TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGE 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LVWATSAN PROGRAM

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR REHABILITATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS UNDER WORKS PACKAGE 2 LOT 1

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CERTIFICATION

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT- SEPTEMBER 2021

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EXEUTIVE SUMMARY

1.0 Introduction

In this section, we present general information that summarizes the findings of the Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply network within Kisumu city and satellite towns. The objective of this study was to evaluate the environmental and social impacts that are likely to emanate from construction, operation and decommissioning phases of the proposed project. We have, as a way forward suggested ways of minimising the identified adverse impacts and optimizing the positive impacts.

2.0 Proposed Project

The proposed project is a water supply project whose objective is to supply water to residents of Kisumu city and Satellite towns. The project will involve rehabilitation, reinforcement and extension of water supply infrastructure in Kisumu city; to reduce Non-Revenue Water (NRW); improvement of water supply within Northern and Eastern Kisumu through laying and rehabilitation of distribution network from Kajulu WTP and Kibuye, Mamboleo, Kibuye, Obwolo and Kanyamedha tanks; and rehabilitation and extension of water supply to adjacent localities including Kiboswa and Maseno (transmission mains, pumping stations, storage tanks, boreholes and springs and distribution network). The activities associated with the proposed project and which may lead to adverse environmental and social impacts to members of the public include site clearance; topsoil removal; demolition works; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works; compaction; and surface restorations and reinstatement

3.0 Objective of the Project

The general objective of this project is to improve water supply within Kisumu City and satellite towns through rehabilitation and extension of water supply infrastructure.

4.0 Scope of works

Scope of works for the proposed assignment includes the following:

(i) Rehabilitation and extension of 118 km of OD63 to OD450 transmission and distribution lines in Kisumu City, with 250m^3 ground tank in Obwolo area and 150m^3 Elevated tank at Ukweli, as well as pumping stations.
(ii) Rehabilitation and extension of 25.7 km of OD63 to OD200 transmission and distribution line in Maseno Town, new 1,000m^3 reservoir, drilling or rehabilitation of 2 boreholes and harnessing existing springs;
(iii) Extension of 13km of OD90 to OD225 transmission and distribution network works within Kisumu North area, harnessing of Kalai Springs and Bar K'Oraro springs and construction of related small reservoirs and pumping stations and construction of 1,000m^3 reservoir at Gee.

5.0 Objective of ESIA study

The general objective of the ESIA investigations is to carry out a systematic examination of the present environmental situation within the project area to determine whether the proposed project will impact adversely on the physical and biological elements of the environment within the project area. This is in line with Section 58 (1) of EMCA 1999 that requires proponents to carry out ESIA on projects that appear in the Second Schedule of the Act.

6.0 Study methodology

The following is a summary of methodology pursued in this ESIA study:

6.1 Reconnaissance visit

This was the initial site acquaintance visit whose main aim was to understand the project area, identify constraints, and develop impressions on topography, soils, existing developments and practicality of carrying out project activities within the proposed project area.

6.2 Literature review

This is an indirect method of data gathering and published data both on the internet and from physical sources were collected. Both quantitative and statistical information from relevant secondary sources including various documents and reports on Kisumu County in general and project area in particular were collected and analysed. Special emphasis was placed on baseline information, climate, hydrology, soils, national environmental laws and regulations, human population, settlements and socioeconomic infrastructure within the project area

6.3 Field visits

Field studies were undertaken to evaluate the types, mode of action and magnitude of the specific projected effects and impacts, both favourable and detrimental to the environment and natural resources. This encompassed detailed analysis of water resources, sensitive ecosystems, settlements, health and safety issues as well as general structure of the physical, biological and socio-economic environment.

6.4 Questionnaire administration

Questionnaires were prepared and administered to various stakeholders identified at the initial stages of the study. Those interviewed provided critical insights with regard to socio-economic activities within the project area and how project activities are likely to impact on local populations.

6.5 Key informant interviews

One-on-one interviews with community members within the project area were undertaken to assist in the analysis of impacts to the community and institutions within the project area. Key informants drawn from community leadership structures were engaged during this project and provided critical socio-economic data and information about the project area.

7.0 Baseline Information

Below is description of the baseline information from the project area.

7.1 Location of the Project

The proposed project area is located within Kisumu County and traverses a number of sub counties including Kisumu Central, Kisumu East and Kisumu West Sub Counties. The project area is dominated by various land uses including residential, commercial, institutional and industrial all of which are likely to be affected by project activities during construction phase. The project will be implemented in both built area and within the countryside and this will significantly impact on vegetation species within the project area.

7.2 Climatic Conditions

The mean annual rainfall varies with altitude and proximity to the highlands along the Nandi Escarpment and Tinderet. The area has two rainy seasons, with the long rains occurring in March and May while the short rains occur in September to November. During the short rains the average annual rainfall ranges between 450mm and 600mm. Rainfall data indicates that the county largely receives substantial rainfall. Maseno has a mean annual rainfall of 1,630mm while Kisumu 1,280 mm, and Kibos 1,290 mm. The lowland area which forms a trough of low rainfall receives a mean annual rainfall of between 1,000mm and 1,800mm. Although there is no entirely dry month, the peak generally falls between March and May, with a secondary peak in September to November. The mean annual maximum temperature ranges 25°C to 35°C and the mean annual minimum temperature ranges 9°C to 18°C. The altitude in the county varies from 1,144 metres above the sea level on the plains to 1,525 metres above sea level in the Maseno and Lower Nyakach areas. This greatly influences temperatures and rainfall in the county.

7.3 Demographic features

The 2019 national population census put the population of Kisumu County at 1,155,574 persons. Out of this number, 560,942 are male while 594,609 people are female. The project area traverses three sub-counties of Kisumu with total population of 567,963. Kisumu East sub-county has a total population of 220,997 people while Kisumu Central and Kisumu West sub-counties have total populations of 174,145 people and 172,821 people respectively. The mean population density in Kisumu City is projected to vary from 2,017 per km^2 to 3,735 per km^2 from the year 2006 to the year 2031.

7.4 Biodiversity

The project area has undergone significant changes in biodiversity due to human activities. Human habitation and agricultural activities have significantly interfered with both terrestrial and aquatic habitats in the project area. The project area is endowed with flora, fauna and microbes. The area's wild animals are classified as grassland community. In recent years, man has caused the destruction of the grassland cover, has killed vast numbers of wild animals, and in so doing has opened up large areas for domestic animals. In this way, the number of wild herds has been reduced and they now tend to be confined to certain protected areas.

The area has abundance diversity of trees which is attributed to the fact the area experiences more reliable rainfall; soils are relatively fertile and there is less interference from termites. The various plant species have also adapted to local environmental conditions prevailing. Indigenous trees found within the project area include Balanites spp, Acacia spp, Grewia vilosa, Albizia coriaria, Diospiros abyssinica, Euphorbia triculli, Markhamia lutea, Cassia siamea and Candelibrum spp among others. Common exotic trees within the project area include among others Eucalyptus spp, Thevetia peruviana, Casuarina equistifolia, Croton spp, Leuceana leucocephala, Jacaranda mimosifolia and Grevillea robusta.

7.5 Energy sources

The main sources of energy within the project area are electricity and thermal (firewood, charcoal, kerosene, LPG, biogas and solar). The County has not fully tapped into the potential of solar power and renewable energy. Household electricity consumption accounts for only 5.8 percent of the total electricity supplied by Kenya Power. Electricity coverage stood at 46.24 percent in 2015. The main sources of renewable energy that have been exploited in the County for electricity generation are hydropower and biomass.

7.6 Land Use

The current major land uses within the project area are for industrial, commercial and residential purposes. The industrial area is situated close to the lake and runs parallel to the lakeshore. The area is served mainly by the railway and acts as the terminus of the two railway lines that connect Kisumu with the rest of Kenya. The industrial area is separated from other land uses by Makasembo road and extends towards the airport in the northwest.

The Central Business District (or CBD) is the main area of commercially-used land in town. The northern section of the CBD predominantly consists of the central and local government administrative offices, whereas the central portion consists of modern offices, department stores and branches of Nairobi-based companies.

The residential zone covers the greatest portion of urban land in Kisumu. Distinct subdivisions of residential areas related to the historical growth of the town can also be noticed. Kisumu's residential land use falls into three main categories namely the high-class residential areas; low and middle income/ public housing areas; and the peri-urban, slum settlements and the rural extended boundary areas.

Surrounding the central part of the town is a belt of unplanned slum and informal settlements that has developed to form a semi-circle around the old town. These include Nyalenda, Manyatta, Bandani, Kibos, Nyamasaria, Pandpieri, Migosi and Obunga. Manyatta Arab and Kaloleni alone are located within the CBD.

7.7 Water Supply

The water supply system in Kisumu can be categorized into three systems: that provided by KIWASCO, the peri-urban system and the system provided within the informal settlements. The existing water supply facilities provided by KIWASCO are in very poor condition and a large proportion of the population has no access to the service. The coverage of KIWASCO's current water supply network commands 80% and is mainly concentrated within the built up urban centre. The combined water supply capacity from the two water treatment systems amounts to 81,000m^3/day. Peri-urban water supply systems consist of small-scale systems, outside the Kisumu Municipal County service area, operated by Community Based Organisations (CBOs), Non-Governmental Organisations (NGOs), etc. Informal Settlements Systems are a combination of the Municipal System and Peri-urban Systems.

Maseno town used to get its water from Maseno – Kombewa scheme which is supplied from Maragoli brooks (a small stream), where an intake is located, and through Maseno WTP. It was constructed in 1978 for a design capacity of 1 800 m^3/d and a tank of 450 m^3. Currently, the plant operates at an average capacity of 1 200 m^3/day. There are two existing tanks at Houma (100 m^3) and Ojola (100 m^3). This scheme used to be under the supervision of the Gulf Water Company, which has now been integrated within KIWASCO. The scheme does not supply Maseno for lack of pressure, although a DN75 supposedly exists. Maseno town currently gets its water from Amatsi Water Services Company Limited (AWASCO) through their Maseno Scheme. AWASCO is a Water Service Provider Company, operating in Vihiga County in line with Water Act 2016.

Maseno University is supplied from a water treatment plant located within the Yala Basin in the Vihiga County. It is operated by the Vihiga Water Supply and Sanitation Company (VIWASCO), under the control of Lake Victoria North Water Works Development Agency (LVNWWDA). Water gravitates from a weir on the Zaaba River - a tributary of Edzawa River - down to the treatment plant. It uses conventional treatment, with sedimentation and sand filtration. The main consumer of this plant is Maseno University, located at the border of Vihiga and Kisumu Counties. So, it targets a population of 15 000 students and 1 250 staff, for a total of about 16 250 people. The current supply from VIWASCO (1 200 m^3/day) is not enough for the University. In addition, the University relies on 5 boreholes which have a cumulated yield of 496 m^3/ day. It makes also an extensive use of roof harvesting, mostly for cleaning purpose.

Kisumu North including Kiboswa area gets its water from Nyahera – Mkendwa scheme which is supplied from Orinde springs. As the scheme is relying on spring water, the latter is of good quality and very low turbidity. So, chlorination is the only chemical process used for this scheme. This scheme used to be under the supervision of the Gulf Water Company, which has now been integrated within KIWASCO. This spring is equipped with a ground tank of 150 m^3. Water is then elevated to the tanks of Gee (2 tanks of 150 m^3 and 75 m^3). The yield of this Mkendwa spring is about 100 m^3/ day.

7.8 Crop and Livestock Production

The main food crops grown in the project area are maize, sorghum, beans, cassava and sweet potatoes. The project area is not associated with cash crop cultivation. Vegetables produced within project area include; tomatoes, onions, avocado and kales while fruits are mangoes, pawpaw, bananas, oranges and watermelon. The average farm size within the project area is 2 hectares. Due to small farm holdings and the resulting limited benefits of economies of scale, the practice of mechanized agriculture is heavily constrained.

Livestock production within the project area includes rearing of traditional breed of cattle, poultry, sheep, goats and pigs. All households visited during this study keep livestock. Animal husbandry practices are almost uniform across the area with most livestock species raised on extensive farming systems. A few farmers have shifted to intensive animal farming methods, which have increased the yield of the various livestock products. Livestock production continues to play a major economic and socio-cultural role within the project area. It provides a source of food, income, employment, power, organic manure, and a means of transportation.

8.0 Study findings

The following findings came out of the ESIA study

(i) From the EIA study, it was noted that Kisumu city, Maseno and Kiboswa area have a number of development challenges that need to be addressed to ensure sustainable implementation of the proposed water project. Water supply within great sections of the project area is inadequate and local inhabitants are forced to look for water from unreliable sources.
(ii) It was noted during the study that some of the water sources relied upon by the local people are unprotected and thus aggravates incidents of waterborne diseases.
(iii) Although significant sections of Kisumu city are currently covered by water supply network, Maseno and Kiboswa area still struggle with the problem of inadequate water supply. It was noted that some residents within these areas still get their drinking water from unprotected sources like shallow wells, springs and open rivers. This water, which is increasingly polluted, is often used without any treatment.
(iv) Water supply in the project area can also be unreliable due to pipe bursts due to relatively old pipes and vandalism by sections of the public. It is therefore important that a lasting solution to the water supply issue is realised and the proposed project timely: the local population will significantly benefit from it.
(v) It was noted during this study that the proposed project will lead to a number of environmental and social impacts both during construction and operation phases of the project. The adverse impacts will be on private properties, natural environment and neighbouring land uses. Analysis of the anticipated adverse impacts revealed that most of the impacts are low in significance and can be adequately mitigated through implementation of the recommended mitigation measures contained elsewhere in this ESIA Study Report.
(vi) The project will result in better access to safe drinking water leading to improved standard of living and changes in exposure to both communicable and non-communicable diseases.

(vii) Project implementation will promote a more sustainable use of water resources with improvements in the infrastructure to reduce losses and introduction of better metering and billing procedures to encourage more efficient use of water.

(viii) Cases of pipe bursts will be reduce thanks to the proposed project. Other benefits associated with the proposed project include reduced exposure to water related diseases; availability of clean water in recommended quantities and creation of employment opportunities to the local people among other benefits.

