upper site of the river	0.47	5	0.64	10
4	TP4	Drilling area	0.61	5	0.89	10
5	TP5	Homes	0.51	5	0.84	10
6	TP6	Road side	0.41	5	0.80	10
7	TP7	Shrubs	0.33	5	0.71	10
8	TP8	Shrubs	0.31	5	0.85	10
9	TP9	Tree's	0.41	5	0.64	10

10	TP10	Plantation and trees	0.34	5	0.76	10
----	------	----------------------	------	---	------	----

The levels of PM10 and PM 2.5 at the measured locations ranged from 0.34 mg/m<sup>3</sup> to 0.89 mg/m<sup>3</sup>; At the time of measurement, concentrations of inhalable dust were however the highest at the drilling area, at 0.89 mg/m<sup>3</sup> and lowest at test point 8 which was found to be 0.31 mg/m<sup>3</sup>. Nevertheless, based on the results obtained, dust exposure levels were within the required standards of EMCA Air Quality Regulations, 2014;

## 8.0 CONCLUSIONS AND RECOMMENDATIONS


The Ambient Air Quality measurement commissioned by Taifa Gas Limited was carried out on 23-24 April 2022 to assess compliance with the Air Quality Regulations 2014. The levels of the the “TOP 15 VOC” of the 5 sample points were tabulated and found to be less than 600 µ/gm<sup>-3</sup>, which is the maximum recommended by Air Quality Regulations 2014.

The levels of PM10 and PM2.5 at the measured locations ranged from 0.34 mg/m<sup>3</sup> to 0.89 mg/m<sup>3</sup>; At the time of measurement, concentrations of inhalable dust were however the highest at the drilling area, at 0.89 mg/m<sup>3</sup> and lowest at test point 8 which was found to be 0.31 mg/m<sup>3</sup>. Nevertheless, based on the results obtained, dust exposure levels were within the required limits as stipulated by standards of EMCA Air Quality Regulations, 2014;



## REFERENCES

- 1 IAQM 2011, *Guidance on the Assessment of the Impacts of Construction on Air Quality and the Determination of their Significance*, Institute of Air Quality Management, December 2011
- 2 Environmental Management and Coordination Act (Air Quality) Regulations, 2014
- 3 Mfe 2002, *Ambient Air Quality Guidelines – 2002 Update*, Prepared by the Ministry for the Environment and the Ministry of Health (NZ), Air Quality Report No 32, May 2002, downloaded from:<http://www.mfe.govt.nz/publications/air/ambient-air-quality-may02/ambient-guide-may02.pdf>
- 4 EPA, AP 42, Fifth Edition, Volume I, *Chapter 13: Miscellaneous Sources, 13.2.4 Aggregate Handling and Storage Piles*, November 2006.
- 5 EPA, AP 42, Fifth Edition, Volume I, *Chapter 13: Miscellaneous Sources, 13.2.4 Aggregate Handling and Storage Piles*, November 2006.

## APPENDIX I: LABORATORY RESULTS



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tel: 01962 560331 fax: 01962 541339 e-mail: diffusion@gradko.co.uk

2187

### LABORATORY ANALYSIS REPORT

**Report Number** N09288R  
**Customer** EcoScience & Engineering Ltd  
11th Floor Mitsumi Business Park  
Muthithi Road  
Westlands  
Nairobi, Kenya  
**Booking In Reference** T1656  
**Despatch Note Number** 74250  
**Date Samples Received** 24/04/2022  
**Diffusion Tube Type** Tenax  
**Job Reference** 52000429

Identification and estimation of ng on tube in accordance with ISO 16000-6

Tube Number	GRA10258			
Gradko Lab Reference	02N2290			
Exposure Time (mins)	1380			
Sample ID	Tafra Gas SEZ Limited-Sample 1			
Top 15 VOC	NIST Library Quality Match	Estimated ng on tube	ppb in air*	ugm <sup>3</sup>
Toluene	94	102.46	169.39	125.535
m/p-Xylene	97	136.56	148.36	120.506
Ethylbenzene	91	124.71	132.69	113.860
o-Xylene	97	80.87	54.38	56.097
Benzene, 1,2,4-trimethyl-	95	3.43	4.54	2.177
Benzene, 1-ethyl-3-methyl-	94	2.24	2.96	1.420
Octane	96	1.11	1.46	6.67
2-Butoxyethanol	94	1.05	1.39	6.55
Benzene, 1,3,5-trimethyl-	97	1.92	2.21	5.83
Benzene, 1-ethyl-4-methyl-	95	1.90	1.18	5.69
Benzene, 1-ethyl-2-methyl-	95	1.71	1.94	4.52
Propylbenzene	90	1.71	1.94	4.49
Benzene, 1,2,3-trimethyl-	95	1.59	1.78	3.72
Undecane	96	1.50	1.66	4.15
Benzene, 1-ethyl-3,5-dimethyl-	94	1.45	1.59	3.18
Tube Number	004165			
Gradko Lab Reference	02_BLANKTXA191218_02			
Sample ID	Laboratory Blank			
Top 15 VOC	NIST Library Quality Match	Estimated ng on tube		
7-Hexanol, 2-ethyl-	47	6		
1 Compound detected				

Samples have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures. Results within this report relate only to samples as received. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*). These calculations and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager, Gradko International Ltd. This report is not to be reproduced, copied or sold without the written permission of Gradko International Ltd.


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Report Number N09276R

Gradko International Ltd

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Signed: 

L. Gates, Laboratory Manager

## APPENDIX 2: LABORATORY RESULTS



(A division of Gradko International Ltd.)  
 St. Martin's Road, Wale Street Winchester, Hampshire SO13 8RH  
 tel: 01962 540331 fax: 01962 541339 e-mail: diffusion@gradko.co.uk



## LABORATORY ANALYSIS REPORT

### Uptake Rates

All compounds: 2.00 ng/ppm<sup>1</sup>/min<sup>1</sup>.

Results are not Blank corrected.

Results greater than 1000ng are outside of our UKAS accredited calibration range.

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Identification of compounds is carried out by comparison of the mass spectra to the NIST 17 mass spectral library. Compounds with a quality match below 85% are noted as a tentative identity and shown in *italics*. These compounds are outside of the scope of our UKAS accreditation.

Analysts Name	Mariella Angelova	Date of Analysis	15/05/2022
Report Checked By	Len Gates	Date of Report	15/05/2022

Analysis has been carried out in accordance with In-house method GLM 13

Sample has been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures. Results within this report data only as examples as provided. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*). These calculations and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.  
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Report Number N00176R

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21/07

## LABORATORY ANALYSIS REPORT

**Report Number** N09288 R  
**Customer** EcoScience & Engineering Ltd  
 11th Floor Mitsumi Business Park  
 Mulberry Road  
 Westlands  
 Nairobi, Kenya  
**Booking In Reference** T 1656  
**Despatch Note Number** 74250  
**Date Samples Received** 24/04/2022  
**Diffusion Tube Type** Tenax  
**Job Reference** 52000429

## Identification and estimation of ng on tube in accordance with ISO16000-8

<b>Tube Number</b>	GKA10250			
<b>Gradko Lab Reference</b>	02N2290			
<b>Exposure Time (min)</b>	1500			
<b>Sample ID</b>	Tenax Gas SEZ Limited-Sample			
<b>Top 15 VOC</b>	<b>NIST Library</b> <b>Quality Match</b>	<b>Estimated</b> <b>ng on tube</b>	<b>ppb in air*</b>	<b>µgm<sup>3</sup></b>
Toluene	94	102.46	169.39	125.535
m/p-Xylene	97	136.56	146.36	120.508
Ethylbenzene	91	124.71	132.69	115.860
o-Xylene	97	90.87	94.36	96.097
Benzene, 1,2,4-trimethyl-	95	1.43	4.54	2.177
Benzene, 5-ethyl-3-methyl-	94	2.24	2.96	1.420
Octane	96	1.11	1.46	6.67
2-Octanone	94	1.05	1.39	6.55
Benzene, 1,3,5-trimethyl-	97	1.02	2.21	5.83
Benzene, 5-ethyl-4-methyl-	95	1.90	1.16	5.69
Benzene, 5-ethyl-2-methyl-	95	1.71	1.04	4.92
Propylbenzene	90	1.71	1.04	4.49
Benzene, 1,2,3-trimethyl-	95	1.59	1.76	3.72
Undecane	96	1.50	1.66	4.15
Benzene, 5-ethyl-3,5-dimethyl-	94	1.45	1.59	3.18
<b>Tube Number</b>	004105			
<b>Gradko Lab Reference</b>	02 BLANKTYA191218_02			
<b>Sample ID</b>	Laboratory Blank			
<b>Top 15 VOC</b>	<b>NIST Library</b> <b>Quality Match</b>	<b>Estimated</b> <b>ng on tube</b>		
3-Pentanone 2-ethyl-	47	6		
<b>1 Compound detected</b>				

Sample has been tested within the scope of the Laboratory Quality Procedures. Results within this report have not been independently verified. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*). These calculations and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager.

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Version 1.0 (24 June 9 - 1 August 2011)

Report Number: N09288 R

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 L. Galea, Laboratory Manager





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## LABORATORY ANALYSIS REPORT

### Uptake Rates

All compounds: 2.00 ng ppm<sup>-1</sup> min<sup>-1</sup>.

Results are not Blank corrected.

Results greater than 1000ng are outside of our UKAS accredited calibration range.

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 15000-6

Identification of compounds is carried out by comparison of the mass spectra to the NIST 17 mass spectral library. Compounds with a quality match below 85% are noted as a tentative identity and shown in *italics*. These compounds are outside of the scope of our UKAS accreditation.

Analyte Name	Marrella Angelova	Date of Analysis	15/05/2022
Report Checked By	Len Gates	Date of Report	15/05/2022

Analysis has been carried out in accordance with in-house method GLM 13

Sample has been tested within the scope of gradko international Ltd Laboratory Quality Procedures. Results within this report relate only to samples as received. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*). These calculations and results are outside the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager: gradko international Ltd. This report is not to be reproduced, except in full, without the written permission of gradko international Ltd.

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Report Number: N097508

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## APPENDIX 5: LABORATORY RESULTS



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### LABORATORY ANALYSIS REPORT

**Report Number** N03235R

**Customer** Ecopience & Engineering Ltd  
 11th Floor Mitsumi Business Park  
 Muthithi Road  
 Westlands  
 Nairobi, Kenya

**Booking In Reference** 11658

**Despatch Note Number** 74250

**Date Samples Received** 24/05/2022

**Diffusion Tube Type** Tenax

**Job Reference** 32003427

Identification and estimation of ng on tube in accordance with ISO18000-8


Tube Number	GRA 19250			
Gradko Lab Reference	02N2290			
Exposure Time (mins)	1371			
Sample ID	Early Gas SEZ Ltd- Sample 2			
<b>Top 15 VOC</b>	<b>NIST Library</b>	<b>Estimated</b>		
	<b>Quality Match</b>	<b>ng on tube</b>	<b>ppb in air</b>	<b>µgm<sup>3</sup></b>
Toluene	94	198.32	192.44	198.813
m,p-Xylene	97	136.85	132.35	137.112
Ethylbenzene	91	124.59	122.35	129.242
o-Xylene	97	89.32	84.38	78.085
Benzene, 1,2,4-trimethyl-	95	4.08	4.44	3.733
Benzene, 1-ethyl-3-methyl-	94	3.81	3.38	34.03
Cisane	98	2.22	2.32	5.88
2-Guacetylbenz	94	1.98	1.92	8.22
Benzene, 1,3,5-trimethyl-	97	1.92	2.21	5.99
Benzene, 1-ethyl-4-methyl-	95	1.90	2.10	5.44
Benzene, 1-ethyl-2-methyl-	95	1.38	1.84	4.88
Propylbenzene	90	1.76	1.95	4.88
Benzene, 1,2,3-trimethyl-	95	0.99	0.88	3.03
Undecane	98	0.80	0.76	3.72
Benzene, 1-ethyl-3,5-dimethyl-	94	0.82	0.82	2.99
<b>Tube Number</b>	<b>004185</b>			
<b>Gradko Lab Reference</b>	<b>02_BLANK.TXTA191218_02</b>			
<b>Sample ID</b>	<b>Laboratory Blank</b>			
<b>Top 15 VOC</b>	<b>NIST Library</b>	<b>Estimated</b>		
	<b>Quality Match</b>	<b>ng on tube</b>		
1-Piceneol, 2-ethyl-	47	5		
1 Compound detected				

Samplers have been tested within the scope of ISO/IEC 17025:2017 International Lab. Laboratory Quality Procedures Results within this report are not subject to external audit. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*). The actual analysis and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager Canalis International Ltd. This report is not to be reproduced, copied or sold without the written permission of Canalis International Ltd.

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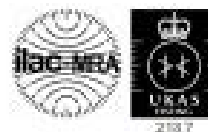
Canalis International Ltd  
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 Signed: L. Gato, Laboratory Manager



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## LABORATORY ANALYSIS REPORT

### Uptake Rates

All compounds: 200 ng/ppm (L/min<sup>-1</sup>)

Results are not blank corrected.

Results greater than 1000ng are outside of our UKAS accredited calibration range.

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 15000-5

Identification of compounds is carried out by comparison of the mass spectra to the NIST 17 mass spectral library. Compounds with a quality match below 85% are noted as a tentative identity and shown in italics. These compounds are outside of the scope of our UKAS accreditation.

Analyst Name	Mariella Angelova	Date of Analysis	13/03/2012
Report Checked By	Len Gates	Date of Report	13/03/2012

Analysis has been carried out in accordance with in-house method GLM 13

Samples have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures. Results within this report relate only to samples as received. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*), these calculations and results are not within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager, Gradko International Ltd. This report is not to be reproduced, except in full, without the written permission of Gradko International Ltd.  
 Report Number: N0937618 Page: 2 of 3

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 Signed: L. Gates, Laboratory Manager



A division of Gradko International Ltd.  
 1st, Marlow House, 1st Floor West Wing, Harrogate, Yorkshire YO21 3HH  
 Tel: 01422 860771 Fax: 01422 841379 e-mail: info@gradko.co.uk



## LABORATORY ANALYSIS REPORT

**Report Number** N02233R  
**Customer** EcoScience & Engineering Ltd  
 11th Floor Mitum Business Park  
 Muthithi Road  
 Westlands  
 Nairobi, Kenya  
**Booking In Reference** T1856  
**Despatch Note Number** 74250  
**Date Samples Received** 24/05/2022  
**Diffusion Tube Type** Tenax  
**Job Reference** 32003422

### Identification and estimation of ng on tube in accordance with ISO18000-8

Tube Number	GRA 10250			
Gradko Lab Reference	02N2230			
Exposure Time (mins)*	1374			
Sample ID	Tenax Gas SEZ Ltd Sample 3			
<b>Top 15 VOC</b>	<b>NIST Library</b>	<b>Estimated</b>		
	<b>Quality Match</b>	<b>ng on tube</b>	<b>ppb in air*</b>	<b>µgm<sup>3</sup></b>
Toluene	94	128.00	120.38	121.873
m,p-Xylene	97	112.22	113.88	114.950
o-Xylene	91	108.33	112.75	113.433
p-Xylene	97	49.24	54.03	55.780
Benzene, 1,2,4-trimethyl-	95	3.22	3.85	3.988
Benzene, 1-ethyl-3-methyl-	94	2.98	2.85	2.870
Octane	98	2.00	1.92	4.71
2-Octanethiol	94	1.07	1.02	4.77
Benzene, 1,3,5-trimethyl-	97	1.01	1.00	4.48
Benzene, 1-ethyl-4-methyl-	95	1.33	1.28	4.34
Benzene, 1-ethyl-2-methyl-	95	1.18	1.44	4.08
Propylbenzene	90	1.28	1.45	4.27
Benzene, 1,2,3-trimethyl-	95	0.70	0.73	2.94
Undecane	98	0.80	0.76	3.10
Benzene, 1-ethyl-3,5-dimethyl-	94	0.72	0.88	2.72
Tube Number	004186			
Gradko Lab Reference	02_BLANKTEXTA101218_02			
Sample ID	Laboratory Blank			
<b>Top 15 VOC</b>	<b>NIST Library</b>	<b>Estimated</b>		
	<b>Quality Match</b>	<b>ng on tube</b>		
1-Hexanol, 2-ethyl-	47	0		
1 Compound detected				

\*Samples have been tested within the scope of Gradko International Ltd. (see any (s) quality Procedures) Results within this report should only be used for reference. Data provided by the customer or subsequent calculations shall be indicated by an asterisk (\*). The results shown and results provided within the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager. Gradko International Ltd. This report is not to be reproduced, except in full without the written permission of Gradko International Ltd.

Version 1.04 (2018 Issue 1) - August 2014

Report Number: N02233R

Page 1 of 2

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Gradko International Ltd  
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 Signed:   
 L. Gibo, Laboratory Manager



A division of Gredco International Ltd.  
 16, Marlow House, 77, Welles Street, Manchester, M12 3BH  
 tel.: 0161 234 3633 fax: 0161 234 1378 e-mail: info@gradko.co.uk



## LABORATORY ANALYSIS REPORT

### Uptake Rates

All compounds: 2.00 ng.ppm<sup>-1</sup>.min<sup>-1</sup>.

Results are not Blank corrected.

Results greater than 1000ng are outside of our UKAS accredited calibration range.

Estimated results as ng on tube are calculated by reference to toluene in accordance with ISO 16000-6

Identification of compounds is carried out by comparison of the mass spectra to the NIST 17 mass spectral library. Compounds with a quality match below 85% are noted as a tentative identity and shown in italics. These compounds are outside of the scope of our UKAS accreditation.

Analysa Name	Marilla Angelova	Date of Analysis	13/05/2022
Report Checked By	Len Gates	Date of Report	18/05/2022

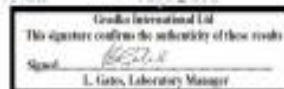
Analysis has been carried out in accordance with in-house method GLM 13

Samples have been tested within the scope of Gredco International Ltd Laboratory Quality Procedures. Results within this report are solely for samples as supplied. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*). These calculations and results are within the scope of our UKAS accreditation. Any queries concerning data within this report should be directed to the Laboratory Manager Gredco International Ltd. This report is not to be reproduced, in whole or in part, without the written permission of Gredco International Ltd.

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Report Number N0957611

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## APPENDIX 9: LABORATORY RESULTS



UK division of Gradko International Ltd.  
 16, Marlinas House, 77 Water Street Winchester, Hampshire SO23 8HH  
 tel: 01962 865555 fax: 01962 841579 e-mail: info@gradko.co.uk



21 07

## LABORATORY ANALYSIS REPORT

**Report Number** N03293R  
**Customer** EcoScience & Engineering Ltd  
 11th Floor Mitsumi Business Park  
 Mulhalla Road  
 Westlands  
 Nairobi, Kenya  
**Booking In Reference** T1056  
**Despatch Note Number** 74250  
**Date Samples Received** 24/04/2022  
**Diffusion Tube Type** Tenax  
**Job Reference** 32003433

## Identification and estimation of ng on tube in accordance with ISO18000-8

Tube Number	GWA10258			
Gradko Lab Reference	02N2293			
Exposure Time (mins)	1383			
Sample ID	Text Gas SE2 Sample 4			
Top 15 VOC	NIST Library Quality Match	Estimated ng on tube	ppb in air	µgm <sup>3</sup>
Toluene	94	181.44	179.21	177.001
m,p-Xylene	97	178.87	173.85	173.430
Ethylbenzene	91	122.88	142.89	133.772
o-Xylene	97	37.87	32.11	31.68
Benzene, 1,2,4-trimethyl-	95	3.99	4.98	3.880
Benzene, 1-ethyl-3-methyl-	94	2.98	3.12	2.860
Octane	98	2.08	3.92	4.44
2-Ethoxyethanol	94	2.01	3.93	4.99
Benzene, 1,3,5-trimethyl-	97	0.99	1.28	0.88
Benzene, 1-ethyl-4-methyl-	95	0.98	1.24	0.94
Benzene, 1-ethyl-2-methyl-	95	0.78	0.98	4.98
Propylbenzene	90	0.75	0.97	4.95
Benzene, 1,2,3-trimethyl-	95	0.88	0.89	3.77
Undecane	98	0.98	0.78	4.42
Benzene, 1-ethyl-3,5-dimethyl-	94	0.48	0.89	3.08
Tube Number	004105			
Gradko Lab Reference	02_BLANKTEXTA191218_02			
Sample ID	Laboratory Blank			
Top 15 VOC	NIST Library Quality Match	Estimated ng on tube		
1-Hexanol, 2-ethyl-	47	8		
1 Compound detected				

Samples have been tested within the scope of Gradko International Ltd. Laboratory Quality Procedures. Results within this report have not been rechecked. Data provided by the client and any other special calculations shall be indicated by an asterisk (\*). The calculations and results are not within the scope of ISO18000-8. Any special calculations done in this report should be directed to the Laboratory Manager.

