CHINA COMMUNICATIONS CONSTRUCTION COMPANY CCCC MOMBASA NEW KIPEVU OIL TERMINAL (KOT) PROJECT	
ENGINEERING, PROCUREMENT AND CONSTRUCTION OF NEW KIPEVU OIL TERMINAL -MOMBASA PORT, TENDER NO. KPA/077/2017-18/PDM	DOCUMENT NO. **CCCC/KOT/EMP/02**
ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN	**REV. A0**

Environmental Management and Monitoring Plan for New KOT Pipeline Marshalling Yard at Dongo Kundu Special Economic Zone

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ENGINEERING, PROCUREMENT AND CONSTRUCTION OF
NEW KIPEVU OIL TERMINAL(KOT) AT MOMBASA PORT
CONTRACT No. KPA/077/2017-18/PDM

Environmental Management and Monitoring Plan or New KOT Pipeline Marshalling Yard at Dongo Kundu Special Economic Zone

September 2019

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1. BACKGROUND INFORMATION

1.1. Introduction

Kenya Ports Authority is relocating the Kipevu Oil Terminal (KOT) from its current location at Mombasa Port to a new site within the Kilindini Channel. To implement the project, KPA has contracted China Communications Construction Company Limited (CCCC) to undertake the civil works and construction of the new oil and gas terminal with its auxiliary facilities. As part of the project, CCCC requires a pipeline assembly yard at Dongo Kundu Special Economic Zone (SEZ) area (Figure 1) which belongs to KPA. The site was however not covered during the preparation of the Environmental and Social Impact Assessment (ESIA) for the new KOT project which was licensed in 2016 (Annex 1). However, a Strategic Environmental Assessment (SEA) of the Dongo Kundu SEZ was prepared and licensed by NEMA in 2016 as well and thereafter a Comprehensive Environmental Management and Conservation Plan (CEMC Plan) in 2018 to fulfil the conditions of the SEA. According to the SEA and the CEMC Plan all projects to be implemented within the SEZ will undergo project specific EIAs depending on their risk categories and pursuant to Section 58 of the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya.

Hence in June 2019, CCCC prepared an Environmental Impact Assessment Project report for the proposed pipeline marshaling yard which was licensed by NEMA in August 2019 (Annex 2). The EIA Licence condition requires CCCC to prepare a comprehensive Environmental Management and Monitoring Plan (EMMP) prior to commencement of the works and submit it to KPA and NEMA for approval. To fulfill this condition, CCCC contracted Envasses Environmental Consultants Limited in September 2019 to prepare the EMMP. The status of implementation of the other EIA Licence Conditions is summarized in Table 1.

1.2. The new Kipevu Oil Terminal Pipeline Marshaling Yard at Dongo Kundu SEZ

The relocation of the old KOT built in 1963 is meant to address the lack of adequate capacity to meet the growing regional demand for oil products estimated at 450 million litres monthly and improve safety at the Mombasa Port. The new oil and gas terminal will involve construction of offshore dolphins within the Kilindini Channel with a capacity to berth four ships at a time and connected to storage facilities in Kipevu via subsea and land-based pipelines. The subsea pipelines will run from the Terminal in the north-east direction to the shoreline touching land at the area between berth 14 and 16. They will cross the Port access roads and Railway Line and then run south west to the tie-in point close to the existing KOT pipeline route.

To implement the project, KPA has contracted CCCC to undertake the civil works and construction of the new oil and gas terminal with its auxiliary facilities. As part of the project, CCCC requires a pipeline assembly yard at Dongo Kundu Special Economic Zone (SEZ) area which belongs to KPA.
The subsea pipelines will be supplied at lengths of 6m and will need to be welded together in order to continuously cover the 1.15km. This activity requires adequate space and the Dongo Kundu Special Economic Zone (SEZ) area has been identified as a suitable location due to its proximity to the new KOT project site and availability of adequate and suitable land owned by Kenya Ports Authority. The project will be temporary and will last for a period of 12 months beginning the time it will be licensed by the government agencies.

1.3. Description of the proposed project

The proposed project will involve the construction of a pipeline assembly area, temporary campsite and a temporary jetty. The proposed project activities will include excavations and levelling of the yard area using excavators, graders and compacting machines and later the

construction of a temporary campsite and rail lines for transporting welded pipelines into the sea and onward to the new KOT site. At the same time, the proponent will construct a temporary jetty at the seafront area of the project site and dredge it to allow the docking of a the vessel to be used in towing the pipes from the jetty to the trenches linking new KOT site to Mombasa Port.

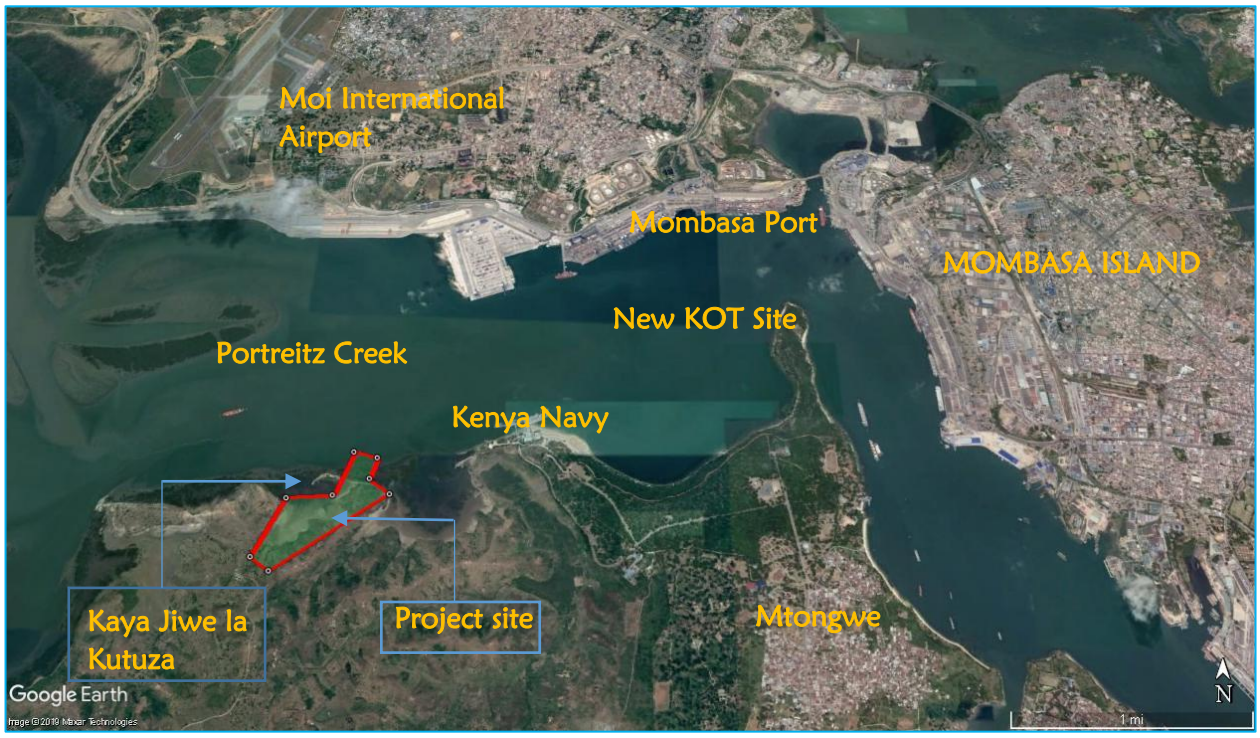

Figure 1: The location of the proposed project within the Mombasa Special Economic Zone (Source: Google Earth, 2019).

1.4. Objectives of the EMMP

The objective of the EMMP is to improve the environmental performance of the project by ensuring that the proponent complies with the EMP developed during the EIA process, emerging issues and stakeholder concerns on the protection and conservation of the marine environment at all phases of the project cycle. The contractor (CCCC) will therefore implement mitigation measures to ensure adherence to the recommendations of the EIA project report, the EMP and comply with the conditions of the EIA License issued by NEMA and potential improvement orders that may be issued by NEMA. Further the contractor in collaboration with the Environmental Consultants will ensure that weekly reports on the efficacy of the EMP are prepared and submitted to KPA, NEMA and the project engineer.

The EMMP will further improve environmental performance by guiding the proponent and key stakeholders on required levels of legislative and regulatory compliance with the Environmental Quality Standards prescribed under the Environmental Management and Coordination Act Cap 387 of the Laws of Kenya for different environmental media such as water, air, noise, vibrations and marine ecosystem (fisheries and socio-economics) during the entire project cycle.

Apart from these two broad objectives, the EMMP will specifically fulfill the following objectives;

- Monitor whether the environmental and social impacts predicted at the EIA stage are significantly affected and to measure the changes that occur

Table 1: General, Construction, Operation and Decommissioning Conditions of EIA License for the proposed new KOT Pipeline Marshalling Yard at Dongo Kundu SEZ.

No.	General Conditions	Status	Comments
1.	The license is given for the proposed pipeline marshalling yard for the ongoing development of new Kipevu Oil Terminal (pipeline assembling area, railage system, temporary camp site and a temporary jetty) at Dongo Kundu Special Economic Zone, Mombasa County		
2.	Without prejudice to the other conditions of this license, the proponent shall implement and maintain an environmental management system, organizational structure and allocate resources that are sufficient to achieve Compliance with the requirements and conditions of this license	Compliant	
3.	The authority shall take appropriate action against the proponent in the event of breach of any of the conditions stated herein or any contravention to the Environmental Management and Co-ordination Act, 1999 and regulations there under	Compliant	
4.	This license shall not be taken as statutory defense against charges of pollution in respect of any manner of pollution not specified herein	Compliant	
5.	The proponent shall ensure that records on conditions of licenses/approval and project monitoring and evaluation shall be kept on the project site for inspection by NEMA's Environmental Inspectors	Compliant	
6.	The proponent shall submit an Environmental Audit report in the first year of operation to confirm the efficacy and adequacy of the Environmental Management Plan	Not relevant to the project	The project is temporary and will last for 12 months
7.	The proponent shall comply with NEMA's improvement orders throughout the project cycle	Ongoing	No orders yet
8.	The proponent shall provide final accounts (final project cost) on completion of construction phase. This should be done prior to project commissioning/operation/occupation	Pending	To be done once project is complete
9.	Construction Conditions		
10.	The proponent shall ensure that the proposed establishment of the temporary marshalling yard meets the requirements and conditions of the Mombasa Special Economic Zone	Compliant	Sustenance compliance with SEZ CEMC Plan
11.	The proponent shall ensure that all necessary and relevant approvals and permits are obtained from the relevant agencies (like Kenya Forest Service, Kenya Maritime Authority, County Government of Mombasa) before commencement	Ongoing	Approvals obtained except KFS Special User Licence

	of the construction/establishment of the temporary marshalling yard		
12.	The proponent shall ensure that a special user permit is acquired from the Kenya Forest Service for the utilization of the Mangrove area before commencement of the project	Ongoing	Approval letter received from KFS awaiting Special User Licence
13.	The proponent shall ensure that the relevant permits and approval are obtained from the County Government of Mombasa before commencement of the proposed construction	Done	Permit obtained
14.	The proponent shall ensure that the proposed temporary jetty is approved for construction and operation by the Kenya Maritime Authority before it is constructed	Pending	
15.	The proponent shall ensure that all debris generated during the process of excavation of the project site is collected and disposed off in a site designated and approved by the County Government of Mombasa	Pending	
16.	The proponent shall develop a comprehensive water quality monitoring plan and submit the plan to NEMA before the commencement of the project	Ongoing	Part of EMMP
17.	The proponent shall submit all particulars for the vessels and crew involved in the construction and operation of the marshaling yard to Kenya Maritime Authority	Pending	
18.	The proponent shall furnish Kenya Maritime Authority with information on the construction schedule to enable the authority issue notices to mariners in time.	Pending	
19.	The proponent shall develop an oil emergency response plan and waste management plan and submit to Kenya Maritime Authority for approval before commencement of the construction	Pending	
20.	The proponent shall ensure that any dredging at the site is guided by the Environmental Management Plan developed under the Environmental and social impact Assessment Study report for the licensed KOT project	Pending	
21.	The proponent shall ensure the bio-digester (not a septic tank) is incorporated in the designs of the proposed project and implemented	Pending	
22.	The proponent shall ensure that a mangrove compensatory program - replanting and growing for any mangrove that is going to be lost – is developed and implemented under the supervision of the Kenya Forest Services	Ongoing	CCCC has contracted a company to
23.	The proponent shall develop and implement a comprehensive sedimentation management plan to ensure no soil erosion and sedimentation into the sea	Ongoing	Part of EMMP

	during exaction and leveling at the site		
24.	The proponent shall undertake suitable and adequate measures to ensure that the social-cultural and religious values for the Kaya, which is within the neighborhood of the proposed project site, are protected, respected and observed through the project cycle	Done	Undertaken at EIA stage
25.	The proponent shall ensure that the proposed project adheres to the requirements of Kenya Ports Authority master plan	Compliant	Sustenance compliance with KPA master plan
26.	The proponent shall ensure that suitable measures are put in place to compensate all persons and properties to be affected by the establishment of the marshalling yard	Ongoing	Part of EMMP
27.	The proponent shall put in place a comprehensive complaint redress mechanism to address all potential complaints from the different stakeholders	Pending	
28.	The proponent shall ensure strict adherence to the provisions of Environmental Management and Coordination (Noise and Excessive Vibrations Pollution Control) Regulations 2009	Pending	
29.	The proponent shall ensure dust reduction measures are incorporated in the designs of the project and implemented	Pending	
30.	The proponent shall ensure strict adherence to the Occupational Safety and Health Act (OSHA), 2007	Pending	
31.	The proponent shall ensure strict adherence to the Environmental Management Plan developed throughout the project cycle	Pending	Part of EMMP
32.	The proponent shall ensure that the development adheres to zoning specifications issued for development of such a project within the jurisdiction of County Government of Mombasa, Kenya Ports Authority and other relevant authorities	Pending	
33.	The proponent shall ensure that construction activities are undertaken during the day (and not at night) between 0800Hrs and 1700Hrs; and that transportation of materials to and from the site is undertaken during weekdays (off peak hours)	Not relevant to the project	
34.	The proponent shall ensure that adequate and appropriate sanitary facilities are provided for the workers during construction phase and that proper decommissioning of the facilities is carried out once construction is complete	Ongoing	Part of EMMP
35.	The proponent shall ensure that construction workers are provided with adequate personal protective equipment (PPE), as well as adequate training.	Pending	