9.0 Public Consultation

Informing the local people, leaders and key stakeholders about the proposed project was carried out through community consultative meetings, key informant interviews, questionnaire administration, email communication and telephone calls. A number of issues regarding implementation of the proposed project were raised by stakeholders during public meetings and it is their wish that these issues are addressed amicably during project implementation to ensure sustainability. The main issues raised by stakeholders consulted are as follows:

- Water availability to everyone within the service area. Stakeholders wanted water to be available to all individuals within the service area in order to deal with the deficit being experienced at the moment.
- Compensation for land and property damaged also featured significantly during consultations. Those consulted are of the opinion that compensations should be made before project implementation commences.
- It also came out during the meetings that compensations were not made for the existing pipeline wayleaves and land owners may want further engagements during implementation of the proposed project.
- Those consulted indicated that there were no agreements made with land owners at the time the existing pipelines were laid.
- Stakeholders also wanted to know measures that will be put in place during implementation phase of the project to ensure that water supply is not interrupted.
- Other issues raised during public meetings include employment for local youths and experts;
- The need to make provisions for stand pipes and water kiosks for those who may not be in a position to connect directly to their houses;
- The need to have different rates for rural and urban dwellers;
- The need of the proponent to be involved in corporate social responsibility initiatives within the project area.
- Stakeholders consulted also felt that KIWASCO should consider reviewing their connection fees because it is felt to be prohibitive and beyond the reach of majority of local people.

For more on comments during public meetings, see Appendix 2 on Minutes of Public meetings

10.0 Environmental and Social Impacts and Mitigation Measures

The impacts associated with the proposed project will emanate from project inputs, activities and outputs. The project inputs that shall be potential sources of impacts include among others materials taken from the local and external sources and machinery to be used at the project site for various project activities. The project activities that shall be potential sources of impacts include excavation works, construction of project infrastructure and extraction and transportation of materials. Project outputs likely to lead to adverse impacts include solid wastes from construction and operation activities and emissions from the site (hydrocarbons, carbon dioxide, and particulate matter). The Table below summarises anticipated impacts and mitigation measures proposed.

Table 1.1: Environmental and Social Impacts and Mitigation Measures

Environmental Impact	• Mitigation Measures
Disruption of socio-economic activities within the project area	• Kiosk owners who have constructed their kiosks within road reserves will be advised in advance to remove the kiosks before excavation activities begin. • In situations where the facilities are outside the road reserve but have to be affected by the works, the affected individuals shall be compensated as per provisions of World Bank OP 4.12 and applicable Kenyan legislations. • Other option available is to reconstruct the affected structure on behalf of the Project Affected Person (PAP) • Loss of revenue from disrupted services shall be mitigated through compensation for the losses.
Disruption of services within the project alignment area	• Consultations with the service providers to ascertain location of service lines will be carried out before commencement of construction process; • The contractor shall liaise with Kisumu Water and Sanitation Company (KIWASCO) and private water service providers to restore all disrupted water services as soon as pipe laying and backfilling of trenched areas are finalised • The contractor shall liaise with Kenya Power Company and other utilities to restore power cables or other services disrupted during excavation activities as soon as pipe laying and backfilling of trenched areas are finalised.
Impact on fences and perimeter walls	• The destroyed fences will be restored by the contractor • Where destruction is significant, owners shall be compensated after the Resettlement Action Plan are carried out and the properties valued.
Impact on public infrastructure	• All excavated soil, if appropriate, shall be used for backfilling of trenched areas and site restoration. • Damaged road surfaces shall be adequately restored to pre-excavation conditions. • Excess spoil materials shall be disposed of in approved locations

	in compliance with existing laws, rules and regulations.
Blockage of drainage channels	• Working under dry weather conditions and unclogging all blocked storm water drainage channels shall be implemented.
Impacts of obtaining construction materials	• Maximise the re-use of excavated materials in the works, as fill. • Site quarries and borrow pits shall be chosen carefully to minimise impacts on existing land uses. • Strip all available topsoil from borrow pits and quarries and store it safely for use in site restoration. • Close all borrow pits and quarries in accordance with an approved plan to maximise their long-term biological productivity (capacity for plant growth) and minimise health and safety hazards. • Carry out EIA for quarry site if new quarries are to be opened for purposes of this project • Include a provision in the tender documents that where goods and services are of equal quality, those sourced from an organisation implementing a certified EMS and/or CSR approach will be preferred.
Accidents and Injuries to workers and residents	• The Contractor shall conform to all the stipulations of the Occupational Health and Safety Act, 2007. The Act requires the designation of a Health and Safety representative when more than 20 employees are deployed; • The contractor shall provide ample warning signs, guard rails, warning tape, etc., around open excavations, stacks of material, debris, etc. and shall be held liable for all claims as a result of neglect of such precautions and provisions; • Proper access control should be enforced to ensure that no unauthorised persons enter the site; • Material delivery vehicles shall be under the control of competent personnel. Ensure that persons handling equipment and materials are suitably trained, supervised and adequately instructed; • Valves to storage tanks should be locked to prevent accidental flooding during maintenance; • Use of requisite Personal Protective Equipment (PPE) at all times during construction works • Use fall protection equipment when working at heights; • Maintain work areas to minimize slipping and tripping hazards; • Use proper techniques for trenching and shoring; • When installing or repairing mains adjacent to roadways, implement procedures and traffic controls, such as establishment of work zones so as to separate workers from traffic and from equipment as much as possible; reduction of allowed vehicle speeds in work zones to 40km/hr; and use of high-visibility safety apparel for workers in the vicinity of traffic
Risks to local residents	• Establish and enforce a strict code of conduct for all project

	drivers including outside suppliers delivering materials. The code should focus on safety, especially speed, and loading, especially banning all carriage of staff, workers and passengers except in seats. • Establish and implement an HIV/AIDS prevention programme specifically related to the project's construction phase. The programme should include, at a minimum the identification of specific risk groups (e.g. bar workers, truck drivers), specific AIDS awareness campaigns for these risk groups and HIV/AIDS tests for identified sex workers and the provision of Anti retro-virals.
Exposure to Corona virus	• Hand washing station equipped with running water and soap shall be installed at the entrance to the work area for use by construction workers. • Construction workers shall be provided with face masks that shall be used all the time while at the site • All construction workers shall be required to self-report flue like symptoms. If any staff feels ill, the concerned staff will be tested to ascertain their Covid 19 status. • The contractor shall develop a risk plan with mobile food vendors. The vendors shall be required to comply with Covid 19 containment protocols including having a hand washing station equipped with running water and soap at their outlets. All utensils shall be properly washed and sanitized before use by customers. • Project personnel shall limit travels outside project area. Any person planning to visit any place outside the project area shall get clearance from the Project Manager. They will be put in self-isolation for 14 days before resuming any activity at the quarry site • Social distancing shall be observed at all times at the construction site. Any orientation of new hires and training activities including toolbox talks shall be done in compliance with the 6ft (2m) social distancing rule. No more than ten personnel shall be trained or taken through toolbox talks at the site at any time. • Any person that has had close contact with a confirmed COVID-19 patient will not be allowed to enter project site. The person shall undergo a mandatory Covid 19 test at a government facility and be isolated for 14-days starting from the day they last interacted with the person with COVID-19.
Solid waste generation	• Express condition shall be put in the contract that before the

	contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant; • Construction site management plans will be required for all works. This plan will include a waste management plan for all activities during the construction period. • Bins/ receptacles shall be placed at appropriate locations within the site as collection centres to facilitate separation and sorting of the various types of wastes; • The contractor shall work hand in hand with private waste handlers and local council to facilitate sound waste management; and • The wastes shall be properly segregated and separated to encourage recycling of some useful waste materials.
Atmospheric Pollution	• Impose speed limits (40 km/h in all areas within the site boundaries). • Damping down of access roads, stockpiles and cleared areas must take place to minimize dust pollution. • Ensure that no refuse wastes are burnt on the premises or surroundings. Refuse wastes should be removed by an official contractor and dumped at an approved site in compliance with local laws and regulations. More significantly, an Integrated Solid Waste Management system is encouraged. • Proper rehabilitation and restoration of disturbed areas is required in order to minimize bare patches. • Vehicles to be used during the construction phase are to be kept in good working condition and should not be the source of excessive fumes. • Transported materials must be done in such a manner that they do not fly or fall off the vehicle by covering or wetting friable materials. • Sprinkle water before undertaking very dusty operations to reduce dust pollution. • Dust and air pollution due to dust when excavated material is stock piled, should be limited by means of wetting (particularly dry season), covering with foil or working in small sections so that the trenches are backfilled with excavated soil within shortest possible period (maximum 2 days).
Noise Impact	• Schedule road traffic movements to normal working hours (08H00 –17H00). • Silencers on equipment such as generators will be properly designed. • Where need be, all exposed workers will be provided with functional ear muffs, whose use is mandatory, and closely enforced, monitored and supervised.
Water supply disruption	• Give warning to consumers so that they can store water that

	can last them within the period of disruption • Notify KIWASCO in writing to enable them to disconnect water services ahead of excavation works • Ensure that water services are restored within 24 hours and keep records of restoration as evidence.

11.0 Conclusions and Recommendations

11.1 Conclusion

The process followed in this study was aimed at providing opportunity to the neighbouring community to express their views, fears and expectations with regard to the proposed rehabilitation and extension of water supply infrastructure within the project area. The consultation process was open and unbiased. The ESIA study and public consultation was conducted under an atmosphere of mutual trust and the local people were willing to spare their time to give audience to the ESIA consultants and provide their input in the entire process. Those consulted did not raise any significant issues with regard to implementation of the proposed project and it can be concluded that stakeholders are supportive of the project. They also feel that the project has more benefits and should therefore be implemented as proposed.

11.2 Recommendations

A number of measures for sustainable implementation of the proposed project and associated infrastructure are contained in Chapter 9 that deals with Environmental and Social Management Plan (ESMP). The Project proponent is advised to implement these additional recommendations to ensure sustainable coexistence of the project and neighbouring populations and land uses.

11.2.1 Implementation of the project as proposed

Based on the findings from field study and public consultation, the project should be implemented as proposed. The project does not have any unique features that may result in adverse impacts to the physical environment and neighbouring community. Similar projects have been implemented within Kisumu County and elsewhere without any reported adverse environmental and social impacts.

11.2.2 Resettlement Action Plan (RAP)

Implementation of the proposed project will involve minimal interference with existing developments some of which have been built on road reserves. Sections of these developments may be impacted on during project implementation and the Project Affected Persons (PAPs) should be properly identified and assets affected valued under the auspices of resettlement Action Plan (RAP). Restorations and compensations should be made in compliance with applicable rules and regulations. More importantly, land will be required for locating project infrastructure including water pipelines and storage tanks. Easements will be required for pipeline wayleaves while land for location of storage tanks will be permanently acquired making resettlement action planning an important aspect of project implementation.

12.2.3 A relook into the agreements for existing Wayleaves

The proposed project will involve rehabilitation and extension of water supply infrastructure within Kisumu city and satellite towns. This would ideally mean that compensation will only be made to those whose land shall be affected within the areas earmarked for extensions. It however emerged during public meetings that compensations were not made for some of the existing pipeline wayleaves and land owners may want further engagements during the implementation of the present project.

11.2.4 Community sensitization

Local community members should be sensitized about the project ahead of construction activities. This sensitization will enable those who have erected developments on or close to water lines to remove them in advance of development activities to avoid losses. Where businesses may be temporarily affected during construction process, affected individuals should be allowed to reconstruct their businesses after construction works.

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ACRONYMS AND ABBREVIATIONS

AFD	Agence Française de Développement
CIDP	County Integrated Development Plan
DEAP	District Environment Action Plan
DN/ND	Nominal Diameter
EIA	Environmental Impact Assessment
EMCA	Environmental Management and Coordination Act
EMF	Electromagnetic Flow
EMP	Environmental Management Plan
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
LVSWWDA	Lake Victoria South Water Works Development Agency
FGD	Focus Group Discussion
GoK	Government of Kenya
Ha	Hectare
KWSSP	Kisumu Water Supply and Sanitation Project
LTAP	Long Term Action Plan
LTD	Limited
ISEP	Integrated Science and Engineering Projects Limited
NEMA	National Environment Management Authority
NGO	Non-Governmental Organisation
NLP	National Land Policy
NLC	National Land Commission
NPS	Nominal Pipe Size
NTU	Nepholometric Turbidity Units
PAC	Polyaluminium Chloride
PAP	Project Affected Person
STAP	Short Term Action Plan
SOE	State of Environment
TOC	Total Organic Carbon
TOR	Terms of Reference
uPVC	Un-plasticised Polyvinyl Chloride
VFD	Variable Frequency Drive
WHO	World Health Organisation
WTP	Water Treatment Plant
WTW	Water Treatment Works

CHAPTER 1

1.0 INTRODUCTION

1.1 Background to the project

The city of Kisumu is located in Western Kenya, on the shores of Lake Victoria, the second largest fresh water lake in the world. The 2019 national population census put the population of Kisumu County at 1,155,574 persons. Out of this number, 560,942 are male while 594,609 people are female. The public water supply and sanitation services in Kisumu city had deteriorated into a deplorable state of repair by the early 2000's, due to a lack of public investment since the 1980's and subsequent lack of maintenance by the former Kisumu Municipal Council. At this time, almost 50% of the population had no access to the water and sanitation services and were also receiving water of poor quality at a high cost. Furthermore, only 50% of the residents had uninterrupted services.

Following the inception of the Lake Victoria South Water Works Development Agency (LVSWWDA) as the asset holding and development agency responsible for the water and sanitation services in Kisumu city under the Water Act 2016, the Kisumu Water Supply and Sanitation Project (KWSSP) was initiated by the Ministry of Water and Irrigation (now Ministry of Water and Sanitation and Irrigation) to develop the water supply and sanitation systems to adequately serve a projected population in the service area of 663,000 by the year 2031. LVSWWDA was the executing agency with overall responsibility for implementation of the Project. In this context, the French Development Agency's (AFD's) intervention in Kisumu began in 2005 with the financing of the Kisumu Water Supply and Sanitation Project (KWSSP). This project was undertaken in two steps namely Short Term Action Plan (STAP) and Long Term Action Plan (LTAP)

Short Term Action Plan was meant to restore the capacity of the existing system to near design, which was completed in 2007 and mainly consisted of rehabilitation of the Dunga source works (Lake Victoria) to deliver 21,500m³/day and rehabilitation and extension of the distribution system. These works were implemented between 2006 and 2007. Long Term Action Plan was divided into two phases. Phase 1 consisted of emergency works, to increase the capacity of the Dunga source to 45,500m³/day. These included construction of a raw water transmission pipeline and associated infrastructure and construction of a 24,000 m³/day Water Treatment Plant including chemical house, storage tank and associated infrastructure). These works were implemented between 2009 and 2011 but were not substantially completed.

Based on the above background, Lake Victoria South Water Works Development Agency (LVSWWDA) has retained BRL, ISEP LTD and SCET TUNISIE JV to carry out feasibility study, detailed design and supervision of works for rehabilitation and extension of water supply network within Kisumu city and Satellite towns in a bid to improve water supply infrastructure within the project area of influence. The feasibility study has come up with various interventions in the water supply system for the horizon period of 2048. This Environmental and Social Impact Assessment study has been carried out for purposes of anticipating adverse

impacts and recommending mitigation measures for implementation in order to ensure sustainable coexistence of the project and neighbouring land uses. This is in compliance with provisions of Section 58 (1) of Environmental Management and Coordination Act (EMCA) 1999 and Environmental (Impact Assessment and Audit) Regulations 2003.