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 C:\env\10258\env\9 - August 2011 Report Number: N03293R Page 1 of 2

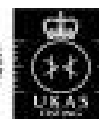
REPORT OFFICIALLY CHECKED

This signature confirms the authenticity of these results  
 Signed: L. Gato, Laboratory Manager

## APPENDIX 10: LABORATORY RESULTS



UK (Private) Off-Cradle International Ltd  
 96, Marston Triangle, 77, Water Street, Weymouth, Dorset, Hampshire, UK DT9 8BB  
 Tel: 01962 848131 Fax: 01962 841379 e-mail: info@off-cracle.gradko.co.uk



## LABORATORY ANALYSIS REPORT

### Uptake Rates

All compounds:  $2.00 \text{ ng ppm}^{-1} \text{ min}^{-1}$

Results are not Blank corrected.

Results greater than 1000ng are outside of our UKAS accredited calibration range.

Estimated results as  $\mu\text{g on tube}$  are calculated by reference to toluene in accordance with ISO 18000-8

Identification of compounds is carried out by comparison of the mass spectra to the NIST 17 mass spectral library. Compounds with a quality match below 85% are noted as a tentative identity and shown in *italics*. These compounds are outside of the scope of our UKAS accreditation.



Analyte Name	Marcella Angelova	Date of Analysis	15/03/2022	+
Report Checked By	Len Gates	Date of Report	15/04/2022	+

Analysis has been carried out in accordance with in-house method GLM 13

Sample has been tested within the scope of Off-Cradle International Ltd Laboratory Quality Procedures. Results within this report relate only to samples analysed. Data provided by the client and any subsequent calculations shall be indicated by an asterisk (\*). These calculations and results are outside the scope of our UKAS accreditation. Any queries concerning data in this report should be directed to the Laboratory Manager, gradko Environmental Ltd. This report is not to be reproduced, except in full, without the written permission of gradko Environmental Ltd.

Form 1 (H724 Issue 9) - August 2019

Report Number N09156R


Page 2 of 1

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gradko International Ltd  
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 Signed: L. Gates, Laboratory Manager



## Appendix 1: Equipment calibration

 <p style="margin: 0;">Aeroqual Limited 460 Rosebank Road, Auckland 1026, New Zealand Phone: +64-9-623 3013 Fax: +64-9-623 3012 www.aeroqual.com</p>		SCIENCE & ENGINEERING LTD. P.O. Box 55533 - 00200, NAIROBI																											
<b>Calibration Certificate</b>																													
<b>Calibration Date:</b> 13 January 2021																													
<b>Model:</b> <span style="border: 1px solid black; padding: 2px 10px;">PM2.5 PM10      0-1.000 mg/m3</span>																													
<b>Serial No:</b> SHPM 5003-48DC-001																													
<div style="margin-bottom: 10px;"> <b>Measurements</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%;">PM2.5 mg/m3</th> <th style="width: 25%;">PM10 mg/m3</th> </tr> </thead> <tbody> <tr> <td>Reference Zero</td> <td>0.000</td> <td>0.000</td> </tr> <tr> <td>AQL Sensor Zero</td> <td>0.000</td> <td>0.000</td> </tr> <tr> <td>Reference Span</td> <td>0.096</td> <td>0.141</td> </tr> <tr> <td>AQL Sensor Span</td> <td>0.099</td> <td>0.143</td> </tr> </tbody> </table> </div> <div> <b>Calibration Standard</b> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="width: 25%;">Standard</th> <th style="width: 25%;">Manufacturer</th> <th style="width: 25%;">Model</th> <th style="width: 25%;">Serial number</th> </tr> </thead> <tbody> <tr> <td>Optical Particle Counter</td> <td>Met One Instruments</td> <td>9722-1</td> <td>U11996</td> </tr> <tr> <td>Test aerosol</td> <td>ATI</td> <td>0.54 µm latex microspheres</td> <td>n/a</td> </tr> </tbody> </table> </div>				PM2.5 mg/m3	PM10 mg/m3	Reference Zero	0.000	0.000	AQL Sensor Zero	0.000	0.000	Reference Span	0.096	0.141	AQL Sensor Span	0.099	0.143	Standard	Manufacturer	Model	Serial number	Optical Particle Counter	Met One Instruments	9722-1	U11996	Test aerosol	ATI	0.54 µm latex microspheres	n/a
	PM2.5 mg/m3	PM10 mg/m3																											
Reference Zero	0.000	0.000																											
AQL Sensor Zero	0.000	0.000																											
Reference Span	0.096	0.141																											
AQL Sensor Span	0.099	0.143																											
Standard	Manufacturer	Model	Serial number																										
Optical Particle Counter	Met One Instruments	9722-1	U11996																										
Test aerosol	ATI	0.54 µm latex microspheres	n/a																										
<b>QC Approval:</b> _____ <b>TY</b>																													
<b>Date:</b> _____ <b>13-Jan-21</b>																													

## Appendix 3: AIR QUALITY MONITOR PRACTICING LICENSE

MoL/DOSH 4

  
**REPUBLIC OF KENYA**  
**The Occupational Safety and Health Act, 2007**  
**CERTIFICATE OF APPROVAL OF AIR QUALITY MONITOR**

I hereby approve **Mr. Philip Otieno Abuor**, holder of **National ID No. 5967315** of P.O. Box **55533 - 00200 Nairobi**, to carry out **Air Quality Measurements** of workplaces for the purpose of Rules 16 and 17 as read with Rule 2 of Factories and Other Places of Work (Hazardous Substances) Rules (Legal Notice No. 60/2007) under the Occupational Safety and Health Act, 2007, Laws of Kenya.

This certificate is valid from **1<sup>st</sup> July 2021** to **30<sup>th</sup> June 2022**, unless revoked by the Director of Occupational Safety and Health Services any time earlier.

Certificate No. **OSH / AQM 003**

Date of Issue: 29/07/2021

  
 Director of  
 Occupational Safety  
 and Health Services

Conditions

1. The authority to carry out air quality monitoring cannot be delegated.
2. This certificate does not allow the holder to carry out Air Quality Monitoring in his/her place of work or employment.
3. The holder of this approval certificate must continually upraise her/himself of the safety and health legislation in this country.
4. The holder of this approval certificate undertakes to notify the director's office of any air quality measurements two weeks prior to executing the said work.
5. A copy of the report of the results of measurements must be sent to the relevant offices of the DOSHS within fourteen days of the completion of measurements.
6. To verify the authenticity of this certificate the occupier should endeavour to visit [www.dosh.go.ke](http://www.dosh.go.ke), the official website of the Directorate of Occupational Safety and Health Services or call 0202957722 for the updated list of approved Air Quality Monitors.



Signature of Approved Person  
 Date: 29/07/2021


## 8. Baseline Report For Soil And Water



CLIENT	ENVIRONMENTAL CONSULTANTS
Taifa Gas Investment Ltd	Philip Abuor GLAKES CONSULTING LIMITED P.O.Box 62861 - 00200 Nairobi Kenya

**MAY, 2022**

## 1 CERTIFICATION

<b>REPORT TITLE:</b>	Environmental Baseline Report for Soils and Water
<b>PROJECT NAME</b>	TAIFA GAS INVESTMENT GEZ ON THE PROPOSED SITE TO BE LOCATED AT THE SPECIAL ECONOMIC ZONE IN DONGO KUNDU, MOMBASA COUNTY
<b>SAMPLING DATE:</b>	23-24 April 2022
<b>PURPOSE</b>	Baseline Assessment Report
<b>CLIENT REPRESENTATIVE:</b>	Sign..... Date..... Taifa Gas Investment Ltd
<b>APPROVER:</b>	 Sign..... Date... <b>25/5/2022</b> ... Philip Abuor
<b>DISCLAIMER</b>	This assignment has been carried out to the best of our knowledge and ability and within the terms of contract with the client and is limited to the exercise of reasonable care. This report is not intended to relieve the Establishment from their contractual obligations. This report reflects our findings at the time and place of intervention and is issued under the company's standard terms of service.



## 2 ACRONYMS

°C	Degrees Celsius
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
ISO	International Standardization Organization
TSS	Total Suspended Solid
mg/kg	Milligrams Per Kilogram
ppm	Parts Per Million
SOP	Standard Operating Procedure
SP	Sampling Point
VROM	The Ministry of Housing Spatial Planning and the Environment (Dutch)
NEMA	National Environmental Management Authority
USEPA	United states environmental protection urgently
ND	Not Detected
NR	Not Regulated

### 3 EXECUTIVE SUMMARY

Taifa Gas Investment SEZ Ltd engaged registered environmental experts, Mr. Philip Abuor (NEMA Reg. 1710) to undertake Soil & Water sampling for TAIFA GAS INVESTMENT GEZ ON THE PROPOSED SITE AT THE SPECIAL ECONOMIC ZONE IN DONGO KUNDU, MOMBASA COUNTY.

Soil sampling was conducted on 23-24 April 2022 in accordance to the USEPA SOP on Field Sediment Sampling. The soil samples were collected from 4 predetermined locations. The samples were collected from the ground at a depth of 0.2 meters directly using a manual hand held trowel. The samples were placed in zip bags and then cooled by ice packs in a cool box at a temperature of 4° C and transported to the laboratory for analysis using standard approved methodologies.

Water sampling was done on 23-24 April 2022; water samples were collected from different sampling points as shown in diagram 4. The samples were collected by use of sampling bottles, preserved in cool boxes, transported to the laboratory for analysis using standard approved methodologies.

The results of the water parameters tested were within the acceptable limits as stipulated in the EMCA (Water Quality Regulation), 2006 Legal Notice 120 of for Quality Standards for Sources of Domestic Water (First schedule). These results could have been influenced by seasonality i.e rainy and dry seasons.

The analysis results indicates that the soil quality with reference to the measured parameters values of heavy metals are within the guideline values in accordance to the Standard Chemical Compound Values Based on Dutch standard. Oil & Grease was not detected in all the sampling points.

## 4 INTRODUCTION

### 4.1 Objectives

The objective of the assignment was to undertake baseline soil and water assessments.

### 4.2 Scope of Work

The scope of work involved soil and water sampled in the areas described below:

#### I. Water Sampling:

No	SAMPLING POINT	DESCRIPTION OF THE SAMPLING POINT	SAMPLING LOCATION
1	Testing point 1	Along the seasonal river	- 4.049513, 39.6481107
2	Testing point 3	River point	- 4.0716546, 39.63617
3	Testing point 4	Drilling Area, OFF	- 4.033389, 39.6055108
4	Testing point 5	Homes	- 4.0386656, 39.5961486

#### II. Soil Sampling:

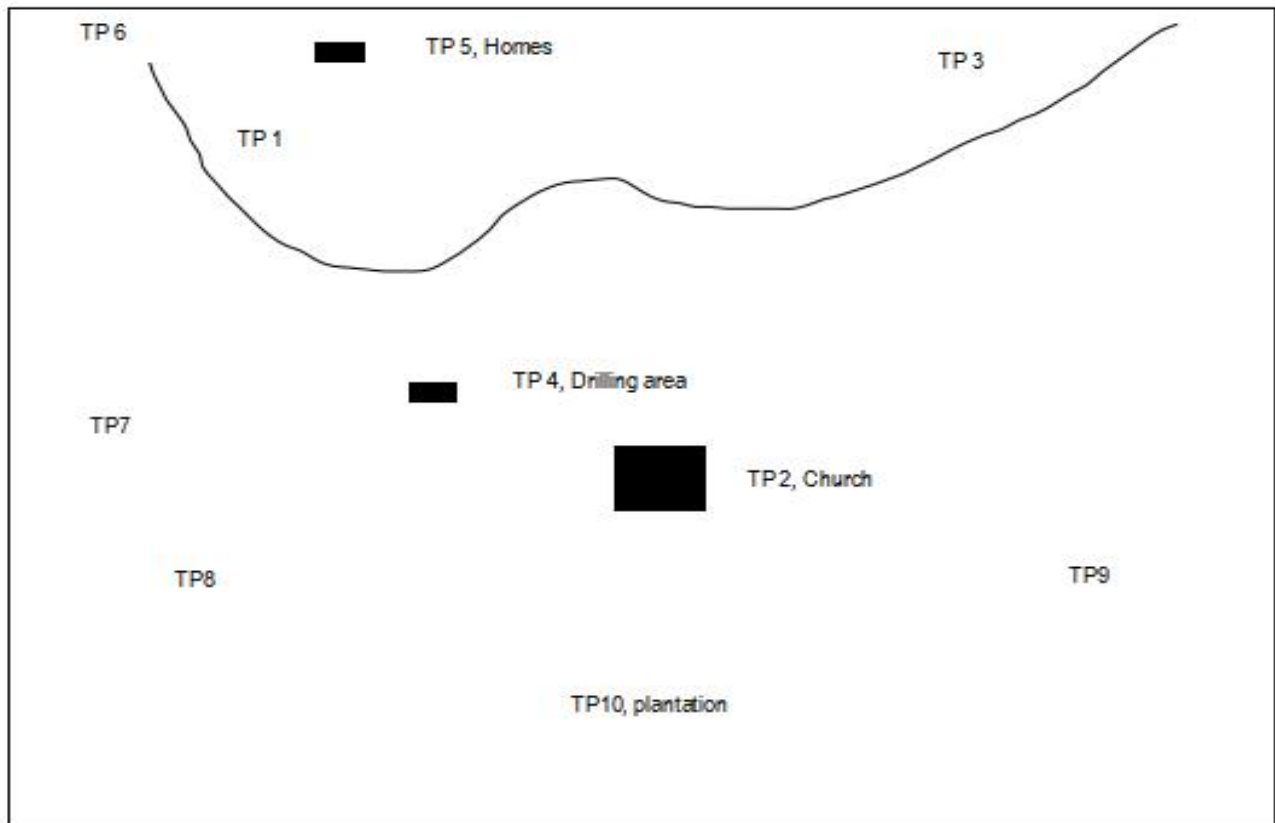
No	SAMPLING POINT	DESCRIPTION OF THE SAMPLING POINT	SAMPLING LOCATION
1	Testing Point 2	Church house	- 4.033329, 39.605511
2	Testing Point 6	Near settlement	N/A
3	Testing Point 7	Shrubs	- 4.0386656, 39.5961486
4	Testing Point 8	Shrubs	-4.05466, 39.66359

Soil and water samples were collected from these pre-determined locations and the samples submitted to Cropnuts a NEMA approved and KENAS accredited laboratory for analysis.

The measurement area location are as indicated in figure 1 below.

FIG 1 : AREA SAMPLING POINTS





## 5 METHODOLOGY

### 5.1 Water Sampling

The sampling of the water was done according to the following procedures based on methods defined in the ISO 5667: Water sampling was done on 23-24 April 2022; water sample was collected from a borehole within a private residence. The sample was collected by use of sampling bottle, preserved in cool boxes, transported to the laboratory for analysis using standard approved methodologies.

### 5.2 Soil sampling

Soil sampling was done on in accordance to the USEPA protocol on Field Sediment Sampling. The soil samples were collected from the 2 predetermined locations i.e. near the dispensary and at the proposed fuel area.

Subsurface samples were collected from the ground at a depth of 0.1 meter directly using a manual soil-sampling auger. The samples were placed in zip bags and then cooled by ice packs in a cool box at a temperature of 4° C and transported to the laboratory for analysis using standard approved methodologies.

## 6 APPLICABLE LEGISLATION AND GUIDELINES

### 6.1 Water Quality Guidelines

The water analysis results were compared to the first schedule of the Environmental Management and Coordination Act, Water Quality Regulations, 2006; Legal Notice No. 120 (Kenya) quality standards for sources of domestic water.

**Table 10: Quality Standards for Sources of Domestic Water**

Parameter	EMCA (Water Quality), Regulations 2006 First schedule (Environment) Guide Value (max allowable)
pH	6.5 – 8.5
Suspended solids	30 (mg/L)
Nitrate-NO <sub>3</sub>	10 (mg/L)
Ammonia –NH <sub>3</sub>	0.5 (mg/L)
Nitrite –NO <sub>2</sub>	3 (mg/L)
Total Dissolved Solids	1200 (mg/L)
Scientific name ( <i>E.coli</i> )	Nil/100 ml
Fluoride	1.5 (mg/L)
Phenols	Nil (mg/L)
Arsenic	0.01 (mg/L)
Cadmium	0.01 (mg/L)
Lead	0.05 (mg/L)
Selenium	0.01 (mg/L)
Copper	0.05 (mg/L)
Zinc	1.5 (mg/L)
Alkyl benzyl sulphonates	0.5 (mg/L)
Permanganate value (PV)	1.0 (mg/L)

## 6.2 Soil Guidelines

### Dutch Target Values and Intervention Values Soil Remediation

It is worth noting that Kenya is yet to formulate standards for soil contamination. The Dutch values were developed by the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM). Dutch Standards are environmental pollutant reference values (i.e., concentrations in environmental medium) used in environmental remediation, investigation and cleanup. The intervention values and the accompanying target values for soil/sediment are given in the table 4 below.

**Table 11:** Standard Chemical Compound Values Based on Dutch standard

Soil/Sediment		
	Soil/Sediment	
	(mg/kg dry weight)	
	Target values	Intervention values
	Standard soil	Standard soil
<b>Metals</b>		
Arsenic	29	56
Antimony	3	15
Barium	160	625
Cadmium	0.8	12
Chromium	100	380
Cobalt	9	240
Copper	36	190
Mercury	0.3	10
Lead	85	530
molybdenum	3	200
Nickel	35	210
Zink	140	720
Beryllium	1.1	30
Selenium	0.7	100
Vanadium	42	250
Thalium	1	15
Silver	-	15
Tin	-	900

## 7 RESULTS

Sample analysis was done by KENAS and NEMA accredited laboratory. Summary of analysis results are presented in tables 5, 6 below:

### 7.1 Water analysis results

**Table 12: Quality Standards for Sources of Domestic Water**

NO	PARAMETER	RESULTS				EMCA (Water Quality), Regulations 2006 First schedule (Environment) Guide Value (max allowable)	
		Test Point 1	Test Point 3	Test Point 4	Test Point 5		
1	pH	7.5	7.54	8.12	7.87	6.5– 8.5	
2	Suspended solids	4.00	2.00	238	24	30 (mg/L)	
3	Nitrate-NO <sub>3</sub>	7.65	2.28	0.48	1.68	10 (mg/L)	
4	Ammonia –NH <sub>3</sub>	0.21	<0.01	0.50	4.64	0.5 (mg/L)	
5	Nitrite –NO <sub>2</sub>	0.018	0.015	0.23	0.036	3 (mg/L)	
6	Total Dissolved Solids	1178	587	989	1110	1200 (mg/L)	
7	Fluoride	1.36	1.44	1.46	1.46	1.5 (mg/L)	
8	Arsenic	<0.007	<0.007	<0.007	<0.007	0.01 (mg/L)	
9	Cadmium	<0.002	<0.002	<0.002	<0.002	0.01 (mg/L)	
10	Lead	<0.009	<0.009	<0.009	<0.02	0.05 (mg/L)	
11	Selenium	<0.02	<0.02	<0.02	<0.02	0.01 (mg/L)	
12	Copper	<0.01	<0.01	<0.01	<0.01	0.05 (mg/L)	
13	Zinc	<0.01	<0.01	<0.01	<0.01	1.5	(mg/L)
14	Oil & Grease	ND	ND	ND	ND	ND	

## **Discussion and conclusions**

The results of the water parameters tested were within the acceptable limits as stipulated in the EMCA (Water Quality Regulation), 2006 Legal Notice 120 of for Quality Standards for Sources of Domestic Water (First schedule). These results could have been influenced by seasonality i.e rainy and dry seasons.