36.	The proponent shall ensure that the development adheres to zoning specifications issued for development of such a project within the jurisdiction of County Government of Mombasa, KPA, KMA, KFS and other relevant Authorities.	Pending	
37.	**Operational Conditions**		
38.	The proponent shall implement the developed water quality monitoring plan and submit monthly monitoring reports to NEMA, KMA and KMFRI for analysis	Pending	Part of EMMP
39.	The proponent shall ensure that all workers use appropriate personal protective equipment	Pending	
40.	The proponent shall ensure no dust emissions to the external environment during the operations of the facility	Pending	
41.	The proponent shall adequate and appropriate fire outbreak management measures are put in place and that the personnel are well trained on fire management	Pending	
42.	The proponent shall ensure that all solid waste is handled in accordance with the Environmental Management and Coordination (Waste Management) Regulations 2006	Pending	Part of EMMP
43.	The proponent shall ensure that all waste water is disposed as per the standards set out in the Environmental Management and Coordination (Water Quality) Regulations 2006	Pending	Part of EMMP
44.	The proponent shall comply with the relevant principal laws, by-laws and Guidelines issued for development of such a project within the jurisdiction of Mombasa Municipal Council, Ministry of Lands, Physical Planning Department and other relevant Authorities	Pending	
45.	The proponent shall ensure that environmental protection facilities or measures to prevent pollution and ecological deterioration are designed, constructed and employed simultaneously with the proposed project	Pending	Part of EMMP
46.	**Decommissioning Conditions**		
47.	The proponent shall ensure that a decommissioning plan is submitted to the Authority for approval at least three (3) months prior to decommissioning	Pending	
48.	The proponent shall ensure that all pollutants and polluted material is contained and adequate mitigation measure provided during the phase	Pending	

- Assess the adequacy of environmental monitoring such as whether the selected monitoring locations, frequency, methods and supervision and to recommend remedial measures and improvement where necessary
- Identify and address potential gaps in the environmental impacts, mitigation measures and monitoring plans recommended during the EIA process
- Ensure that the recommended mitigation measures and monitoring plans are consistent with the wider frameworks for the conservation and protection of the marine environment such as KPA Environment, Health and Safety polices, National Environment Policy, the Integrated Coastal Zone Management Policy

1.5. CCCC Environment Policy

CCCC has an environment policy in place which is integrated with that of Health and Safety. The Environmental Policy states that the principal goals of Environmental Management are to:

1. Commit resources for environmental management
2. Identify key environmental and social issues associated with projects
3. Implement suitable mitigation measures
4. Implement environmental monitoring to enhance the effectiveness of mitigation measures
5. Take actions to prevent and reduce potential environmental risks associated with projects

1.6. Organization for implementation of the EMMP

The implementation of the EMMP will require a well-organized human resource framework apart from financial resources to facilitate mitigation measures. The contractor will take the lead role in recruitment and management of the EMMP implementation team whose staff establishment will include the project manager, HSE manager, environmental expert, and environmental compliance sub-contractors for both onshore and offshore works (Figure 2). The sub-contractors will include staff from Envasses Environmental Consultants Limited and Polucon Services (K) Limited. The profiles of both companies, certifications, testimonials and Curriculum Vitae of key staff are provided (Annex 3-5).

The implementation team will be supported by other staff members from CCCC and Envasses Environmental Consultants Limited whose roles will be determined and allocated on a need by need basis. Both CCCC and Envasses will ensure that the staffs to be involved in different assignments are competent and advance communication with details on tasks assigned and deliverables expected provided for their information prior to engagement. This will ensure efficiency and effective actions in the implementation of the EMMP.

Reports will be prepared on a weekly basis by the environmental expert and submitted to CCCC who will in turn submit them to KPA and NEMA.

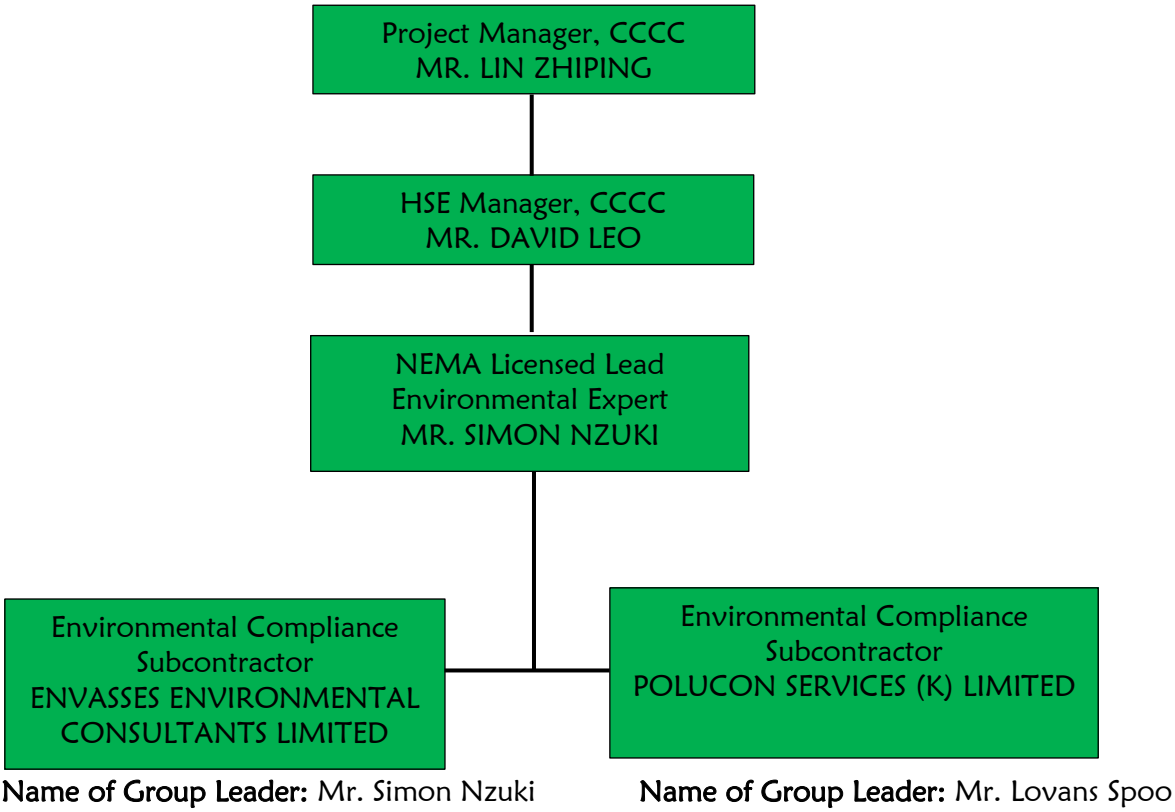

Figure 2: Organization for implementation of the EMMP.

2. SIGNIFICANT ENVIRONMENTAL IMPACTS AND MANAGEMENT PLAN

The EMMP focuses on the construction, operation and decommissioning phases of the new KOT pipeline marshalling yard and therefore the following summary identifies the significant impacts anticipated or predicted for this phases of the project cycle. The EIA Project Report (CCCC, 2019) identified the positive impacts of the project which included the increased oil and gas handling capacity of the port and improving safety, support of the ongoing construction of the new KOT at Mombasa Port which is a national project with important socio-economic implications and creation of employment. Negative impacts included the loss of biodiversity including mangroves, temporary access channel dredging and impacts, pollution of environmental media, soil erosion and sedimentation, wastewater generation and occupational safety and health of the workers and the community.

2.1. Pre-construction and construction phase impacts

2.1.1. Loss of mangroves

The project will utilize approximately 17% (5ha) of the adjacent mangrove forest area including mudflats. According to the National Mangrove Forest Management Plan, the stocking rate for the dominant mangrove species i.e. *Rhyzophora mucronata* is 1,475 stems/ha translating to a total loss of 7,375 trees. As noted in the baseline information, mangrove forest provides both important environmental goods and services which include breeding grounds for fish, coastal stabilization, habitats for birds and other biodiversity and support apiculture. They regulate climate through carbon sequestration and serve religious purposes in the case of Kaya Jiwe La Kutuza. Hence felling the mangroves will lead to habitat loss and will affect the other services they provide.

2.1.2. Temporary access channel dredging and impacts

The proponent will dredge the seabed between the main shipping channel and the temporary jetty to allow for a bigger vessel to access the site to tow and lay the completed pipeline within the 1.25km trench between the new KOT and the old one. The environmental impacts of dredging are well documented in the main Environmental and Social Impact Assessment Study report for the project undertaken in 2016. They include impact on biological communities and livelihoods as well as water quality degradation. However, the scale of dredging proposed under this project is limited both in scope and extent and will provide on-off support service transporting and laying of the oil and gas pipelines.

2.1.3. Solid waste generation

At construction phase vegetation clearance, construction works and workers the project site will generate solid wastes comprised of biomass, metal and wood cuttings and domestic wastes (plastics, paper etc.) while servicing of machinery, equipment and motor vehicles will generate wastes such as spare parts, oil and fuel containers and tyres. Poor disposal of solid wastes causes environmental pollution and disposal sites are potential breeding grounds for diseases and therefore a health risk to communities.

2.1.4. Soil erosion and sedimentation

Excavation and other civil works will create loose soils that are susceptible to erosion and will potentially contribute to sedimentation of the nearby mangrove forest and Kilindini Channel downstream of the project site. Sedimentation causes smothering of mangroves through covering of pneumatophores and preventing regular tidal flashing which is important for their growth and zonation. This implies that the impact of possible sedimentation would increase the spatial loss of

mangroves within the project site over and above the 5ha initially projected to be affected. Soil erosion and subsequent sediment load within the Kilindini Channel would result in water quality degradation by reducing availability of sunlight, dissolved oxygen (DO) and increased chemical oxygen demand (COD). These would in turn affect biological communities such as fish and benthic habitats.

2.1.5. Water demand and wastewater generation

During construction, the project will require water for drinking, sanitation, concrete mixing, curing, dust management and compaction works. The total water demand for the project is estimated at 50m^3 per day for the two months within which construction works will be undertaken. Out of these, 10% i.e. 5m^3 will be used for domestic purposes and will generate 3.5m^3 which will need to be disposed off. The rest of the water soaks into ground areas within the project site and along the access road.

2.1.6. Air pollution

Sources of air pollution at the project site are dust from excavation works and emissions from machinery/equipment and vehicular traffic. As indicated in the baseline information, ambient air quality standards at the project site were found to be within the acceptable limits of the Environmental Management and Coordination (Air Quality) Regulations, 2014. However, air pollution and emissions above the prescribed levels can potentially cause health problems which include respiratory diseases and visual irritant. It will potentially affect the workers, visitors to the project site and the local community if it is in excess of 100$\mu g/m^3$

2.2. Operational phase impacts

2.2.1. Health and safety risks

Welding, joining, brazing and testing of the integrity of the welded areas of the pipes for potential leakage point's present health and safety risks to workers and neighbors. Health hazards connected with welding, joining and brazing operations include exposure to metal fumes and Ultra Violet (UV) Radiation. Potential safety hazards associated with these processes include burns, eye damage, electrical shock, cuts and injury to toes and fingers. X-ray tests for integrity tests of the welded pipes present significant health concerns due to the potential for exposure to unsafe dose of x-rays. The International Atomic Energy Agency reports that fatigue, carelessness and lack of proper training are the three common factors attributed to industrial radiography accidents.

2.2.2. Solid waste generation

At operational phase, the project will generate solid wastes from the campsite area, welding and service areas as well as the temporary jetty. Wastes from the campsite, service areas and temporary jetty are predictably domestic in nature while those from the welding areas will include pieces of welding rods and cuttings.

2.2.3. Water demand and wastewater generation

At operational stage water will be needed for sanitation, cleaning and drinking which will be sourced from a borehole and water bowsers. Based on the projected workforce of 200 people, water demand at the facility will be at most 10m^3 per day including cleaning activities of which 70% will be wastewater. Poor disposal of wastewater has the potential to pollute the environment and can harbor disease causing pathogens such as mosquitoes.

2.2.4. Noise pollution

Significant noise levels will emanate from handling of pipes by machinery, welding activities and vehicular traffic. Construction sites such as the proposed yard which are near residential areas can only emit noise levels of up to 60 dB(A) during the day and 35dB (A) during the night as per the Second Schedule of the Environmental Management And Coordination (Noise And Excessive Vibration Pollution) (Control) Regulations,2009. Some of the project activities such as use of heavy machinery and equipment may produce noise levels which are above these limits and are a health hazard.

2.3. Decommissioning Phase Impacts

The project will operate for a period of 12 months after which the proponent will decommission the yard, campsite, jetty and auxiliary facilities. Prior to decommissioning, the proponent will prepare and submit a due diligence decommissioning audit report to NEMA at least three months in advance, and obtain demolition permits from the County Government of Mombasa and NEMA. The main environmental concerns likely to occur during the decommissioning phase and possible mitigation measures are discussed below.

2.3.1. Waste generation

Demolition activities will result in generation of both solid waste and effluent. The main sources of solid waste will include demolition waste from the yard, campsite and jetty. The debris and other solid waste have a potential to pollute the environment and lower water quality. Effluent from the proposed bio-digester will also need to be disposed off appropriately.

2.3.2. Health and safety risks

Health and safety risks during demolition are likely to emanate from accidental falls and cuts, injuries from demolition tools and machinery use. Noise and air pollution from demolitions works could pose a health and safety risks to workers, neighbors and visitors to the site.

2.3.3. Loss of livelihoods

Job opportunities created during the operational phase of the project will be lost. This will in turn result in loss of income for the casual labourers and service workers leading to eventual economic decline.

2.3.4. Creation of ecologically vulnerable land

The abandoned site will comprise of derelict land that will be susceptible erosion.

Table 2: Environmental Management Plan for the construction phase of the new KOT pipeline Marshalling Yard at Dongo Kundu SEZ.