1.2 Need for expansion and improvement of Water supply infrastructure in Kisumu city and Satellite towns

Even though some works have been carried out in Kisumu city with regard to water supply and sanitation, it appears that there are strong needs for further investments in water and sanitation sector in Kisumu. It is also worth noting that in as much as the previous projects significantly improved water and sanitation situation in Kisumu town, it is evident that many low-income residents living in informal settlements and peri-urban areas lack access to both clean water and to safe and environmentally sound sanitation facilities. With regard to water supply, previous projects mainly focused on water intake and treatment works as well as transmissions mains and storage tanks. There is now a stronger need for rehabilitating/renewing the network, which is in poor conditions and to extend the secondary distribution system from the various tanks built under the Kisumu Water Supply and Sanitation Project (KWSSP). The present situation is characterized by a reticulation network (including customer connections) that is not yet to the scale of the production potential, still rather unexploited with distribution reservoirs systematically full in Kibuye, despite the high demand in fast-growing areas.

1.3 The proposed project

The proposed project is a water supply project whose objective is to supply water to residents of Kisumu city and Satellite towns. The project will involve rehabilitation, reinforcement and extension of water supply infrastructure in Kisumu city to reduce Non-Revenue Water (NRW); improvement of water supply within Northern and Eastern Kisumu through laying of secondary distribution network from Kajulu WTP, Mamboleo, Kibuye, Obwolo and Kanyamedha tanks; and rehabilitation and extension of water supply to adjacent localities including Kiboswa and Maseno (transmission mains, pumping stations, storage tanks, and distribution network). Activities associated with the proposed project and which may lead to adverse environmental and social impacts to members of the public include site clearance; topsoil removal; demolition works; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works; compaction; and surface restorations and reinstatement

1.4 Project Location

The proposed project area is located within Kisumu County and traverses a number of sub counties including Kisumu Central, Kisumu East and Kisumu West Sub Counties. The project area is dominated by various land uses including residential, commercial, institutional and industrial all of which are likely to be affected by project activities in one way or the other. The project area has undergone significant changes in biodiversity due to human activities. Human habitation and agricultural activities have significantly interfered with both terrestrial and aquatic habitats in the project area. The area is endowed with flora, fauna and microbes. The area has abundance diversity of trees which is attributed to the fact the area experiences more reliable

rainfall; soils are relatively fertile and there is less interference from termites. The various plant species have also adapted to local environmental conditions prevailing.

1.5 Significance of the project

The following will be achieved as a result of implementation of the proposed project:

(i) Better access to safe drinking water leading to improved standard of living; and changes in exposure to both communicable and non-communicable diseases;
(ii) Improvements in domestic hygiene and a reduction in health risks that have all along been associated with poor water quality or inadequate access to services, as a result of improvements in drinking water quality and its availability;
(iii) Promotion of a more sustainable use of water resources with improvements in the infrastructure to reduce losses and introduction of better metering and billing procedures to encourage more efficient use of water; and
(iv) General improvements in service reliability and pressure levels.

1.6 Objectives of ESIA study

1.6.1 General Objective

The general objective of this environmental and social Impact assessment was to carry out a systematic examination of the present environmental situation within the project area to determine whether the proposed project activities will adversely impact on the physical and biological elements within the project area. This is in compliance with Section 58 (1) of Environmental Management and Coordination Act (EMCA) 1999 that requires proponents to carry out ESIA on projects that appear in the Second Schedule of the Act.

1.6.2 Specific Objectives of ESIA Study

Specific objectives of this ESIA include the following:

(i) To highlight environmental issues of the proposed project with a view to guiding policy makers, planners, stakeholders and government agencies in understanding the implications of the proposed project on environmental elements within the project area;
(ii) To review existing legal, institutional and policy framework relevant to the proposed project;
(iii) To anticipate environmental and social impacts associated with implementation of the proposed project with a view to coming up with mitigation measures for adverse impacts noted;
(iv) To assess the relative importance of the impacts of alternative plans, design and sites;
(v) To generate baseline data for monitoring and evaluation of how well the proposed mitigation measures are implemented during the project operation period;
(vi) Develop an Environmental and Social Management Plan (ESMP) to guide in decision making and for future auditing;
(vii) Raise stakeholder awareness on the impact of the project on the environment; and

(viii) Develop an ESIA report in conformity with the EMCA 1999 and Environmental (Impact Assessment and Audit) Regulations 2003.

1.7 Scope of the study

The study has been conducted to evaluate the potential and foreseeable impacts of the proposed development. The physical scope is limited to the proposed site and the immediate environment as may affect or be affected by the proposed project and associated infrastructure. Any potential impacts have been evaluated as guided by EMCA 1999 and the Environmental (Impact assessment and Audit) Regulations 2003. This report includes an assessment of impacts of the project on the proposed site and its environs with reference to the following key issues:

1.7.1 Review of policy, legal and administrative framework

Several policies, legal and administrative arrangements and protocols that have direct relevance to the proposed development were reviewed. This was in an attempt to establish the framework within which the significance of the various impacts anticipated due to implementation of the proposed project can be evaluated. A lot of emphasis has been placed on legal and policy frameworks that have a direct relevance to water and sanitation sector. These include the constitution of Kenya 2010; Kenya Vision 2030; National Environment Policy 2013; Environmental Management and Coordination Act (EMCA) 1999, Water Act 2016 and Water Quality Regulations 2006 among others. International agreements and conventions that are relevant to the water and sanitation sector and which have been reviewed include the Vienna Convention for Protection of Ozone Layer; United Nations Framework Convention on Climate Change; RAMSAR Convention on wetlands of international importance; and United Nations Convention on Biological Diversity, 1992. World Bank guidelines relevant to the proposed project including OP/BP 4.01 on Environmental Assessment; OP/BP 4.04 on Natural Habitats; OP 15.50 on Disclosures; and OP/BP 4.12 on Involuntary Resettlement have also been reviewed. These have formed the basis for the determination of the significance of the various impacts associated with implementation of the proposed project.

1.7.2 Description of the proposed project.

The proposed project has been described in terms of location and physical characteristics of the project area; design of the water and sewerage systems; products, by-products , waste and waste management methods. This approach has been pursued since it makes it possible to know the likely sources of impacts, how the impacts relate to one another in terms of being direct, indirect, cumulative, reversible etc. in order to propose sustainable mitigation measures for the management of adverse impacts noted.

1.7.3 Review of the baseline information.

Baseline information forms the basis of degree and magnitude of the impact since they give the conditions of the environment in terms of resources and impacts before implementation of the proposed project and associated infrastructure. This helps in the monitoring exercise and for that matter, brings into focus the extent of the accuracy of the prediction of the impacts in question.

1.7.4 Assessment of the potential environmental impacts.

Assessment of environmental impacts on the biophysical, socio-economic, religious and cultural aspects is the very reason why any ESIA study is carried out. Environmental aspects associated with any project are normally felt on natural or human elements. It is the direction, magnitude and extent of the impacts on these elements that make the impact either positive or negative. These are the various social and physical parameters that are in continuous interplay within the general environment of any project and it is how the project will affect or will be affected by these parameters that eventually lead to positive or negative perception in environmental terms.

1.7.5 Proposition of alternatives.

Any planning activity must work towards giving sustainable alternatives with regard to resource allocation. ESIA as a planning tool must therefore give options that can be pursued in order to get sustainable results. The alternatives in this project have been looked at in terms of product mix, site, technology, design, scale and extent. The comparisons of these with the proposed project option give rise to the best project option.

1.7.6 Development of mitigative measures.

Mitigative and management measures are meant to limit the extent of negative impacts that may arise as a result of a particular development alternative. Potentially negative environmental impacts of a project may be tolerated by both environmental elements and neighbouring populations depending on the mitigative measures proposed for implementation. Measures to manage adverse impacts associated with implementation of the proposed project have been included in this report to promote sustainable development principles.

1.8 Environmental and Social Impact Assessment (ESIA) Team

The ESIA study was conducted by a team of professionals drawn from various disciplines who ensured that all matters relating to the project as it impacts on the neighbouring environment were adequately covered and critical stakeholders consulted. Table 1.1 below gives a summary of ESIA team composition and tasks assigned to each member of the team.

Table 1. 1: ESIA Team Composition and task assignment

No	Name	Position	Task
1	Eng. Caleb Opati	Project Director / Water Treatment Specialist/ Civil Engineer	• Liaise with the Client to ensure that the project is carried out as provided for in the contract; • Define tasks and work programmes for all Consultants; • Maintain quality control of all works; • Prepare all technical documents/reports relevant to the assignment; • Ensure that adequate resources are allocated to the field team; • Liaise with field team to ensure that data collection exercise is carried out as per

			schedule; • Work in consultation with the Team Leader for expeditious delivery of outputs; • Coordinate report writing; • Chair all review and consultative meetings; • Establish and maintain quality control; • Maintain work standards by ensuring that reporting schedules are adhered to; • Manage the flow of information between Field Team and the Joint Venture; and • Participate in any activity that may require your expertise.
2	Amimo Odongo	EIA Lead Expert and Team Leader	• Review of environmental policies, legislative and institutional frameworks; • Review of data on planned and existing key development projects proposed for implementation within the project area; • Collection of baseline data on environmental conditions; • Assessment of the impacts of future similar projects on the environment within the project area; • Gather data and information on existing environmental problems within the project area; • Propose measures to mitigate existing and future adverse impacts; • Consider options to improve the environmental benefits; • Carry out analysis of alternative means of implementing the projects; • Recommend feasible and cost effective mitigation measures for negative impacts; • Develop an Environmental/Social Management and Monitoring Plan; • Lead field team and ensure that data collection exercise is carried out as per schedule; • Coordinate report writing and ensure that all relevant information is included in the report; • Compile Draft and Final ESIA Reports; • Present draft reports to the Client as per schedule; and • Incorporate comments from the client into the draft report and prepare final report
3	Christine Amondi Ponde	Sociologist	• Review environmental policies, legislative and institutional frameworks; • Review available reports and documents from previous studies;

			• Asses the impacts of future similar projects on social environment within the project area; • Gather data and information on existing social problems within the project area; • Carry out social analysis of potential impacts using PRA methods; • Carry out analysis of the implications of anticipated emergence of new social challenges with the aim of recommending appropriate mitigation measures; • Consider options to improve social benefits; • Carry out analysis of alternative means of implementing the projects; • Recommend feasible and cost effective mitigation measures for negative social impacts; • Monitor all gender related components, including gender action (see 11.6 Gender); • Develop a Social Management and Mitigation Plan; and • Develop a monitoring plan;
4	Julius Omondi	Assistant Engineer- Water and Sanitation	• Review of technical drawings to ensure that they meet the required standards for projects of this nature; • Review of data on baseline environmental conditions of the project area including soil to ascertain their suitability for the proposed project; • Review of technical documents related to the project • Stakeholder engagement on technical aspects of the project; • Consideration of options to improve project benefits; • Carrying out analysis of alternative means of implementing the projects; and • Recommending feasible and cost effective mitigation measures to prevent or reduce significant negative impacts identified to acceptable levels.
5	Stephen Ochieng	Environmentalist	• Review of environmental policies, legislative and institutional frameworks; • Review of data on planned and existing key development projects proposed for implementation within the project area; • Collection of baseline data on environmental conditions; • Assessment of the impacts of future similar

			projects on the environment within the project area; • Gather data and information on existing environmental problems within the project area; • Proposition of measures to mitigate existing and future adverse impacts; • Consideration options to improve the environmental benefits; and • Recommendation feasible and cost effective mitigation measures for negative impacts;
6	Cynthia Shitsukane	Assistant Engineer- Water and Sanitation	• Review of technical drawings to ensure that they meet the required standards for projects of this nature; • Review of data on baseline environmental conditions of the project area including soil to ascertain their suitability for the proposed project; • Review of technical documents related to the project • Stakeholder engagement on technical aspects of the project; • Consideration of options to improve project benefits; • Carrying out analysis of alternative means of implementing the projects; and • Recommending feasible and cost effective mitigation measures to prevent or reduce significant negative impacts identified to acceptable levels.

1.9 Environmental and Social Impact Assessment Outputs

The following are the outputs of this Environmental and Social Impact Assessment study:

(i) A detailed Environmental and Social Impact Assessment report outlining baseline environmental conditions, project description, project alternatives, environmental impacts and mitigation measures proposed.

(ii) A comprehensive Environmental and Social Management Plan (ESMP) detailing institutional structure with respect to safeguards implementation; roles and responsibilities of the environmental personnel of the contractor and other stakeholders in the project; capacity building requirements, and consultant support required; and costs for implementation of mitigation measures and provisions for monitoring of environmental parameters during construction and operation phases of the project including any capacity building requirements.

CHAPTER 2

2.0 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT METHODOLOGY

2.1 General

The purpose of conducting the ESIA study was to ensure that the proposed project is environmentally sound and fits well within existing land uses. The study has described and quantified impacts associated with the proposed project on the physical environment and neighbouring populations and land uses. The activities for the ESIA involved desk studies and fieldwork that included direct interviews, transect walks and direct observations leading to the preparation of this Study Report. Below is a detailed description of activities undertaken during the study

2.2 Reconnaissance visit

This was the initial site acquaintance visit whose main aim was to understand the project area, identify constraints, and develop impressions on topography, soils, existing developments and practicality of developing water and sanitation infrastructure within the proposed area. It also marked the major inception meeting with representative of project proponent and local administration offices represented in the area to pave way for further involvement of their officers in subsequent meetings and consultations. The main objective of these meetings was to agree on expectations of the assignment, its execution procedure, focal and reference points of the proposed project and work plan.

2.3 Literature review

This is an indirect method of data gathering and published data both in the Internet and from physical sources were collected. Both quantitative and statistical information from relevant secondary sources including various documents and reports on Kisumu County in general were collected and reviewed. This helped in the identification of the gaps existing in the available information and enabled the ESIA team to arrange to undertake detailed field investigations. Special emphasis was placed on climate; hydrology; soils; national environmental laws and regulations; human population and settlements; and socioeconomic infrastructure within the project area. Literature review involved review of the following data associated with project area.

2.3.1 Hydrology and Water Quality

The assessment of hydrological and water quality conditions in the study area were based on review of topographic maps; review of relevant reports; and on-site field inspections. Field inspections included observation of slopes and drainage on the sites. Evidence of slope instability was sought. The potential relationship between drainage courses and adjacent trails was examined, as was the effect of vegetation on surface soil conditions and water quality. The locations of storm drains discharging into natural drainage courses were noted, as were the effects of these discharges on flows and erosion features.