## 7.2 Soil analysis results

**Table 13:** Standard Chemical Compound Values Based on Dutch standard

No	Parameter	Results				Soil/Sediment (mg/kg dry weight)	
						Target values	Intervention values
						Standard soil	Standard soil
		Test Point 2	Test Point 6	Test Point 7	Test Point 8		
1	Arsenic	1.43	1.54	1.44	1.78	29	56
2	Cadmium	<0.20	<0.20	<0.20	<0.20	0.8	12
3	Chromium	28.0	46.0	69.3	37.6	100	380
4	Cobalt	11.5	11.41	21.6	14.3	9	240
5	Copper	2.94	4.52	2.72	2.58	36	190
6	Mercury	NA	NA	NA	NA	0.3	10
7	Lead	5.06	7.85	9.14	7.70	85	530
8	molybdenum	0.65	<0.10	0.95	<0.10	3	200
9	Nickel	66.4	76.4	48.3	49.9	35	210
10	Zinc	0.87	0.85	0.89	0.94	140	720
11	Oil& grease	ND	ND	ND	ND	NR	NR
12	Ca:Mg Ratio	5.91	16.2	5.93	6.81	NR	NR

### 7.3 Discussion and Conclusions

The analysis results have indicated that the soil quality with reference to the measured parameters values of were found to be within the required specifications values. The heavy metals were found to be within the guideline values in accordance to the Standard Chemical Compound Values Based on Dutch standard. Oil & Grease was not detected in all the sampling points.



## 8 APPENDIX 1: PHOTOGRAPHIC REPORTS



Water sampling from the borehole, drilling area



Swampy area



River point area



Trees at the site



Neighbourhood settlement



Vegetation at the site

## 9 APPENDIX 2: WATER LAB ANALYSIS REPORT FROM TEST POINT 1



### Water Analysis Report

NEMA - Water Quality

Report Ref #: CN-10888		TL/21	
Customer:	Taifa Gas Investment SEZ Ltd	Water Use:	Surface Water
Address:	P.O.Box 40462-00100 NBI	Crop Stage:	NA
Project Name:	ESIA Study- LPG Storage	Comments:	NA
Contact Person:	Mr. Jamal Huwel	Condition:	Filled
Date Received:	24-April-22	Analysis Date:	26-April-22
Report Date:	8-May-22	Sample ID:	CE292NEMA0032

Parameter	Unit	Result	Guide Low	Guide High	Low	Optimum	High	Symbol	Current	Method
pH		7.50	6.50	8.50				pH	7.51	Direct Measurement
Electrical Conductivity	mS/cm	1.32		< 1.50				EC	1.22	Direct Measurement
Nitrate N	ppm	7.65						NO3N	7.85	Direct Measurement
Ammonium	ppm	0.21						NH4	0.19	Direct Measurement
Nitrite N	ppm	0.018						NO2N	0.011	Direct Measurement
Fluoride	ppm	1.36		< 1.50				F1	1.66	Direct Measurement
Total Dissolved Solids	ppm	1178		< 1200				TDS	1170	Direct Measurement
Total Suspended Solids	ppm	4.00		< 30.0				TSS	3.00	Direct Measurement
Arsenic	ppm	< 0.007		< 0.02				As	< 0.007	Direct Measurement
Cadmium	ppm	< 0.002		< 0.10				Cd	< 0.002	Direct Measurement
Lead	ppm	< 0.009		< 0.10				Pb	< 0.009	Direct Measurement
Selenium	ppm	< 0.02		< 0.20				Se	< 0.02	Direct Measurement
Copper	ppm	< 0.01		< 1.00				Cu	< 0.01	Direct Measurement
Zinc	ppm	< 0.01		< 0.50				Zn	< 0.01	Direct Measurement
Oil and Grease	ppm	ND		Nil				NA	ND	Direct Measurement

COMMENTS #
Water has high fluoride levels.

	Jo Gakobo Lab Manager Approval Date: 15/05/2022	Cordingley Jeremy Managing Director Approval Date: 15/05/2022
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# 10 APPENDIX 3: WATER LAB ANALYSIS REPORT FROM TEST POINT 3

## Water Analysis Report

NEMA - Surface Water Quality



Supplement (0) to Test Report Sample No. CE292N EM A0013

Report Ref#: CN-108566

TL/21

Customer:	Taifa Gas Investment SKV Ltd	Water Use:	Surface Water	Date Received:	24-April-22
Address:	P.O.Box 40462-00100 NRB	Crop Stage:	NA	Analysis Date:	26-April-22
Project Name:	ESIA Study- LPG Storage	Comments:	NA	Report Date:	8-May-22
Contact Person:	Mr. Jamal Huwel	Condition:		Sample ID:	CE292NEMA0019

Water Source: Sample 2

Parameter	Unit	Result	Guide Low	Guide High	Low	Optimum	High	Symbol	Current	Method
pH		7.54	6.50	8.50				pH	7.54	Water Quality
Electrical Conductivity	nS/cm	1.17		< 1.50				EC	0.93	Water Quality
Nitrate N	ppm	2.28						NO3N	2.28	Water Quality
Ammonium	ppm	< 0.01						NH4	< 0.01	Water Quality
Nitrite N	ppm	0.015						NO2N	0.015	Water Quality
Fluoride	ppm	1.44		< 1.50				Fl	1.64	Water Quality
Total Dissolved Solids	ppm	587		< 1200				TDS	587	Water Quality
Total Suspended Solids	ppm	2.00		< 30.0				TSS	2.00	Water Quality
Arsenic	ppm	< 0.007		< 0.02				As	< 0.007	Water Quality
Cadmium	ppm	< 0.002		< 0.10				Cd	< 0.002	Water Quality
Lead	ppm	< 0.009		< 0.10				Pb	< 0.009	Water Quality
Selenium	ppm	< 0.02		< 0.20				Se	< 0.02	Water Quality
Copper	ppm	< 0.01		< 1.00				Cu	< 0.01	Water Quality
Zinc	ppm	< 0.01		< 0.50				Zn	< 0.01	Water Quality
Oil and Grease	ppm	ND		Nil				NA	ND	Water Quality

### COMMENTS #

Has high fluoride levels.



## 11 APPENDIX 4: WATER LAB ANALYSIS REPORT FROM TEST POINT 4



### Water Analysis Report

NEMA - Water Quality

Report Ref #: CN-10888

TL/21

Customer:	Taifa Gas Investment SEZ Ltd	Water Use:	Surface Water	Date Received:	24-April-22
Address:	P.O.Box 80062-00100 NDI	Crop Stage:	NA	Analysis Date:	26-April-22
Project Name:	ESIA Study- LPG Storage	Comments:	NA	Report Date:	8-May-22
Contact Person:	Mr. Jamal Huwel	Condition:	Filled	Sample ID:	CE2 92 NEMA 0032

Parameter	Unit	Result	Guide low	Guide High	Low	Optimum	High	Symbol	Current	Method
pH		7.50	6.50	8.50				pH	7.51	
Electrical Conductivity	m S/cm	1.32		< 1.50				EC	1.22	
Nitrate N	ppm	7.65						NO3-N	7.85	
Ammonium	ppm	0.21						NH4	0.19	
Nitrite N	ppm	0.018						NO2-N	0.011	
Fluoride	ppm	1.36		< 1.50				Fl	1.66	
Total Dissolved Solids	ppm	1178		< 1200				TDS	1170	
Total Suspended Solids	ppm	4.00		< 30.0				TSS	3.00	
Arsenic	ppm	< 0.007		< 0.02				As	< 0.01	
Cadmium	ppm	< 0.002		< 0.10				Cd	< 0.01	
Lead	ppm	< 0.009		< 0.10				Pb	< 0.01	
Selenium	ppm	< 0.02		< 0.20				Se	< 0.01	
Copper	ppm	< 0.01		< 1.00				Cu	< 0.01	
Zinc	ppm	< 0.01		< 0.50				Zn	< 0.01	
Oil and Grease	ppm	ND		Nil				NA	ND	

#### COMMENTS #

Water has high fluoride levels.

## 12 APPENDIX 5: WATER LAB ANALYSIS REPORT FROM TEST POINT 5



## Water Analysis Report

NEMA - Surface Water Quality

Report Ref #: CN-108558

TL/21

Customer:	Taita Gas Investment SEZ Ltd	Water Use:	Surface Water	Date Received:	24-April-22
Address:	P.O.Box 40462-80100 NDI	Crop Stage:	na	Analysis Date:	26-April-22
Dem Area:	ESTIA Storage LPG Storage	Comments:	na	Report Date:	6-May-22
Contact Person:	Mr. Jamal Huxel	Condition:	Tilled	Sample ID:	CE2 92 NEMA 0018

Parameter	Unit	Result	Guide low	Guide High	Low	Optimum	High	Symbol	Current	Method
pH		7.87	6.50	8.50				pH	7.87	
Electrical Conductivity	mS/cm	1.36		< 1.50				EC	1.36	
Nitrate N	ppm	1.68						NO3N	1.68	
Ammonium	ppm	4.64						NH4	4.64	
Nitrite N	ppm	0.036						NO2N	0.036	
Fluoride	ppm	1.46		< 1.50				Fl	1.46	
Total Dissolved Solids	ppm	1110		< 1200				TDS	1110	
Total Suspended Solids	ppm	24		< 30.0				TSS	24	
Arsenic	ppm	< 0.007		< 0.02				As	< 0.007	
Cadmium	ppm	< 0.002		< 0.10				Cd	< 0.002	
Lead (as Lead)	ppm	< 0.009		< 0.10				Pb	< 0.009	
Selenium	ppm	< 0.02		< 0.20				Se	< 0.02	
Copper	ppm	< 0.01		< 1.00				Cu	< 0.01	
Zinc	ppm	< 0.01		< 0.50				Zn	< 0.01	
Oil and Grease	ppm	ND		Nil				N/A	ND	

COMMENTS #

## 13 APPENDIX 6: SOIL LAB ANALYSIS REPORT FROM TEST FROM TEST POINT 2

## Soil Analysis

Complete Soil Analysis (data only), Heavy Metals in Soil  
(Aqua regia)



TL/21

Customer:	Taifa Gas Investment SEI Ltd	Crop:	No crop	Date Received:	24-April-22
Address:	P.O.Box 40462-00100 NBI	Crop Stage:	NA	Analysis Date:	26-April-22
Project Name:	ESIA Study- LPG Storage Plant Development Project	Comments:	NA	Report Date:	8-May-22
Contact Person:	Mr. Jamal Huwel	Condition:	Dry	Sample ID:	CE292SA0017

Field: Sample 1 Site House SEZ Dongo Kundu Mombasa Top Soil

Parameter	Unit	Result	Guide Low	Guide High	Symbol	Method
pH (H <sub>2</sub> O)		7.20	6.00	6.80	pH	Potentiometric
Phosphorus	ppm	44.3	20.0	100	P	Mehlich 3 - ICP
Potassium	ppm	468	400	1600	K	Mehlich 3 - ICP
Calcium	ppm	7820	5130	7180	Ca	Mehlich 3 - ICP
Magnesium	ppm	966	616	985	Mg	Mehlich 3 - ICP
Iron	ppm	43.6	30.0	300	Fe	Mehlich 3 - ICP
Manganese	ppm	381	30.0	300	Mn	Mehlich 3 - ICP
Boron	ppm	1.59	0.80	2.00	B	Mehlich 3 - ICP
Copper	ppm	2.94	2.00	10.0	Cu	Mehlich 3 - ICP
Zinc	ppm	0.87	2.00	20.0	Zn	Mehlich 3 - ICP
Arsenic	mg/kg	1.43		< 20.0	As	Aqua regia - ICP
Cadmium	mg/kg	< 0.20		< 30.0	Cd	Aqua regia - ICP
Chromium	mg/kg	28.0		< 200	Cr	Aqua regia - ICP
Cobalt	mg/kg	11.5		< 30.0	Co	Aqua regia - ICP
Molybdenum	mg/kg	0.65		< 1.00	Mo	Aqua regia - ICP
Nickel	mg/kg	66.4		< 75.0	Ni	Aqua regia - ICP
Lead	mg/kg	5.06		< 450	Pb	Aqua regia - ICP
Oil & Grease*	mg/kg	ND	NA	NA	NA	
Ca:Mg Ratio	%	5.91	4	7	Ca:Mg	

Jo Gakobo Lab Manager		Cordingley Jeremy Managing Director		Approval Date: 15/05/2022
<p>Disclaimer Statement: "Due care and skill are applied in handling of samples presented by you for examination at the Laboratory to ensure that the Analysis Report is as accurate as possible. It is noteworthy that the Analysis Report exclusively relates to the sample presented and examined by the Laboratory. The Company gives no warranty that the Analysis Report relates to the source or any part of the source of the sample. Please note that the recommendations given in the Analysis Report are based on the parameters included in the request from you for analysis. The sporadic character of samples and the date of the Analysis Report shall be fundamental in the reading and interpretation of the Analysis Report. This document cannot be reproduced except in full, without prior written approval of the company."</p> <p>* Parameter is not accredited. - Parameters sub contracted to a third party laboratory. - All Opinions and Interpretations expressed herein are outside the scope of accreditation.</p>				

Crop Nutrition Laboratory Services Ltd, Limuru, Kenya

## 14 APPENDIX 7: WATER LAB ANALYSIS REPORT FROM TEST POINT POINT

Complete Soil Analysis (data only), Heavy Metals in Soil  
(Aqua regia)



TL/21

Customer:	Taifa Gas Investment SEZ Ltd	Crop:	No crop	Date Received:	24-April-22
Address:	P.O.Box 40462-00100 NBI	Crop Stage:	NA	Analysis Date:	26-April-22
Project Name:	ESIA Study- LPG Storage Plant Development Project	Comments:	NA	Report Date:	8-May-22
Contact Person:	Mr. Jsmal Huwel	Condition:	Dry	Sample ID:	CE292SA0020

Field: Sample 2 Beacon

Top Soil

Parameter	Unit	Result	Guide Low	Guide High	Symbol	Method
pH (H <sub>2</sub> O)		7.80	6.00	6.80	pH	potentiometric
Phosphorus	ppm	5.17	20.0	100	P	Multitek 3 - ICP
Calcium	ppm	15280	8710	12200	Ca	Multitek 3 - ICP
Magnesium	ppm	555	1050	1670	Mg	Multitek 3 - ICP
Sulphur	ppm	38.0	20.0	200	S	Multitek 3 - ICP
Iron	ppm	76.5	30.0	300	Fe	Multitek 3 - ICP
Manganese	ppm	128	30.0	300	Mn	Multitek 3 - ICP
Boron	ppm	1.55	0.80	2.00	Bi	Multitek 3 - ICP
Copper	ppm	4.52	2.00	10.0	Cu	Multitek 3 - ICP
Zinc	ppm	0.85	2.00	20.0	Zn	Multitek 3 - ICP
Arsenic	mg/kg	1.54		< 20.0	As	Aqua regia - ICP
Cadmium	mg/kg	< 0.20		< 30.0	Cd	Aqua regia - ICP
Chromium	mg/kg	46.6		< 200	Cr	Aqua regia - ICP
Cobalt	mg/kg	11.41		< 30.0	Co	Aqua regia - ICP
Molybdenum	mg/kg	< 0.10		< 1.00	Mo	Aqua regia - ICP
Nickel	mg/kg	76.4		< 75.0	Ni	Aqua regia - ICP
Lead	mg/kg	7.85		< 450	Pb	Aqua regia - ICP
Oil & Grease	mg/kg	ND	NA	NA	NA	
Ca:Mg Ratio	%	16.2	4	7	Ca:Mg	

Jo Gakobo  
Lab Manager

(Signature)

Cordingley Jeremy  
Managing Director

(Signature)

Approval Date: 15/05/2022

Disclaimer Statement: The care and skill are applied in handling of samples presented by you for examination at the Laboratory to ensure that the Analysis Report is as accurate as possible. It is understood that the

## 15 APPENDIX 8: WATER LAB ANALYSIS REPORT FROM TEST POINT 7



**Soil Analysis**Complete Soil Analysis (data only), Heavy Metals in Soil  
(Aqua regia)

Customer:	Taifa Gas Investment SEZ Ltd	Crop:	No crop	Date Received:	24-April-22
Address:	P.O.Box 40462-00100 NBI	Crop Stage:	NA	Analysis Date:	26-April-22
Project Name:	ESIA Study- LPG Storage Plant Development Project	Comments:	NA	Report Date:	8-May-22
Contact Person:	Mr. Jamal Huwel	Condition:	Dry	Sample ID:	CE2 92 SA 00 21

Field: Sample 3

Top Soil

Parameter	Unit	Result	Guide Low	Guide High	Symbol	Method
pH (H <sub>2</sub> O)		7.44	6.00	6.80	pH	potentiometric
Phosphorus	ppm	11.5	20.0	100	P	As of 1st 3 - ICP
Calcium	ppm	9670	6350	8890	Ca	As of 1st 3 - ICP
Magnesium	ppm	999	762	1220	Mg	As of 1st 3 - ICP
Sulphur	ppm	13.9	20.0	200	S	As of 1st 3 - ICP
Iron	ppm	51.5	30.0	300	Fe	As of 1st 3 - ICP
Manganese	ppm	278	30.0	300	Mn	As of 1st 3 - ICP
Boron	ppm	1.83	0.80	2.00	B	As of 1st 3 - ICP
Copper	ppm	2.72	2.00	10.0	Cu	As of 1st 3 - ICP
Zinc	ppm	0.89	2.00	20.0	Zn	As of 1st 3 - ICP
Arsenic	mg/kg	1.44		< 20.0	As	As of 1st 3 - ICP
Cadmium	mg/kg	< 0.20		< 30.0	Cd	As of 1st 3 - ICP
Chromium	mg/kg	69.3		< 200	Cr	As of 1st 3 - ICP
Cobalt	mg/kg	21.6		< 30.0	Co	As of 1st 3 - ICP
Molybdenum	mg/kg	0.95		< 1.00	Mo	As of 1st 3 - ICP
Nickel	mg/kg	48.3		< 75.0	Ni	As of 1st 3 - ICP
Lead	mg/kg	9.14		< 450	Pb	As of 1st 3 - ICP
Oil & Grease	mg/kg	ND	NA	NA	-	
Ca:Mg Ratio	%	5.93	4	7	Ca:Mg	

Jo Gakobo  
Lab Manager

Cordingley Jeremy  
Managing Director

Approval Date: 15/05/2022

**16 APPENDIX 9: WATER LAB ANALYSIS REPORT FROM TEST POINT 8**

## Soil Analysis

Complete Soil Analysis (data only), Heavy Metals in Soil  
(Aqua regia)



TL/21



Customer:	Taifa Gas Investment SRI Ltd	Crop:	No crop	Date Received:	24-April-22
Address:	P.O.Box 40462-00100 NBI	Crop Stage:	NA	Analysis Date:	26-April-22
Project Name:	ESIA Study LPG Storage Plant Development Project	Comments:	NA	Report Date:	8-May-22
Contact Person:	Mr. Jamal Huwel	Condition:	Dry	Sample ID:	CE2 92 GA0021

Field: Sample 3

Top Soil

Parameter	Unit	Result	Guide Low	Guide High	Symbol	Method
pH (H <sub>2</sub> O)		7.44	6.00	6.80	pH	Potentiometric
Phosphorus	ppm	11.5	20.0	100	P	Method 1 - ICP
Calcium	ppm	9670	6350	8890	Ca	Method 1 - ICP
Magnesium	ppm	999	762	1220	Mg	Method 1 - ICP
Sulphur	ppm	13.3	20.0	200	S	Method 1 - ICP
Iron	ppm	51.5	30.0	300	Fe	Method 1 - ICP
Manganese	ppm	278	30.0	300	Mn	Method 1 - ICP
Boron	ppm	1.83	0.80	2.00	B	Method 1 - ICP
Copper	ppm	2.72	2.00	10.0	Cu	Method 1 - ICP
Zinc	ppm	0.89	2.00	20.0	Zn	Method 1 - ICP
Arsenic	mg/kg	1.44		< 20.0	As	Aqua regia - ICP
Cadmium	mg/kg	< 0.20		< 30.0	Cd	Aqua regia - ICP
Chromium	mg/kg	69.3		< 200	Cr	Aqua regia - ICP
Cobalt	mg/kg	21.6		< 30.0	Co	Aqua regia - ICP
Molybdenum	mg/kg	0.95		< 1.00	Mo	Aqua regia - ICP
Nickel	mg/kg	48.3		< 75.0	Ni	Aqua regia - ICP
Lead	mg/kg	9.14		< 450	Pb	Aqua regia - ICP
Oil & Grease	mg/kg	ND	NA	NA	-	
Ca:Mg Ratio	%	5.93	4	7	Ca:Mg	



## Biodiversity

### Baseline data:

Field surveys for data between April and May for the following:

- Vegetation communities
- Flora
- Reptiles and amphibians
- Insects
- Birds
- Mammals

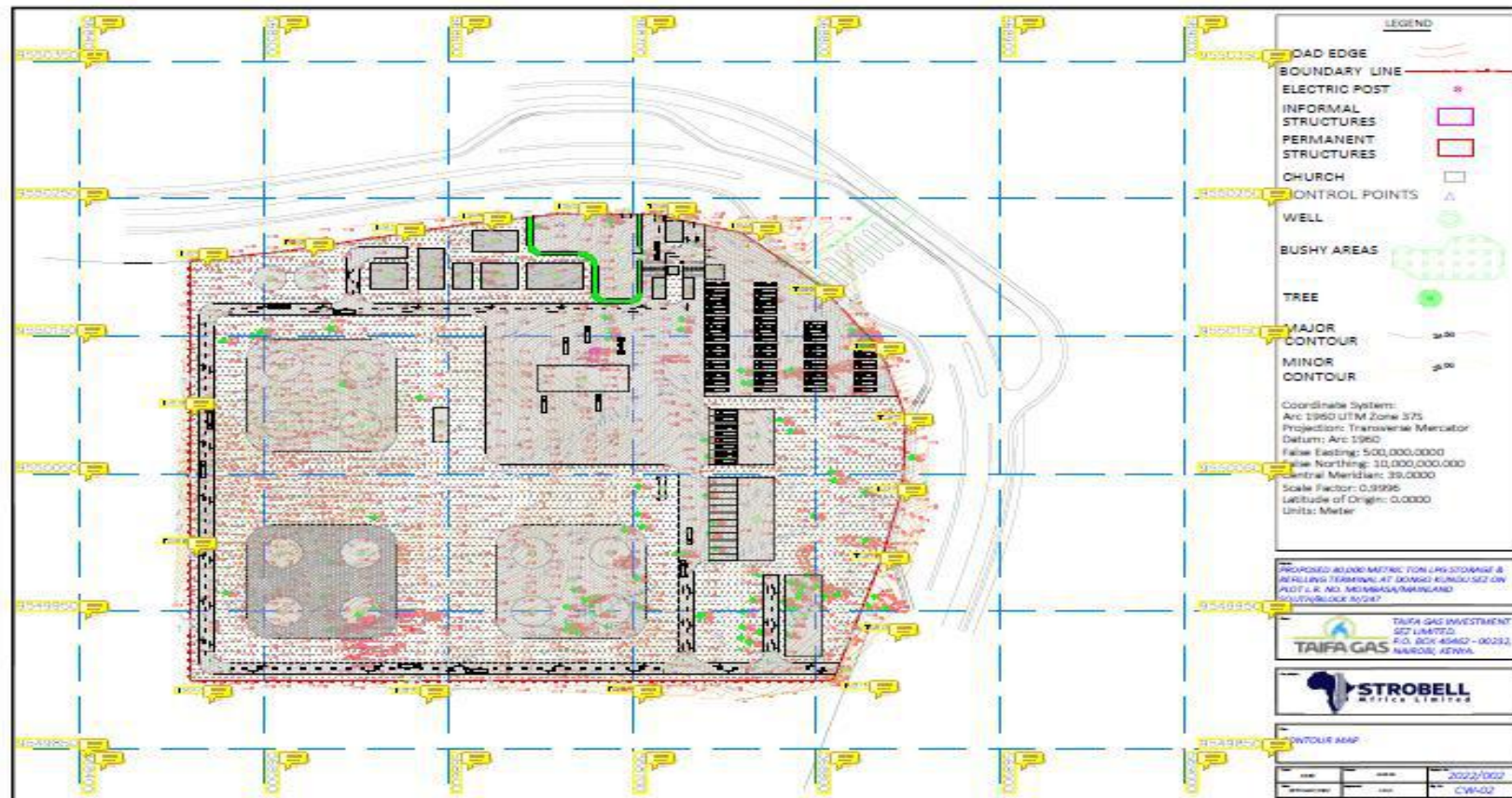
### Key Species of Conservation Concern:

- No endemic plant and animal species
- Few bird species

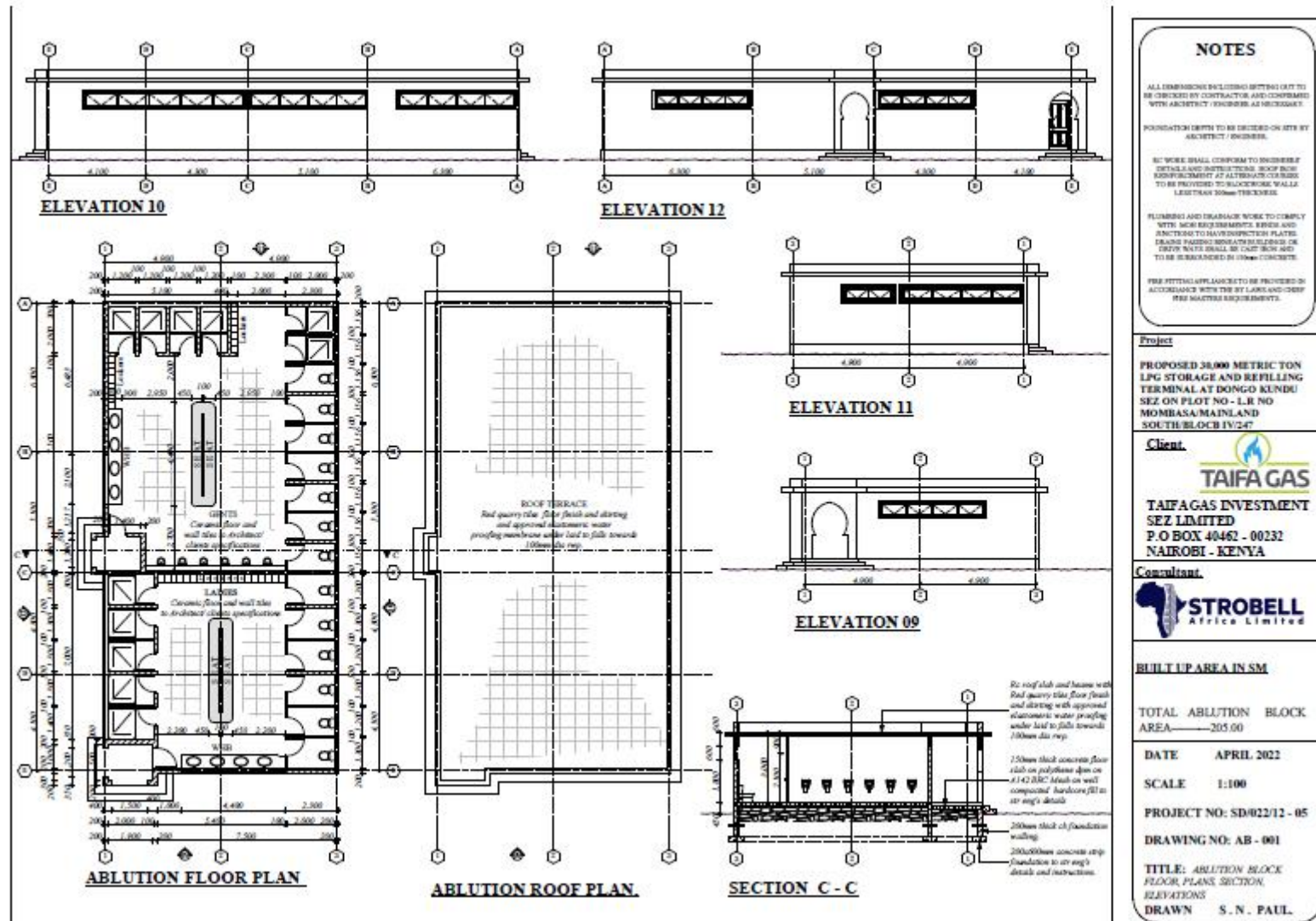




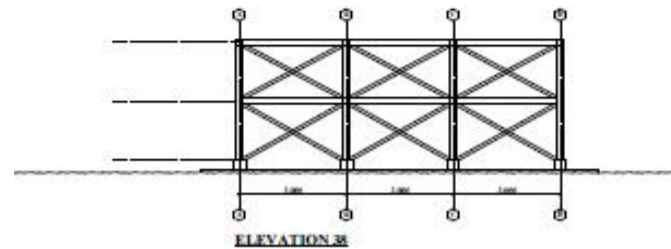
## 9. Preliminary Architectural plans



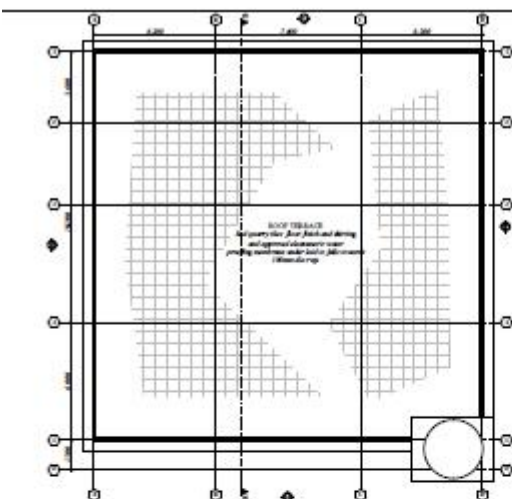




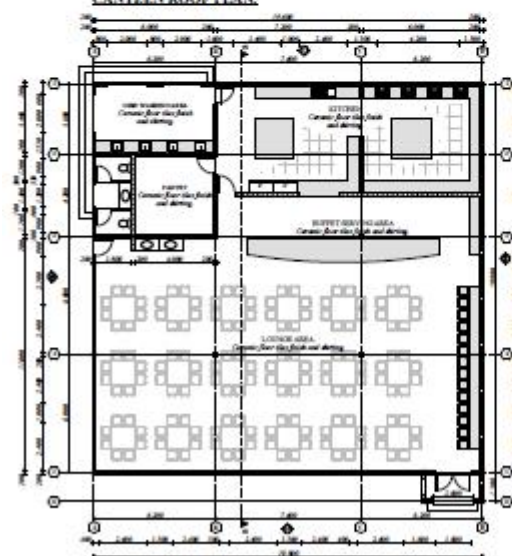




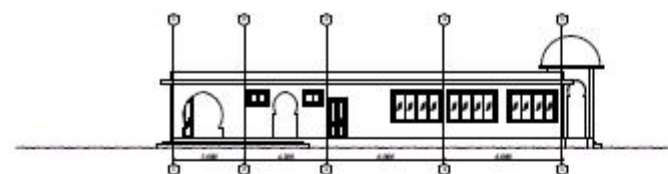




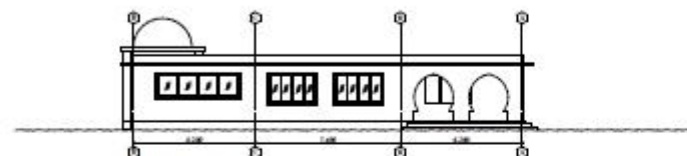
CANTEEN ROOF PLAN.



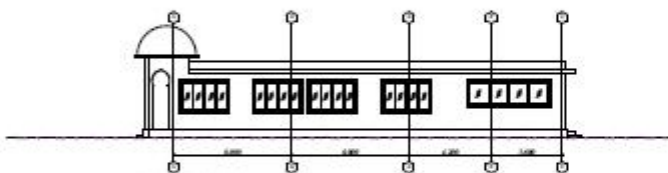
**CANTEEN FLOOR PLAN.**



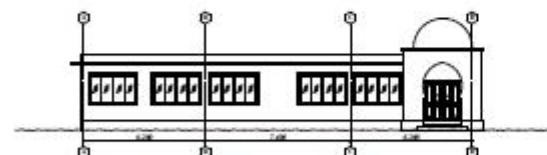
ELEVATION 08



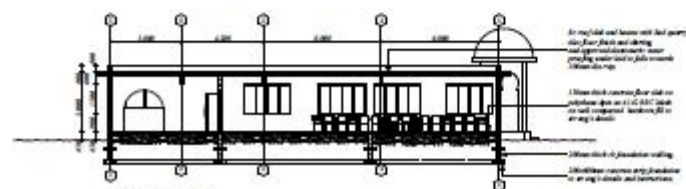
**ELEVATION 07**



ELEVATION 06



ELEVATION 05



SECTION B - B

## NOTES

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Final
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PROPOSED 13,888 METRIC TON  
LPG STORAGE AND REFILLING  
TERMINAL AT DONGO KUNDU  
SEE ON PLOT NO. 1, E. NO.  
NIMBARA/MALINDA AND  
SOUTHWESTERN INDIA

4



TAIFA GAS INVESTMENT  
SEZ LIMITED  
P.O BOX 49462 - 00232  
NAIROBI - KENYA

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MULTIPLY AREA IN SM

GRADED FLOOR \_\_\_\_\_ 400.0

TOTAL	
CANTEEN AREA	400

Chewer's Sign

Architect's Type

DATE	APRIL 2022
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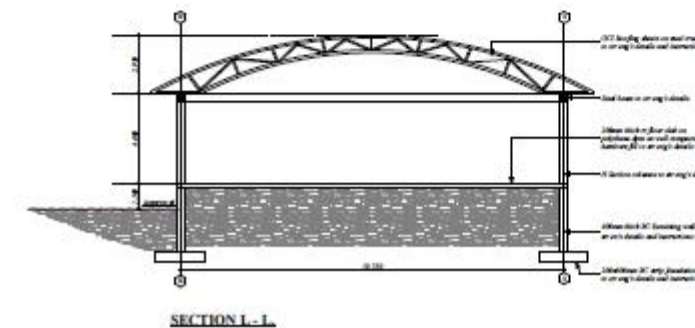
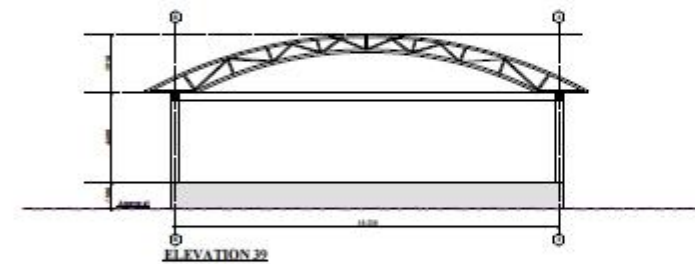
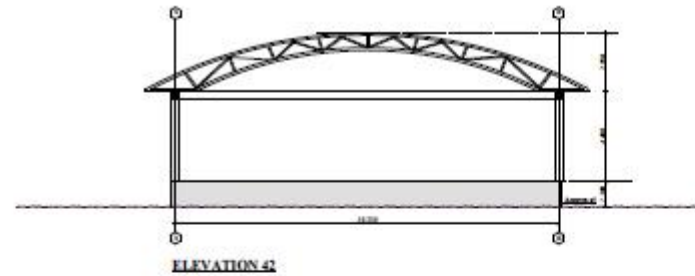
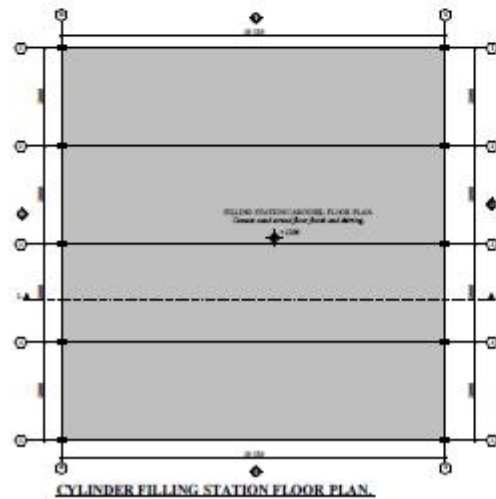
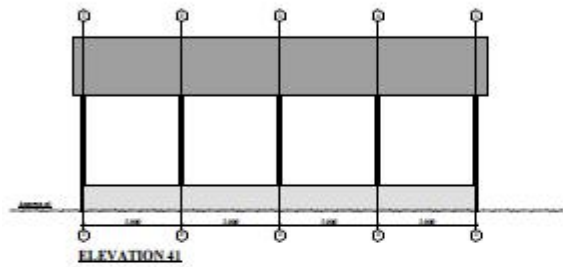
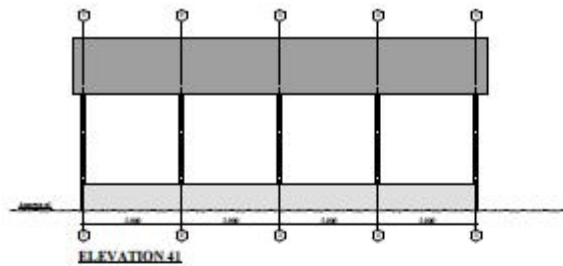
SCALE 1:100