Environmental issues	Recommended mitigation measures	Responsibility	Timeframe	Cost (KES)
Pre-construction and Construction phase EMP				
Loss of arable and grazing lands	Compensate the local community	KPA & CCCC	Twice, Prior to project commencement and prior to the next rainfall season	1,300,000
	Finalize and implement RAP	KPA	ongoing	Nil
Loss of mangroves	Obtain approval from KFS to utilize the mangrove area	CCCC	Prior to project implementation	500,000
	Replanting and growing 15,000 mangroves in an alternative area	KPA/CCCC/KFS /CFA	During and post project implementation	15,000,000
Impact on Kaya Jiwe la Kutuza	Perform a cleansing ceremony and relocate the 8 sacred rocks falling within the project area	Kaya Elders	During the EIA Process	200,000
Dredging of the jetty access channel	Implement the mitigation measures provided in the ESIA study report of 2016	CCCC	During construction of jetty	In project cost
Loss of terrestrial vegetation cover	Obtain authorization from KFS and County Government of Mombasa to fell trees	CCCC	Prior to commencement of operations	20,000
	Plant trees in farmlands and homesteads outside the SEZ	CCCC	Continuous	100,000
	Rehabilitate the area after decommissioning	CCCC	After decommissioning	TBD
Soil erosion and Sedimentation	Carry out civil works at near shore areas during low tide	CCCC	During construction of yard	Nil
	Create a band wall between the mangrove and project site to prevent soil erosion	CCCC	2 Months	In project cost
	Develop and implement water quality and biological communities monitoring plan	CCCC	During construction of yard	2,000,000
Solid waste generation	Procure waste collection bins with capacity for segregation	CCCC	Prior to project implementation	100,000
	Create awareness on waste management	CCCC	Continuous	Nil
	Procure a sizeable waste collection bin	CCCC	Prior to project commencement	250,000
	Procure the service of NEMA licensed solid waste handler	CCCC	At project commencement	Tender
	Provide a small scale sanitary landfill for	CCCC	Prior to project	50,000

Environmental issues	Recommended mitigation measures	Responsibility	Timeframe	Cost (KES)
	composting organic wastes		commencement	
	Comply with Waste Management Regulations, 2006	CCCC	Continuous	Nil
Wastewater generation	Procure mobile toilets	CCCC	At project commencement	Tender
	Comply with Water Quality Regulations, 2006	CCCC	Continuous	Nil
Air pollution	Restriction of speed of vehicles and signage	Drivers	During construction of yard	50,000
	Sprinkle water to suppress dust	CCCC	During construction of yard	1,200,000
	Use serviceable machinery/equipment/ trucks	CCCC	Continuous	Nil
	Implement air quality monitoring plan	CCCC	During construction of yard	100,000
	Comply with Air Quality Regulations, 2014	CCCC	During construction of yard	Nil
Noise pollution	Provide PPE for workers at peak noise areas	CCCC	During construction of yard	30,000
	Comply with the Noise and Excessive Vibration Pollution (Control) Regulations, 2009	CCCC	During construction of yard	Nil
Health and safety concerns	Create awareness among workers on safety	CCCC	During construction of yard	Nil
	Provide and enforce use of PPEs to workers and visitors	CCCC	During construction of yard	2,000,000
	Train workers on first aid and procure kits	CCCC	After recruitment	15,000
	Procure insurance cover for the workers	CCCC	During construction of yard	2,000,000
	Provide a standby ambulance for the yard workers and a boat for the jetty works	CCCC	Prior to commencement of project	Existing
Narrow access road	Expand the access road to the project site to allow two-way traffic	CCCC	Prior to commencement of the project	TBD
	Erect road warning signage and observe speed limits of 20km/hr	CCCC	Prior to commencement of the project	TBD

Table 3: Environmental Management Plan (EMP) for the operational phase of the proposed new KOT pipeline marshalling yard at Dongo Kundu Special Economic Zone

Environmental impacts	Recommended mitigation measures	Responsibility	Timeframe	Cost (KES)
Health and safety risks	Employing highly skilled personnel for welding of the pipes and X-ray tests activities	CCCC	Prior to start of operations	TBD
	Provide PPEs and enforce their use for all employees and visitors to the project site	CCCC	Continuous	1,650,000
	Obtain a permit for use of industrial radiography from the Radiation Protection Board	CCCC	Prior to start of operations	2,000
	Create awareness and post warning signs within radiation areas	CCCC	Prior to start of operations	65,000
	Ensure site is clear of all people except the ones directly involved with X-ray tests	CCCC	During X-Ray Tests	Nil
	Position the X-ray booth and equipment away from the campsite	CCCC	One off	Nil
	Conduct the X-ray tests at night between 10pm and 4am	CCCC	Continuous	Nil
	Ensure safe custody of all X-ray equipment and accessories	CCCC	Continuous	Nil
	Confirm alternatives to X-Ray testing technologies	CCCC	Prior to operations	Nil
	Keep and update an incident/accident register	CCCC	Continuous	Nil
	Procure first aid kits and place them in strategic points at the yard	CCCC	Continuous	25,000
	Install and maintain firefighting equipment	CCCC	Continuous	100,000
Solid waste generation	Sensitize employees on proper solid waste management	CCCC	Continuous	30,000
	Place waste receptacles in high use areas	CCCC	Continuous	Nil
	Contract a NEMA licensed solid waste handler and implement the contractual agreement	CCCC	Continuous	Tender
	Comply with the Waste Management Regulations, 2006	CCCC	Continuous	Nil
Wastewater generation	Install a bio-digester	CCCC	Prior to start of operations	2,000,000

Environmental impacts	Recommended mitigation measures	Responsibility	Timeframe	Cost (KES)
	Undertake monitoring of the quality of wastewater discharging from the bio-digester	CCCC	Quarterly	30,000
	Apply for and obtain an Effluent Discharge Licence from NEMA	CCCC	One off	105,000
	Comply with the Water Quality Regulations, 2006	CCCC	Continuous	Nil
Air pollution	Ensure proper management of solid wastes and wastewater	CCCC	Continuous	Nil
	Develop and implement an Air Quality Monitoring Plan	CCCC	Quarterly	120,000
	Comply with the Air Quality Regulations, 2014	CCCC	Continuous	Nil
Noise pollution	Obtain a noise permit from the County Government of Mombasa	CCCC	Prior to start of operations	10,000
	Provide PPE to staff working within peak noise producing areas	CCCC	Continuous	50,000
	Comply with the Noise and Excessive Vibration Pollution (Control) Regulations, 2009	CCCC	Continuous	Nil

Table 4: Environmental Management Plan (EMP) for the decommissioning phase of the proposed new KOT pipeline marshalling yard at Dongo Kundu SEZ.

Environmental impact	Recommended mitigation measures	Responsibility	Timeframe	Cost (KES)
Waste generation	Recover re-usable materials for sale or use in other project sites	CCCC	During decommissioning	Nil
	Contract a NEMA licensed waste handler to handle and dispose both solid waste and effluent generated from the demolition activities	CCCC	During decommissioning	1,000,000
	Comply with Waste Management and Water Quality Regulations, 2006	CCCC	During decommissioning	Nil
Health and safety	Install signage to forewarn people on ongoing demolition activities	CCCC	During decommissioning	200,000
	Provide and enforce the use of PPE throughout the demolition works	CCCC	During decommissioning	50,000
	Avail first aid kits on site throughout the entire period	CCCC	During decommissioning	15,000
Loss of livelihoods	Prepare and issue recommendation letters to employees to seek alternative employment opportunities	CCCC	Prior to decommissioning	Nil
	Review potential job opportunities in other ongoing contracts by the proponent and recommend the employees who quality	CCCC	Prior to decommissioning	Nil
	Comply with labor laws by paying the employees their terminal dues	CCCC	Prior to decommissioning	Nil
Ecologically vulnerable land	Rehabilitate the area by planting fast growing tree species like casuarina in consultation with KPA and in line with the Master Plan for the Mombasa SEZ	CCCC	After decommissioning	3, 000,000
	If the RAP for the SEZ will not have materialized, the land to revert to local community awaiting compensation	CCCC	After decommissioning	Nil

2.4. Implementation of the Environmental Management Plan

2.4.1. Introduction

The Environmental Management Plan (EMP) will be implemented through a collaborative effort between CCCC, a consultant on Environment, a NEMA designated laboratory, KPA and NEMA. Other state and non-state actors will be consulted on a need by need basis. China Communications and Construction Company Limited in collaboration with a NEMA Licensed contractor will take the responsibility and lead role for the implementation of the EMP, ensure monitoring and evaluation of activities are done in the most efficient manner with regular meetings held to discuss the action plan implementation with KPA and key stakeholders. The responsibility for mobilizing resources for implementation of the EMP will be vested in CCCC.

Monitoring of the plan implementation will be done on a continuous basis and a report on progress prepared by the consultant weekly. The weekly report shall capture information on achievements made against set targets, documentation of best practices for purpose of future replication, challenges and recommendations on the way forward.

2.4.2. Waste management

Waste that will be generated at the project site including the solid wastes and effluent will be handled, managed and disposed as provided for in the Environmental Management and Coordination (Waste Management) Regulations, 2006.

Objectives

The objective of the waste management plan is to;

- Comply with the Environmental Management and Coordination (Waste Management) Regulations, 2006.
- Prevent pollution through indiscriminate disposal of wastes in non-designated areas.
- Minimize waste generation, encourage reuse and or recycling.

Waste handling

- China Communications and Construction Company Limited will provide waste receptacles and ensure that they are placed at strategic locations at all project areas where waste is generated.
- Segregation of waste will be done at source in the following categories; scrap metal, timber/wood, plastics, paper, food based waste, clinical waste, oil and grease based waste and garden waste.
- Labeled waste receptacles of appropriate color (color coding) will be provided for each type of waste.
- A transfer station (temporary enclosed holding area) will be provided for where collected waste will be held in a short period during the construction and laying of pipelines within Dongo Kundu area.

Waste Collection and transportation

- Waste will be collected for disposal from the holding area at least twice by a waste collector who is duly licensed by NEMA.
- The vehicle used to carry the waste must be licensed to carry the waste by NEMA as provided for in the Environmental Management and Coordination (Waste Management) Regulations, 2006.
- All vehicles used to transport the waste to be labeled in such a manner as may be directed by NEMA.

- Collection and transportation of the waste to be done in such a manner not to cause scattering of the waste.
- The vehicle and equipment for waste transportation to be in such a manner not to cause scattering of or flowing of waste; and
- The vehicle that will transport the waste and other means of conveyance of waste to follow the scheduled routes by NEMA from the point of collection (project site) to the disposal site.

Waste disposal

All waste collected and transported will only be disposed at disposal sites approved by the NEMA and the County Government of Mombasa.

Records

All waste collected, transported and disposed will be recorded in the waste tracking document (Form III as per the Waste Management Regulations, 2006). In this form the following details will be captured: -

- Details of the transporter
- Description of the waste collected
- Disposal certificate

The waste tracking document will be completed/filled in five copies one copy will be returned by the transporter to the waste collection source after successfully disposing the waste. China Communications and Construction Company Limited will maintain copies of each consignment of waste collected and disposed throughout the project period.

2.4.3. Emergencies and contingencies

The Port of Mombasa already has an emergency response plan. China Communications and Construction Company Limited will liaise with KPA to ensure that construction and operational activities at the proposed pipeline marshalling yard are incorporated in the overall emergency response plan, clearly indicating authority and responsibility for dealing with such incidents. China Communications and Construction Company Limited will appoint a Health, Safety and Environment (HSE) Officer(s) who will be charged with the responsibility of coordinating HSE matters between CCCC, KPA and the project Engineer. The HSE Officer(s) will be responsible for the implementation of this EMMP. Their roles will include the following, among others:

- Advising CCCC on applicable HSE regulations such as the Occupational Safety and Health Act (OSHA) 2007, The Factories and Other Places of Work Act (H & S Committee Rules), 2003, EMCA (Water Quality) Regulations, 2006, EMCA (Waste Management) Regulations, 2006 among others.
- Ensuring that all accidents and incidents occurring at the site are promptly reported and investigated.
- Administration of safety awareness and motivation scheme.
- Keeping statistics of accidents, incidents and dangerous occurrences and ensuring that reportable cases are filed with the Engineer; KPA and the Directorate of Occupational Safety and Health Services.
- Ensuring all construction equipment are promptly maintained and lifting equipment are licensed by approved government inspectors.

In addition to ensuring that all staffs at the site are trained in performing their duties to prevent accidental injuries, CCCC will provide employees with appropriate personal protective equipment (PPE) such as safety shoes, hand gloves, ear plugs, and helmets among others to

reduce exposure. This will be in addition to obtaining insurance cover for all employees and for the construction sites.

2.4.4. Contingency Plan for Oil Spills

Reporting and altering mechanisms will be established to ensure that any spillage is promptly reported in line with KPA emergency response plan. In addition, specialized oil spill response equipment will be available in the proximity of the proposed project site to deal with small to medium spillages. Such equipment may include containment booms, recovery pumps, and temporary storage tanks and approved dispersants.

KPA is a member of the Oil Spill Mutual Aid Group (OSMAG) which was established in conformity with the International Maritime Organization (IMO) Conventions. It is a forum that brings together KPA, stakeholders from oil industry and the Kenya Navy to make the port compliant with internationally accepted norms in safety and preparedness and containment of marine spill. OSMAG has in response to this requirement formed the Oil Spill Response Action Team (OSRAT), whose members undergo training and thorough drills on oil pollution prevention and on safety aspects at the port every three months. China Communications and Construction Company Limited will at all times liaise with KPA to ensure that prior to undertaking hazardous tasks, risks assessments are undertaken and KPA is informed so that emergency response plan can be activated. China Communications and Construction Company Limited, KPA and the Engineer shall organize meetings (quarterly) where any accidents and incidents would be reviewed.

2.4.5. Grievance Redress Mechanism

The project will have an impact on the livelihood of local community and fishermen, conservation of marine and coastal resources and health and safety. Failure to address the environmental and social impacts of the project may constitute grievances among the affected and interested stakeholders of the project and lead to conflicts and stalling of the project. Legal actions available to the affected persons under the Kenya Constitution 2010 and the Environmental Management and Coordination Act Cap 387 could delay the implementation and actualization of the project overtime and will have cost implications on both CCCC and KPA. It is therefore imperative that the project establishes a credible Grievance Redress Mechanism (GRM) that is legitimate, reliable, transparent, efficient and responsive to complaints raised by the affected and interested persons.

China Communications and Construction Company Limited will formulate a GRM specific to the proposed project. The GRM should include the objectives, types of grievances, confidentiality, purpose, responsibility, details of the procedure and records among others. The GRM should be formulated in consultation with KPA, NEMA, Kenya Fisheries Service and key stakeholders including local fishermen and the Community Forest Association (CFA).