2.3.2 Vegetation

The assessment of the potential effects of project construction on vegetation was considered within the proposed project site, buffer areas and regional area. The Project site includes areas that will be directly disturbed by project construction. Buffer areas (adjacent areas) include a one (1) kilometre wide area surrounding the project site. The regional area specified in this assessment includes areas outside the one kilometre buffer area.

A review of publicly available data, existing information, literature and other data was completed before initiating fieldwork. This office-based review included the examination of maps to determine the extent of natural vegetation on the sites and the variability in vegetation composition. The review also included previously completed reports on the vegetation of the study areas and sensitive ecosystem inventory mapping of the sites. Information about rare and endangered plant species and plant communities was obtained from the State of Environment Report. Information provided through interviews with knowledgeable people from the project area was incorporated into the baseline data.

The initial field visits were conducted within the study area between May 2021 and July 2021 to confirm vegetation composition and distribution of the existing vegetation features of the project sites. The second round of field visits took place within the project area in September 2021. This helped in ascertaining changes that may have occurred in vegetation composition since the initial site visits.

2.3.3 Wildlife and Wildlife Habitat

The assessment of the potential effects of project construction on wildlife considered wildlife use, habitat and habitat features. A review of publicly available data, existing reports and literature was completed before initiating field work. Information collected during the office-based review was used to identify potential habitat for rare and at-risk wildlife.

Field surveys were conducted at the project site and neighbouring areas. Wildlife specialists walked within the project and adjacent areas and documented topography, observed wildlife, noted wildlife habitat and habitat features (*e.g.*, wildlife trees, stick nests, and perch trees), and searched for signs of use by rare or at-risk wildlife. A "purposeful meander" technique was used to survey the areas and more detailed searches were performed at locations where potentially important habitat or habitat features were observed.

2.3.4 Fish

The proposed project is located within Kisumu city and neighbouring areas and traverses a number of Sub Counties including Kisumu Central, Kisumu East and Kisumu West Sub Counties. These areas sit on the shores of Lake Victoria and project activities are therefore likely to have significant impact on fish species. Information on the main water resources within the project area including lakes, rivers, dams and wetlands was gathered. Information on the variety of fish stocks in these water bodies including native and introduced species were gathered from secondary sources. The impacts of the proposed project on fish stocks within the local water bodies were ultimately assessed.

2.3.5 Land Use

The Land use section of this ESIA builds on information collected for the siting analyses, which included a review of existing planning documents, site visits, and discussions with representatives of the client to understand existing and planned land uses and potential impacts of the proposed works on these land uses. News articles, media releases, and information on other community initiatives were also reviewed to understand the regional and local context of the project area. A lot of data was borrowed from previously prepared feasibility studies and design documents. Visits to the sites were conducted by the ESIA experts to confirm the use of the sites and adjacent land by property owners and local residents.

2.3.6 Traffic

Traffic data was obtained through observation of traffic flow along roads traversing the project area and identifying the type of vehicles that frequent the road. Assessment of the level of impact on affected neighbourhoods and road users and identification of potential mitigation measures to reduce or avoid traffic impacts was done. To conduct the aforementioned tasks, data was obtained through review of relevant traffic flow data, plans and reports and inspection of the relevant routings, road system, and affected neighbourhoods during site visits.

2.3.7 Noise and Vibration

The Noise and vibration section has been prepared based on facility design information and adjacent land uses. The ESIA experts surveyed the area identifying the existing sources of noise impacts and comparing this with the project situation. Noise and vibration effects during facility construction are assumed to be the same as a typical construction project and to follow all applicable municipal bylaws. Based on the foregoing assumptions, potential effects of noise and vibration on surrounding areas were identified and mitigation measures proposed.

2.3.8 Human Health

The assessment of the potential effects of project construction on human health was considered within project alignment areas. Data on existing baseline information in terms of site conditions, land uses within project alignment areas, neighbouring facilities and their distances from the project site, any other unique feature of the project area that may be affected by project construction and operation activities were collected and analysed. Information on water quality and access, prevalent diseases within the project area, solid waste and wastewater management, sanitation issues and physical and biotic factors were collected and analysed. Existing conditions of infrastructure including roads, water supply, noise generating activities and whether there are any pollution sources within project vicinity was analysed. The collected data was used to assess potential impacts on health, safety and the environment both to the workers and the local community during construction and operation phases of the project.

2.3.9 Visual Aesthetics

Visual impacts are changes to the scenic attributes of the landscape brought about by the introduction of visual contrasts (e.g., development) and the associated changes in the human visual experience of the landscape. Visual impacts in this project arise from changes in available view of the landscape due to location of the project and associated infrastructure. Visual

impacts in this study were determined through the subjective assessment of the visual receptors (i.e. residents, outdoor recreational areas etc.) and the magnitude (scale) of the change in view. Sensitivity were looked at from the point of view of receptors' location; the importance of receptor views; their activity (i.e. working, recreation or travelling through); expectations; available view; and the extent of screening of this view. These visual elements were considered in the assessment in comparison with present conditions.

2.4 Consultation and public participation

During the EIA study, extensive consultations with project neighbours and critical stakeholders were undertaken with the project area of influence. The consultations were undertaken through direct interviews, questionnaire administration and stakeholder meetings as described below.

2.4.1 Questionnaire administration

Questionnaires were prepared and administered to various stakeholders identified at the initial stages of the study. Those interviewed provided critical insights with regard to socio-economic activities within the project area and how project activities are likely to impact on local populations. Those consulted through this method at this stage were mainly those residing within the project area of influence.

2.4.2 Key informant interviews

One-on-one interviews with community members within the project area were undertaken to assist in analysis of impacts to the community and institutions in the project area. Key informants drawn from community leadership structures were engaged during this project and provided critical socio-economic data and information about the project area. These interviews were conducted to augment and confirm data and information obtained using the other tools and methodologies.

2.4.3 Community consultative meetings

The consultative meetings served two purposes; first they offered an opportunity for stakeholder sensitisation on the proposed project. Secondly, they presented an opportunity for the ESIA study team to gather data and information on contentious issues relating to implementation of the proposed project. To better address the latter objective, participants were first taken through the key highlights of the issues to be explored under the ESIA study. Through a question and answer session, stakeholders were given opportunity to understand the implication of the proposed project on the environment and local population

CHAPTER 3

3.0 PROJECT DESCRIPTION

3.1 Nature of the project

The proposed project will involve rehabilitation and extension of water supply infrastructure within Kisumu city and satellite towns. The old pipes are major sources of Non- Revenue Water and have contributed to significant financial loses to KIWASCO. Main activities will include replacement of water lines that have aged over time with new ones and extension of the lines to areas not currently supplied with water.

3.2 Proposed Project

The proposed project is a water supply project whose objective is to supply water to residents of Kisumu city and Satellite towns. The project will involve rehabilitation, reinforcement and extension of water supply infrastructure in Kisumu city to reduce Non-Revenue Water (NRW); improvement of water supply within Northern and Eastern Kisumu through laying of secondary distribution network from Kajulu WTP, Mamboleo, Kibuye, Obwolo and Kanyamedha tanks; and rehabilitation and extension of water supply to adjacent localities including Kiboswa and Maseno (transmission mains, pumping stations, storage tanks, and distribution network). The activities associated with the proposed project and which may lead to adverse environmental and social impacts to members of the public include site clearance; topsoil removal; demolition works; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works; compaction; and surface restorations and reinstatement. Land will be required for locating project infrastructure including water pipelines and storage tanks. Easements will be required for pipeline wayleaves while land for location of storage tanks will be permanently acquired

3.3 Scope of works

Implementation of the project will be done in clusters within Kisumu city, Maseno and Gee areas. For Kisumu city, the scope of works will involve rehabilitation and extension of 118km of network as follows:

- Phase 1A: 59km of OD63 to OD450
- Phase 1B: 16.8km of OD63 to OD200,1 tank of 250 m³ and 1 tower of 150 m³ and 2 pumping stations (11 and 33kW)
- Phase 1C: 18.1km of OD63 to OD315
- Phase 1E: 7km of OD110 to OD250
- Renewal of network in City: 17.4km of OD63 to OD400

Maseno works will involve implementation of the following:

- 24.7km of OD63 to OD200
- Provision for hydrogeological investigations, drilling and equipment of two boreholes (~15 m³/h @ 100m),
- 1km of OD90 for transmission to market tower,

- Rehabilitation of Millennium springs and kiosks

Gee works will involve rehabilitation of Kalai and Bar K'oraro springs as follows:

- Kalai springs: intake, 100 m³ tank and PS (3 kW)
  Bar K'oraro: 150 m³ tank and PS (9kW)
- PS1 (10 kW)
- 13km of OD90 to OD225
- 1,000 m³ Gee tank

3.4 Measures for the proposed project

The implementation of the proposed project will cover Kisumu city and neighbouring areas including Kajulu, Wathorego, Gee/Kiboswa and Maseno town. The following works have been proposed for implementation

3.4.1 Works for Kisumu city

In addition to the proposed rehabilitation and reinforcement of selected pipes in order to reduce Non-Revenue Water (NRW), the main impact on the reduction of NRW will originate from the switch from pressure distribution from Dunga WTP to gravity distribution from Kibuye and Watson reservoirs, through the proposed decoupling of the transmission and distribution networks. In addition, the creation of pressure zones, by regulating the pressure in the system, will also significantly reduce NRW.

3.4.1.1 Phase 1A – Core Group

Phase 1A, corresponds to the core group, with networks in the informal settlements of Bandani, Obunga, Manyatta and Nyamasaria, as well as in the areas of Migosi, Wathorego and Kadero. This will be accomplished through rehabilitation and extension of 59km of OD63 to OD450. This group includes works necessary to reduce NRW, increase the water coverage in Kisumu area (especially in the North and the East) and in the informal settlements, as well as in areas where wastewater network works is planned as part of Works Package 1.

3.3.1.2 Phase 1 B

Phase 1B is focused on investment for Obwolo's area, including the rehabilitation of Obwolo pumping station and the construction of a 250 m³ ground reservoir, with 16.8km of OD63 to OD200 of network works. In addition to transition from direct pumping distribution to gravity distribution in Obwolo area and extending the coverage there, it includes some network extensions in the East and network reinforcements next to Kisumu airport.

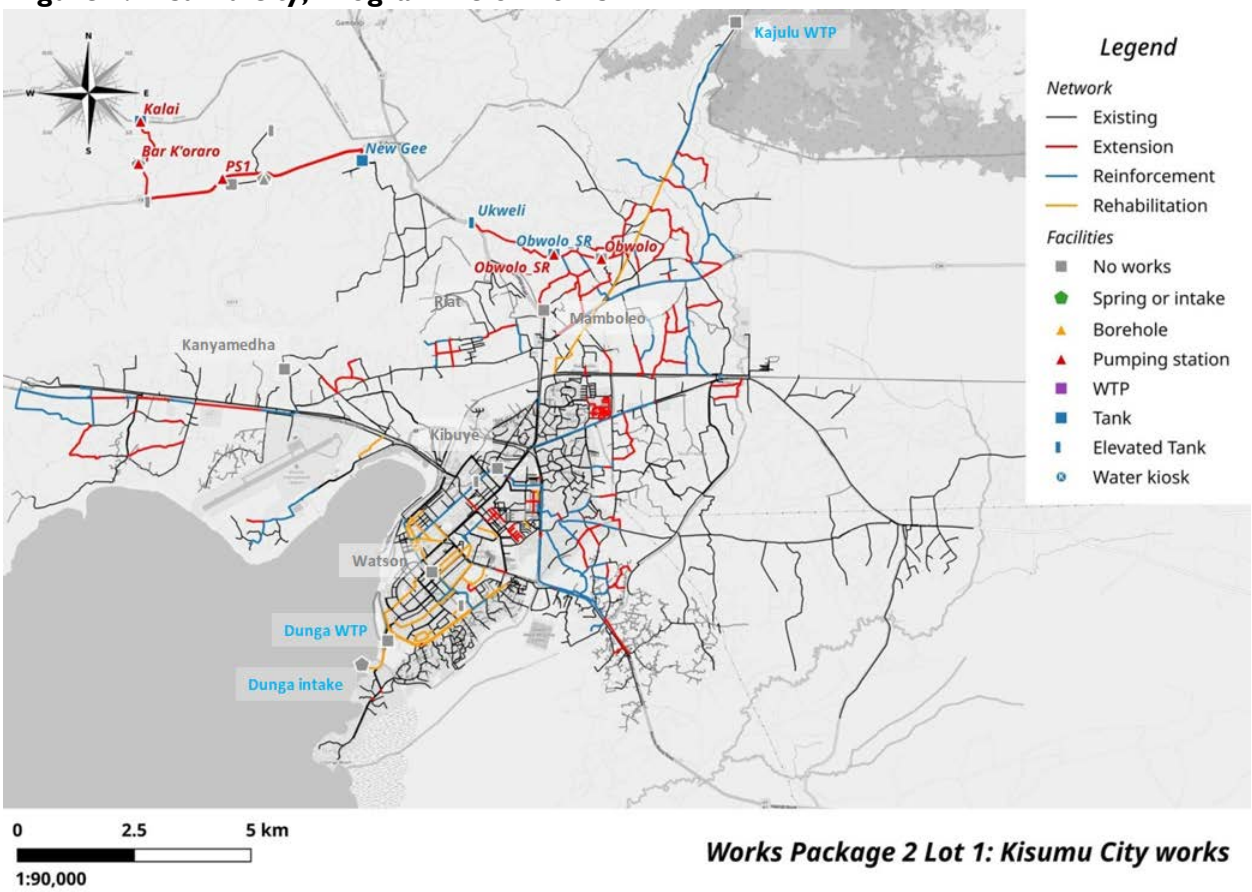
3.4.1.3 Phase 1C

Phase 1C is focused on network works in Kanyamedha and Otonglo distribution area, as well as in Riat Hills, between Mamboleo and Kanyamedha reservoirs. This will be accomplished through rehabilitation and extension of 18.1km of OD63 to OD315. This group mostly aims at increasing the water coverage in the West of Kisumu area, where the Otonglo WWTP is expected to be constructed in the future.

3.4.1.4 Phase 1E

Phase 1E is focused on the network rehabilitation works in Kisumu centre requested by KIWASCO, as well as on reinforcement works for Dunga village area. This will be accomplished through rehabilitation and extension of 7km of DN110 to OD250. This group includes works which should reduce NRW.