PROJECT NO: SD-022/12 - 04

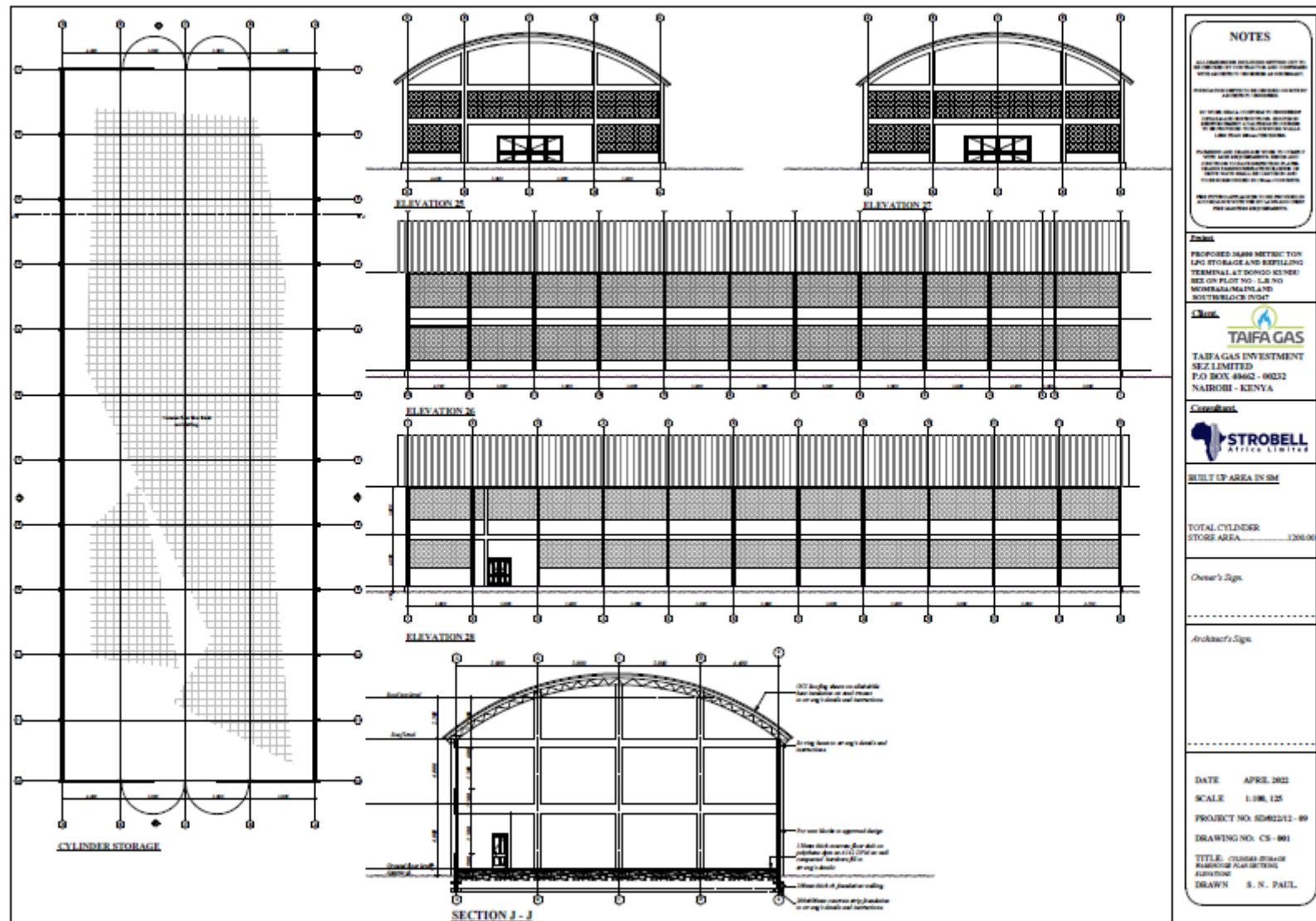
DRAWING NO. C-001

TITLE: CENTER FLOOR PLAN  
SECTION: ELEVATIONS

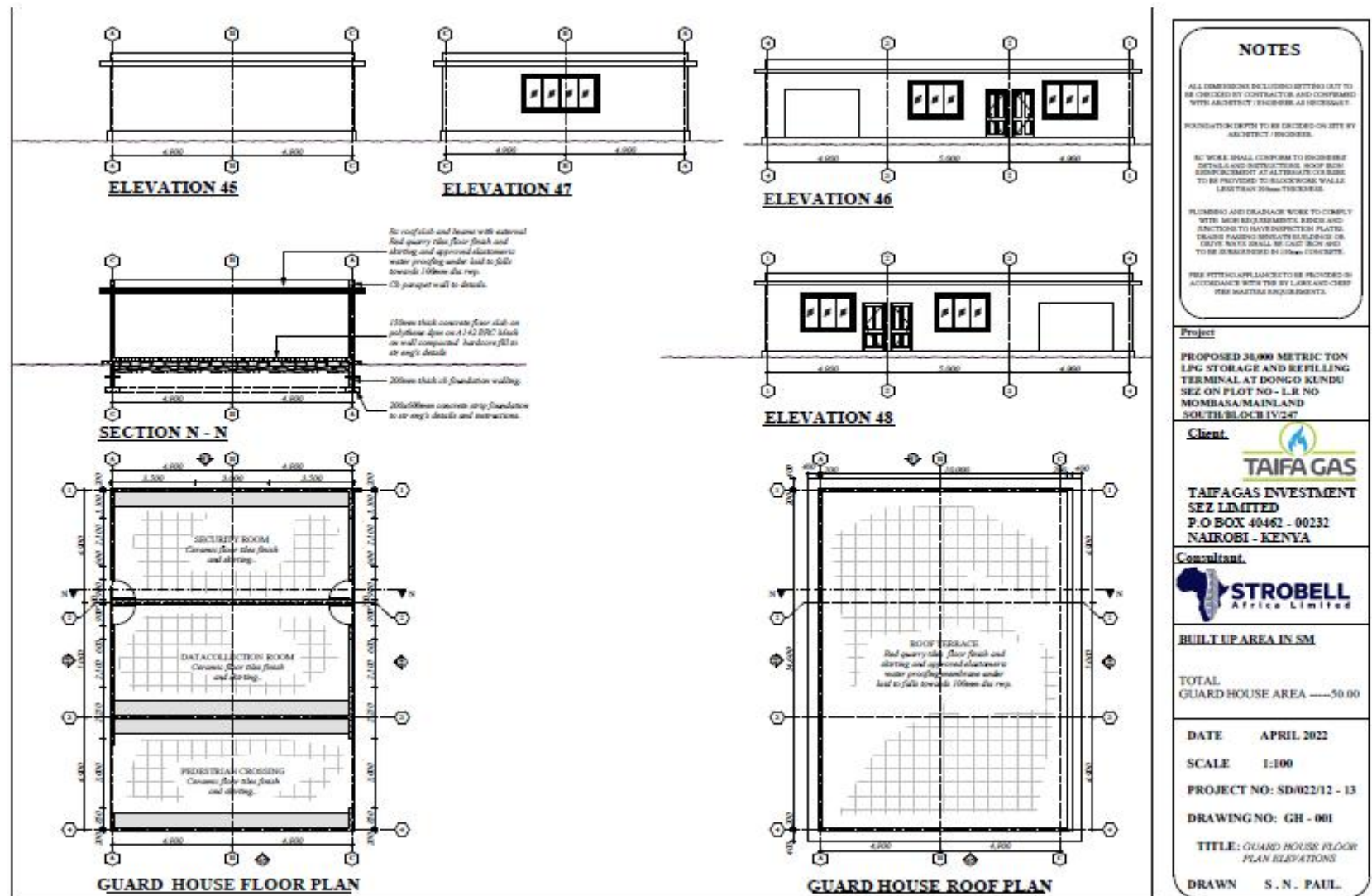
DRAWN S. N. PAUL



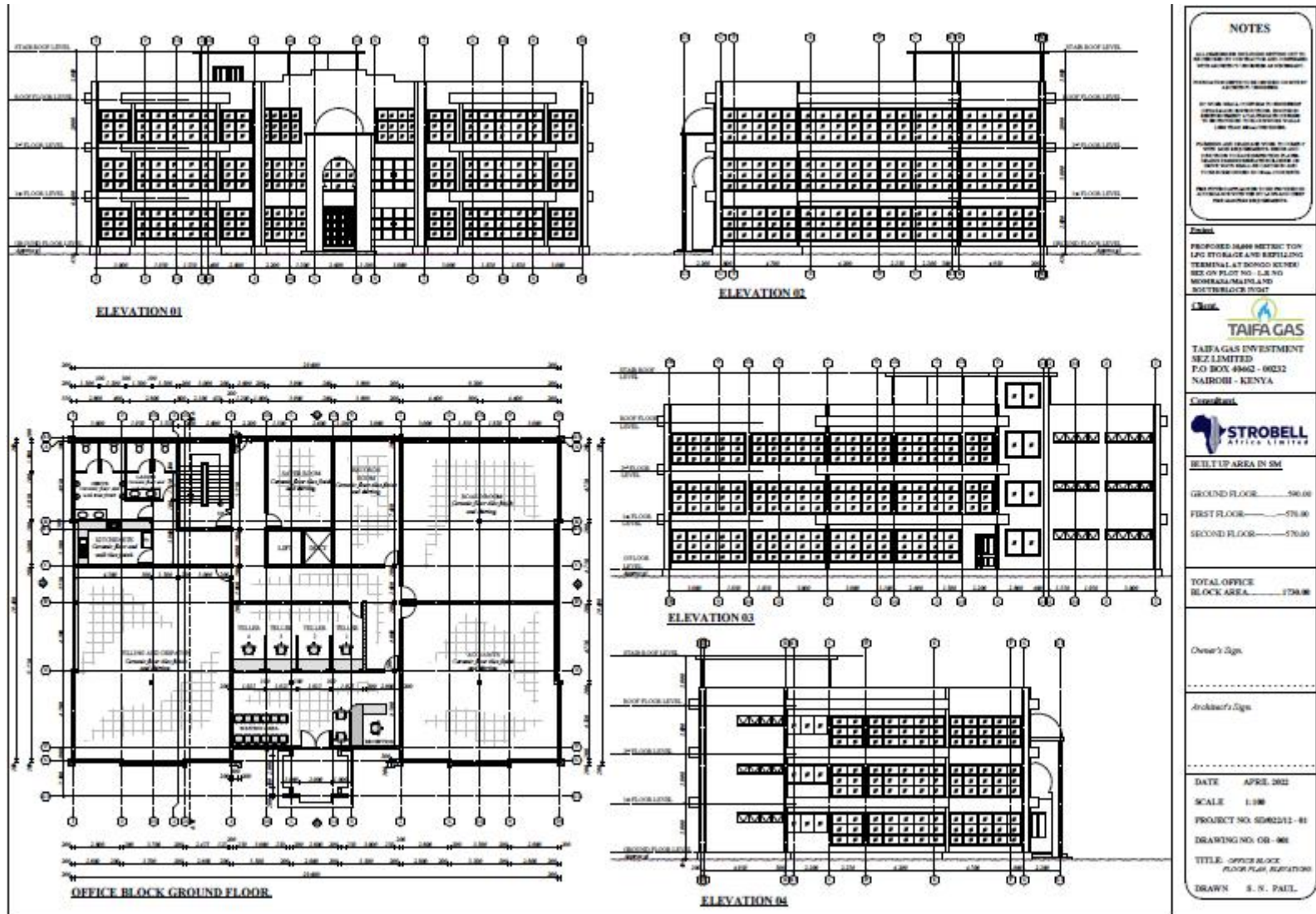
<p><b>NOTES</b></p> <p>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</p> <p>2. THE DESIGNER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE CLIENT.</p> <p>3. THE DESIGNER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE CLIENT.</p> <p>4. THE DESIGNER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE CLIENT.</p> <p>5. THE DESIGNER IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED BY THE CLIENT.</p>	
<p><b>Client:</b></p> <p>PROPOSED 1000 METRIC TON LPG STORAGE AND REPELLING THERMAL AT DINDO KESTER, BOX ON PLOT NO. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 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999, 1000.</p>	
<p><b>Client:</b></p> <p>TAIFA GAS INVESTMENT SEZ LIMITED P.O. BOX 8460 - 00232 NAIROBI - KENYA</p>	
<p><b>Consultant:</b></p> <p><b>STROBELL</b> ARCHITECTS</p>	
<p><b>BUILT UP AREA IN SM</b></p> <p>TOTAL CYLINDER FILLING STATION AREA: 500.00</p>	
<p>Owner's Sign:</p>	
<p>Architect's Sign:</p>	
<p>DATE: APRIL 2022</p> <p>SCALE: 1:100</p> <p>PROJECT NO: SDW2212-12</p> <p>DRAWING NO: CFS-001</p> <p>TITLE: CYLINDER FILLING STATION FLOOR PLAN, SECTION ELEVATION</p> <p>DRAWN: S. N. PAUL</p>	











**NOTES**

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED. DIMENSIONS TO FACE UNLESS OTHERWISE SPECIFIED.

THESE DRAWINGS ARE TO BE USED FOR THE DESIGN OF THE BUILDING ONLY. THEY ARE NOT TO BE USED FOR ANY OTHER PURPOSE.

THESE DRAWINGS ARE TO BE USED FOR THE DESIGN OF THE BUILDING ONLY. THEY ARE NOT TO BE USED FOR ANY OTHER PURPOSE.

THESE DRAWINGS ARE TO BE USED FOR THE DESIGN OF THE BUILDING ONLY. THEY ARE NOT TO BE USED FOR ANY OTHER PURPOSE.

**TAIFA GAS**

TAIFA GAS INVESTMENT  
 VIZ LIMITED  
 P.O. BOX 48462 - 00232  
 NAIROBI - KENYA

**STROBELL**

STROBELL  
 ARCHITECTS LIMITED

**RELEVANT AREA IN SM**

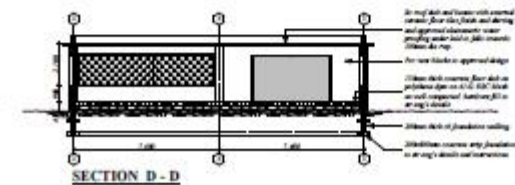
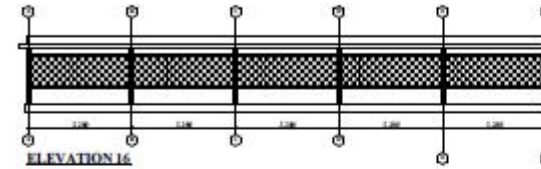
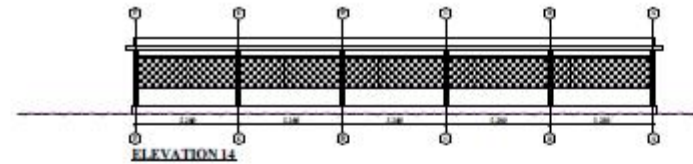
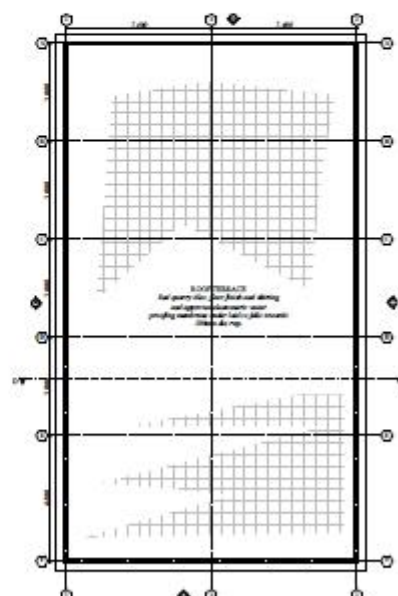
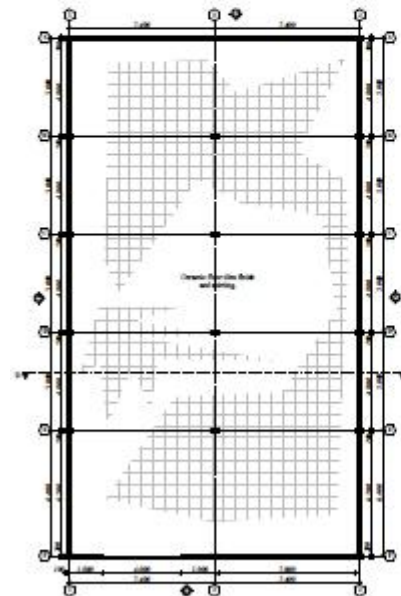
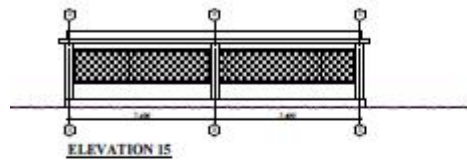
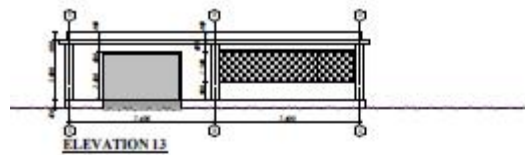
GROUND FLOOR.....590.00  
 FIRST FLOOR.....570.00  
 SECOND FLOOR.....570.00

**TOTAL OFFICE BLOCK AREA.....1730.00**

Owner's Sign

Architect's Sign

DATE: APRIL 2022  
 SCALE: 1:100  
 PROJECT NO: 40402211-01  
 DRAWING NO: 08-001  
 TITLE: OFFICE BLOCK FLOOR PLAN, ELEVATIONS  
 DRAWN: S. N. PAUL



### NOTES

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.  
2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.  
3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.  
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9. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.  
10. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.

### Project

PROPOSED 1000 METRIC TON  
LPG STORAGE AND REFILLING  
TERMINAL AT DONDO KINERU  
SITE OF PLOT NO. 1, 2 & 3  
MOMBASA MAINLAND  
SOUTHERN BLOCK 10/11

### Client

**TAIFA GAS**  
TAIFA GAS INVESTMENT  
SEC LIMITED  
P.O BOX 49462 - 00232  
NAIROBI - KENYA

### Consultant

**STROBELL**  
ARCHITECTS LIMITED

### BUILT UP AREA IN SQM

TOTAL POWER AND CONTROL  
ROOM AREA — 200.00

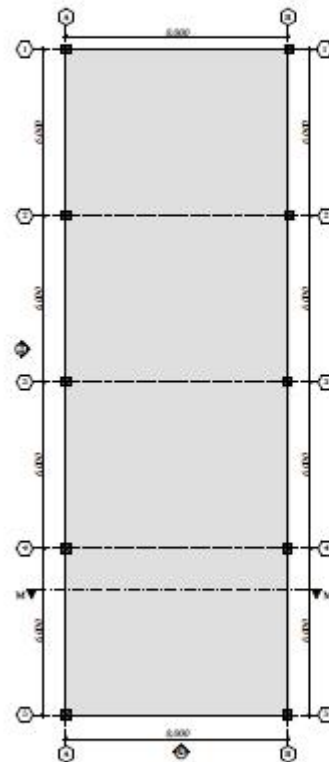
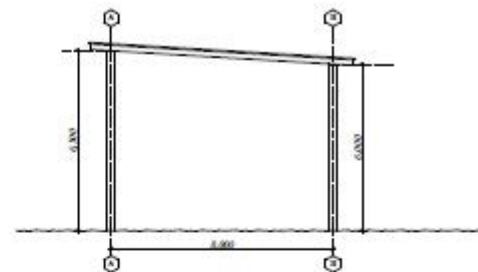
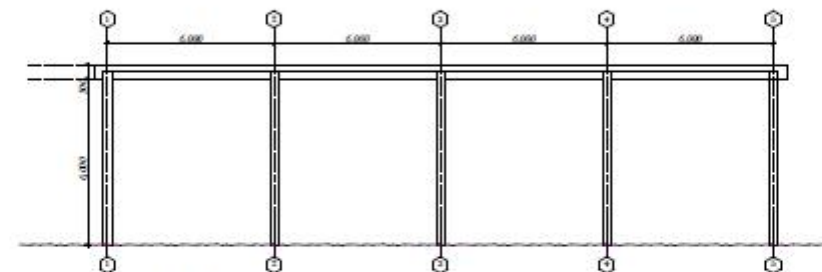
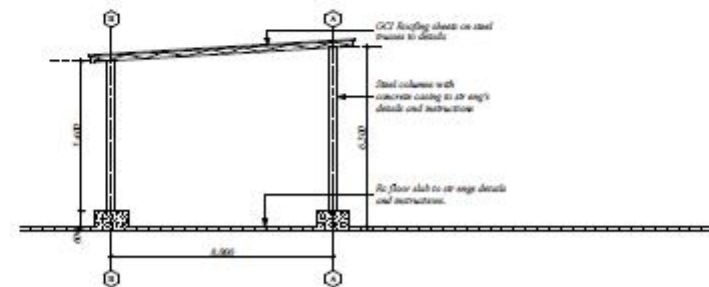
Owner's Sign

Architect's Sign

DATE: APRIL 2022  
SCALE: 1:100  
PROJECT NO: SD02212-06  
DRAWING NO: PCR-001  
TITLE: POWER/CONTROL ROOM  
FLOOR PLAN (SECTION ELEVATION)  
DRAWN: S. N. PAUL





**PUMP STATION FLOOR PLAN****ELEVATION 45****ELEVATION 44****SECTION M-M****NOTES**

ALL DIMENSIONS INCLUDING SETTING OUT TO BE CHECKED BY CONTRACTOR AND CONFIRMED WITH ARCHITECT / ENGINEER AS REQUIRED.

FOUNDATION DEPTH TO BE DECIDED ON SITE BY ARCHITECT / ENGINEER.

NO WORK SHALL CONFORM TO ENHANCED DETAILS AND INSPECTIONS, WORK SHALL BE INSPECTIONED AT ALTERNATE LOCATIONS TO BE PROVIDED TO BLACKWORK WALLS LESS THAN 30mm THICKNESS.

PLUMBING AND DRAINAGE WORK TO COMPLY WITH NEW REQUIREMENTS. BRISKS AND JUNCTIONS TO HAVE INSPECTION PLATES. DRAINAGE PIPING OPERATED BY SLIDERS OR DRIVE VALVE SHALL BE CAST IN CONCRETE TO BE REINFORCED BY 10mm CONCRETE.

PER FITTING APPLICABLE TO BE PROVIDED IN ACCORDANCE WITH THE BY LAKE AND CHIEF PER MATING REQUIREMENTS.