3. ENVIRONMENTAL MONITORING PLAN

3.1. Introduction

An Environmental Monitoring Plan is required to ensure full and systematic implementation of the EMP. Environmental Monitoring will be important to continuously ensure that environmental performance is assessed and recorded to provide data and information during the implementation of the project. It will provide specific information on the characteristics and functioning of environmental and social variables in space and time and compare impacts predicted during the EIA with those which actually occur during and after implementation of the project components, in order to assess whether the impact prediction process performs satisfactorily by;

- Ensuring that impacts do not exceed legal standards specified under EMCA Regulations and where they exceed appropriate mitigation measures and early warning systems are provided
- Checking the implementation of mitigation measures in the manner described in the EIA report
- Providing early warning of potential environmental damage and recommending on the appropriate mitigation strategies

The frequency of monitoring will vary depending on the parameters, stage of project implementation and the severity of the anticipated/predicted environmental impacts as per the EIA and the EMP.

Three types of monitoring will be implemented as follows;

1. **Baseline Monitoring**: A baseline monitoring for the project site was undertaken by Polucon Services (K) Limited, marine biologists in collaboration with the consultant. The subsequent monitoring will therefore assess changes in those parameters over time against the existing baseline.
2. **Impact Monitoring**: The ecological, health and socio-economic parameters within the project area and other impacted sites will be measured in order to detect environmental changes which may occur a result of the construction and operation of the project. This will include water quality, biological communities, air and noise monitoring.
3. **Compliance Monitoring**: Will employ a periodic sampling method, or continuous recording of specific environmental quality indicators or pollution levels to ensure project compliance with recommended environmental protection standards as per EMCA Cap 387 as well as occupational safety and health in compliance with OSHA, 2007. This will be done in collaboration with a NEMA accredited laboratory (Polucon Services (K) Limited) and will include Water Quality Regulations, 2006; Noise and excessive vibration Regulations, 2009, Waste Management Regulations, 2006; Wetlands Regulations, 2009 and Air Quality Regulations, 2014 among others.

The monitoring instruments and tools for the programme are provided as part of the monitoring programme alongside their calibration certificates.

For each of the environmental and social impact to be monitored, the monitoring plan provides the sources of impacts, impacts of the parameter degradation on the environment, objectives of the monitoring, proposed sampling locations, monitoring parameters, frequency and test methods to be used.

3.2. Water quality monitoring plan

3.2.1. Monitoring objectives

- To assess the variation of the physical and chemical parameters due to project activities at the project site.
- To assess the effectiveness of environmental management plan designed to minimize water pollution.

3.2.2. Sources of Impacts

Potential sources of water pollution would be:

- Sediment loads from excavation and leveling activities
- Dredging of the seabed at the jetty area
- Effluent generated from the bio-digester at the campsite

3.2.3. Potential Impacts

- Potential impacts on biological communities as a consequence of decline in water quality.
- Release of sediment into the water column, creating turbid plumes which can migrate away from the initial activity area and onto nearby sensitive habitats. The suspended sediments can reduce light, clog filtering and feeding apparatus, and settle onto benthic organisms, including ecologically important, habitat forming and therefore pose an environmental hazard.
- Decline in fish population.

3.2.4. Indicators of Impacts

- Increased sediment load
- Increased turbidity
- Decline in fish populations
- Concerns from fishermen and conservation bodies

3.2.5. Monitoring locations

Water quality monitoring will be carried out at the following three stations (Figure 3);

- Monitoring Station 1 (MS 1): located at the temporary Jetty area (4º03'48.81", 39º36'33.14"). Water samples will be obtained at depths of -0.5m and -3m
- Monitoring Station 2 (MS 2): located within the mangrove area (4º03'49.78", 39º36'35.88"). Water sample will be obtained at a depth of -0.5m
- Monitoring Station 3 (MS 3): located at the last discharge point of the bio-digester at the campsite (4º3'58.58", 39º36'29.76) and samples will be obtained from the last discharge point into the environment.

3.2.6. Monitoring parameters

The parameters to be monitored are;

- Turbidity
- Suspended Solids
- pH
- Chemical Oxygen Demand
- Dissolved Oxygen
- Perspective Degree

Figure 3 Proposed water quality monitoring stations at the project site (Source: Google Earth, 2019).

Effluent from the campsite area will be monitored pursuant to the parameter prescribed under the Third Schedule of Environmental Management and Coordination (Water Quality) Regulations, 2006. The parameters to be monitored are;

- pH
- Biological Oxygen Demand
- Chemical Oxygen Demand
- Total Suspended Solids
- Ammonia
- Total Dissolved Solids
- *E.Coli* colonies
- Total coliform count

3.2.7. Monitoring frequency

For water quality monitoring at MS 1 and MS2 the frequency will be as follows;

- Physical parameters i.e. pH, turbidity and dissolved oxygen will be monitored daily for the project construction phase and monthly during the operational and decommissioning phases.
- Chemical parameters i.e. COD, Total Suspended Solids (TSS) and Perspective Degree shall be monitored every 10 days during the construction phase and monthly during the operational and decommissioning phases.

For MS3 the first sample will be obtained once the campsite becomes operational and thereafter quarterly as per the Environmental Management and Coordination (Water Quality) Regulations, 2006.

3.2.8. Testing methods and equipment

The test methods for the water quality monitoring parameters and instruments to be used are as shown in Table 5 below.

Table 5: Testing methods and instrument models to be used in water quality monitoring.

Parameters	Test Methods	Instrument
pH Value	APHA method No. 4500-H*B	PH-520
Total Suspended Solids	APHA method No. 2540-D	LSS-200
Chemical Oxygen Demand	PQA/LIM/064	PF-12
Dissolved Oxygen	PQA/LIM/065	DO-610
Turbidity	APHA Method No. 2130-B	LTURB-3B
Perspective Degree	PQA/LIM/068	Observed

3.3. Biological monitoring plan

3.3.1. Monitoring objective

The objectives of the monitoring plan is to determine;

- Impact of water quality degradation on the biological communities
- Recovery of habitats and fauna populations after the project completion
- To ensure good performance and delivery of quality seedlings

3.3.2. Sources of Impacts

Potential sources would be:

- Sediment loads from excavation and leveling activities
- Dredging of the seabed at the jetty area
- Effluent generated from the bio-digester at the campsite

3.3.3. Potential Impacts

- Potential impacts on aquatic biota (mangrove) as a consequence of decline in water quality.
- Release of sediment into the water column, creating turbid plumes which can migrate away from the initial activity area and onto nearby sensitive habitats. The suspended sediments can reduce light, clog filtering and feeding apparatus, and settle onto benthic organisms, including ecologically important, habitat forming and therefore pose an environmental hazard.
- Decline in fish population.

3.3.4. Indicators of Impact

- Biodiversity index and abundance index-Relative change in quantity and/or coverage of key biodiversity parameters such as mangroves as the project progresses in comparison to abundance at the commencement of project (baseline conditions)
- Fish mortalities
- Reported complaints from fishers, community and conservation groups

3.3.5. Monitoring locations

Biological monitoring will be carried out at the following three stations;

- MS 1: located at the temporary jetty area (Figure 4)
- MS 2: located within the mangrove area (Figure 4)
- MS 4: located at Bombo Creek (Exact location to be identified during preparation of the Baseline Environmental Monitoring Plan)

3.3.6. Monitoring parameters

Biological monitoring parameters at MS1 and MS2 identified are;

- The fishery which will focus on species diversity, abundance and catch per unit effort especially for the mangrove area where crustaceans are targeted by the local fishermen.
- The mangrove forest will be monitored on the basis of potential diebacks of mangroves from smothering by sediments or changes in tidal regime.

Biological monitoring parameters at MS4 are the replanted mangroves and their environment which will focus on;

1. Tending and monitoring of the nursery

The parameters to be monitored include;

- Growth and survival rates,
- Pests and disease infestations
- The general health and condition of the seedlings

2. Tending and monitoring of the replanted mangroves

- Height and Diameter of the replanted mangroves

Physical parameters to be measured will include;

- Soil fertility and erosion,
- Salinity
- Pollution and
- Tidal height

Biological parameters to be monitored will include field survival of the replanted mangroves.

3.3.7. Monitoring frequency

The monitoring frequency for MS1 and MS2 will be;

- Twice monthly during the construction phase and thereafter monthly for the rest of the project life. The monitoring will be conducted by a team of marine scientists.

The monitoring frequency for MS4 will be carried out;

- Weekly at the nursery stage
- Monthly for the 1st year after out planting
- Every 6 months for 2 years after out planting

The monitoring will be conducted by the consultant and the local CFA.

3.3.8. Monitoring methods

Monitoring methods at MS1 and MS2 will include;

- Fisheries monitoring will be carried out using two approaches i.e. use of a Remotely Operated underwater Vehicle (ROV) which assesses the benthic characteristics, fish and invertebrate's abundance of an area as diving in the channel is restricted and interviews with local fishermen using structured questionnaires.

- Mangrove forest monitoring methods will be through transect walks and recording observations and documenting the number of die backs if any and the condition of the forest.

Monitoring methods at MS4 will include;

- Height will be measured from the base of the standing stem to the tip of the highest leaf tip of the seedling. Diameter on the other hand will be measured consistently at 1/3 point (Based on the total height) from the base of the seedling.
- Physical parameters would be undertaken by a NEMA designated laboratory.
- Biological parameters will be measured by establishing permanent sample plots (PSP) measuring 4x4m where all living or dying individual mangrove stems are counted and percent survival and mortalities are computed.

Figure 4: Proposed biological monitoring stations at the project site (Source: Google Earth, 2019).

3.4. Air Quality Monitoring Plan

3.4.1. Monitoring objectives

- To measure concentrations of dust and gaseous emissions at selected locations surrounding the project area so that the results can be assessed in relation Environmental Management and Coordination (Air Quality Regulations), 2014.

- To ensure that adopted air pollution mitigation measures are effective.
- To comply with the provisions and requirements of the Environmental Management and Coordination (Air Quality) Regulations, 2014.

3.4.2. Sources of Impact

Potential sources of air pollution at the project site are;

- Dust from excavation activities and the yard area
- Emissions from machinery/ equipment
- Vehicular traffic and
- Poor disposal of waste which can foul the air

3.4.3. Significant Impacts on Environment

The most significant potential impact would be fugitive dust and this would be expected to be localized within 100 to 200 m of the project site. Emissions from these sources would not be expected to result in significant deterioration in local air quality. In addition, there would be emission from heavy machinery used in excavations. Management measures shall be undertaken to keep changes to local air quality to an absolute minimum.

3.4.4. Indicators of Impact

Reported cases of respiratory irritation and complaints raised by workers, visitors neighbors or CCCC staff.

3.4.5. Monitoring location

Air quality monitoring will be conducted at the campsite area and areas near the residential developments. These locations are sensitive receptors of air pollution above the prescribed limits.

3.4.6. Monitoring parameters

The monitoring parameters and standard specified target values for the purpose of environmental monitoring and protection are stipulated in the First Schedule of the Air Quality Regulations, 2014 as shown below:

- Oxygen
- Carbon Dioxide
- Nitrogen Dioxide
- Nitrogen Oxide
- Sulphur Dioxide
- Suspended Particulate Matter
- Carbon Mono-oxide
- Hydrogen Sulfide

3.4.7. Monitoring frequency

Air quality sampling and analysis will be carried out in collaboration with a NEMA designated laboratory on a quarterly basis.

3.4.8. Test method and equipment

Air Quality instruments to be used will be the same as those used to generate the baseline data (Aeroqual portable air monitors S500 series). It will entail measurement and recording of particulate matter for a period of 1hr time weighted average period and a calculated 24hr time weighted average period for the volatile organic compounds (VOCs), nitrogen dioxide, non-methane hydrocarbons and carbon dioxide/monoxide.

3.5. Noise Monitoring Plan

3.5.1. Objectives

- Ensure compliance with the Environmental Management and Coordination (Noise and Excessive Vibrations) Regulations, 2009
- Safeguard the health of employees, neighbors, CCCC staff and visitors

3.5.2. Sources of Impacts

Significant noise level will emanate from;

- Handling of pipes by machinery
- Welding activities
- Vehicular traffic

3.5.3. Reporting Results

CCCC shall monitor noise and vibration with approved equipment for 24 hours. Monitoring items will be as follows:-

- Noise level (LAeq, 12 hours, 6:00a.m-6p.m, 6p.m-6a.m)
- Noise level (LAeq, 1 hour)
- Noise level (L5, L50, L95)
- Vibration velocity (Maximum value during the 10 minutes hourly)
- Record of noise and vibration source

3.5.4. Monitoring locations

Noise level measurements shall be conducted at the campsite and areas near the residential development.

3.5.5. Monitoring frequency

The proponent will conduct noise level measurements quarterly in collaboration with a NEMA designated laboratory.

3.5.6. Test equipment

The instruments to be used during noise measurements should be like that used during the baseline survey (Sound analyzer AW 5636).

3.6. Social monitoring plan

The proponent will develop a Grievance Redress Mechanism for potential conflicts resolution for the entire project cycle.

3.7. Environmental monitoring equipment

China Communications and Construction Company Limited has procured a number of equipment for use in implementation of the monitoring plan as discussed in the preceding section and as per Table 6 below. The data sheets and calibration certificates for the equipment are attached (Annex 6 and 7 respectively.

Table 6: The proposed monitoring instruments capabilities which were also used in baseline monitoring.

Items	Instrument Model	Measuring Range	Accuracy
Noise	AW5636	30-130dB	0.1dB
COD	PF-12	2-40，15-160,100-1500	1mg/L
SS	LSS-200	0-1000mg/L	0.01mg/L
pH	PH-520	0-14	0.01
DO	DO-610	0.0～20.0mg/L	0.2/0.5 (Depending on temperature)
Turbidity	LTURB-3B	0～400NTU	0.01 NTU
Vibration	AW5936	**Mechanical vibration：** (reference frequency-15.92Hz) Acceleration：0.01m/s2～300m/s2 Speed：0.1mm/s～3000mm/s Displacement：0.001mm～30mm **Hand-transmitted vibration：** （90～180）dB（setting 10-6m/s2 as 0dB）	

4. WORK SCHEDULE

Table 7 below summarizes the work schedule for implementing the monitoring programme. A detailed monitoring schedule is attached (Annex 8).

Table 7: Summary of the monitoring schedule.