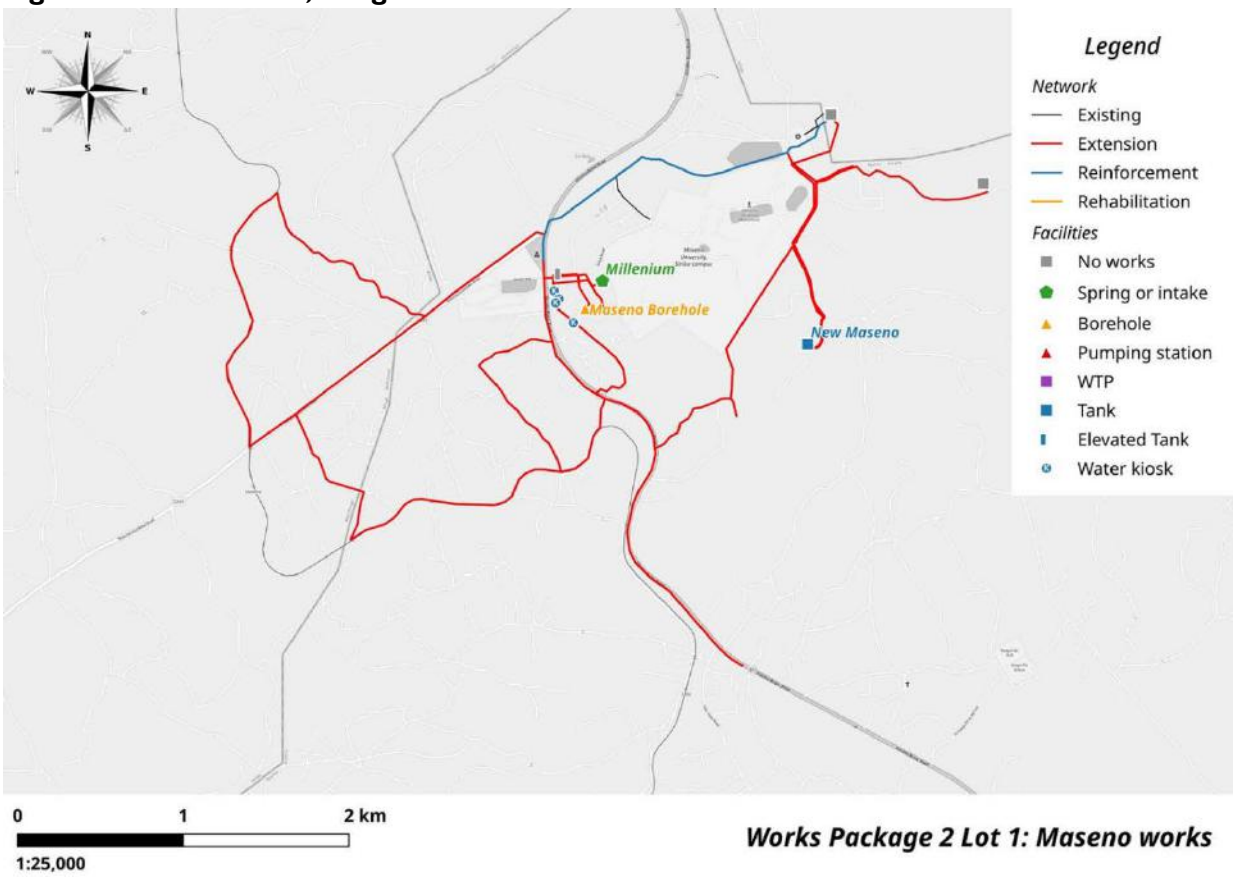
Figure 1: Kisumu city; Programme of works



3.4.2 Works for Maseno area

Maseno University (with a target population of 15,000 students and 1,250 employees) and Maseno town presently rely on the supply from Zaaba River WTP in Vihiga County, as well as from five boreholes (with a cumulated yield of 496 m³/ day). As a recent Belgian project has increased the capacity of the WTP by 5,000 m³/ day to 7,450 m³/ day, rehabilitated Maseno's reservoir of 500 m³ and laid a new DN200 line to supply it, it is proposed to make the most of this source. With the new DN200 supplying Maseno reservoir, Zaaba River WTP could supply 2,000 – 2,500 m³/day to Maseno area. The figure below presents the water supply and distribution works proposed for Maseno area.

Figure 2: Maseno area; Programme of works



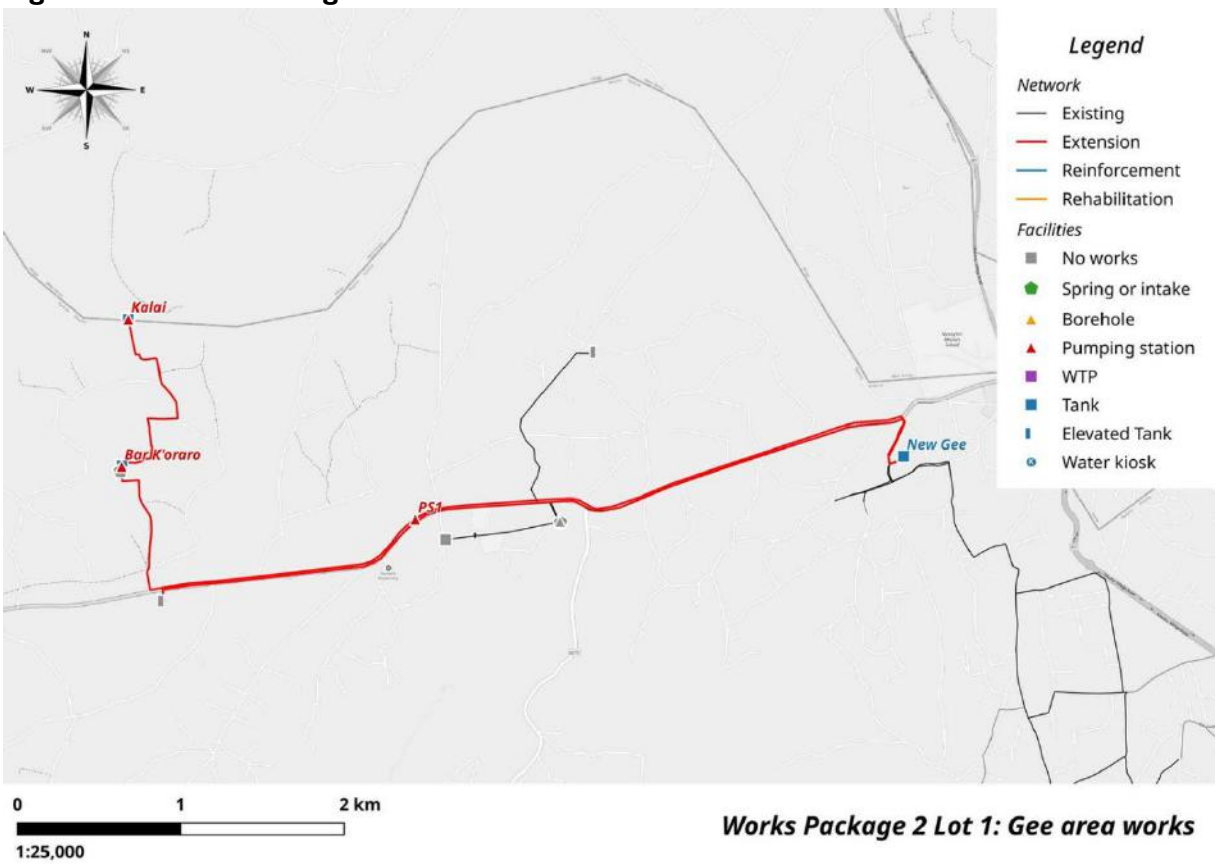
The works include the following:

(i) A new reservoir of 1,000 m³;
(ii) 25.7km of OD63 to OD200 of transmission and distribution network works;
(iii) Drilling and equipment of two boreholes;
(iv) Rehabilitation of Millennium springs and kiosks

3.4.3 Works for Gee Area

Gee reservoir area, including Kiboswa, Nyahera-Mkendwa scheme and the upper part of the recently completed OBA project is currently only supplied from Orinde springs. Although the springs have just been rehabilitated, their production, estimated at around 450 m³/ day, cannot satisfy the current and projected demand for the area – 2,362 m³/ day for 2018 and 6,513 m³/ day for 2048.

Figure 3: Gee area: Programme of works



The works include the following:

- Kalai springs: and Bar K'oraro springs, and the related reservoirs and pumping stations
- 13km of DN90 to OD225 of transmission and distribution network works.
- A new reservoir of 1000 m³, which could be expanded in the future

3.5 Project activities that are likely to lead to adverse environmental and social impacts

Various activities are associated with the proposed project and these have the potential of leading to various adverse environmental and social impacts to neighbouring populations and land uses. These activities include site clearance; topsoil removal; demolition works; excavation works; disposal of surplus demolition and excavated materials; disposal of excavated material and backfilling works. Other activities associated with the proposed project and which may lead to adverse social and environmental impacts include surface compaction; surface reinstatement; surface restorations; and restoration of borrow areas, spoil tips and quarries as discussed below:

3.5.1 Site Clearance

This will involve preparation of the site by the contractor by carrying out general clearance of the ground and by removing trees and other vegetation to permit the proper execution of the Works. Site clearance will be carried out over the areas to be occupied by the permanent Works before beginning excavation or other works, and shall include the clearance of all trees, stumps, bushes and other vegetation and the grubbing out of all roots and the removal of all boulders and disposal of them as directed by the Resident Engineer. Site clearance will also involve removal of various structures located along the proposed water lines including food kiosks, fences, gates and retail business premises.

3.5.2 Topsoil Removal

This is the stripping of top soil by the contractor to a depth as shown in the drawings or as specified in the bill of quantities. This shall be done after establishing surface levels of the ground by the engineering team.

3.5.3 Demolition works

Demolitions will involve dismantling of any buildings or other structures within project alignment area and stacking the recovered materials on the adjoining land of the owner of such building or structure. Demolition exercise may also involve removal of permanent and temporary facilities located along project alignment areas including buildings, business premises, gates, live fences and perimeter walls among other facilities.

3.5.4 Excavation works

Excavation shall involve digging of trenches along the proposed water lines for purposes of laying pipes and casting manholes. Excavations shall also be done for structures, fill foundations, channels for ditches, road cuttings and trenches for pipe laying among other activities. Excavation works may be associated with damage to structures, services or other properties caused by movement of excavation machinery.

3.5.5 Disposal of Excavated Materials

Materials obtained from excavations which are not suitable for forming embankments or other fill areas are normally disposed of. These materials will be disposed of to tips provided by the contractor and approved by the Engineer. Measures shall be put in place to ensure that excess materials which may be surplus to the total requirements of the Works are used in rehabilitation of excavated areas as directed by the Engineer.

3.5.6 Disposal of Surplus Demolition and Excavated Materials

All surplus demolition or excavated materials will be disposed of by the contractor to tips provided by the contractor and approved by the Engineer. The contractor is expected to comply with existing rules and regulations governing disposal of spoils.

3.5.7 Backfilling works

3.5.7.1 Backfilling of Excavations

Excavated areas will be, if appropriate, backfilled with materials from excavation process. All backfilling of excavations will be thoroughly compacted in layers and by means which will not damage the works. Backfilling will also be done of excavations for reinforced concrete structures. Various materials including granular materials imported from approved material extraction sites will be used.

3.5.7.2 Backfilling of Pipe Trenches

This will involve covering the laid pipes with materials obtained from the excavations selected and screened as necessary and to approval of Engineer.

3.5.8 Compaction

Compaction shall involve pressing of the restored areas using appropriate machinery to restore them to pre-project conditions. Compaction of filling shall proceed as soon as possible after spreading of a soil layer. Compaction of filling of normal materials will be carried out only when the moisture content is within limits specified or directed by the Engineer.

3.5.9 Surface Reinstatement

This shall involve reinstatement by the contractor of all surfaces of roads, fields, paths etc., whether public or private which shall have been affected by the Works. The sites shall be reinstated temporarily by the contractor in the first instance and in due course when the ground has consolidated fully, the surfaces shall be permanently reinstated. Temporary reinstatements shall be carried out immediately the trenches are refilled.

3.5.10 Surface Restorations

Temporary restoration will be carried out immediately after excavations have been refilled by returning the excavated material to the position from which it was removed and adding such suitable materials as may be required and consolidating the various materials as works proceed in order to provide a surface that is adequate for the purpose that the original surface fulfilled.

3.5.11 Restoration of Borrow Areas, Spoil Tips and Quarries

This shall involve finishing to safe and fair slopes any spoil tips, quarries or other borrow areas developed by the contractor for the purpose of the Works. Where directed by the Engineer these areas shall be re-soiled and grassed over or otherwise seeded.

3.6 Products, by-products and wastes

3.6.1 Products

The products associated with this project is a functional water system for use by residents of Kisumu city and satellite towns

3.6.2 By-products

There are no by-products associated with the operation of the proposed project

3.6.3 Wastes

There will be solid, liquid and gaseous wastes associated with construction and operation of the proposed project. These will be from project activities during construction, operation and decommissioning phases. Other wastes from construction site will mainly be material residues of the construction materials. These include heaps of sand and aggregates, bits and pieces of various pipe types, paper packaging materials, pieces of timber, pieces of iron (metal bars), among others scattered within the construction area. Solid waste shall be managed in strict conformity to the existing legal framework.

3.6.4 Dust and air pollution

Dust emission is anticipated during construction when dust from traffic, construction activities and construction machinery will be emitted. It is recommended that watering be enforced to keep dust at minimal levels. Air pollution is not anticipated to be a major problem during operation phase of the project. The Table below gives a summary of waste to be generated at the site both during construction and operation phases of the project

Table 3. 1: Summary of solid wastes to be generated at the site

Type	Description	Sources
Combustible	Paper, cardboards, cartons, wood, boxes, plastic, rags, cloth, bedding, leather, rubber, grass, leaves, yard trimmings etc.	Offices, yards
Non- combustible wastes	Metals, tin, cans, glass bottles, crockery, stones etc.	Workshops, offices, kitchenette
Bulky wastes	Large auto parts, tyres, stoves, refrigerators and other large appliances, furniture, large crates, trees, branches, stumps etc.	Workshops, sidewalks, kitchenette and offices,
Garbage	Waste from the preparation, cooking and serving of food	Kitchenette, eating areas and yards
Street wastes	Street sweeping, dirt, leaves etc.	Sidewalks and open areas within work areas
Abandoned vehicles	Automobile and spare parts	Contractor camps and workshop areas
Construction and demolition wastes	Roofing and sheathing scraps, rubble, broken concrete, plaster, conduit pipes, wire, insulation et	Construction and demolition site
Hazardous wastes	Pathological wastes, explosives, radioactive materials	Store areas, workshop areas, fuel storage areas

3.7 Waste management

The following control measures will be employed by the contractor to reduce the environmental impacts from waste generation, handling, storage and disposal:

(i) Open burning, burying and dumping of waste within construction site, work areas and other areas within construction zone are strictly prohibited;

(ii) Separate labeled waste receptacles will be provided for plastic, paper, tins, and used bottles among other waste items;
(iii) The mixing of hazardous and non-hazardous waste is prohibited;
(iv) All hazardous waste will be provided with secondary containment and suitably bunded to meet legal requirements, where necessary. The wastes will be handled and transported by licensed hazardous waste handling companies;
(v) A program for regular collection and removal of waste bins will be implemented;
(vi) All litter will be controlled within all work areas by means of good housekeeping;
(vii) Where possible, performance measurement and targets for reduction reuse and recycling will be developed and implemented;
(viii) Any wastes that cannot be reused and recycled will be transported and disposed of in accordance with requirements of Waste Management Regulations 2006;
(ix) Volumes and types of waste will be monitored to establish whether additional opportunities for improvements in waste management (avoid, reduce, reuse, recycle) can be adopted, where practicable; and
(x) All workers will be trained on the Waste Management Plan, through shift briefs, etc.