**Project**

PROPOSED 30,000 METRIC TON LPG STORAGE AND REFILLING TERMINAL AT DONGO KUNDU SEZ ON PLOT NO - L.B. NO MOMBASA/MAINLAND SOUTH/BLOCK IV/247

**Client**

TAIFA GAS INVESTMENT SEZ LIMITED  
P.O BOX 40462 - 00232  
NAIROBI - KENYA

**Consultant****BUILT UP AREA IN SM**

TOTAL  
PUMP ROOM AREA—192.00

DATE APRIL 2022

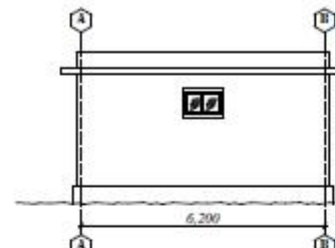
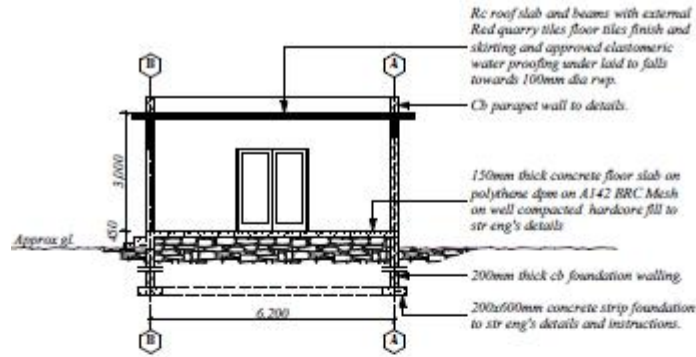
SCALE 1:100

PROJECT NO: SD/022/12 - 09

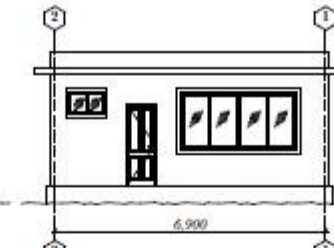
DRAWING NO: PR - 001

TITLE: PUMP ROOM FLOOR PLAN SECTION ELEVATIONS

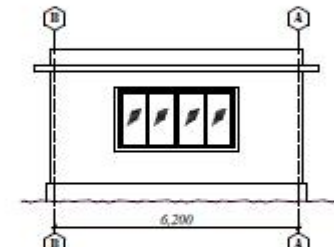
DRAWN S. N. PAUL



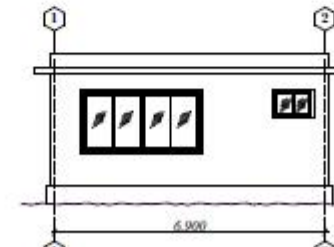
**ELEVATION 29**



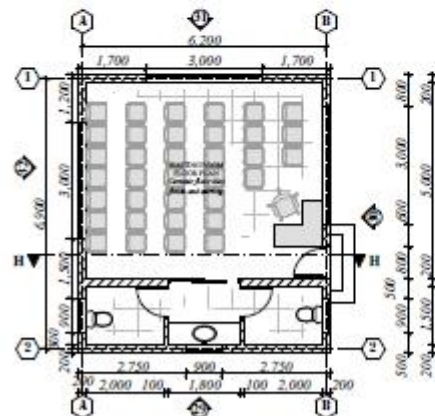
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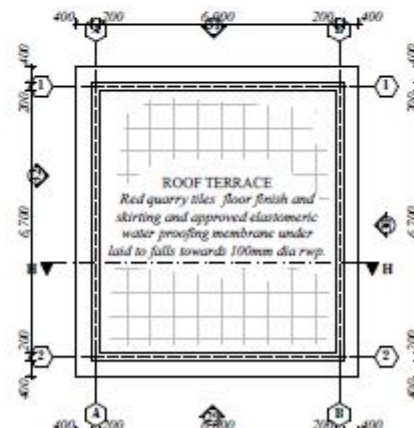
**ELEVATION 31**



**ELEVATION 32**

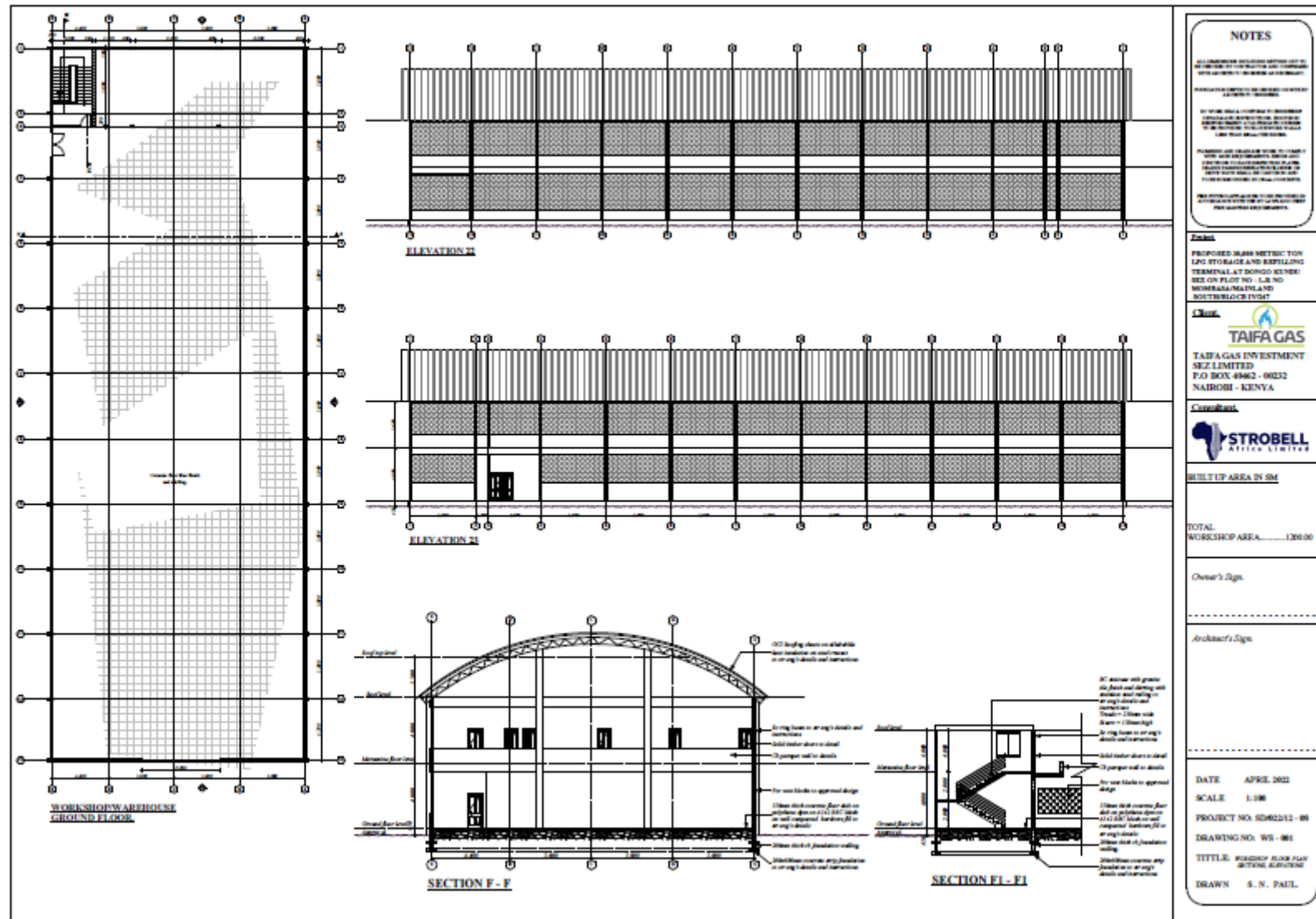


**WAITING ROOM FLOOR PLAN**

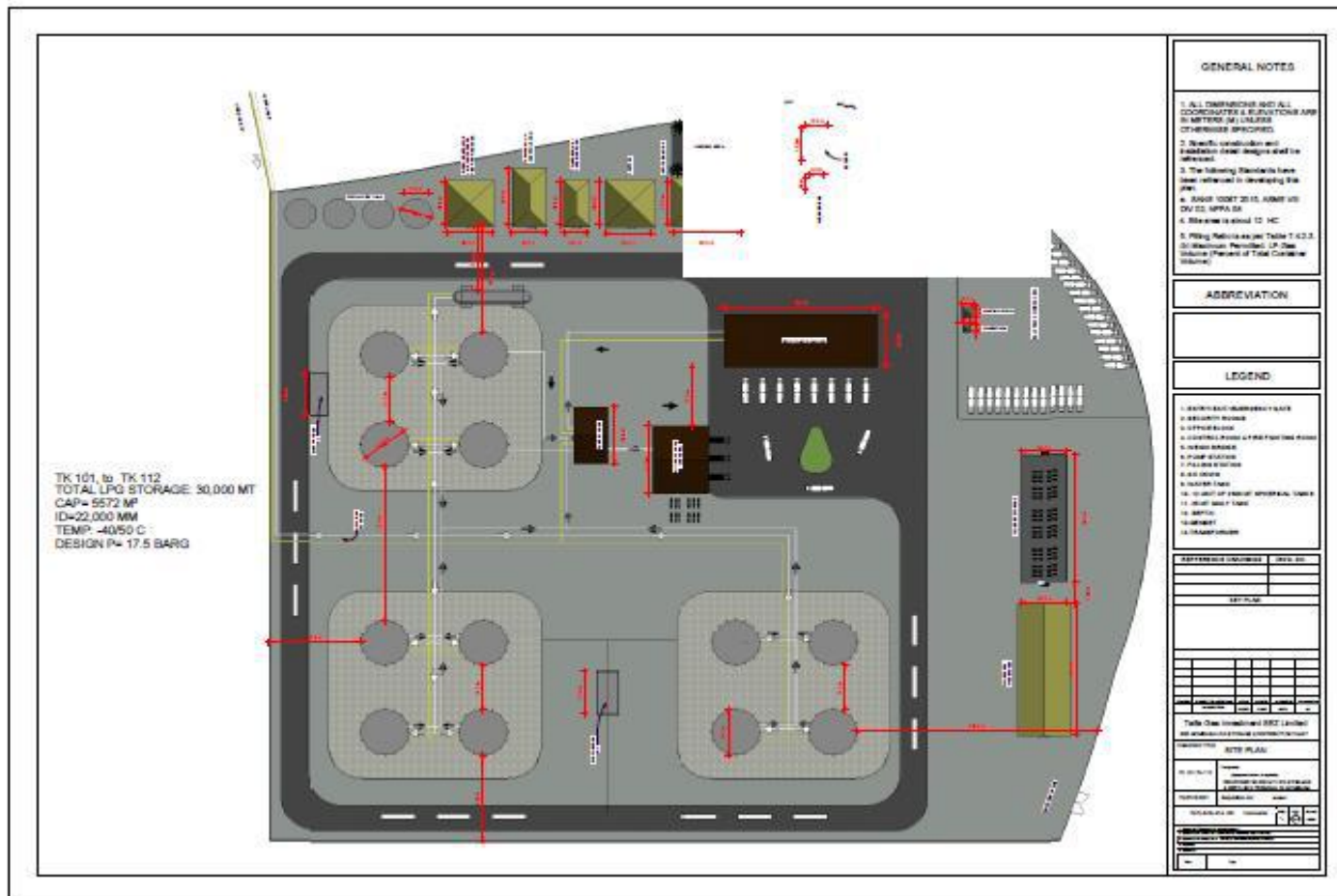


**WAITING ROOM ROOF PLAN**

NOTES	
<p>1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.</p> <p>2. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>3. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>4. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>5. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>6. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>7. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>8. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>9. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p> <p>10. ALL DIMENSIONS ARE TO FACE UNLESS OTHERWISE SPECIFIED.</p>	
<p><b>TAIFA GAS</b></p> <p>TAIFA GAS INVESTMENT SEZ LIMITED P.O. BOX 49642 - 00232 NAIROBI - KENYA</p>	
<p><b>STROBELL</b></p> <p>ARCHITECTS LIMITED</p>	
<p>BUILT UP AREA IN SM</p>	
<p>TOTAL WAITING ROOM AREA 45.00</p>	
<p>Owner's Sign</p>	
<p>Architect's Sign</p>	
<p>DATE APRIL 2022</p> <p>SCALE 1:100</p> <p>PROJECT NO: SWR0212-16</p> <p>DRAWING NO: WR-002</p> <p>TITLE: WAITING ROOM FLOOR SECTION, ELEVATIONS</p> <p>DRAWN: S. N. PAUL</p>	



## 10. site Plans





## 11.minutes for a stakeholders' meeting held at Bahari Beach Hotel on 8<sup>th</sup> April 2022

### MINUTES OF STAKEHOLDERS' MEETING HELD ON FRIDAY 08<sup>th</sup> APRIL 2022 AT BAHARI BEACH HOTEL, STARTING FROM 9.30 AM TO 1.00 PM

The minutes are for stakeholders' meeting on Environmental and Social Impact Assessment Study for the proposed Liquid Petroleum Gas (LPG) Storage Plant (terminal) project by Taifa Gas Investment SEZ Limited. The project is proposed to be located at Special Economic Zone in Dongo Kundu Likoni Mombasa County on LR.NO. MOMBASA/MAINLAND SOUTH /BLOCK IV/247- PORTION.

#### Members present

See attached list

#### Agenda

1. Arrival, Registration and Introduction
2. Opening Remarks
3. Remarks from the Professional team
4. Project Brief
5. Feedback from Respondents/A.O. B
6. Closing Remarks and Prayer

#### Minute 1: Arrival, Registration and Introduction

- 1.1 The stakeholders arrived at the meeting venue at 10. 00AM.They all registered their names on the attendance sheet which was being circulated. The Assistant ESIA Team Consulting Leader (Mr. Matthew. O. Were) called the meeting to order at 10.15 AM with a prayer from Khamis Ramadhan (Chairman SEZ Dongo Kundu Committee). He welcomed all the members present.

#### Minute 2: Opening Remarks

- 2.1 Mr. Matthew O. Were, pointed out the aim of that meeting was to introduce to participants, the various professionals who would be working to ensure that a substantial report is submitted to NEMA so as to ensure that the Investor (Taifa Gas Investment SEZ Limited) obtains an EIA approval license for the proposed establishment of an LPG plant within the Dongo Kundu area. He pointed out that the experts would expound to the members their areas of expertise.
- 2.2 He informed the members that so many investors will be coming to invest in the special economic Zone and it would be ideal if the parents enrolled their children to study courses which will render them ideal for various opportunities to be availed by the various investors. He also urged members to negotiate with the investors to ensure that their needs are fulfilled and they fully benefit.
- 2.3 He went ahead to introduce the team of experts who had accompanied him for the meeting. These included; Professor Ciira Kiiyuikia, Eng. Andrew Meso, Philip Abour, Joy Wasirimba and Grace Ndanu Sila.

**Minute 3: Remarks from the Professional team**

- 3.1 Professor Ciira Kiiyuikia (ESIA Team Consulting Leader), pointed he would be part of the team carrying out the EIA study for the proposed project. He stated that the meeting with the stakeholders was essential in that it will form part of the EIA study report to be submitted for EIA approval. He thus requested the stakeholders to air out their views and opinions relating to how the proposed project would affect them. He urged members to be candid and objective.
- 3.2 Joy Wasirimba, (a Sociologist), pointed out that as a result of establishment of the LPG plant by the investor, there are social issues which are likely to arise. Some of these social issues include; child labour, HIV/AIDS, crime, increase in insecurity, increase in teenage and unwanted pregnancies; increase in prostitution; and increase in sexually transmitted diseases (STDs), employment of the youth and allocation of technical jobs. She informed members that she would be in the area to examine how the proposed project will affect the people's lives (both positively and negatively) as well as lead to disruption of existing family structures and social networks.
- 3.3 Philip Abour pointed out that having expertise in his line of duty, he would be involved in carrying out analysis of various aspects of the environment. These include; air, water and noise. He pointed out that the analysis will be done to ensure that the proposed activities are as per the set standards and regulations. He requested the Chief and the Assistant chief of the area to ensure that there is enough security since they would be carrying equipment for analysis which if stolen are expensive to purchase.
- 3.4 Eng. Andrew Meso (Civil Engineer), pointed out that he will be part of the team that will ensure that the construction meets the set international construction standards. He also pointed out that they would plan, organize and oversee the construction of the LPG plant and see into it that the contractor follows all the set standards and requirements.
- 3.5 Grace Ndanu Sila (EIA/EA Lead Expert), pointed that as an environmental expert, she would be involved in the assessment of the proposed project, evaluate the impacts, identify environmental issues, and recommend mitigation measures. She urged the members to air their views and opinions (both positive and negative) regarding the proposed project.

**Minute 4: Project Brief**

- 4.1 Eng. Andrew Meso, (Civil Engineer) took time to give a brief to the members on the proposed project. He pointed out that the investor (Taifa Gas Investment SEZ





Limited)), had plans to establish an LPG plant within the Dongu Kundu area. He pointed out the investor had a similar project in Tanzania which had employed 250 people directly and 10,000 indirectly.

- 4.2 He informed members that, the investor will be importing gas in form of liquid compressed gas which will be processed somewhere else and will be brought in bulk and stored in storage tanks and will be packaged for sale to their clients in Uganda, Rwanda, Congo and East Africa markets.
- 4.3 He pointed that 30 acres had been allocated for the project and these acres had been obtained from two members of the local community who are neighbours i.e Mzee Benji and Tesi. He informed members that the surveyors had been taken to site to put beacons.
- 4.4 Andrew went on to make a power point presentation on the layout for the proposed plant. He pointed out that to avoid any hazard emanating from the operation of the proposed plant, appropriate mitigation measures will be put in place.

#### **Minute 5: Views from the Locals**

##### **5.1 Khamis Ramadhan, Chairman, Dongu Kundu SEZA Committee**

- 5.1.1 He pointed out that he was enchanted to meet the environmental experts who gave him more information regarding the project. He informed members together with the lead expert, he had visited the site and was aware of the proposed project activities.
- 5.1.2 He urged the investor to come to the region without deferment since this would benefit the locals by ensuring that they get jobs as well as improvement of the surrounding schools and hospital through the CSR activities by the investor. He also pointed out that other projects shall be improved.
- 5.1.3 He also requested the investor to ensure that 75 % of the jobs are given to the locals.

##### **5.2 Bakari Mangale, A member of the Dongu Kundu SEZA Committee**

- 5.2.1 He requested the EIA team to elaborate further on the proposed project since members were not aware of the proposed activities by the investor within the Dongu Kundu area.
- 5.2.2 Bakari also requested that a community benefit agreement which spells out the benefits the community will receive in return for supporting the developer's project in their neighborhood be written to circumvent situations whereby the investor gives empty promises.

##### **5.3 B.H Mwangi, A member of the Dongu Kundu SEZA Committee**



**5.3.1** He pointed out that within the SEZ, there are so many people occupying the land, and once the investors come to invest within the area, these people have to move and their land will be taken over by the various projects. He thus requested that SEZA should come up with a resettlement Action plan and appropriate compensation mechanism for those currently occupying the land.

**5.3.2** In response to his concern, Madam Rose Muya (Assistant County Commissioner) pointed out that a committee will be formed to determine the appropriate compensation mechanisms once they give their shambas to the SEZ investors. In addition, she pointed out that for this investor (Taifa Gas Investment SEZ Limited) had already initiated the process. She also reminded that the research the team was doing was only for the investor to obtain the approval for his project and was not for the whole Special economic Zone.

**5.4 Riziki H. Mwakusirikwa, A Civil Society Representative from Dongo Kundu**

**5.4.1** In her remarks, she pointed out that the people were apprehensive that the previous contractors had given them empty promises which never came to pass.

**5.4.2** She requested consideration of an M.O.U between the investor and the people on the implementation of proposed project by the investor and this would be in identification of skilled and semi-skilled labour on the said project.

**5.4.3** She also requested the investor to be involved in CSR activities by improving the schools and hospitals within. She also urged the investor to ensure that the locals are considered when it comes to tendering processes.

**5.4.4** She urged that small tenders should be awarded to the women groups, Persons with Disability and youths. She also requested that sponsorship programmes be availed.

**5.4.5** In addition to her comments, Joy Wasirimba (Sociologist) requested the people to have an employment committee which should have a database of all the youths from the area, ensure that the youth submit their CVs, so that once an investor comes on board, they can be considered for any opportunity.

**5.6 Rasheed Abdallah, Chief, Mbuta Location**

**5.6.1** He urged the committee to prepare their youth with the required skills by ensuring that the youth enroll for courses which will enable them be shortlisted for jobs advertised by the investors. He also pointed out that within the area, there are so many youth and women groups which only become busy during the electioneering period. He thus requested the SEZ committee to identify those groups to ensure that they can be sub contracted to supply goods and services once the companies are in operation.



- 5.6.2 He challenged the committee members by questioning them how they had benefitted from the previous engagements. He requested them to register the committee so that they can lobby for any assignment.
- 5.6.3 He also requested the investor to take part in CSR activities. For instance giving scholarships to the students from the area to study courses related to their field of operation.
- 5.6.4 Rasheed requested the investor to ensure that appropriate mitigation measures are put in place to avoid any hazards and accidents as a result of operation of the proposed project which is a high risk kind of a project (as per the second schedule of EMCA, 2015).He pointed out that within the area, there was no any hospital, hence enquiring how prepared the investor was in cases of accident and the issue of security.
- 5.6.5 He also urged the investor to ensure that all the social issues which include; youth unemployment, child labour, adolescent pregnancy and early child marriage which might increase as a result of the project are addressed.