Monitoring item	Monitoring Frequency/Location	Monitoring parameter	Monitoring target
Physical water quality (relationship between turbidity and suspended sediments)	Impact and compliance monitoring to be done at -0.5m, 3m, 6m below the water surface at the temporary jetty and -0.5m, 3m within the mangrove area daily	Turbidity and Suspended Solids (SS) and pH	EMMP target values
	Physical observations on changes in turbidity at the temporary jetty and within the mangrove area	Turbidity and pH	Relatively clear waters within the Kilindini channel based on observed baseline each trip
Chemical water quality (Turbidity)	The temporary jetty and within mangrove area monitoring stations at 0.5m, 3m, 6m below the water surface after every 10 days	SS, COD, Temperature, Salinity and Perspective Degree	EMMP target values
Water quality parameters prescribed by the Third Schedule of Water Quality Regulations, 2006	Baseline monitoring once the campsite is operational and quarterly thereafter at the last discharge point of the bio-digester	DO, pH, TSS, COD, Ammonia, *E.Coli* and total coliform count	Baseline values to be obtained once the campsite becomes operational
Biological monitoring at MS1 and MS2	Bi-monthly for the entire construction phase and monthly at operational and decommissioning phase	Mangrove and marine fauna	Minimize degradation of habitats and population decline and/or mortalities
Biological monitoring at MS4	Weekly at nursery stage	Mangrove seedlings	90% survival rate
	Monthly during Year 1 after out planting	Mangrove seedlings	
	Every 6 months for 2 years after out planting	Height and Diameter of the replanted mangroves	
Air quality	At the project site for 24 hours, prior to commencement of the contract works and quarterly thereafter at a designated point	Oxygen, Carbon Dioxide (CO2), Nitrogen Dioxide (NO2), Nitrogen Oxide, Sulfur Dioxide (SO2), Suspended Particulate matter	As stipulated in the Environmental Management and Coordination Act (Air Quality) Regulations,

		(SPM), Carbon Monoxide (CO), Hydrogen Sulfide (H2S)	2014
Ambient noise/vibration level	At the project site for 24 hours, prior to commencement of the contract works and quarterly thereafter at a designated point	Noise level (LAeq, 12 hours, 6a.m-6p.m, 6p.m- 6a.m) Noise level (LAeq, 1 hour) Noise level (L5, L50, L95)	As stipulated in the Environmental Management and Coordination Act (Noise and Excessive Vibration pollution control) Regulations, 2009

5. REFERENCES

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Republic of Kenya Statutes

- Environmental Management and Coordination (Air Quality) Regulations, 2014
- Environmental Management and Coordination (Noise and Excessive Vibrations) Regulations, 2009
- Environmental Management and Coordination (Waste Management) Regulations, 2006
- Environmental Management and Coordination (Water Quality) Regulations, 2006
- Environmental Management and Coordination Act Cap 387 of the Laws of Kenya
- The Merchant Shipping Act, 2009

- The Occupational Safety and Health Act, 2007

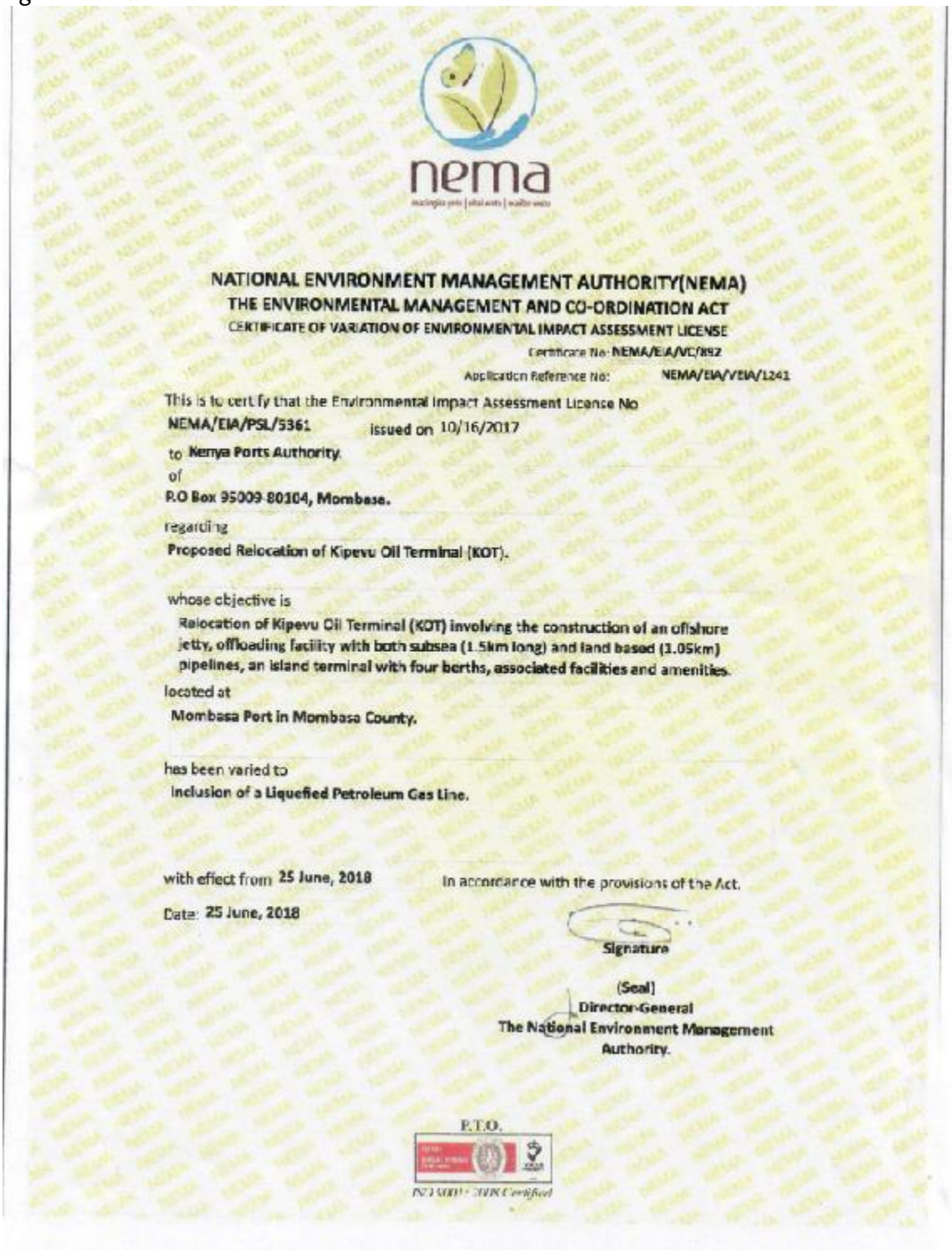
International Conventions

- The Marpol Convention 73/78
- The United Nations Convention on the Law of the Sea (UNCLOS)

6. ANNEXURES

Annex 1: Copy of EIA License for the ESIA on relocation of KOT at Mombasa Port
Annex 2: Copy of EIA License for the proposed pipeline marshalling yard at Dongo Kundu SEZ
Annex 3: Company Profile and Testimonials for Envasses Environmental Consultants
Annex 4: Curriculum Vitae of Key Staff proposed for implementation of the EMMP
Annex 5: Company Profile of the NEMA Designated Laboratory i.e. Polucon Services (K) Limited and accreditation Certificates
Annex 6: Monitoring Equipment to be used to implement the EMMP
Annex 7: Calibration Certificates of the monitoring equipment
Annex 8: Detailed Monitoring Schedule

Annex 1: Copy of EIA Licence for the ESIA on relocation of KOT at Mombasa Port Agencies in 2017



nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

CERTIFICATE OF VARIATION OF ENVIRONMENTAL IMPACT ASSESSMENT LICENSE

Certificate No: NEMA/EIA/VC/892

Application Reference No: NEMA/EIA/VEIA/1241

This is to certify that the Environmental Impact Assessment License No **NEMA/EIA/PSL/5361** issued on 10/16/2017

to **Kenya Ports Authority**

of **P.O Box 95009-80104, Mombasa.**

regarding **Proposed Relocation of Kipevu Oil Terminal (KOT).**

whose objective is **Relocation of Kipevu Oil Terminal (KOT) involving the construction of an offshore jetty, offloading facility with both subsea (1.5km long) and land based (1.05km) pipelines, an island terminal with four berths, associated facilities and amenities.**

located at **Mombasa Port in Mombasa County.**

has been varied to **Inclusion of a Liquefied Petroleum Gas Line.**

with effect from **25 June, 2018** In accordance with the provisions of the Act.

Date: **25 June, 2018**

Signature

(Seal)

Director-General

The National Environment Management Authority.

P.T.O.

Annex 2: Copy of EIA License for the proposed pipeline marshalling yard at Dongo Kundu SEZ

Application Reference No. PR/MSA/4951

Registration No. 0060480

For Official Use

nema

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENT IMPACT ASSESSMENT LICENSE

This is to certify that the Environmental Impact Assessment Project Report received from China Communication Construction Company Limited .....(Name of individual/firm) of..... P.O Box 00623-39037 Nairobi .....(Address) Submitted to the National Environment Management Authority (NEMA) in accordance with the Environment Impact Assessment and Audit Regulations 2003 regarding..... Proposed Marshalling yard .....(title of project)whose objective is to carry on ..... Pipeline Marshalling yard for the ongoing development of new Kipevu oil terminal .....(briefly describe purpose)located at ..... Plot No. MSA/IV/MS/247 situated in Likoni, Mombasa County (S 4°03'59", E 39°36'20") .....(locality and county)has been reviewed and a license is hereby issued for implementation of the project, subject to attached conditions

Date this..... 6th .....Day of..... August 2019

Signature.....

SEAL

Director General

The National Environment Management Authority

CONDITIONS OF LICENSE

1. This license is valid for a period of **24 months** (time within which the project should commence) from the date hereof.
2. The Director-General shall be notified of any transfer/variation/surrender of this license.

P.T.O.

Annex 3: Company Profile and Testimonials for Envasses Environmental Consultants

FIRM PROFILE

Envasses Environmental Consultants Limited
Ralli House, P.O. Box 2013-80100, MOMBASA &
Vision Plaza, P.O. Box 44573-00100, NAIROBI
Email: info@envasses.org
Tel: +254 722 347 155
Website: www.envasses.org

Contact Person &CEO: Mr. Simon Nzuki

2019

1. Firm information

Legal status
Registered under the Business Names Act in Year 2007 and Incorporated as a Limited Liability Company in 2012

Shareholding
The firm is 100% locally owned

NEMA Registration
Registered by NEMA as a Firm of Experts No. 6175 and holds a valid EIA/EA practicing license for year 2017 as per Section 68 & 69 of EMCA, 1999 (Rev. 2015) and Legal Notice No. 101 of 2003(Rev. 2016).

Registration by Environment Institute of Kenya (EIK)
The firm is registered by EIK holds a valid licence for year 2017

Single Business Permit
The company has a valid single business permits under the category of Professional Services Firm issued by the County Government of Mombasa

Tax obligations
The firm holds a valid tax compliance certificate. The company VAT Registration Number is 0176893Z and the PIN is P051406008U.

Offices
Thefirm has registered offices in Mombasa and Nairobi. In Mombasa the offices are located at Ralli House while in Nairobi they are located at Vision Plaza.

Staff Establishment
The firm has a total of 10 Permanent staff and 4 Senior Consultants who work on part-time basis depending on the nature of consultancies.

Firm organogram

Figure 1. Firm Organogram

2. Scope of services provided by the Firm

Environmental Impact Assessment Studies and Audits

These services include undertaking Environmental and Social Impact Assessment (ESIAs), Environmental Audits (EAs), Strategic Environmental Assessments and Environmental and Social Safeguards that include Resettlement Action Plans (RAPs) for large infrastructural projects. To provide these services the company is duly registered by NEMA as a Firm of Experts No. 6175 and holds an EIA/EA practicing license as per Section 68 & 69 of EMCA,(Rev. 2015) and Legal Notice No. 101 of 2003(Rev.2016).

A key output of the ESIA studies is an Environmental Management Plan (EMP) aimed at mitigating the impacts of a development proposal

Environmental Management and Monitoring Programmes (EMMPs)

We provide services in the preparation and implementation of Environmental Management and Monitoring Programmes (EMMPs) with an experience of over 50Years for all the experts combined. The EMMPS have mainly focused on the Kenya coast which harbours diverse and rich ecosystem supporting unique biological communities. These ecosystems consist of mangroves/wetlands, coral reefs, sea-grass, beaches, sand dunes, riverine estuaries and the open ocean among others. Monitoring involves baseline, impact and compliance monitoring focusing on marine ecosystems, water quality, emissions and air pollution, noise pollution and socio-economic monitoring.

Natural Capital Assets Assessment and Spatial Planning

The firm provides services in assessment of natural capital assets and mapping services using Remote Sensing and Geographic Information Systems (GIS). It also has registered physical planners who assist clients in development of spatial and physical plans consistent with the Physical Planning Act. In assessment of natural capital assets for planning interventions, the firm employs scenario based modeling which compares the existing conditions (business as usual) of the natural capital assets against implementation of development projects especially large-scale infrastructural projects.

Environmental and Conservation Management Plans

The firm provides services in the preparation of Environmental and Conservation Management Plans mainly targeting coastal and marine resources. In the preparation of these plans, the firm is guided by Kenya's policy, legal and institutional framework which includes the Environmental Management and Coordination (Amendment) Act 2015 and Sectoral Laws such as the Forest, Fisheries, Wildlife, Water and Physical Planning among others.

3. Guiding Focal areas in Firm Consultancies

In providing its services, the Firm is guided by six focal areas which include;

1. Environmental and socio-economic sustainability,
2. Pollution Control,
3. Climate Change Mitigation and Adaptation,
4. Ecological Enhancement,
5. Environmental Education and Awareness and
6. Environmental Protection and Conservation through Partnerships.

4. Relevant past experience

Since its inception, the company has provided consultancy services in Environmental and Social Impact Assessments (ESIAs), Environmental Audits, Environmental Monitoring, Preparation of Conservation and Management Plans for Natural Resources, Land-use Planning and Socio-Economic Surveys, Baseline Surveys and Occupational Safety and Health. It has further provided advisory services to companies and projects as lead experts to comply with the Environmental Management and Coordination Act Cap 387. In total the company has undertaken over 500 ESIA studies and project reports and a similar number of Environmental Audits.