3.8 Waste Monitoring Process

Monitoring activities associated with the management of hazardous and non-hazardous waste shall include the following:
(i) Regular visual inspection of all waste collection and storage areas for evidence of accidental releases and to verify that wastes are properly labeled and stored;
(ii) Regular audits of waste segregation and collection practices;
(iii) Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments;
(iv) Characterizing waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the waste, especially hazardous wastes;
(v) Keeping manifests or other records that document the amount of waste generated and its destination; and
(vi) Periodic auditing of third party treatment and disposal services including re-use and recycling facilities when significant quantities of hazardous wastes are managed by third parties. Audits shall include site visits to the treatment storage and disposal location

3.9 Waste Handling Matrix

Waste materials shall be properly stored and handled to minimize the potential for a spill or impact to the environment. The Table below gives summary of waste handling matrix for the proposed project.

Table 3. 2: Waste handling matrix during project construction

Waste Stream	Location	Activity Generating Waste	Hazardous/ Non Hazardous	Handling/ Disposal Method
Automotive and Heavy Equipment	Equipment Repair Shop and	Replacement	Non-Hazardous	Returned to vendors for recycling

Waste Stream	Location	Activity Generating Waste	Hazardous/ Non Hazardous	Handling/ Disposal Method
Parts-Used	Fabrication Shop			
Batteries (Alkaline)	Various Locations	Battery Failures	Universal Waste	"D" cell and below are acceptable in the Non-Burnable Waste Dumpster
Batteries (Lead Acid)	Equipment Repair Shop and Fabrication Shop	Battery Failures	Universal Waste	Lead acid batteries are returned to the vendor upon removal
Cardboard/Office Paper	Parts Department & Offices	Shipping Boxes & Office Activities	Non-Hazardous	Dispose of through contracted solid waste handler.
Computers Discarded	Parts Department & Offices	Replacement	Non-Hazardous	Ship to assigned site for recycling or disposal
Diesel Filters-Used	Equipment Repair Shop and Fabrication Shop	Filter Changes	Non-Hazardous	Dispose of through a contracted solid waste handler
Diesel Rags	Various Locations	Mechanic activities	Hazardous	Dispose of through contracted hazardous waste handlers
Drained Diesel	Equipment Repair and Fabrication Shop	Draining diesel fuel and filters	Non-Hazardous when burned as off-Spec fuel	Burned for energy recovery in clean burn multi-oil heating system.
Empty Paint Cans	Various Locations	Painting activities	Non-Hazardous	Ship to assigned site for recycling or disposal
Fluorescent Light Bulbs	Offices, kitchen, boardrooms etc.	Bulb replacement	Universal Waste	Ship to assigned site for recycling or disposal
Grinding Wheels	Equipment Repair Shop and Fabrication Shop	Grinding activities	Non-Hazardous	Dispose of through a contracted waste handler
Metal Shavings/ Cuttings	Equipment Repair Shop and Fabrication Shop	Fabricating activities	Excluded Hazardous if recycled	Place in recycle metal dumpster
Oil Filters-Used	Equipment Repair Shop and	Oil filter changes	Excluded Hazardous	Dispose of through contracted solid

Waste Stream	Location	Activity Generating Waste	Hazardous/ Non Hazardous	Handling/ Disposal Method
	Fabrication Shop			waste handler
Oil-Used	Equipment Repair Shop, Fabrication Shop, Service Trucks	Draining oil and filters	Excluded Hazardous if burned for energy recovery	Burned for energy recovery in clean burn multi-oil heating system. Use in the curing of formwork
Oily Waste (rags, absorbents)	Various Locations	Mechanic activities, equipment drips and leaks	Non-Hazardous	Dispose of through contracted waste handler
Scrap Metal	Various Locations	Fabrication activities & house cleaning	Excluded Hazardous if recycled	Place in recycle metal dumpster
Tires	Various Locations	Replacement	Non-Hazardous	Place tires up to 20" rim diameter into dumpster.
Toner Cartridges	Offices	Copiers, printers, fax machines	Non-Hazardous	Ship to assigned site for recycling or disposal
Welding Rods	Various Locations	Welding activities	Excluded Hazardous	Ship to assigned site for recycling or disposal
Wood Waste	Various Locations	Various activities and shipping pallets	Non-Hazardous	Place in recycle wood dumpster

CHAPTER 4

4.0 DESCRIPTION OF EXISTING BASELINE ENVIRONMENT

4.1 Site location and description

The proposed project area is located within Kisumu County and traverses a number of sub counties including Kisumu Central, Kisumu East and Kisumu West Sub Counties. The project area is dominated by various land uses including residential, commercial, institutional and industrial all of which are likely to be affected by project activities during construction phase. The project will be implemented in both built area and within the countryside and this will significantly impact on vegetation species within the project area.

The project area has undergone significant changes in biodiversity due to human activities. Human habitation and agricultural activities have significantly interfered with both terrestrial and aquatic habitats in the project area. The project area is endowed with flora, fauna and microbes. The area's wild animals are classified as grassland community. In recent years, man has caused the destruction of the grassland cover, has killed vast numbers of wild animals, and in so doing has opened up large areas for domestic animals. In this way, the number of wild herds has been reduced and they now tend to be confined to certain protected areas.

Plate 1: Section of vegetation species within the project area

The area has abundance diversity of trees which is attributed to the fact the area experiences more reliable rainfall; soils are relatively fertile and there is less interference from termites. The various plant species have also adapted to local environmental conditions prevailing. Indigenous

trees found within the project area include *Balanites spp, Acacia spp, Grewia vilosa, Albizia coriaria, Diospiros abyssinica, Euphorbia triculli, Markhamia lutea, Cassia siamea* and *Candelibrum spp* among others. Common exotic trees within the project area include among others *Eucalyptus spp, Thevetia peruviana, Casuarina equistifolia, Croton spp, Leuceana leucocephala, Jacaranda mimosifolia* and *Grevillea robusta.*

The main source of energy within the proposed project area is electricity from the national grid. Other sources of energy include diesel generators within business premises, kerosene, charcoal and firewood. Water within the area is obtained from pipe system of KIWASCO, rivers, Lake Victoria, boreholes and shallow wells while sanitation facilities within the project area include KIWASCO sewerage system and pit latrines.

Various waste management methods have been adopted by residents of the project area and these include use of private waste handlers, burning and composting. Most roads within the project area are done to bitumen standards while storm water drainage system is available in a few of the roads traversing the project area.

4.2 Climatic Conditions

The mean annual rainfall varies with altitude and proximity to the highlands along the Nandi Escarpment and Tinderet. The area has two rainy seasons, with the long rains occurring in March and May while the short rains occur in September to November. During the short rains the average annual rainfall ranges between 450mm and 600mm. Rainfall data indicates that the county largely receives substantial rainfall. Maseno has a mean annual rainfall of 1,630mm while Kisumu 1,280 mm, and Kibos 1,290 mm. The lowland area which forms a trough of low rainfall receives a mean annual rainfall of between 1,000mm and 1,800mm. Although there is no entirely dry month, the peak generally falls between March and May, with a secondary peak in September to November. The mean annual maximum temperature ranges 25°C to 35°C and the mean annual minimum temperature ranges 9°C to 18°C. The altitude in the county varies from 1,144 metres above the sea level on the plains to 1,525 metres above sea level in the Maseno and Lower Nyakach areas. This greatly influences temperatures and rainfall in the county.

4.3 Physical and Topographic Features

Kisumu County lies in a down warped part of large lowland surrounding the Winam Gulf, at the tip of which is Kisumu Town. The county can be divided into 3 topographical zones namely: the Kano Plains, the upland area of Nyabondo Plateau and the midland areas of Maseno. The major physical features within the project area include the overhanging huge granite rocks at Kisian and the legendary Kit Mikayi in Kisumu West Sub-county, the Lake Victoria, which is the second largest fresh water lake in the world, the geographically famous rice-growing Kano Plains, and lake islands (e.g. Ndere National Park which are major tourist attraction). There are a number of rivers and streams within the project area including Kibos River, Kisian River among others. The rivers are heavily silted, resulting in the extensive formation of lakeside swamps.

Plate 2: River Kibos on which Kajulu WTP is located

4.4 Demographic features

4.4.1 Population Census

The 2019 census showed that the population of Kisumu County is approximately 1,155,574 people. The sections below give summary of population characteristics of Kisumu County.

4.4.2 Distribution of Population by Sub-county

The 2019 population census put the population of Kisumu County at 1,155,574 persons. Out of this number, 560,942 are male while 594,609 people are female. The project area traverses three sub counties of Kisumu with total population of 567,963 people as summarised in the Table 4.1 below.

Table 4. 1: Distribution of Population by Sex and Sub-County

Sub County	Sex			Total
	Male	Female	Intersex	
Kenya	23,548,056	24,014,716	1,524	47,564,296
Kisumu	560,942	594,609	23	1,155,574
Kisumu East	108,304	112,689	4	220,997
Kisumu Central	84,155	89,985	5	174,145
Kisumu West	85,697	87,121	3	172,821

4.4.3 Population Density

The mean population density in Kisumu City is projected to vary from 2,017 per km^2 to 3,735 per km^2 from the year 2006 to the year 2031. The sub locations of Kibuye. Milimani, Nyalenda

and Manyatta will have population densities varying from 8,202 to 11,765 persons per km^2 in 2006, to 15,187 to 21,7984 persons per km^2 in 2031. The particulars of population density for Kisumu City and its sub locations are given in the Table below

Table 4. 2: Distribution of Population by Sex, Number of Households, Land Area, Population Density and Sub Locations

Sub County/ Sub Location		Sex*		Land area	Density
	Total	Male	Female	Sq. Km	Persons per Sq. Km
Kisumu East	**220,997**	**108,304**	**112,689**	**141.6**	**1,560**
Kadero	8,557	4,100	4,457	6.8	1,251
Okok	4,833	2,325	2,508	3.5	1,376
Got-Nyabondo	4,473	2,133	2,339	8.4	533
Wathorego	21,010	10,427	10,581	8.5	2,468
Konya	19,737	9,508	10,229	13.4	1,475
Nyalunya	25,853	12,698	13,155	16.0	1,611
Kasule	42,245	20,428	21,816	20.3	2,086
Nyalenda A	30,019	15,094	14,925	3.7	8,142
Manyatta B	33,183	16,492	16,691	2.6	12,876
Chiga	15,275	7,454	7,821	25.9	589
Kisumu Central	**174,145**	**84,155**	**89,985**	**36.8**	**4,737**
Winam	174,145	84,155	89,985	36.8	4,737
Kanyakwar	18,421	9,398	9,022	8.6	2,133
Manyatta 'A'	46,705	22,444	24,259	2.4	19,865
Migosi	23,892	10,630	13,262	2.0	12,044
Nyawita	12,145	6,011	6,134	1.3	9,334
Nyalenda B	34,905	17,000	17,903	5.7	6,121
Kisumu West	**172,821**	**85,697**	**87,121**	**209.0**	**827**
Maseno	57,555	28,440	29,114	87.9	655
Korando A	14,537	8,265	6,271	9.0	1,615
Korando B	9,268	4,421	4,847	7.9	1,171
Kogony	31,140	15,405	15,735	12.1	2,578
Dago	6,686	3,281	3,405	9.2	726
Mkendwa	1,040	550	489	0.9	1,205

4.5 Soils

The soils in project area are dominated by the former lake sediments, commonly sands and clay soils. In Kano plains, the soils are poorly drained and are generally very deep and firm. They are dark brown and grey in colour. In the western part of the Kano plains are the dark cotton soils commonly associated with swamps. On the slightly elevated grounds and piedmont plains are clay soils, which are usually of moderate fertility. On the uplands are sandy soils, which are derived from intermediate igneous rocks. These soils are also imperfectly drained and reasonably deep. The North western part of Kisumu has ferrasols and acrisols which have developed from the granites of rocky south Kakamega uplands. These soils are of low fertility and have rock bases not more than 80cm from the surface. On the fringes of the Winam Gulf

and Lake Victoria beach ridges are soils of varying fertility, most of which are susceptible to water logging. The black cotton soil is found mainly in the plains while the upper zones are marked with residuals of brown volcanic soils. In some areas, the soils are rocky giving rise to sandy soils.

4.6 Biodiversity

The project area has undergone significant changes in biodiversity due to human activities. Human habitation and agricultural activities have significantly interfered with both terrestrial and aquatic habitats in the project area. The project area is endowed with flora, fauna and microbes. The area's wild animals are classified as grassland community. In recent years, man has caused the destruction of the grassland cover, has killed vast numbers of wild animals, and in so doing has opened up large areas for domestic animals. In this way, the number of wild herds has been reduced and they now tend to be confined to certain protected areas. Impala Park is located within Kisumu Municipality has an orphanage and a sanctuary for leopards, hyenas, dik diks, baboons, monkeys and tortoises in their caged section, while impalas, crocodiles, monitor lizards, hippos, monkeys and pythons roam freely inside the park. The project area also has a national museum, which also houses the snake park, where live cobras, black mambas, green mambas, puff udders, pythons and crocodiles are caged for viewing.

The grass land also supports myriads of seed eating birds including pests such as grain-eating weaverbirds. Many species of rats, mice and numerous other rodents are also found in this area. Inside the lake, Hippopotamus (Hippopotamus amphihibius) are normally found in herds. Their dung fertilizes the habitat thus providing food for certain water plants such as algae on which the lake fish feeds. Crocodiles (Crocodylus niloticus) are found in and by the shores of the lake, as are a great variety of fish stock, some of which have been introduced from outside the area. The two native Tilapia species are Tilapia escutenta and Tilapia variabilis. The introduced species are Tilapia nilotica, Tilapia zilli and Tilapia leocostica. Another important introduced species is the Nile perch (Lates nilotica) which is predatory. Other examples of predatory fish in Lake Victoria include Lung fish (Protopterus annecteus) Catfish (Clarius mozambicus), Bagrus and Haplochromis. The lake swamp is also known to be an excellent habitat for the python.