#### **Minute 6: Closing Remarks and Prayer**


- 6.1 Rose Muya (Assistant County Commissioner) thanked members for creating time to attend the meeting. She urged them to prepare themselves for the project by ensuring that an agreement is done in writing. She also urged members to prepare their youths for the jobs by enrolling them to colleges offering courses related to various fields. She also advised the committee members to prepare themselves since they would be bargaining for the community. She requested that the investors to ensure that all the needs of the affected people are taken into consideration.
- 6.2 Professor Cira Kilyukla pointed out that he was thrilled that the members of the Dongo Kondu community had turned in large numbers for the meeting. He informed members that they were just preparing the way, and if the local area residents allowed them, they would proceed. He added that if, there will be any blockages, it will be difficulty for the investor to invest in the area. He pointed out that the issue of resettlement will be taken into consideration. He also assured the locals that the youth will be offered jobs.
- 6.3 Khamis Ramadhan, Chairman, SEZA Committee, thanked members for attending the meeting and also for airing their views and opinions. He assured the EA Team that the members of the community were ready to cooperate and would offer any form of support the investor together with the experts required.
- 6.4 There being no other agenda the meeting was adjourned at 1.15 PM with a prayer from Khamis Ramadhan.

Minutes Written by:



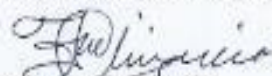
Grace Ndanu Sila  
ESIA Consulting Team Member

Minutes Reviewed by:



Matthew O. Were  
Assistant ESIA Team Consulting Leader

Minutes approved for circulation by:



Professor Clara Kihukia  
ESIA Consulting Team Leader and Chairman of the meeting

Representative of the Participants

Signed by: SAID BILU

Date:










Signature:














## 12. Attendance List for stakeholders' meeting held at Bahari Beach Hotel on 8<sup>th</sup> April 2022

ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT BAHARI BEACH HOTEL, ON 8<sup>TH</sup> APRIL 2022, STARTING FROM 9.30 AM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR.NOMOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORION.

	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	AREA OF RESIDENCE	SIGN
1.	Eng. Andrew Mwangi	072552457		2410884	mucandrow@gmail.co-	MSK.	
2.	Bacani Mwangi	0723972592	Box 2057-80150 M.A.	10769303	bacani.mwangi@exham-MSA	MSA	
3.	Matthew O. Were	0722576524	P.O. BOX 2100-00100 M.A.	4244805	wereomati@yahoo.com	Nairobi	
4.	M. Cira Kijakia	0722896536		4831364	Kiitiga@gmail.com	MSA	
5.	Arco Ota	072484432	P.O. BOX 2100-00100 M.A.	270000	grace.mwangi@gmail.com	MSA	
6.	Khanis Lindi	0722825534	P.O. BOX 2100-00100 M.A.	5355998	KhanisLindi20@gmail	MSA	
7.	Khanis Banaoka	0724451888		16708062		MSA	
8.	Farheed Abdulla	0724604223	96042 M.A.	2254055	Farheed.abdulla@gmail.com	LIMONT	
9.	Buriale Subira Abdalla	0790144706		26665506		LIMONT	

ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT BAHARI BEACH HOTEL ON 8<sup>TH</sup> APRIL 2022, STARTING FROM 9.30 AM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR.NOMOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORTION.

	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	AREA OF RESIDENCE	SIGN
10.	ROSE MUYA	0723281916		27847127	naelalis-nw@gmail.com	MTONGWE	
11.	KHAMIS RANIKHAY	073451565		16705062		MIONGWE	
12.	KHAMIS SHIS	0728825534	843, 284 NGA	5385978	Khamis Mtebeza@gmail.com	SALWATIMBA	
13.	CHRISTINE MARIKE	0714335882	1795 M34	7936125		MIONGWE	
14.	MUMENDO A. MURARE	0712-283537		12894008		MTONGWE	
15.	THARBITA LOIKI	0710135182		0731283		MTONGWE	
16.	FATUMA SHEE	0724726084		16005627		MTONGWE	
17.	DZENGO LESI	0707583292		30815856		MTONGWE	
18.	KELLY KONDE	0725256138		0672114		MIONGWE	



ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT BAHARI BEACH HOTEL ON 8<sup>th</sup> APRIL 2022, STARTING FROM 9.30 AM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR.NOMOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORION.

	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	AREA OF RESIDENCE	SIGN
19.	CHARISTINE MATHIE	0714833882	1795 MCH	9936125	—	MTONGWE	<i>[Signature]</i>
20.	Bintou Subina Abdoulaye	0790141706	—	26565506	—	MTONGWE	<i>[Signature]</i>
21.	Tabitha Kout	0710135182	—	0731283	—	MTONGWE	<i>[Signature]</i>
22.	Said A. Gindoo	0728502468	—	9774592	—	MTONGWE	<i>[Signature]</i>
23.	MESUMA RAMADHAN	0723090628	—	10578480	—	MTONGWE	<i>[Signature]</i>
24.	B.H. Mwanika	0712700061	—	8404887	—	SHIMANGALA	<i>[Signature]</i>
25.	SHABAN OMAR	0701590513	—	5466184	—	SHIMANGALA	<i>[Signature]</i>
26.	TABU CHAKA	0705560379	—	2739561	—	DONGO KUNDU	<i>[Signature]</i>
27.	SAMUEL SANGA	0722264706	—	5011588	—	DONGO KUNDU	<i>[Signature]</i>









28 HAMADI JUMA

ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT BAHARI BEACH HOTEL ON 8<sup>TH</sup> APRIL 2022, STARTING FROM 9.30 AM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR.NOMOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORION.

	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	AREA OF RESIDENCE	SIGNATURE
28.	HAMMAD, JUMU	0718559188		10579566		DONGO KUNDU	
29.	ISSA ABAR	0702706161		23387735		VITIWENI	
30.							
31.	UMAZI CHAKA	0743587009		26795105		DONGO KUNDU	
32.	OMAR SALIM	0745612860		5844193		VITIWENI	
33.	SAID BIDU	0702892100		24964500		MWANGARA	
34.							
35.							
36.							


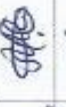









ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT BAHARI BEACH HOTEL ON 8<sup>TH</sup> APRIL 2022, STARTING FROM 9.30 AM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE TANK DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR-NOMOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORION.

	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	AREA OF RESIDENCE	SIGN
37.	Mwshari Juma	0712667166	96042	28833066	smwsharijuma@gmail.com	Mombasa	
38.	Mariam Yusuf	0705284221		29708558	Mariam.yusuf@fay.org icellykonde@gmail.com	Mombasa	
39.	KELLY KONDE	0725236135	90423	0672114		MWANGAZA	
40.	MESAD AHMED	0792932799		21034607		MWANGAZA	
41.	RIZKI H. Mwanungu	0725716082		21730927	rmwanungu@gmail.com	NTONGWE	
42.	JAMES O. JIRA	0723972554		3884158		MWANGAZA	
43.	Joy Wadrimba	0713932101		24700920	wadrimba.joy@gmail.com	Mombasa	
44.	Philip Azua	071556685	55533	57625	Philip.Azua@gmail.com	Mombasa	
45.							

**13. Attendance List for stakeholders' meeting held at Mombasa Beach Hotel on 12<sup>th</sup> May 2022**

ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT MOMBASA BEACH HOTEL IN NYALI MOMBASA, ON THURSDAY 12TH MAY 2022, STARTING FROM 10.00 AM TO 2.00 PM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR-NOMOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORION.

NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	ORGANISATION OR INSTITUTION OR AREA OF RESIDENCE	SIGN
1. Joy Wasimba	0713932121	—	24700920	wasimba.joy@gmail.com	JKH Holding	
2. Stefano Njoroge	079745851	P.O. Box 950620	2658003	smile@kenya.go.ke	KNX	
3. Mr. Ciro Kipilele	0722816536	—	180364	Kipilele@gmail.com	Spiral Ltd	
4. BALUBU KANGALIA	07121326177	—	28760265	kangalialubulu@gmail.com	JKH HOLDING LIMITED	
5. Grace Otua	072241032	P.O. BOX 2100-00100 NRB	27769318	graceotua@gmail.com	JKH Holding Limited	
6. Eng. Andrew Muri	0723922027	—	2490882	andrewmuri@gmail.com	JKH Holding	
7. Gabriel Wani	0700332131	—	12687697	gabrielwani@gmail.com	JKH Holding	
8. Saad Becha	0740899100	—	24964500	Saadbecha@gmail.com	SEZ Cam	
9. Ahmed Juma Mwa Njoroge	0722758706	WILSONI	2155524	—	SEZ	










2

ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT MOMBASA BEACH HOTEL IN NYALI MOMBASA, ON THURSDAY 12TH MAY 2022, STARTING FROM 10.00 AM TO 2.00 PM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR.NOMOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORION

NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	ORGANISATION OR INSTITUTION OR AREA OF RESIDENCE	SIGN
10. Philip Abani	073566815	NBI	546235	Philip Abani@yahoo.co	JTL	A
11. Matthew O. Were	0722876304	NBI	424605	weremate@yahoo.com	KH-Holiday	Matthew
12. SAMUEL SANBIA	0722364706	SEZ.	5011588	-	SEZ - Coastal	SEZ
13. Teddy B. Bunge	0720751953		27644443	teddybunge@yahoo.com	Interior	Teddy
14. SAID SHEH M.	0726534457	MSA	10571612	Saidshah@kws.go.ke	KWS	Said
15. Edward Bossire	070809556	NLC	11464098	mbusire2001.06@gmail.com	NLC	Edward
16. Wamun Naino	0722653770	NBI	1311400	Wamun Naino@gmail.com	DUSIS	Wamun
17. Abdul Raz	0769859441	-	-	Abdul Razafindralandy@gmail.com	Taifa Gas	Abdul
18. Amari Kimo Kizito	0722372203	NISA	28988104	amari.kimo@kpm.co.ke	Kenya Ports Authority	Amari



ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT MOMBASA BEACH HOTEL IN NYALI MOMBASA, ON THURSDAY 12TH MAY 2022, STARTING FROM 10.00 AM TO 2.00 PM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LB. NOMBASA/MAINLAND SOUTH/BLOCK IV/247-PORION

	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	ORGANISATION OR INSTITUTION OR AREA OF RESIDENCE	SIGN
19	RASHED AGA	0724684022	1605	22640175	-	Intern. Centre	
20	Christine Njoroge	0714833882		9986125	-	Soc. Comm. Hse	
21	ISSA NBARO	072272616		8587723		COMET	
22	Shaban Omar	070119013	-	5466184	-	Mombasa Intergovt.	
23	DAVID MUNGA	0923658463	9640 Mbe	8706354	daridmunga@gmail.com	MCC	
24	Bikuu H. Wambui	0701010473		3725861	bikuum123@gmail.com	NLC	
25	KINOTI MUGAMBI	0726463264	Muthiga, 645, 4th Floor	3192267	mugambi.ernest@gmail.com	SEA	
26	JAMAL HOWEL	0745116876	40962	1020472	jamal.howel@truffysworld.com	TAFI GTS	
27	Shadrack Muriu	0720887173		0618830	muriu.shadrack@gmail.com	Kenya's 1st Kenyan Business Council	

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ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT MOMBASA BEACH HOTEL IN NYAU MOMBASA, ON THURSDAY 12TH MAY 2022, STARTING FROM 10.00 AM TO 2.00 PM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR.NOMOMBASA/MAINLAND SOUTH/BLOCK IV/247-PORION







	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	ORGANISATION ,INSTITUTION OR AREA OF RESIDENCE	SIGN
28	MURRAY SUTEMAN	0712667185	16025	28833066	smurris@reginald.com	Asst. Chief	
29	KENNIS SARA	072825734	84329	5385997	Kennissara@gmail.com	Comm. Member	
30	FRANNA GEE	0724726018		168627		Comm. Member	
31	NORAL NICHOLSON	072153045		72406531	norach@nicholson.org	NLC MSA	
32	HOMIS RAMADHAN	123378130522	DSM		hramad@hramad.com	THAI GAS	
33	WATERIA COLLE	0722588437		7635375	wateria@wateria.com	NEMA	
34	JAMES .N. KATHURU	072268535	16778-8060 MSA	11023035	James.N.Kathuru@gmail.com	KENYA ATTA UNIVERSITY-MIA	
35	Kennedy Kiga	0723689326	84700 MSA	27193014	Kennedy.Kiga@gmail.com	NEMA	
36	STELLA NYGOMI	0703632434	46641 Kibundi	2947305	stella.nygomi@gmail.com	EPMA	

ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT MOMBASA BEACH HOTEL IN NYALI MOMBASA, ON THURSDAY 12TH MAY 2022, STARTING FROM 10.00 AM TO 2.00 PM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR, NOMBOMBA, MAINLAND SOUTH / BLOCK IV/247-PORION


	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	ORGANISATION ,INSTITUTION OR AREA OF RESIDENCE	SIGN
37	Apollinarius J. Mwandigwa	0721512722	80078	10397944	mmandigwa@msa	KFS	[Signature]
38	Kipkemboi Rono	0707889469	84254-80100	29686775	krona@kenya.co.ke	Kenya Coast	[Signature]
39	WANGA BRIGID	0712651400	80100	29686775	mmandigwa@msa	Kenya Coast	[Signature]
40	Daniel Githaoi	0721857725		20462220	githaoi@kpa	KPA	[Signature]
41	Kenneth Mosop	071877945		13992286	kenyapetroleum	KPA	[Signature]
42	Rizkiyeh Mwakulungu	0725716652		21720927		SOC Comm	[Signature]
43	MW R K Mwanjeto	0724414765		26343099	richmond18@gmail.com	Kenya Coast	[Signature]
44	Anthony Mugo	07268168286	98072-80100	2744630	anthony.mugo@shabell.co.ke	Shabell Africa	[Signature]
45	Nicholas Ogo Mugo	0710811837	90679-80100	1430712	nicholas.mugo@shabell.co.ke	MP Office Libani	[Signature]



ATTENDANCE LIST FOR STAKEHOLDERS WHO ATTENDED A PUBLIC CONSULTATION MEETING HELD AT MOMBASA BEACH HOTEL IN NYALI MOMBASA, ON THURSDAY 12TH MAY 2022, STARTING FROM 10.00 AM TO 2.00 PM FOR THE ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDY ON THE LIQUID PETROLEUM GAS (LPG) STORAGE PLANT DEVELOPMENT PROJECT TO BE LOCATED AT SPECIAL ECONOMIC ZONE IN DONGO KUNDU MOMBASA COUNTY ON LR/MOMBASA/MAINLAND SOUTH /BLOCK IV/247-PORION

	NAME	MOBILE NO.	POSTAL ADDRESS	ID NUMBER	EMAIL ADDRESS	ORGANISATION OR AREA OF RESIDENCE	SIGN
46.	Princess Kisiu	0722816254	2766-50100	244529421	Princess.Kisiu@gmail.com	Occupational Safety & Health (POSTS)	
47.	Anthony Kitaruna	0707415227	2766-30100	34017530	anthonyf1cany@gmail.com	Occupational Health and Safety	
48.	MARTIN KIPKEGO	0715122787	5735-30100	23712448	martinkipkego@yahoo.co.uk	Moi University Coops campus	
49.	REGINA WACHUKA	0722353976	59474-80100 MSA	—	regina.wachuka@gmail.com	EPZA MSA	
50.	MAGDIE WACHUKA	0724215336		018607	terese.ronga@egronline.co.ke	ELVE (Moi University Coops campus)	
51.	CHRISTINA K. MUKHUNA	0724862583	400-30100 MSA	9206970	ckmukhuna@gmail.com	MSA	
52.							
53.							
54.							

# 14.Minutes for stakeholders who attended a Public Consultation Meeting held at Mombasa Beach Hotel on 12<sup>th</sup> May 2022

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**MINUTES OF THE STAKEHOLDERS' MEETING HELD ON THURSDAY 12<sup>TH</sup> MAY, 2022  
AT MOMBASA BEACH HOTEL, NYALI MOMBASA STARTING 9AM TO 1.40 PM**

The minutes are for stakeholders' meeting on Environmental and Social Impact Assessment (ESIA) Study for the proposed Liquefied Petroleum Gas (LPG) storage plant (terminal) project by Talfa Gas Investment SEZ limited. The project is proposed to be located within Special Economic Zone in Dongo Kundu Likoni Mombasa County on LR. No. MOMBASA/MAINLAND SOUTH /BLOCK IV/247- PORTION.

**MEMBERS PRESENT**  
See attached list

**AGENDA**

1. Arrival, Registration, Prayer and Introduction
2. Opening Remarks
3. Proponents' Brief of the Project
4. Recognition of Primary Stakeholders
5. Brief on SEZA
6. Disclosure of the ESIA Study by JKH – Holding Limited ESIA Consulting Team
7. Plenary Session and AOB
8. Closing Remarks and Prayer

**MINUTE 1:     Arrival, Registration, Prayer and Introduction**

- 1.1     Participants began arriving at the venue from 9 A.M. They registered their names and the organizations they represent at the registration table. By 10 A.M. a quorum of 45 participants had been met and the session was kicked off with a word of prayer from Shaban Omar Fungiza, a SEZ Dongo Kundu committee member and Kaya elder.
- 1.2     The Consulting Team Leader chairing the meeting and a session moderator, Professor Cira Kiyukia, then brought the meeting to order and participants were given the opportunity to self-introduce themselves.

**MINUTE 2:     Opening Remarks**

- 2.1     Matthew O. Were, the Assistant Team Consulting Leader and co-moderator, appreciated all participants for their positive response and for honoring the invitation and attending the session, as well as Mzee Fungiza for the prayer. He pre-empted that this was a consultative meeting with regulators, the political wing and other lead agencies including the larger public identified as primary



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stakeholders from the stakeholder mapping exercise done during the Environmental Social Impact Assessment (ESIA). He stated further that this was a continuation of other stakeholder meetings held prior and that the aim of the meeting was to disclose the ESIA study findings (as a preliminary report) and to identify issues and concerns from all parties present to be mainstreamed into the final report. The session was also meant to familiarize the agencies present with the project for easier assessment of whether the proponent will have complied fully and bridged any gaps/ limitations identified during the session, upon receiving the final report.

- 2.2** Professor Cira Kiiyukia recognized and appreciated the presence of all regulators and lead agencies, local administration, project proponent, the public and community representatives, and the progress from sessions/ discussions held so far.

He noted that the project is important to the development of Mombasa County, Kenya and the East African region at large, but that environmental conservation and sustainable development were equally important, hence the need to carry out the ESIA and to have the plenary session with all relevant stakeholders' present. He went on to invite Jamal S. Huwel, the Managing Director Taifa Gas Investment SEZ Limited to give a brief on Taifa Gas Group and the proposed LPG plant project.

### **MINUTE 3: Proponents' Brief of the Project**

- 3.1** Taifa Gas was founded in 2005 as Mihan Gas in Tanzania, but changed names to Taifa Gas in 2008, in line with its operations throughout the East African Region. By 2014, the company had established 20 LPG storage and filling facilities across Tanzania at a total cost of USD 30 Million. The aim of this expansion was to provide affordable gas to all in an environmentally sustainable way. In 2016, it built the capacity of the Dar es Salaam terminal to be able to receive 7640 tonnes of gas up from 1640 tonnes. Around the same time, the company expanded to other countries in the EAC, namely: Uganda (2015), Kenya (2017), Zambia (2020), Rwanda and Burundi (2021) and Congo (ongoing).
- 3.2** In 2021, the company purchased a ship in order to manage the entire supply chain and ensure reduced gas prices. The company's vision is to grow into a leading company that better people's lives through clean energy with a focus on LPG, in an environmentally sustainable way. The mission is to deliver clean energy to every doorstep by ensuring product availability, affordability and awareness through effective investment. Core values of the company include: Caring for people and the environment; Integrity; Transparency; delivering high quality commitment and striving and improving through innovation; and abiding with the laws of land.
- 3.3** Taifa Gas Kenya Limited began the wholesale and retail supply of LPG in Nairobi in 2021 and is looking to expand operations to Mombasa, Eldoret,

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Kisumu and Nanyuki. This investment will depend greatly on the success of the establishment of the SEZ investment in Dango Kundu. The investment has so far costed USD 55 Million. The SEZ investment will be the largest for the company with a capacity of holding 30,000 tonnes of LPG gas.

- 3.4** Why Kenya? Kenya is a key corridor to other countries in the EAC, such as Sudan and Ethiopia and there is high market potential for LPG gas in Kenya. The expected investment is USD 75000 and both the existing Taifa Gas Kenya Limited project and the SEZ investment will provide over 600 employment opportunities. Total expected investment for both projects is USD 130 Million.
- 3.5** Jamal S. Huwel finished off his presentation by appreciating the local community for their support and good reception to the establishment of the project in the area.