In addition the firm has a wide range of experience in undertaking consultancies on preparation of Environmental Management and Monitoring Plans (EMMPs) spanning over 50 years for all the lead consultants combined. The EMMPS have mainly focused on the Kenya coast which harbours diverse and rich ecosystem supporting unique biological communities. These ecosystems consist of mangroves/wetlands, coral reefs, sea-grass, beaches, sand dunes, riverine estuaries and the open ocean among others. We have also been involved in the preparation of specific area environmental management and monitoring plans under the Integrated Coastal Zone Management (ICZM) process which is anchored in Section 55 of EMCA, Cap This includes action plans for pollution prevention, biodiversity and socio-economic monitoring, protection and conservation of endangered species such as sea turtles (Listed under Appendix 1 of Cites) and Dugongs among others. A section of the individual consultants working for the firm have been contracted before to prepare baseline surveys for the Kenyan Coast under the State of the Coast (SoC) Report for Kenya. Between late 2018 and early 2019 the firm was contracted by the Indian Ocean Commission and NEMA to prepare the ICZM Action Plan for Kenya (2019-2023) including a comprehensive monitoring programme on pollution, biodiversity, blue economy development and socio-economic activities among others.

The firm has experience in working within the port and offshore areas having being the consultant for KPA and other port related infrastructure in Environmental Compliance since year 2012. The lead consultants in the firm have previously undertaken research and environmental monitoring activities on the protection and conservation of marine resources within the Kilindini and Portreitz Creeks while working for the Kenya Marine and Fisheries Institute (KMFRI).

The firm has further experience in providing consultancies for donor funded projects such as the just concluded Kenya Coastal Development Project (KCDP) funded by the World Bank. During project implementation the firm provided services in preparation of environmental and monitoring plans, review of policy, legal and institutional framework and undertook various ESIAs for the initiatives under KCDP.

The key experience of the firm in the last two years is summarized in the table 1 below. All the listed projects have successfully being completed except ongoing contracting by KPA for this year's environmental audit and monitoring.

Table 1. Summary of relevant key experience for the last 2 years

Year	Assignment Name	Client
2019	Environmental Audit and Monitoring of Kenya Ports Authority Facilities in Kenya from Year 2012 to Present	Kenya Ports Authority
2019	Preparation of the Integrated Coastal Zone Management (ICZM) Plan for Kenya (including a comprehensive Monitoring Programme	Indian Ocean Commission and NEMA
2018	Preparation of Environmental Management, Conservation and Monitoring Plans for the Mombasa Special Economic Zone (SEZ) at Dongo Kundu area	JICA Design Team and Ministry of Industrialization and Enterprise Development
2018	Environmental and Social Impact Assessment (ESIA) for proposed LPG Facility and Construction of a Jetty terminal at Vipingo area of Takaungu, Killfi County	Vipingo Development Limited/Centum Investments Limited
2108	Preparation of ESIA including Environmental Management and Monitoring Plan for a large scale barge loading facility to support LAPPSET Construction at Kilifi Creek, Kilifi County	Karsan Ramji and Sons Limited, Kilifi County Government
2018	Preparation of a comprehensive Environmental Management and Monitoring Plans for Lamu Seascape to support planning interventions in development of Lamu Port South Sudan Ethiopia Transport (LAPPSET)	World Wide Fund (WWF) for Nature, County Government of Lamu, and LAPPSET Development Authority
2018	Preparation a Water Quality Management Plan for Kenya's Coastal Zone	NEMA, UNEP (Nairobi Convention)
2003-2019	The lead consultants have been involved in research and marine ecosystem monitoring projects along the Kenyan Coast targeting key ecosystems such as coral reefs, mangroves, seagrass beds and fisheries as well as the socio-economic dynamics of the communities who utilize these resources	Various WWF, World Bank (KCDP), Indian Ocean Commission,

Key Client Portfolio

1. Kenya Ports Authority
2. National Environment Management Authority
3. China Civil Engineering and Construction Corporation (K) Limited & China Wu Yi Companies
4. Jiang Xi Youse Construction Company Limited
5. Japan International Cooperation Agency
6. Mombasa Water and Sewerage Company
7. Kenya Maritime Authority
8. World Bank-Kenya Coastal Development Project
9. Agakhan Hospitals
10. Devki Still Mills
11. Kalu Works
12. Mabati Rolling Mills

13. Pwani Oil Products Limited
14. Ndovu Cement
15. Multiple Hauliers East Africa
16. Kenya Medical Research Institute
17. Dr. Emays and Partners
18. Symbion Architects
19. County Governments of Kwale, Kilifi and Lamu
20. Ministry of Industrialization and Cooperatives Development
21. Pan African Movement (Makupa Transit Shade/Boss Freight/Mat International)
22. World Wide Fund for Nature
23. Karsan Ramji & Sons
24. UNEP-Nairobi Convention
25. Community Development Trust Fund (CDTF)
26. Centum Investments Limited-Vipingo Development Limited
27. Dhajal Brothers
28. Cargill Kenya
29. Mulji Devraj
30. Surya Development
31. Njuca Consolidated
32. R.K. and K.B. Sanghani
33. Coast Calcium
34. Numerous Private Developers on construction projects

Summary of key personnel

Environmental Impact Assessments (EIAs) envision a multi-disciplinary approach to the preparation of the reports for submission to NEMA. In this regard, the firm has a varied expert base which includes

1. Environmental Experts
2. Natural Resource and Development Expert
3. Civil and Structural Engineer
4. Socio-economist
5. Environmental media sampling and analysis experts (Pulucon Services (K) Limited)

Table 2. Summary of key personnel

Name of expert	Team Role	Area of expertise
Mr. Simon Nzuki	Team Leader and contact person	– Environmental Impact Assessment and Audit/Environmental Information Systems (GIS) – Water infrastructure – Waste management projects – Experienced in conservation and management of endangered species – Community/Stakeholder Participation/PRA techniques
Ms. Jane Gitau	Deputy Team Leader	– Environmental Science and Technology including water projects – Wastewater management
Eng. Paul Kimotho	Civil and Structural Engineer	– Civil and structural works and its impacts on the Environment
Mr. Kiunga Kareko	Natural resources expert with a bias in marine issues	– Natural resources and development planning – Monitoring and Evaluation – Community/Stakeholder Participation/PRA techniques – Monitoring and evaluation expert
Dr. Bernerd Fulanda	Marine biologists and fisheries expert	– Marine Ecology/Fisheries Expert – Experience in preparation of fisheries and marine resources management conservation in Kenya
Dr. Andrew Wamukota	Socio-economist	– Socio-economist and experience in GRM – Monitoring and Evaluation – Community/Stakeholder Participation/PRA techniques
Mr. Harrison Onganda	GIS analyst	– Mapping and GIS Analyst

Summary of support and administrative staff who work with the lead consultants

Name of support staff	Qualification
Ms. Rhoda Mutanu	Master of Science in Urban Water Engineering and Management
Mr.Omar Said	BSc. Marine Biology and Fisheries
Ms Jackline Adhiambo	BSc. Marine Biology and Fisheries
Ms. Kasichana Kengah	BSc. Environmental Science
Mr. Daniel Njagi	Sociology and community development

CONSULTANCY APPROACH AND METHODOLOGY

Consultancy approach

Due to the diverse nature of environmental and social impact assessments, the consultancy will be implemented by a multi-disciplinary team of experts who will include a senior environmental consultants, engineers, marine ecology and fisheries experts, social expert and water experts. The approach in delivering the assignment will involve consultations between the consultants and the client on one hand and consultative meetings among the experts for entire duration of the assignment.

Methodology

Legal Notice No. 101 of 2003 provides the guidelines for undertaking Environmental and Social Impact Assessments in Kenya. For the proposed assignment, we outline the main methods that the team of experts will use in undertaking the ESIA study.

Description of the project and adequacy of land requirements

Initially the consultants will undertake a scoping and screening exercise through a reconnaissance survey. The reconnaissance will be aimed at providing a description of the site, proposed project design vis vis the neighborhood and development of a checklist of key environmental concerns to be addressed by the ESIA. The scoping and screening criteria will be informed by Schedule II of Legal Notice No. 101 of 2003. The schedule specifies the issues to be considered in environmental audits including; ecological considerations (Biological diversity, sustainability, ecosystem maintenance), Social considerations (economic impacts, social cohesion and disruption, effect on human health, communication, effects on culture and objects of cultural value),Landscape impacts (views opened up or closed, visual impacts, compatibility with surrounding area), Land uses (effect of facility operations on current land uses) and environmental media (impact of operations of the facilities on water resources, air pollution, noise levels etc).

At the scoping stage, the consultants will also seek to profile the stakeholders who are likely to be impacted by the proposed development.

At this stage the consultants will also undertake a description of the project based on the architectural plans to be provided by the client. Adequacy of the land requirements will be confirmed from the title deed of the project site, the building code and zoning of the project area.

Collection of baseline data of the project area

Baseline data of the project area will be collected through a site visit (observations), literature review, and analysis of spatio-temporal data, real time photographs and interviews with neighbors. The target environmental baseline will include includes topography, landcover/land use types, climate, water resources, energy, wildlife and socio-economic profile of the site. Real time environmental parameter mapping will be undertaken using hand held GPS systems.

Historical data and information about the site such as climate, soils, waste management, population dynamics, energy and water supply/use, etc, will be obtained from existing documentation either held by the client or from previous studies targeting the site/neighbourhood.

The consultancy will also collect baseline data on environmental media particularly air, water, soil and noise. The purpose of soil sampling will be to ensure that soil within the site is not contaminated. The consultants have an existing partnership agreement with Polucon Services (K) Limited who are a NEMA designated laboratory to obtain samples and analyze them to determine whether they comply with the Air Quality Regulations (2014), Noise Regulations (2009) and Water Quality Regulations (2006). The methods used for analysis are summarized below.

Table 3. Environmental parameters, equipment and methods of analysis

Environmental parameter	Equipment/Methodology	
Air Quality	IMR 2800P flue gas / ambient air analyzer	
Noise Measurements	NL-52 Sound Level Meter	
Effluent	**Parameter**	**Method**
	pH value	APHA Method 4500-PH B
	Biochemical Oxygen Demand (mg/L)	AOAC Method 973.44
	Chemical Oxygen Demand (mg/L)	AOAC Method 973.46
	Total Suspended Solids (mg/L)	APHA Method 2540 D
	Ammonia –NH^{4+} (mg/L)	APHA Method 4500-NH_3 G
	Total Dissolved Solids (mg/L)	APHA Method 2540 C
	E.Coli colonies count/100ml	APHA Method 9221 G
	Total coliform count/100ml	KS 05-453


Figure 1. Air and noise quality monitoring during a previous assignment

Legislative analysis

Legislative analysis of the required levels of compliance for the project will be undertaken using literature review of government statutes and in line with the Kenya constitution, 2010. Under each of the statutes we will analyze the required level of compliance and make recommendations as appropriate.

Public consultative strategy

Social impact assessment of the project will be undertaken through a Partidpatory Rural Approach (PRA). Stratified sampling will be used to profile the neighbours to be consulted, collect social data and gather relevant stakeholder inputs. The concerns, views/inputs of the neighbors and stakeholders who might be affected by the proposed project will be obtained through three approaches i.e. structured questionnaires and informal interviews with neighbors to the site as well

as formal consultative meeting. The consultants will liaise with KMA for contacts or introduction to neighbors to the site or facilities.

Figure 2. A previous stakeholder consultative meeting organized by the consultants during an assignment by JICA on the Mombasa Special Economic Zone in 2018

Environmental and social impact identification and analysis

The environmental impacts associated with the project will be identified during the site visits, laboratory analysis of the quality of environmental parameters, consultative meetings with the stakeholders and the impact profile matrix that will be prepared by the various experts involved in the ESIA process. The impacts will be assessed based on the project cycle i.e. construction phase impacts, occupational phase impacts and possible decommissioning of the project. They will include;

- Impacts associated with construction and installation of the desalinization plant
- Impacts of abstraction of sea water on marine biodiversity
- Disposal of brine
- Noise pollution
- Air pollution
- Sources of materials and resources required to implement the project
- Waste production and management (Compliance with the Waste Management Regulations and Water Quality Regulations)
- Environmental risks, safety and health concerns

Environmental Management Plan (EMP)
An environmental management plan will then be prepared to provide mitigation measures for the identified impacts and risks. The EMP will include the identified environmental or social impact, proposed mitigation measure, responsibility for implementing the mitigation measure, costs and timeframe.

Environmental Monitoring Programme
The ESIA study will propose an environmental monitoring programme to ensure continuous improvement of the environmental performance of the new project once it's completed. The monitoring programme will be based on the Environmental Management Plan and the results of analysis of environmental parameters. The key features of the monitoring programme will include a focus on water consumption and disposal of sewage, energy consumption, waste generation and disposal and social monitoring plan.

Reporting
Report preparation will be undertaken through a desktop approach. The consultants will prepare copies of reports for each stage as per NEMA requirements and include copies for both file and client.

Referees

Organization/Institution	Contact details
Kenya Ports Authority	Mr. Githinji Maina +254722176147
Devki Steel Mills	Mr. Samir Shah+254733272547
Agakhan Hospitals	Mr. Aquinius Mung'atia +254722365450
JICA	Mr. Cyrus Mbisi +254720927251
Kenya Maritime Authority	Capt. Dave Muli +254729403588

Supporting documentation
1. Copy of Certificate of Incorporation of the Company
2. Copy of PIN Certificate of the Company
3. Copy of Tax Compliance Certificate
4. Copy of Single Business Permit

Annex 4: Curriculum Vitae of Key Staff proposed for implementation of the EMMP

（1）Curriculum Vitae for the project manager of KOT CCCC LTD.

Form: Resume of Proposed Personnel

Date: 19th March, 2019

Position: Project Manager				
Personnel information	Name	Lin Zhiping	Age	40
	Date of Birth	08 Nov. 1979	Sex	Male
	Education: 1998-2002 - Diploma in Transportation & Civil Engineering in South China University of Technology.			
	Present Employer- China Communication Construction Company New KOT Project Position: Project Manager			

Summarize professional experience over the 20 years in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Company, project, Position, and Relevant Technical and Managerial Experience
Jan. 2019	Up to date	CCCC New Kipevu Oil Terminal Position: Project Manager
2017	2018	Manager of technology department of First company of Fourth harbor of CCCC.
2014	2017	Vice manager of technology department of First company of Fourth harbor of CCCC.
2013	2014	Project chief engineer of Nakala Corridor Project, Marine works in Nakala, Mozambique. Responsible for technical issues and site construction management. The project adopts include BS, En code and standard. The employer is Vale Brazil.
2011	2013	Project chief engineer and construction manager of Kenya Port of Mombasa berth 19 and adjacent container stacking yard project. Responsible for technical issues and site construction management. The project adopts include BS, En code and standard. The employer is Kenya Port Authority.
2008	2011	Deputy Project Chief Engineer of the Port Said East Container Terminal Phase 2 Marine Works project, Egypt. Responsible for technical issues and design affairs, and coordination with designer and consultant. The project adopts include BS, API and Egypt code and standard. The employer is world largest container terminal operation company, MAERSK.