The project area has abundance diversity of trees which is attributed to the fact the area experiences more reliable rainfall; soils are relatively fertile and there is less interference from termites. The various plant species have also adapted to local environmental conditions prevailing. Indigenous trees found within the project area include *Balanites spp, Acacia spp, Grewia vilosa, Albizia coriaria, Diospiros abyssinica, Euphorbia triculli, Markhamia lutea, Cassia siamea* and *Candelibrum spp* among others. Common exotic trees within the project area include among others *Eucalyptus spp, Thevetia peruviana, Casuarina equistifolia, Croton spp, Leuceana leucocephala, Jacaranda mimosifolia* and *Grevillea robusta.* Table 3.1 below gives summary of dominant indigenous and exotic tree species respectively.

Table 4. 3: Dominant indigenous tree species within the project area

No.	Common Name	Common Name	Local Name	Main Uses
1	*Markhamia lutea*	Nile tulip	Siala	Building, agroforestry
2	*Albizia coriaria*	Silk tree	Ober	Furniture
3	*Euphorbia triculli*	Finger euphorbia	Ojuok	Fencing
4	*Mangifera indica*	Mango tree	Mawembe	Fruit
5	*Lannea schweinfurthii*	False marula	Kuogo	Herbal, firewood
6	*Cassia siamea*	Iron wood	Oyieko	Building, shade
7	*Combretum ssp*	Bushwillows	Keyo	Windbreak, firewood
8	*Spidium guavaja*	Guava	Mapera	Fruit, firewood
9	*Grewia trichocarpa*		Powo	Building, firewood
10	*Diospiros abyssinica*	Giant dyospyros	Ochol	Herbal, shade

Table 4. 4: Dominant exotic tree species within the project area

No	Scientific Name	Common Name	Local Name	Main Uses
1	*Eucalyptus ssp*	Tasmanian blue gum	Bao	Building
2	*Grevillea robusta*	Silk oak	Bole	Agroforestry
3	*Thevetia peruviana*	Yellow oleander	Chamama	Fencing, shade, firewood
4	*Cyperus ssp*	Umbrella sedge	Obudo	Furniture
5	*Jacaranda mimosifolia*	Brazilian Rosewood	Jakaranda	Shade
6	*Persea americana*	Avocado	Abakado	Fruit, firewood
7	*Terminalia brownie*	Silver greywood	Umbrella	Shade
8	*Pinus ssp*	Pine	Pine	Furniture
9	*Leuccana leococephala*	Leuccana	Lukina	Agroforestry
10	*Azandiritcha indica*	Neem tree	Arobaini	Harbal

4.7 Energy resources

The main sources of energy within the project area are electricity and thermal (firewood, charcoal, kerosene, LPG, biogas and solar). The County has not fully tapped into the potential of solar power and renewable energy. Household electricity consumption accounts for only 5.8 percent of the total electricity supplied by Kenya Power. Electricity coverage stood at 46.24 percent in 2015. The main sources of renewable energy that have been exploited in the County for electricity generation are hydropower and biomass.

4.7.1 Thermal Energy Consumption

Majority of thermal energy used across all sectors in Kisumu is generated from wood fuel, fuel oil, agricultural residues and other oil products. Over 87 percent of households in the project area rely on traditional use of biomass for cooking. The use of firewood, charcoal and paraffin for cooking is prevalent in the project area.

4.7.2 Solar Energy Access

Kisumu County receives an estimated 5 kWh/m^2 per day of solar energy throughout the year. This has made it possible to use solar energy in the County's energy mix. Access to solar energy within the project area is mainly segmented into three tiers: commercial application solar systems (which make up three quarters of the current installed capacity), off-grid solar power systems (powering markets, health centers and other social amenities) and solar house systems (distributed to schools and community social organizations).

4.7.3 Biogas Energy Access

Wood fuel is the key source of energy for rural households. This has a major impact on sustainable development for the County at large hence the need for biogas as an alternative source of energy. Five biogas plants were installed by the County as pilot projects. Three sugar companies also use biogases for electricity generation to meet their own cumulative demand of 20.2MW.

Table 4. 5: Renewable Energy Projects within the project area

Category of Renewable Energy	Kisumu Central	Kisumu West	Kisumu East
Solar Street Lights Centres (Markets, schools, and health facilities)	7	5	4
Integrated solar power box	0	1	0
Solar powered water distribution	0	1	0
Off- grid solar power solutions	0	1	0
Solar power coolers	0	1	0
Domestic biogas plants	0	1	0
School hub solar equipment	1	1	1

Source: Department of Energy CGK (2018)

4.8 Land Use and Tenure

4.8.1 Industrial Land use

The current major land uses within the project area are for industrial, commercial and residential purposes. The industrial area is situated close to the lake and runs parallel to the lakeshore. The area is served mainly by the railway and acts as the terminus of the two railway lines that connect Kisumu with the rest of Kenya. The industrial area is separated from other land uses by Makasembo road and extends towards the airport in the northwest. In 1969, the industrial zone covered a mere 6.5% of all land uses in Kisumu (Kenya Government 2004) but it has since expanded in two directions; along the road to Maseno in the northwest and along the road to Chemelil in the north east

4.8.2 Commercial land use

The Central Business District (or CBD) is main area of commercially used land in town. The northern section of the CBD predominantly consists of the central and local government administrative offices, whereas the central portion consists of modern offices, department stores and branches of Nairobi-based companies.

4.8.3 Residential land use

The residential zone covers the greatest portion of urban land in Kisumu. Distinct subdivisions of residential areas related to the historical growth of the town can also be noticed. Kisumu's residential land use falls into three main categories namely:

(i) The high-class residential areas including Milimani, Robert Ouko, Tom Mboya and Okore in the northern suburbs of the town;
(ii) Low and middle income/ public housing areas including the municipal houses, railway houses, Kenya post, Kenya Power etc. most of which dominate the eastern side of the town; and
(iii) The peri-urban, slum settlements and the rural extended boundary areas.

Surrounding the central part of the town is a belt of unplanned slum and informal settlements that has developed to form a semi-circle around the old town. These include Nyalenda, Manyatta, Bandani, Kibos, Nyamasaria, Pandpieri, Migosi and Obunga. Manyatta Arab and Kaloleni alone are located within the CBD. The average plot sizes in the neighbourhoods and estates are quarter acres, which are normally freeholds with titles issued. But in some estates, the residents have an average plot size of 0.8 acres and on a freehold ownership with no titles issued.

Plate 3: Typical residential house within the project area

4.9 Land Tenure

Land tenure in Kisumu Municipality now tends to be either on a freehold and leasehold basis. The earlier inhabitants of the area - the Luo tribe - controlled the distribution of land in the peri-urban areas of Kisumu. Traditionally, the Luo considered land to be the property of the community, usually the clan, but each member of the clan would be allocated a parcel of land to farm and thereby feed his family. Grazing land and watering places were common and everyone was obliged to provide access to such common land. Subdivision of the pieces of land continued with inheritance from uncles and brothers. Because of this culture of bequeathing land on the sons, further subdivisions of the small parcels of land took place until the size of the land made it uneconomical for most agricultural purposes, although a number of homes continued to breed livestock.

In Kisumu 'slum belt', land has gone through the process of adjudication and a large portion has been registered as individual interests on freehold tenure. The principal reason for this is that neither the municipal council nor the central government has been able to acquire any interest on this land due to the cost of compensation that would need to be paid to the dweller. The peri urban area features a number of quality structures that Kisumu Council cannot afford to acquire with a view to gaining full control over their development. Land in areas outside the Kisumu Municipal area is freehold and land owners have title deeds for their parcels.

4.10 Industry

With the implementation of the East African Community protocol, Kisumu aims to become capital of the regional bloc. Lake Victoria contributes a very large part to the economy of the county since it supports the fishing and fish processing industry the county's main economic activity. Opportunities exist in further developing this sector for local and export markets. Agriculture is also a common economic activity with sugar industries like Muhoroni, Chemelil, Kibos and rice irrigation industries employing a good number of residents. There are opportunities for further investment in this sector.

Equator Bottlers recently unveiled a Sh1.5 billion bottling plant; Jumbo Mattress Co has established a factory at Ahero while Foam Mattresses is setting up a plant in the town. Other companies setting up shops within Kisumu Town include Mayfair Holdings and United Millers, which recently completed the United Mall that hosts businesses including Tuskys Supermarket and Fox theatres. The county has a total of 27 manufacturing industries, 16 bakeries, 12 *Jua-kali* association and 10,500 *Jua-kali* artisans.

4.11 Road Network

Kisumu's high-income residential areas and formal public housing areas are well served with road infrastructure. However, poor road networks are a common feature in low-income areas because the council's input in terms of planning and capital outlay is minimal. Municipal rental areas are also characterized by decay in infrastructure. A combination of the council's financial constraints and poor governance among the urban poor has resulted in a tendency to concentrate resources on the wealthier areas of the town. Road reserves, which are primarily intended for the provision of service corridors for sewerage, storm drainage and piped water

networks, are almost non-existent in slum areas. This is partially due the fact that the road networks are unplanned and also that the few planned road reserves have now been encroached upon by developers. Obunga and Bandani are an example of this. The roads in these areas are amongst the worst in Kisumu. The roads are generally impassable due to poor drainage, inadequate spacing of houses and widespread sewers. Additionally, the roads are not clearly demarcated and structures have been erected on the road reserves. Handcarts are the main modes of transport to access the main roads. In Bandani, unplanned development is predominant on the fringes parallel to the main tarmac road. The railway line cuts Bandani off from the main road, with only one level crossing that does not link well with the internal paths within the areas.

In accordance with rural planning standards that were current at the time of construction, the access roads in Nyalenda, Nyamasaria and Pandpieri, are only 6m wide. However, in urban areas 6m width is only considered suitable for access roads to single plots. However, the majority of roads in these areas do not adhere to even this standard and are only approximately 4m wide. The ring road is the only access network completed which has led to the increase in land values and a change in use to commercial purposes. The ring road is the only public transport vehicle route in the area, beyond which access to the slum area is on foot or bicycle. All the roads within the slums are narrow tracks which lack drainage. Houses are constructed right up to the road edge on either side, allowing no space for road widening.

Manyatta 'A' and Kaloleni are the only slum settlements with well-designed road networks that have been gradually improved to increase accessibility to more than 60% of the area. However, the lower parts of Manyatta lack proper roads similar to other slum areas. The Nairobi road is the only motorized access to Manyatta 'B'. Walking and bicycles are the main modes of transport in Manyatta 'B' where roads are narrow, muddy; water logged and lack drainage systems and street lighting. Manyatta Arab although located in the town centre, does not have an adequate road system because, like other slum areas, its size and density would requires some degree of demolition to take place to provide space for new roads.

The suburban fringe areas of Kisumu such as Kibos, Usoma and Kanyakwar lack infrastructure services and the roads are of a similar condition to those in the slums. The road network is of rural standards, which is unlikely to cope with the increased flow of traffic the new developments will bring. The roads are approximately 6m wide and encroachment on the road reserves is also common. This will pose challenges in the provision of infrastructure services, such as storm drainage, street lighting, sewage and water.

Being an urban center, Maseno town has a quite good and well-maintained road network. Most of the roads in this town are tarmacked hence the most convenient way to move from one place to another within the town is through ‘Matatus’, motorcycles or bicycles. The Kisumu Busia Road which is done to bitumen standards traverses the town

Table 4. 6: KeNHA Roads within the County

Road Class	Road Description	Length in KM	Surface type
A1	Majengo-Kisumu-Kisii-Migori-IBD Isebania	224	Paved
A1-R	Kisumu A1 Dual RHS	1	Paved
A12	IBD Busia-Kisumu-Kericho	198	Paved
B10	Osieko-Bondo-A12 Kisian	82	Paved
B2	Mbita-Homabay-Kendu Bay-A1 Katito	124	Paved
B8	A12 Awasi-Kapsabet-Mosoriot-A8 Eldoret	42	Paved
	Total Length	**671**	

Source: Kisumu Regional Office –KeNHA (2018)

Table 4. 7: KeRRA Roads within the project area

Road Code		Section Name	Road Class		Length	Surface Type	Administrative Unit/ Remarks	Road Conditions
Old	New		Old	New				
C34	C674	Mamboleo-Miwani-Chemelil-Kipsitet	C	C	53	Gravel	Kisumu East/ Muhoroni	Poor
D245	C800	Kombewa-Maseno	D	C	17.2	Paved	Seme (under construction)	Good
	C842	Kalandini-Wang'arot	D	C	19.3	Paved	Seme (under construction	Good
D293	C851	L. Victoria-Ahero-Miwani	D	C	29.6	Gravel	Nyando/ Muhoroni	Fair
D290	C853	Kondele-Rabuor	D	C	16.7	Gravel	Kisumu East	Fair

Source: Kisumu KeRRA Region Office (2018)

4.12 Water Supply

The water supply system in Kisumu can be categorized into three systems: that provided by KIWASCO, the peri-urban system and the system provided within the informal settlements. The existing water supply facilities provided by KIWASCO are in very poor condition and a large proportion of the population has no access to the service. The coverage of KIWASCO's current water supply network commands 80% and is mainly concentrated within the built up urban centre. The combined water supply capacity from the two water treatment systems amounts to 81,000 m^3/day. Peri-urban water supply systems consist of small-scale systems, outside the Kisumu Municipal County service area, operated by CBOs, NGOs, etc. Informal Settlements Systems are a combination of the Municipal System and Peri-urban Systems.

The existing water supply in the low-income areas, including the informal settlements, is inadequate and does not meet the demand. There is no reliable distribution network and piped water is mostly available through water kiosks. Most of the water connections in these areas are illegal, resulting in major financial losses for KIWASCO. Water vendors help in the distribution of the water to the areas away from the water sources.

Shallow wells, springs, boreholes, streams/rivers and Lake Victoria are important alternative water sources. However, most of these sources are of dubious quality and likely to be contaminated due to over-flowing pit latrines, poor wastewater management, and inadequate solid waste and drainage systems. In some of the informal settlements, KIWASCO piped water supply distribution networks are in place, but there is no water supply. In the informal settlements particularly, some sections of the network have been vandalized. Water carriers in the area help in the distribution of the water to the neighbourhoods. The majority of residents in the informal settlements still obtain water from kiosks, shallow wells, streams and rainwater harvesting. The wells in the settlements are in poor condition, some are unprotected and the water supplied is of dubious quality. The infrastructure for the delivery of water services in the informal settlements is either inadequate or non-existent.