#### **MINUTE 4: Recognition of Primary Stakeholders**

- 4.1** The co-moderator, Mathew O. Were, recognized some of the primary stakeholders represented at the workshop. These included Kenya Ports Authority (KPA), Special Economic Zone Authority (SEZA) and SEZ Dango Kundu committee, the Kenya Navy, Kenya Maritime Authority (KMA), Directorate of Occupational Safety and Health Services (DOSHS), Kenya National Highways Authority (KeNHA), Kenya Wildlife Service (KWS), National Environment Management Authority (NEMA), the County Commissioner's Office, the Chief's Office – Mbuta Location, National Lands Commission (NLC), Energy and Petroleum Regulatory Authority (EPRA), Kenya Forest Service (KFS), Export Processing Zones Authority (EPZA) – Mombasa, Kenyatta University and the proponent - Taifa Gas Group, among others.
- 4.2** He then invited the SEZA representative to give a brief on the SEZA program.

#### **MINUTE 5: Brief on SEZA**

- 5.1** Kinoti Mugambi, an engineer representing SEZA, gave a brief on the organization and features of the program that made it appealing for the project and other such investments.
- 5.2** SEZA was established in 2015 under the SEZ Act, with the aim of promoting economic growth in the country through industrialization. Incentives that make the program attractive to investors include: provision of special zones with lower land rates, fair labour rates, low competition and government support, e.g. direct access to government services by investors. The program also has benefits such as GDP growth for the government and employment creation.
- 5.3** Kinoti noted that these were some of the positive features of the SEZ program that drew the proponent to want to establish the depot under the program.



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#### **MINUTE 6: Disclosure of the ESIA Study by JKH – Holding Limited ESIA Consulting Team**

##### **6.1 Project Components and Activities by Andrew Meso**

The Consultant Engineer, Andrew, acknowledged that what was being presented at the moment was preliminary designs of the project. He went on to present the general layout of the SEZ and the location of the identified project site on the layout, where the installations will be done. This area will cover 30 Acres. He then described the process flow of the project. As per the preliminary designs, he noted that the distance of the proposed pipeline from the ocean to KPA's offloading platform is 1.3 KM. The pipeline will have the capacity to pump up to 30,000 tonnes of LPG into the storage tanks. To finalize, he presented on key features of the proposed project, such as vessels construction (to be done in phases), pressure release systems, the pipeline, terminal building, civil structures, the sub-station, firefighting shed and services such as access roads, electricity and power connectivity, storm water drainage and sewerage.

##### **6.2 Environmental Impacts by Philip Abuor**

- 6.2.1** A baseline survey was carried out by the Consultant Environmentalist on the proposed project site, providing information on the conditions of the physical and biodiversity environment, as well as the identification of potential impacts and their classification and the mitigation and management of these impacts. Nationally and internationally recognized standards, e.g. KEBS standards were used to carry out the study.
- 6.2.2** He went on to present a summary of the baseline data on: Air quality; Noise and vibrations; Water resources; Soils, geology and geo-hazards; Biodiversity; Emergency, accidental and non-routine events; Landscape and visual; Land and livelihoods impact assessment; Community health and safety and security impact assessment
- 6.2.3** Philip noted that the environmental conditions observed around the project site were found to be okay, but were bound to be impacted by the project. This information (baseline data), as well as recommended mitigation measures for identified impacts, is covered more in-depth in the ESIA study report.

##### **6.3 Social Impacts by Joy Wasirimba**

- 6.3.1** The Social Impact Assessment covered the social scope of the project and looked into factors such as the number of social receptors in the project area, e.g. number of public facilities; positive and negative impacts of the project; project accessibility (via the Port Access Road); energy use & availability; economic activities; tenure system and land use; domestic water supply; resettlement and housing structures.

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- 6.3.2** Through the stakeholder engagement analysis, Joy identified both Primary and Secondary stakeholders and sought to understand their interests, concerns and influence on the project. Among the primary stakeholders identified were the SEZ committee and 6 households in the area identified as Project Affected Persons (PAPs), as well as lead agencies such as EPRA and SEZA. A Stakeholder Engagement Plan has been shared in the report.
- 6.3.3** Joy mentioned that this was a continuation of other sessions held with the community as part of the Stakeholder Engagement Plan. 4 similar meetings had already been had, namely: An introductory site visit (29<sup>th</sup> March, 2022) with 20 participants; An elders' meeting (6<sup>th</sup> April, 2022) with 5 participants; A meeting with the SEZ committee (8<sup>th</sup> April, 2022) with 25 participants; A Project Affected Persons (PAPs) meeting (9<sup>th</sup> April, 2022) with 13 participants. The gender segregated data of these meetings will be provided in the final report.
- 6.3.4** Joy went on to present some of the positive and negative impacts of the project identified during the study. Some of the positive impacts included: provision of clean energy, access to social amenities, increased land value, improved livelihoods and increased government revenue & foreign exchange, enhanced security and employment creation. However, recommendation was given that the local community be prioritized in the distribution of jobs, especially where they are qualified, or for non-specialized/ non-skilled jobs.
- 6.3.5** Negative impacts identified included: damage to property through demolitions, displacement of people, intrusion of foreign cultural settings, spread of HIV/ AIDS (recommendation for CAP survey to be done) and possible interference with existing graves. Joy noted that mitigation measures to these negative impacts have been recommended in the ESIA study report.

#### **MINUTE 7: Plenary Session**

The aim of the plenary session was to open the floor for comments and concerns from all parties present which would then be incorporated and addressed in the final report. The concerns raised and their responses are noted below:

#### **7.1 Connection of the Plant to Existing KPA Terminals**

The NEMA Representative, Wachira Bore, sought clarification on the length of the connecting pipeline to be constructed by the proponent and whether the pipeline would be connected to the existing Kipevu Oil Terminal (KOT) or to the DK1 which is the new Lamu port. He noted that the distance mentioned by the Consultant Engineer, Andrew, was 1.3 KM while the distance of the KOT from the ocean is 2.7 KM.



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## 7.2 Land Ownership

- 7.2.1** Wachira also raised the issue of land ownership, given that there has been contention on the actual ownership of the land between KPA and the local community.
- 7.2.2** On the issue of land ownership, Daniel Githingi, the Environmental Department Head - KPA clarified that there had been meetings in the last one month between KPA and the SEZA committee and that a Replacement Action Plan (RAP) was already in place. The Resettlement Action Policy had also been adopted by the Government of Kenya that states that the community will be resettled within Dongo Kundu. He, however, noted that the SEZ master plan had not factored in the RAP and that an updated master plan was needed to include the 367 Acres identified for resettlement of the local community, which would result in the amalgamation of gazetted land in Dongo Kundu. The demarcation process is ongoing and final amalgamation will be done for three parcels of land to be owned by SEZA for industrial use, KPA for port use, and the remainder by the local community for resettlement.
- 7.2.3** Daniel also sought further clarification on the connection of the pipeline to the KPA terminal. He also noted that, given the key role played by KPA, the agency needed to be correctly mapped and engaged as a primary stakeholder and not a secondary stakeholder as mentioned by the Consultant Sociologist during her presentation.
- 7.2.4** Matthew O. Were noted that a meeting was needed between SEZA and KPA to clarify the land issue. He also clarified that KPA, alongside EPRA and SEZA were key stakeholders in the project. Further discussions will also be held between the project proponent, Environmental Consulting team, KPA and SEZA to review the designs before submission to EPRA for approvals.
- 7.2.5** Kinoti Mugambi, the SEZA representative, agreed with Daniel Githinji's response on the land issue as a true reflection of the current state, i.e., the RAP, amalgamation of the gazetted SEZ land and subdivision of the land into the 3 parcels. A secondary session between the 3 parties (SEZA, KPA and local community) will further clarify specific details on the subdivision of the land.
- 7.2.6** In response to the issue of the connectivity of the pipeline, Andrew Meso clarified that what had been presented during the disclosure of the ESIA study was the preliminary report and that options were being discussed between KPA's technical team and the proponent's technical team in order to come up with the best designs for the pipeline.
- 7.2.7** Jamal S. Huwel of Taifa Gas clarified that Taifa Gas intended to connect their pipeline to the New KOT and that the distance from the KOT to the site was 2.7 KM and not 1.3 KM as mentioned during the presentation on the project components by the Consultant Engineer. He further made requests to KPA to

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be open to consultations and discussions in order to ensure correct connection of the pipeline by the proponent.

### **7.3 Project Safety Issues**

- 7.3.1** Waweru Karuki from the DOSH noted that compliance with safety measures was paramount in the LPG industry. He requested for a safety guarantee particularly during the modelling of the gas tubes and designing of the storage facility, as well as maintenance of the environment and the port by the proponent.
- 7.3.2** He also requested the proponent to provide a detailed risk register (risk mapping) for both the depot and during transportation/ distribution of the LPG from the plant in order to ensure the safety of all at the plant and during transportation of the LPG.
- 7.3.3** He also noted the importance of streamlining safety issues into the construction and operation phases of the project and urged the proponent Taifa Gas Investment SEZ Limited, to have a meeting with the DOSH to facilitate this.
- 7.3.4** Hamisi Ramadhan of Taifa Gas noted that the Taifa Gas SEZ project is not a stand-alone project and that safeguards already in place or to be put in place are the responsibility of all entities involved and not just Taifa Gas. He further elaborated that the proponent sought to operate in compliance with all set laws and requirements as well as internal, industry, national and international standards and safeguards such as those from NEMA, DOSH, KPA and KEBS among others.
- 7.3.5** Philip Abur noted that the Consulting team had asked the proponents to carry out a qualitative and quantitative risk assessment of the project. The report would capture all potential risks and mitigation measures and would be shared with relevant parties such as EPRA, which would need the reports submitted for review before giving its approvals.

### **7.4 Compliances**

Wachira Bore of NEMA recognized the proponents' commitment to compliance and asked that they continue engaging with NEMA and the relevant agencies to ensure this. He also noted that an EIA is site specific and that in the event that the site changed, another EIA would need to be carried out. He also thanked the proponent for engaging a qualified and registered Environmental Impact Assessment firm of experts and that NEMA would facilitate approval of the project in the fastest time within the law.



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## 7.5 Biodiversity Conservation

Apollinary J. Mwandigha of KFS asked whether the trees on the project site had been assessed and whether their value was known. He also sought to clarify whether plans to replace the cut trees were in place, given that these trees were part of Kenya's 10% tree cover. It was recommended by the Consulting team that the proponent have an afforestation program to replant/replace any trees cut during the set-up of the plant.

## 7.6 Recommendation to carry out the plant and pipeline studies concurrently

Stella from the Energy and Petroleum Regulatory Authority (EPRA) made a recommendation that both the plant development study and the pipeline development study be done concurrently/ parallel for easy assessment by EPRA and other relevant lead agencies. Engineer Andrew Meso took note of this recommendation.

## 7.7 Marine Environment Protection

Stella Maris Muthike from the Kenya Maritime Authority (KMA) noted that it was important for KMA to be involved during the installation of the pipeline in the ocean so as to ensure marine protection and minimal impacts on safety of navigation.

## 7.8 Potential conflict with LNG project

7.8.1 She also followed up on a feasibility study done previously for a Liquefied Natural Gas (LNG) project in the SEZ which identified the Dongo Kundu SEZ as a potential area for set up of the project. She sought clarification on whether it had been approved by KPA, given that this would potentially cause conflict of interest with the Taifa Gas Project.

7.8.2 Amani Kidada of KPA noted that talks were ongoing between KPA and KenGen on whether to use the Dongo Kundu SEZ site or not, given that the LNG design was not found to be compatible with the KOT.

## 7.9 Company Ownership and Investment

7.9.1 The Representative of the Deputy County Commissioner of Ukonii raised questions on the ownership of Taifa Gas (whether state-owned or privately owned) and its partnership with SEZA, on whether there would be potential business wars between Kenya and Tanzania in the future. He also requested that the final document be shared with the County Commissioner's Office.

7.9.2 Hamisi Ramadhan of Taifa Gas responded that Taifa Gas is a private company, even though the Dar es Salaam plant was officially launched by H.E. the late President John Pombe Maghufuli. He further stated that the current good

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working relationship between the Kenyan and Tanzanian governments has created a good environment to do business. He also clarified that Taifa Gas is just a private investor/ investment drawn to the SEZ program by the incentives such as 0% VAT and excise duty and low initial costs from tax cuts and that there was no other partnership between Taifa Gas and SEZA a part from complying with the necessary mandatory requirements to operate as stipulated in the SEZ Act 2015.

#### **7.10 Project Influence on Navigation Charts**

**7.10.1** Major R.K. Mohammed of the Kenya Navy raised concerns of safety with particular interest to the navigation of vessels (in charting). Notifications are usually given to the UK Hydrographic Office for changes to charts. He therefore noted that any adjustments made to the designs, especially in the laying of the pipeline be communicated to the Navy for updating.

**7.10.2** Mathew O. Were noted that the Kenya Navy was a key stakeholder and asked the Major to put all concerns in writing to be address and streamlined in the final document.

#### **7.11 Road Safety and Accessibility and Project Impact on Infrastructure**

**7.11.1** Kipkemai Rono from KeNHA noted that a gravel road was built to feed/ access the SEZ between March and September 2021. He sought clarifications on how the pipeline would interfere with the road and safety of its users. He also asked that the team share the Impact Assessment Report with KeNHA with regards to the road under construction by KeNHA currently i.e., the Mombasa Southern Bypass Road. Information to be provided in the report will include the amount of traffic during construction and operation phases, amount of traffic expected to access the plant, a general description of the trucks to be used (e.g. their weight and axle), and where these trucks are expected to join the roads.

**7.11.2** Matthew O Were asked the KeNHA representative to share these concerns for response via email to be shared with the proponent. He also asked SEZA to ensure that infrastructure in the public zones such as Dongo Kundu SEZ meets both local and international standards for such developments.

**7.11.3** Kinoti Mugambi of SEZA briefly described the location of the project from the road (both the highway and the access road leading to the new port (DK1)). He assured all present that protective/ safety measures would be put in place as per the SEZ Act 2015 which states part of SEZA's mandate as facilitating and coordinating with other government agencies for the interest of investors and the development of such investments and infrastructure. He noted that this would be done through collaborative efforts with KeNHA and other government agencies. He asked the agencies to share their concerns with SEZA, the proponent and the environmental experts to be considered in redesigning of the project.



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## 7.12 Other Concerns and Issues Raised

- 7.12.1** Ahamed Juma Mwasharifu, a SEZ committee member confirmed that the committee supported the project. Numerous discussions on the land issue held in Mbuta and Mwangala villages were also satisfactory. He also asked that the committee be invited to/ involved in all meetings/ deliberations and that the proponent consider their concerns in all that they do as their thoughts and concerns are representative of the residents’.
- 7.12.2** Bi. Riziki, an NGO representative, made emphasis on the proponent taking on meaningful CSR programs and projects for the betterment of the lives of the community surrounding the project site, majority of whom are poor, particularly in the area of education.
- 7.12.3** Kenneth Mosop of KPA reiterated that discussions had already been held between KPA and the community and the RAP developed and that they were heading into the implementation phase of the RAP. He asked the proponent to engage with KPA and SEZA on this front. He also asked whether any geotechnical surveys had been done on the proposed project area, given that the site might change. He further requested that KPA be identified as a key stakeholder and be involved during the laying of the pipeline and its connection to the KOT.
- 7.12.4** Matthew Were thanked all representatives for attending the session. He mentioned that the hydrological analysis of the proposed site had already been done but that the general baseline data of the area would not change much in the event that the site changed (but remained within the same zone) or once the actual site was identified/ agreed upon.
- 7.12.5** Wachira Bore of NEMA countered and emphasized that the EIA had to be site-specific as per EMCA 1999, Amendment of 2015.

## MINUTE 8: Closing Remarks and Prayer

- 8.1** Matthew Were brought the meeting to a close at 1:37 P.M. He asked all lead agencies to email their responses to be streamlined into the final report.
- 8.2** Hamisi Ramadhan of Taifa Gas appreciated all participants for honoring the invitation and for candidly raising their concerns during the session. He reiterated that Taifa Gas was committed to complying with all relevant standards and requirements. He recognized the possibility of the project area changing but also noted that a lot of time had already been spent in discussions with SEZA to finally identify and agree on the current project site.
- 8.3** He assured all participants present that Taifa Gas was keen on its CSR program and that it would pay special attention to afforestation and education

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**JKH**  
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programs in liaison with the local community. He further requested for support from all agencies and stakeholders in order to successfully carry out the project.

- 8.4 The meeting came to an end thereafter with a word of prayer from Christine Matole, SEZA committee member.

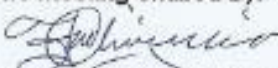
Minutes Written By:

For   
**R. KALUMU KANG'ALIA**  
ESIA Consulting Team Member

Minutes Reviewed (by aid of Video clips) by:

  
**MATTHEW O. WERE**  
Assistant ESIA Team Consulting Leader

The meeting chaired by:

  
**PROFESSOR CHIRA KIIYUKIA**  
ESIA Consulting Team Leader

  
**SAID BIDU**  
Stakeholders' Representative (SEZ Committee Vice Chairman).

**15. Attendance List for an introductory meeting with the Special Economic Zone Authority, National Government administration team, the proponent, Dongo Kundu SEZ Committee and the ESIA consulting team representatives**

SEZ Committee			29/03/2022
NAME	POSITION	PHONE	
1 Samuel Sanga Kalama	SEZ-Committee	0722264706	
2 Kelly Konde	SEZ-Committee	0725256138	
3 Khawis Said	SEZ Committee (Secretary)	072282584	
4 Shaban Omar	SEZ Committee (KATA)	0701590513	
5 FATUMA SHEE	SEZ COMMITTEE	0724726018	
6 BINTALI SUBIRA ABDALLA	SEZ COMMITTEE (V/SECRETARY)	0790141706	
7 CHRISTINE MATOLE	SEZ COMMITTEE	0714838882	
8 SAID B'LY	SEZ COMMITTEE (V/CHAIR)	0700842100	
9 WILLIAMS MWAZI ZWAGO	COMMISSIONER (CHAIR)	0734515688	
10 Rasheed Abdells	- CHIEF - MBUTA	- 0724664623	
11 Mwishaki Suleiman	- ATT. CHIEF - BABUBU	- 0712667188	
12 Elvis Juma	- CCS VIGIWERI	- 0723927814	
13 ROSE MUYA	- ACC LONGO	- 0782381916	
14 KIMOTI MUGAMBI	- Asst. Civil Eng. - SEZA	- 0726463264	
15 Francis Gitau	- Ag. Technical Manager	- 0722246295	
16 Jamal Harwel	- General Manager - TAFE GAS	- 0745116876	
17 Anthony Mugo	- Director Strobel Africa Ltd	- 0726816286	
18 Juma Kiya	- MEMB CH.	0722896536	
19 Matthew O. Were	- NGMA EXPERT.	0722876504	



## 16. Practicing licences for the Experts

FORM 7



**nema**  
nema Kenya | nema Kenya | nema Kenya

(x.15(2))

**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)**  
**THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**  
**ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE**  
 License No : NEMA/EIA/ERP/16976  
 Application Reference No: NEMA/EIA/EL/21911

M/S **JKH Holding Limited**  
 (individual or firm) of address  
 P.O. Box 12927-00100 Nairobi

is licensed to practice in the  
 capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Firm of Experts**  
 registration number **10435**  
 in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **3/30/2022**

Expiry Date: **12/31/2022**

Signature.....  
  
 (Seal)  
**Director General**  
**The National Environment Management Authority**

P.T.O.  
  
 ISO 9001:2015 Certified

FORM 7

(r.15(2))



**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)**  
**THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**

**ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE**

License No : NEMA/EIA/ERPL/16799

Application Reference No: NEMA/EIA/EL/21908

M/S **Matthew Oliechi Were**  
 (individual or firm) of address

P.O. Box 12927-00100 NAIROBI

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**  
 registration number **1454**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: 3/11/2022

Expiry Date: 12/31/2022

Signature.....  
 (Seal)  
 Director General  
 The National Environment Management  
 Authority

P.T.O.



FORM 7



(r.15(2))

**NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)**  
**THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT**  
**ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE**

License No : NEMA/EIA/ERPL/L7485

Application Reference No: NEMA/EIA/EL/22069

M/S **Prof. Ciira Kiiyukia**  
(individual or firm) of address

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capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**  
registration number **0113**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **5/5/2022**

Expiry Date: **12/31/2022**

Signature.....

(Seal)

Director General  
The National Environment Management  
Authority

P.T.O.



## 17. photo Gallery



Introductory Site Visit Photos(29/3/2022)





**Meeting at Bahari Beach Hotel with Elders  
6/4/2022**



**Stakeholders' Meeting held at Bahari Beach Hotel on 8/4/2022**