（2）Curriculum Vitae for the HSE manager of KOT CCCC LTD.

Form: Resume of Proposed Personnel

Date: 19th March, 2019

Position HSE Manager (Alternative)		
Personnel information	Name David Leo（Liu Tingming）	Date of birth 1986-03-20
	Professional qualifications HSE Engineer	
Present employment	Name of employer China Communications Construction Company Ltd.	
	Address of employer No.85 Deshengmenwai Street, Beijing, China	
	Telephone +86-10-82016655	Contact (manager / personnel officer) Liu Qitao
	Fax +86-10-82016500	E-mail ir@ccccltd.cn
	Job title HSE Manager	Years with present employer 10 years

Summarize professional experience over the last 10 years, in reverse chronological order. Indicate particular technical and managerial experience relevant to the project.

From	To	Project/ Position/ Relevant Technical and Management Experience
Jan. 2019	Up to date	CCCC New Kipevu Oil Terminal Position: HSE Manager
2017	2018	Engineering, Procurement, Construction (EPC) of Fishing Port Expansion Phase III & IV Project in Luanda, Angola / Safety Officer / Establishing the health/safety/environment control procedure based on project manuals. Taking measures for construction safety. In charge of health and safety training with the sub-contractor and labour. Be responsible for dealing with safety incident. Ensure that the site works is done safely.

2013	2016	Luanda Oil Service Base Expansion Quay Wall Between Heavy Lift Dock and TCT Area / Safety Officer / Establishing the health/safety control procedure based on project manuals. Taking measures for construction safety. In charge of health and safety training with the sub-contractor and labour. Be responsible for dealing with safety incident. Ensure that the site works is done safely.
2011	2013	Berth No.19,Mombasa Port，Kenya/HSE manager/Establishing the health/safety control procedure based on project manuals. Implement and monitor the HSE plan,carry out the safety induction,health and safety training with the sub-contractor and labour. Organize the drill of emergency respond. Ensure that the site works is done safely.
2009	2011	Angola LNG Project Marine Facilities Work / Safety Officer / Establishing the health/safety control procedure based on project manuals. Taking measures for construction safety. In charge of health and safety training with the sub-contractor and labour. Be responsible for dealing with safety incident. Ensure that the site works is done safely.

Annex 5: Company Profile of the NEMA Designated Laboratory i.e. Polucon Services (K) Limited and accreditation Certificates


Polucon
At your service
OUR VISION
We want to be recognized as the African premier inspection and laboratory Testing Company.
We want customers to identify us with value and consistent quality service.
We are committed to hiring the best employees who are committed to personal growth and who will satisfy our customer needs.
MISSION STATEMENT
Our mission is to meet and exceed our clients' unique requirements through understanding their dynamic needs.
This will be achieved by combining our resources of highly trained, experienced team members and application of effective Quality Management Systems.
CORE VALUES
Integrity, Independent Impartial & Professional
ISO 9001 Certified Company
ISO / IEC 17025 Accredited Laboratory
ISO/IEC 17020 Accredited Inspection Body
ISPM 15 Authorised
ABOUT US
Polucon is a leading Africa's Inspection Verification, Testing & Pest Control Services Company. Established in Kenya in 1990 and headquartered in Mombasa, we are known as the beacon of quality in service delivery to the satisfaction of our clients. We currently operate all over Africa and the rest of the world through our global network partners.
Founded on the platform of professionalism: complete independence, integrity and efficacy define our service delivery process. We ensure that products, processes and installations meet the applicable benchmarks, whether regulatory, voluntary or client specific.
Passion, integrity, entrepreneurship and innovation are the values we put on a pedestal to deliver bespoke solutions of unequalled and reliable value to our clients with respect to industry needs. Whenever you need us, we are always at your service; wherever you are.
We offer inspection of Cargo Survey and Surveillance Services, Consumer Products Inspection, Pre-procurement Inspection, Lab Testing & Analysis, Environmental Pollution Control Services, Fumigation and Pest Control Services.
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OUR SERVICES

1 INSPECTION & VERIFICATIONS

Polucon has vast experience in providing a complete range of inspection services.

These include:

- Vessel Draft Survey
- Cargo Loading Surveys
- Cargo Discharge Surveys
- Vessel Hatch Inspection
- Cargo Tally and Weighing
- Container Suitability Verification
- Container Stuffing / De-stuffing
- Reefer Temperature Monitoring
- Project cargo surveys
- Sampling
- Damage Surveys
- P & I Surveys
- Stock Monitoring
- Cargo Inspection and Surveillance Services
- Marine Survey
- Consumer Products Inspection
- Pre-shipment Inspection
- Pre-procurement Inspection
- Technical Consultancy and Advice on all matters related to the above services

4

Polucon has a qualified team of cargo inspectors with many years experience in handling inspection and surveillance of food commodities; grains, milled products, vegetable oils, processed foods, chemicals, petroleum, LPG, petrochemicals and minerals.

Polucon is also able to offer tailor-made services for those clients with special requirements. We are a fully licensed international all round surveyor.

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2 LABORATORY TESTING SERVICES
We offer contract laboratory testing services to manufacturers, NGOs, importers, exporters, governments and consumers among others.
Our testing services cover wide spectrum of goods and commodities ranging from grains and cereals, fish, tea, coffee, feeds and feeds stuffs, flours and flour products, farm inputs, water, petroleum, petrochemicals, minerals, soil etc.
Laboratory testing and analysis department is a core tenet in our service portfolio. We have a wide scope of speciality and our services include micro-biology, chemical e.g. Vitamins, Aflatoxin, Pesticide Residues, Protein Elementary Analysis, Mineral Assay to Physical Tests.
Our laboratory is ISO/IEC 17025:2005 accredited and is one of the few laboratories in the continent which have gained publicity through our indisputable high level of competency.
Polucon
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AGRI & FOOD DIVISION
We offer complete food analysis, chemical, physical and microbiological analysis that includes and not limited to:
Aflatoxin
Heavy metals
Moisture
Vitamins
Energy content analysis
Nutritional value
Cereal grading
Tea & Coffee analysis
Water analysis
Honey analysis
Horticultural produce analysis
Drinks and beverages analysis
Fats and Oils analysis
Nuts analysis
Pesticides residue analysis
MINERAL, NON FOOD ITEMS AND PETROLEUM LABORATORY
Highly equipped to offer
Feed analysis
Soil analysis
Fertilizer
Minerals
Petrochemical and petroleum product analysis
Liquid Petroleum Gas (LPG) analysis
STANDARD CONFORMITY SERVICES
Good Manufacturing Practices (GMP)
Good Agriculture Practices (GAP)
ISO 22000
etc
Polucon
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3 ENVIRONMENTAL SERVICES
Polucon is an acronym for "Polution Control".
Polucon is a NEMA designated and gazetted laboratory that offers comprehensive range of environmental monitoring and auditing services to help companies fulfil their legal obligations to comply with environmental regulations.
Our monitoring capabilities include and not limited to:
• Effluent Analysis
• Soil Analysis
• Noise Mapping
• Light Intensity
• Air Monitoring
• Vibration Monitoring
• Water Analysis
• Environmental Impact Assessment & Audits (EIA)
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4 FUMIGATION & PEST CONTROL SERVICES
Our pest control department is committed to implementing a vital system of control of pests for the safety of the overall public and private sectors. Our pest control practices are sound of the relevant safety, quality and environmental guidelines.
The Pest control department is licensed by the Pest control products board as well as the Kenya Plant Health Inspectorate Services (KEPHIS). In addition, we work closely with NEMA to ensure that we are sound to what is environmental friendly.
Our Health and Safety policies ensure both our customer's and our employees are safe from our operations.
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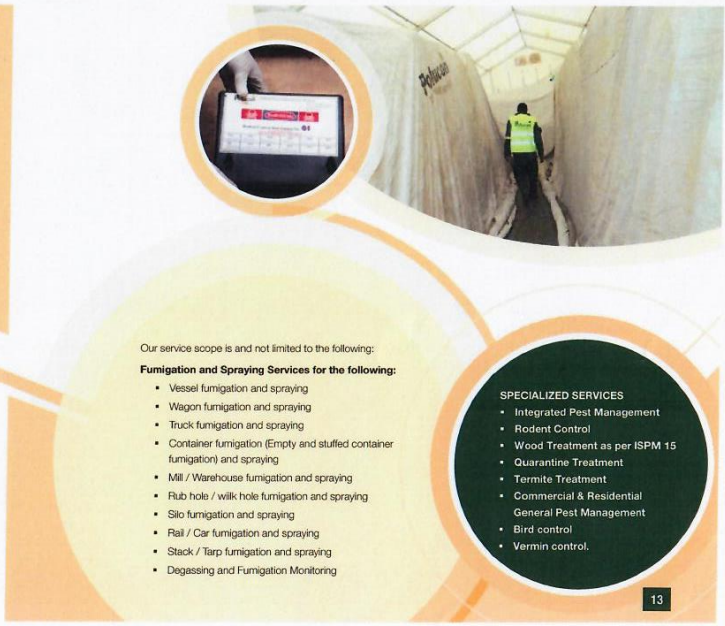
Our service scope is and not limited to the following:
Fumigation and Spraying Services for the following:
Vessel fumigation and spraying
Wagon fumigation and spraying
Truck fumigation and spraying
Container fumigation (Empty and stuffed container fumigation) and spraying
Mill / Warehouse fumigation and spraying
Rub hole / wilk hole fumigation and spraying
Silo fumigation and spraying
Rail / Car fumigation and spraying
Stack / Tarp fumigation and spraying
Degassing and Fumigation Monitoring
SPECIALIZED SERVICES
Integrated Pest Management
Rodent Control
Wood Treatment as per ISPM 15
Quarantine Treatment
Termite Treatment
Commercial & Residential General Pest Management
Bird control
Vermin control.
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COUNTERFEIT
5 FIGHTING COUNTERFEIT
Polucon Services Kenya Ltd is an ISO 9001:2008 certified verification, examination and Testing company operating all over Africa and network partners worldwide.
Polucon has its own ISO/IEC 17025:2005 International Accredited Laboratory and an ISO 17020 inspection and verification department.
It is on this strength that Polucon derives the technical capacity to perform verification, testing and analysis of counterfeits and substandard goods in view of fighting illicit trade.
Polucon acts as an expert witness for the IP owners in case of a court process and identification of counterfeits through testing and verification.
We work with IP owners to understand specifications and general technical features of their genuine products and therefore set strategies to fight the vice.
Polucon acts as a technical agent for IP owners representing them on all matters related to Intellectual Property infringement.
Polucon
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AMONG OUR CLIENTS
Agility
WFP
unicef
Finlays
OiLibya
CRS faith. action.
ARM
ARM CEMENT LTD
SERENA HOTELS
Van Oord
Marine ingenuity
UNOPS
Kenya Bixa Limited
TOYOTA
Pwani
University College
KENSALT
SOUTHERN PALMS BEACH RESORT
Unilever
Pwani
KTDA
GAPCO
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REGIONAL OFFICES
Polucon has Network Partners in 140 locations worldwide enabling us to serve you anywhere in the world.
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Mombasa, Kenya
Phone: +254 41 4470777/3/4
Mob: +254 722 229 944
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Email: polucon@polucon.com
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LIBYA
EGYPT
SAUDI ARABIA
SUDAN
MALI
NIGER
CHAD
NIGERIA
ETHIOPIA
SOMALIA
SOUTH SUDAN
DEMOCRATIC REPUBLIC OF THE CONGO
TANZANIA
ANGOLA
SOUTH AFRICA
IRAN

Certificate No. **IB/06**

KENYA ACCREDITATION SERVICE

KENAS

Accreditation Certificate

This is to certify that

POLUCON SERVICES KENYA LIMITED

is accredited as an Inspection Body type A
upon satisfying the requirements of

ISO/IEC 17020: 2012

Conformity Assessment: Requirements for the operation of various types of bodies performing inspection in respect of the attached schedule

Effective from: **18th June 2018**

Expiry on: **20th September 2022**

KENYA ACCREDITATION SERVICE KENAS

ilac-MRA

Martin Cheptie

Chief Executive Officer / Authorised Officer
Kenya Accreditation Service

Kenya Bureau of Standards
P O Box 54974-00200, Popo Road-South C, Nairobi

QUALITY MANAGEMENT SYSTEM CERTIFICATION SCHEME

CERTIFICATE OF REGISTRATION

No. KEBS/QMS/RF/044 Rev. 03

Annex 1 of 1

Location Certified	Activities Certified
Polucon Services (K) Limited P.O. Box 34077-80118 Nyali Road, Off Links Road - Nyali **MOMBASA**	Cargo Inspection & Verification,Laboratory testing and Pest Control Services.

Date of issue: 28th June 2018
Date of first issue: 10th February 2006
Date of expiry: 3rd April 2021

This annex is approved by:

Dr. Moses Ikiara, MBS
Ag. MANAGING DIRECTOR

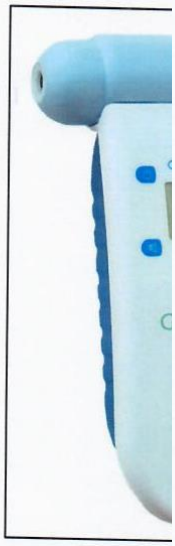
Valid subject to the condition of the scheme. Printed copies of this certificate can be validated at www.kebs.org

Annex 6: Monitoring Equipment to be used to implement the EMMP

Turbidimeter -

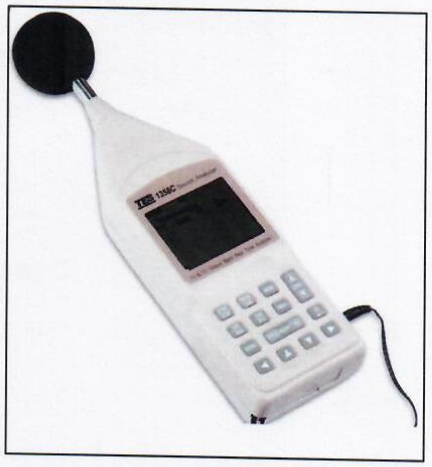
Nitrogen dioxide gas detector

Sulfur dioxide gas detector



Portable air q
pollution monit

Sound level meter used for acoustic measurements



Sound analyzer for noise sampling

Annex 7: Calibration Certificates of the monitoring equipment

INSTRUMEX
An ISO 9001-2015 Certified Company

TEST CERTIFICATE FOR AQM-900

Certificate No: AQM900/18-19/642

Name of the Client : M/s. Polucon Services Ltd. Kenya

Model No. : AQM-900

Serial No. : 12183

Date of Testing (DD/MM/YYYY) : 12/12/2018

Sr. #	Parameters	Value on Device Under Test	Standard Value	Deviation	Remarks
		(a)	(b)	(a)-(b)	
1	Temperature in °C	26.7	26.6	0.1	Acceptable
2	Humidity in %	30.9	31.4	-0.5	Acceptable
3	PM2.5 in µg/m³	96.0	98.0	-2.0	Acceptable
4	PM10 in µg/m³	67.0	65.0	2.0	Acceptable
5	CO in mg/m³	1.928	1.933	-0.005	Acceptable
6	SO_2 in mg/m³	0.101	0.099	0.002	Acceptable
7	H_2S in mg/m³	0.073	0.076	0.003	Acceptable
8	NO_2 in mg/m³	0.006	0.005	0.001	Acceptable
9	O_3 in mg/m³	0.089	0.088	0.001	Acceptable
10	NO in mg/m³	0.030	0.032	-0.002	Acceptable

Remark: The average deviation in the above test has been found to be within acceptable limits as per standards.

Certificate Prepared by:	
Rishabh K.	
Certificate Checked by:	
Radheshyam K.	

Factory Certificate Stamp

INSTRUMEX MUMBAI, INDIA

Registered Office : 106, Ashish Udyog Bhavan, Opp. SNDT College, Liberty Garden, Malad (W), Mumbai - 400 064, India.
Tel: +91-22-28443997 / 67427738 | M: 9322235281 / 9702284343 | Email: info@instrumex.co.in | Web: www.instrumexindia.com

aeroqual

Aeroqual Limited
460 Rosebank Road, Avondale, Auckland 1026, New Zealand.
Phone: +64-9-623 3013 Fax: +64-9-623 3012
www.aeroqual.com

Calibration Certificate No. 25581

Calibration Date: 18 May 2018 11:28

Model: NMHC 0-25 ppm

Serial No: VN--1801301-036

Environmental Conditions

Temperature 23.0 °C

Relative Humidity 19.0 %

Measurements

Calibration Standard /ppm	0.0	10.0	20.0	0.0
AQL Sensor (Mean) /ppm	0.0	10.6	21.1	0.0
AQL Sensor (Std. Dev) /ppm	0.000	0.153	0.115	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

This sensor was calibrated against a certified mixture of isobutene in synthetic air diluted with zero air using mass flow controllers with calibrations traceable to the National Institute of Standards and Technology (NIST).

QC Approval: **Farid Yanes**

Date: **18 May 2018**

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www.aeroqual.com

Calibration Certificate No. 24890

Calibration Date: 24 Apr 2018 08:39

Model: **Carbon Monoxide 0-25ppm GSE**

Serial No: ECM-1904181-006

Environmental Conditions

Temperature 21.0 °C

Relative Humidity 29.1 %

Measurements

Calibration Standard /ppm	0.00	20.00	0.00	0.00
AQL Sensor (Mean) /ppm	0.00	19.94	0.00	0.00
AQL Sensor (Std. Dev) /ppm	0.000	0.011	0.000	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

This sensor was calibrated against a certified mixture of carbon monoxide in synthetic air diluted with zero air using mass flow controllers with calibrations traceable to the National Institute of Standards and Technology (NIST).

QC Approval: **Takao Yamasaki**

Date: **24 Apr 2018**

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Calibration Certificate No. 25528

Calibration Date: 16 May 2018 16:52

Model: Ozone Ultra Low 0-0.15 ppm

Serial No: OZUL1801501-177

Environmental Conditions

Temperature 27.8 °C

Relative Humidity 52.7 %

Measurements

Calibration Standard /ppm	0.005	0.059	0.120	0.000
AQL Sensor (Mean) /ppm	0.006	0.058	0.119	0.000
AQL Sensor (Std. Dev) /ppm	0.002	0.001	0.000	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

The Aeroqual ozone sensors are calibrated in a controlled environment against a NATA certified ozone UV photometer whose traceability is maintained with international standards organisations. *NATA is Australia's national body for accreditation of producers of certified reference materials.

QC Approval: **Farid Yanes**

Date: **16 May 2018**

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Phone: +64-9-623 3013 Fax: +64-9-623 3012
www.aeroqual.com

Calibration Certificate No. 25528

Calibration Date: 16 May 2018 16:52

Model: Ozone Ultra Low 0-0.15 ppm

Serial No: OZUL1801501-177

Environmental Conditions

Temperature 27.8 °C

Relative Humidity 52.7 %

Measurements

Calibration Standard /ppm	0.005	0.059	0.120	0.000
AQL Sensor (Mean) /ppm	0.006	0.058	0.119	0.000
AQL Sensor (Std. Dev) /ppm	0.002	0.001	0.000	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

The Aeroqual ozone sensors are calibrated in a controlled environment against a NATA certified ozone UV photometer whose traceability is maintained with international standards organisations. *NATA is Australia's national body for accreditation of producers of certified reference materials.

QC Approval: **Farid Yanes**

Date: **16 May 2018**

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Phone: +649-623 3013 Fax: +64-9-623 3012
www.aeroqual.com

Calibration Certificate No.1177

Calibration Date: 23 April 2018

Model: PM2.5 PM10 0-1.000 mg/m3

Serial No: 5001-ACC6-001

Measurements

	PM2.5 mg/m3	PM10 mg/m3
Reference Zero	0.000	0.000
AQL Sensor Zero	0.000	0.000
Reference Span	0.136	0.189
AQL Sensor Span	0.141	0.191

Calibration Standard

Standard	Manufacturer	Model	Serial number
Optical Particle Counter	Met One Instruments	9722-1	U11996
Test aerosol	ATI	0.54 µm latex microspheres	n/a

QC Approval:

Date: 23-Apr-18

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www.aeroqual.com

Calibration Certificate No. 24742

Calibration Date: 16 Apr 2018 16:42

Model: Nitrogen dioxide 0-1 ppm

Serial No: ENW-1004181-002

Environmental Conditions

Temperature 27.8 °C

Relative Humidity 52.5 %

Measurements

Calibration Standard /ppm	0.028	0.363	0.000	0.000
AQL Sensor (Mean) /ppm	0.035	0.365	0.000	0.000
AQL Sensor (Std. Dev) /ppm	0.000	0.000	0.000	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

The Aeroqual sensor is calibrated against a chemiluminescence NOx analyser. The calibration of this analyser is traceable to primary standards.

QC Approval: Takao Yamasaki

Date: 16 Apr 2018

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Calibration Certificate No. 25134

Calibration Date: 03 May 2018 10:28

Model: VOC PID 0-20 ppm

Serial No: PDL-0204181-004

Environmental Conditions

Temperature 25.1 °C

Relative Humidity 29.3 %

Measurements

Calibration Standard /ppm	0.00	20.00	0.00	0.00
AQL Sensor (Mean) /ppm	0.00	20.04	0.00	0.00
AQL Sensor (Std. Dev) /ppm	0.000	0.008	0.000	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

This sensor was calibrated against a certified mixture of isobutene in synthetic air diluted with zero air using mass flow controllers with calibrations traceable to the National Institute of Standards and Technology (NIST).

QC Approval: **Farid Yanes**

Date: **03 May 2018**

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www.aeroqual.com

Calibration Certificate No. 24178

Calibration Date: 14 Mar 2018 11:19

Model: **Methane 0-10000 ppm**

Serial No: MT--3011171-014

Environmental Conditions

Temperature 24.5 °C

Relative Humidity 31.2 %

Measurements

Calibration Standard /ppm	0	4000	6000	0
AQL Sensor (Mean) /ppm	0	4061	6044	0
AQL Sensor (Std. Dev) /ppm	0.000	8.641	14.922	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

This sensor was calibrated against a certified mixture of methane in synthetic air diluted with zero air using mass flow controllers with calibrations traceable to the National Institute of Standards and Technology (NIST).

QC Approval: **Farid Yanes**

Date: **14 Mar 2018**

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Calibration Certificate No. 25057

Calibration Date: 02 May 2018 09:14

Model: Hydrogen Sulphide 0-10 ppm

Serial No: EHS-0205181-003

Environmental Conditions

Temperature 23.2 °C

Relative Humidity 25.7 %

Measurements

Calibration Standard /ppm	0.00	5.09	0.00	0.00
AQL Sensor (Mean) /ppm	0.00	5.09	0.00	0.00
AQL Sensor (Std. Dev) /ppm	0.000	0.000	0.000	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

The Aeroqual sensor is calibrated against a certified UV fluorescence analyser.

QC Approval: Farid Yanes

Date: 02 May 2018

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www.aeroqual.com

Calibration Certificate No. 25142

Calibration Date: 03 May 2018 10:32

Model: Sulphur Dioxide 0-10 ppm

Serial No: ESO-0205181-008

Environmental Conditions

Temperature 22.8 °C

Relative Humidity 27.4 %

Measurements

Calibration Standard /ppm	0.00	5.00	0.00	0.00
AQL Sensor (Mean) /ppm	0.00	5.01	0.00	0.00
AQL Sensor (Std. Dev) /ppm	0.000	0.000	0.000	0.000

*The Mean and Standard Deviation are calculated from three consecutive readings.

Calibration Standard

The Aeroqual sensor is calibrated against a certified UV fluorescence analyser.

QC Approval: **Farid Yanes**

Date: **03 May 2018**

ORIGINAL

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Website: www.kebs.org

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BS/MET/19/15/3/6/76

REQUESTED BY:	POLUCON SERVICE(KENYA) LIMITED
ADDRESS :	P.O. BOX 99344
EQUIPMENT:	SOUND LEVEL METER
TYPE/MODEL :	TES-1358C
SERIAL NO. :	150201997
MANUFACTURER:	TES
LAB. NO. :	ACOUSTICS AND VIBRATION-NP 15
DATE :	2018-08-28
CERTIFICATE NO.:	BS/MET/19/15/3/6/76
STICKER SERIAL NO:	36409

1.0. STANDARDS AND REFERENCE EQUIPMENT USED

Multifunction Acoustic Calibrator Type 4226 S/No. 2532059 with a standard uncertainty of ± 0.075 dB was used in the calibration process.

2.0. 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: **2018-08-28**

Checked By: Anderson Maina Date: 2018-08-28

Signed : Kiaguka Date: 2018-09-04

For: MANAGING DIRECTOR

3.0. CALIBRATION RESULTS

3.1 Reading at Reference

Function	Standard Sound Pressure Output (dB)	Reading Before Adjustment (dB)	Reading After Adjustment (dB)	Expanded Uncertainty
FAST	93.9	94.3	NOT ADJUSTED	0.2

3.2 Frequency Response (Inverse A)

Nominal Frequency(Hz)	Expected Sound Pressure Level(dB)	DUT Reading (dB)	Acceptable Tolerance (±dB)	Expanded Uncertainty
31.5	93.9	98.7	3.5	0.2
63	93.9	94.9	2.5	0.2
125	93.9	94.6	2.0	0.2
250	94.0	94.5	1.9	0.2
500	93.9	94.4	1.9	0.2
1000	93.9	94.4	1.4	0.2
2000	93.9	94.5	2.6	0.4
4000	94.0	95.5	3.6	0.7

3.3 C - Frequency Weighting Response

Nominal Frequency(Hz)	Expected Sound Pressure Level(dB)	DUT Reading (dB)	Acceptable Tolerance (±dB)	Expanded Uncertainty
31.5	110.9	111.5	3.5	0.2
63	113.1	113.8	2.5	0.2
125	113.7	114.4	2.0	0.2
250	113.9	114.5	1.9	0.2
500	113.9	114.4	1.9	0.2
1000	113.9	114.3	1.4	0.2
2000	113.7	114.3	2.6	0.4
4000	113.1	114.7	3.6	0.7

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

Range	Level(dB)	DUT Reading(dB)	Expanded Uncertainty
20–100	93.9	94.3	0.2
20–100	93.9	94.3	0.2
20–100	103.9	104.3	0.2
30–120	103.9	104.3	0.2
30–120	113.9	114.3	0.2
40–130	113.9	114.5	0.2

3.5 Time-Weightings

Detector Characteristic	(a) DUT Primary Indicator Range Reading (dB)	(b) DUT Primary Indicator Range FSD - 4 dB (dB)	Deviation = (a) - (b)	Maximum Response
F	105.0	106.0	-1.0	-1.0
S	102.0	106.0	-4.0	-4.1

4.0 REMARKS

4.1 Calibration was conducted at a temperature of **(24 ± 1) ^{0}C**, relative humidity of **(53 ± 10) %RH** and pressure of **(837 ± 5) mbar.**

4.2 The reference for the dB scale is sound pressure level of 20 µPa at 1 kHz.

4.3 The reading in **bold** in section 3.2 exceeded the permitted tolerance for Type 2 sound level meters.

4.4 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 %.

4.5 This certificate is valid until **August 2019.**

Annex 8: Detailed Monitoring Schedule

Monitoring type	Parameters	Frequency	Year 2019												Year 2020											
			Sep				Oct				Nov				Dec				Jan				Feb			
Environmental Monitoring Plan		One-off	■	■																						
Baseline Monitoring plan		One-off			■	■																				
Water Quality	Physical	Daily			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Chemical	10 days				■		■		■		■		■		■		■		■		■		■		■
Biological	ROV and Fisheries	Bi-monthly					■		■		■		■		■		■		■		■		■		■	
	Mangrove nursery	Weekly					■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Planted Mangroves	Monthly																								
Air Quality monitoring (24hrs)		Quarterly				■										■										
Noise level monitoring (24hrs)		Quarterly				■										■										
Social -GRM	Complaints	Daily log	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Monitoring type	Parameters	Frequency	Mar				Apr				May				June				July				Aug			
Environmental Monitoring Plan		One-off																								
Baseline Monitoring plan		One-off																								
Water Quality	Physical	Daily	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Chemical	10 days		■		■		■		■		■		■		■		■		■		■		■		■
Biological	ROV and Fisheries	Bi-monthly	■		■		■		■		■		■		■		■		■		■		■		■	
	Mangrove nursery	Weekly	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	Planted Mangroves	Monthly				■				■				■				■				■				■
Air Quality monitoring (24hrs)		Quarterly				■								■				■								■
Noise level monitoring (24hrs)		Quarterly				■								■				■								■
Social -GRM	Complaints	Daily log	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■