Maseno town used to get its water from Maseno – Kombewa scheme which is supplied from Maragoli brooks (a small stream), where an intake is located, and through Maseno WTP. It was constructed in 1978 for a design capacity of 1 800 m^3/d and a tank of 450 m^3. Currently, the plant operates at an average capacity of 1 200 m^3/day. There are two existing tanks at Houma (100 m^3) and Ojola (100 m^3). This scheme used to be under the supervision of the Gulf Water Company, which has now been integrated within KIWASCO. The scheme does not supply Maseno for lack of pressure, although a DN75 supposedly exists. Maseno town currently gets its water from Amatsi Water Services Company Limited (AWASCO) through their Maseno Scheme. AWASCO is a Water Service Provider Company, operating in Vihiga County in line with Water Act 2016.

Maseno University is supplied from a water treatment plant located within the Yala Basin in the Vihiga County. It is operated by the Vihiga Water Supply and Sanitation Company (VIWASCO), under the control of Lake Victoria North Water Works Development Agency (LVNWWDA). Water gravitates from a weir on the Zaaba River - a tributary of Edzawa River - down to the treatment plant. It uses conventional treatment, with sedimentation and sand filtration. The main consumer of this plant is Maseno University, located at the border of Vihiga and Kisumu Counties. So, it targets a population of 15 000 students and 1 250 staff, for a total of about 16 250 people. The current supply from VIWASCO (1 200 m^3/day) is not enough for the University. In addition, the University relies on 5 boreholes which have a cumulated yield of 496 m^3/ day. It makes also an extensive use of roof harvesting, mostly for cleaning purpose.

Kisumu North including Kiboswa area gets its water from Nyahera – Mkendwa scheme which is supplied from Orinde springs. As the scheme is relying on spring water, the latter is of good quality and very low turbidity. So, chlorination is the only chemical process used for this scheme. This scheme used to be under the supervision of the Gulf Water Company, which has now been integrated within KIWASCO. This spring is equipped with a ground tank of 150 m^3. Water is then elevated to the tanks of Gee (2 tanks of 150 m^3 and 75 m^3). The yield of this Mkendwa spring is about 100 m^3/ day.

4.13 Sanitation Facilities

Currently, in Kisumu County, only 3% of the total population of the County and 7% of the population of Kisumu Municipal area is connected to the sewerage network. This network is located only in the city of Kisumu. There is approximately 136km of sewer network. It has been observed that a part of the population living near the sanitation network prefers, for cost reasons, non-collective sanitation techniques to being connected to the network.

The sewerage system in Kisumu can be classified into three wastewater treatment districts (WTD) i.e. the Central WTD which discharges at Kisat WWTP with a design capacity of 8,000 m3/day but currently only receiving about 5700 m^3/day; the Eastern WTD which discharges at Nyalenda Pond with a capacity of 11,000 m3/day but currently only receiving 5900 m^3/day, collecting wastewater from the southeast; and the Western WTD, which covers the area below the airport but which is not yet implemented.

Areas with access to the public sewer network include Lumumba, Makasembo, Milimani, Ondiek and Robert Ouko. The sewers were built more than four decades ago, and there has been no rehabilitation or extension of the sewer system, except for the Kibos Trunk sewers, which were built in 1980 (LVSWSB, 2008) and the network expansions built during the LTAP project. Upgrading and expanding the sewerage infrastructure is therefore urgently required.

Most households have toilet facilities on the plot or in the house (93.6% of households surveyed), with mainly latrines. The evacuation is mainly done in non-sealed pits. Households using public toilets are not satisfied with it because it is not safe, there are odor nuisances, lack of privacy and it is not close.

There is therefore no dedicated faecal sludge treatment infrastructure in Kisumu County. It is why 52% of households surveyed bury faecal sludge in a new hole in their plot.
In Kisumu city, collected faecal sludge is treated at Nyalenda Ponds.

4.14 Solid Waste

Kisumu City generates approximately 400 tonnes of solid waste per day, 20%-25% of which is collected to the open dump site. Of the total municipal solid waste that is collected, 65% is organic and another 27% is recyclable (County of Kisumu, 2015). The collection and handling of municipal solid waste poses a significant challenge in Kisumu City. The closure in August 2019 of Kachok dumpsite within the city compromises any progress made in the solid waste management system.
With this closure in view, government officials have worked diligently to foster new options and opportunities for solid waste collection and disposal. While these measures are commendable, they are not adequate to address the urgency and scale of the situation. The poor management of solid waste blocks sewers and drainage systems; provides a breeding ground for disease vectors and contributes to the generation of leachates, which pollute the ground water and further contribute to waste related diseases. Table below gives summary of solid waste management methods used in Kisumu city

Table 4. 8: Waste streams and solid waste management methods adopted in Kisumu city

Waste stream	Waste characteristics and composition	Current disposal method
Residential waste	The waste mostly consists of food wastes and packaging such as paper, glass, metals and plastics. Textiles are also included in this category although quantities are lesser than organic and packaging waste	Depending on the neighbourhood, waste collection services are provided by the City's Department of Environment and/or private waste collectors. For informal settlements, services are provided by CBOs and NGOs and individual entrepreneurs. Pits are often used
Market waste	The waste mostly consists of organic waste (i.e. vegetable leaves, stalks, bad and rotten fruit and vegetables) and packaging materials (plastic, paper, sacks and wooden pellets)	Waste collection services are provided by the City's Department of Environment. Some markets are serviced by private collectors sourced by their market associations. A significant proportion of organic waste is sold as animal feed to pig breeders or as input for compost making
Waste from commercial enterprises (shops, companies, restaurants)	The waste consists of organic (food) waste, paper, plastic, e-waste and in certain instances hazardous waste	Waste collection is mostly undertaken by the City's Department of Environment and private collectors
Waste from institutions (schools, colleges, universities)	The waste constitutes organic (food) waste and packaging materials (i.e. cardboard, paper, plastics)	Waste collection is mainly facilitated by private collectors
Industrial waste	The waste generated is dependent on the specific industry and ranges from decomposable food wastes to bottles, plastic containers, cardboard, wooden pellets, ash, construction and demolition waste	Waste collection is mostly undertaken by private collectors. Some industries have recovery and recycling strategies for scrap metal, glass and paper
Waste from healthcare institutions (hospitals, clinics and	The waste is mostly biomedical, hazardous and radioactive. Small quantities of paper, plastics and	Mostly undertaken by private collectors and the City's Department of Environment.

laboratories)	glass are also generated	Some healthcare facilities manage their own hazardous wastes. Common disposal methods include incineration and landfill

4.15 Crop and Livestock Production

4.15.1Main Crops Produced

Crop production is a major contributor to food self-sufficiency and security in the project area. In addition, it contributes to poverty reduction through employment creation and value addition. The main food crops grown in the project area are maize, sorghum, beans, cassava and sweet potatoes. The project area is not associated with cash crop cultivation. Vegetables produced within project area include; tomatoes, onions, avocado and kales while fruits are mangoes, pawpaw, bananas, oranges and watermelon. The average farm size within the project area is 2 hectares. Due to small farm holdings and the resulting limited benefits of economies of scale, the practice of mechanized agriculture is heavily constrained.

4.15.2 Main Livestock Breeds and Facilities

Livestock production within the project area includes rearing of traditional breed of cattle, poultry, sheep, goats and pigs. All households visited during this study keep livestock. Animal husbandry practices are almost uniform across the area with most livestock species raised on extensive farming systems. A few farmers have shifted to intensive animal farming methods, which have increased the yield of the various livestock products. Livestock production continues to play a major economic and socio-cultural role within the project area. It provides a source of food, income, employment, power, organic manure, and a means of transportation. It is a significant user of products from feeds, drugs, vaccines and equipment manufacturing industries and is a major provider of raw materials for agro processing industries. With the increasing population, incomes and urbanization, the demand for livestock and livestock products is on the increase.

CHAPTER 5

5.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

5.1 Introduction

Law is a system of rules that are created and enforced through social or governmental institutions to regulate behaviour while a policy is a deliberate system of principles to guide decisions and achieve rational outcomes. A policy is a statement of intent and is implemented as a procedure or protocol. Law is a system that regulates and ensures that individuals or a community adhere to the will of the state. The law shapes politics, economics, history and society in various ways and serves as a mediator of relations between people. Policies are generally adopted by a governance body within an organization.

5.2 Laws governing Environmental Management in Kenya

The need to take good care of environment is of essence for the survival of human beings. The law has intervened and ensures that human beings are considerate, cautious and careful in their dealings with the environment. Kenyan constitution begins with acknowledging the need for cautionary dealings with the environment by a provision in its preamble that," We the people of Kenya are RESPECTFUL of the environment, which is our heritage, and determined to sustain it for the benefit of future generations" The wording of the constitution in its preamble clearly suggests respect to sustainable development.

5.3 Policy, legal and administrative framework applicable to the proposed project

The review of policy, legal and administrative provisions has been carried out to establish the frameworks within which the significance of the various impacts expected to emanate from proposed project activities can be evaluated. A lot of emphasis has been placed on those frameworks and protocols that have a direct bearing on water and sanitation sector. Legal and regulatory frameworks applicable to the proposed project have been categorised into various sub headings. These include constitution of Kenya and relevant national policies, Kenyan laws and regulations and international agreements and conventions. The regulatory framework considered includes institutions within the water sector and the National Environment Management Authority (NEMA). World Bank Guidelines relevant to the proposed project have also been reviewed. These rules and regulations have formed the basis for the determination of the significance of the various impacts associated with the proposed project. The Tables below give summary of policy, legal and administrative frameworks reviewed and their relevance to the proposed project

5.4 Constitution of Kenya and the Relevant National Policies

Table 5. 1: Relevant National Policies and Legal Framework applicable to the Project

National Policy	Provisions	Relevance to the project
The constitution of Kenya 2010	The Constitution of Kenya 2010 is the supreme law of the land. Under Chapter IV, article 42 provides for the right to a clean and healthy environment for all. Further, Chapter V of the Constitution deals with Land and Environment. Specifically, Part 2 elaborates on the obligations of the proponent in respect to protection of the environment and enforcement of environmental rights.	The proponent shall ensure that establishment and operations of the water supply works do not infringe on the right to a clean and healthy environment for all. The proponent shall ensure that the development is carried out in an ecologically, economically and socially sustainable manner. More importantly, the proponent is entitled to a fair administrative decision-making process from NEMA and other State organs.
Kenya Vision 2030	The Kenya Vision 2030 provides the national development blueprint for the period 2008 to 2030 emanating from the Economic Recovery Strategy for Wealth and Employment Creation. The Visions objective is to transform the Country into a middle-income economy with a consistent annual growth of 10% by year 2030. The Vision outlines the 2030 goal for urban areas as to achieve a "well housed population living in an environmentally-secure urban development" The vision envisages to achieve this by bringing basic infrastructure and services including roads, street lights, water and sanitation facilities, storm water drains, footpaths and others to the people. In achieving these, the vision emphasizes on the need promoting environmental conservation to better support the economic pillar.	The proposed project intends to improve water supply and service delivery in Kisumu City and satellite towns through construction and improvement of water supply infrastructure. This initiative is part of the process in achieving the goals of Vision 2030 for Kisumu residents. The proponent shall endeavor to protect the environment while delivering this key economic pillar.
National Policy on Water Resources Management and Development (1999)	The Sessional paper No. 1 of 1999 was established with the objective of preserving, conserving and protecting available water resources and to ensure that water is allocated in a sustainable, rational and economic way. The policy further desires to supply water of good quality and in sufficient quantities that meets the various water needs while ensuring safe disposal of waste water and environmental protection. To achieve these goals, water supply through increased household connections and developing other resources and improved sanitation is required	While the National Policy on Water Resources Management and Development (1999) enhances a systematic development of water facilities in all sectors of socio-economic progress, it recognizes the by-products of this process as wastewater. The proposed project is geared towards providing sufficient and good quality water through rehabilitation and extension of water supply network within Kisumu city and Satellite towns for the benefit of area residents. As an ongoing process, the proponent will put in place strategies and plans for waste water management.

5.5 Kenyan Laws and Regulations

Table 5. 2: Relevant Legal Framework applicable to the Project

The Water Act, 2016	This is an Act of Parliament to provide for the regulation, management and development of water resources; water and sewerage services; and for other connected purposes. With regard to the regulation and management of water resources, the Act establishes Water Resources Authority that serves as the agent of the national government to regulate the management and use of water resources. The Act provides for regulation of water rights and works and provides for water permit in Section 36. The Act further provides for right to clean water and establishes Water Works Development Agencies and stipulates their power and functions in Section 68.	The Water Act 2016 provides for the management, conservation, use and control of water resources and for the acquisition and regulation of rights to use water, to provide for the regulation and management of water supply and sewerage services. Pollution of the neighbouring water sources shall be avoided by the proponent through implementation of appropriate mitigation and control measures.
Environmental Management and Coordination Act (EMCA) 1999	The Act is the framework environmental law and aims to improve the legal and administrative co-ordination of the diverse sectoral initiatives in the field of environment so as to enhance the national capacity for its effective management. The Act harmonizes the sector specific legislations touching on the environment in a manner designed to ensure greater protection of the environment in line with the National Environment Policy, 2013.	Section 58 of the Act requires proponents of a development likely to have deleterious effects on the environment to prepare and submit an EIA report to NEMA for consideration for decision making. This report is prepared in compliance with the provisions of this section. In addition, several Regulations have been enacted by the line Ministry to operationalize the Act and these shall be complied with by the Project Proponent throughout construction and operation phase of the project.
The Environmental Management and Co-ordination (Waste Management) Regulations, 2006	The Regulations focus on management of solid waste, industrial waste, hazardous waste, pesticides and toxic substances and radioactive substances and are aimed at addressing the impact of pollution from solid waste on the environment which becomes important sources of disease-causing pathogens.	In compliance with these Regulations, the proponent will ensure proper waste management throughout the project cycle and shall procure the services of a NEMA licensed contractor to manage solid wastes generated in the course of project construction and operation processes.
Environmental (Impact Assessment and Audit) Regulations 2003	These Regulations guide the preparation of EIAs including how experts should conduct the EIA process and guidelines and standards to be met by the reports. The Regulations were reviewed in 2016 to align them to the Kenya Constitution 2010. They were also recently	The process of carrying out ESIA shall comply with stipulations in the Regulations and EIA Experts are those who meet minimum conditions stated in the Regulations

	amended (2019) to address challenges that have been reported since they were gazetted.	
Noise and Excessive Vibrations Pollution Control Regulations 2009	The regulations seek to control noise and vibration pollution generated from various sources. Regulation 13 prohibits any person from carrying out construction activities at night, if such activities are likely to generate noise above the levels set under second schedule of these regulations. Regulation 14(3) requires that any person carrying out construction, demolition, mining or quarrying work shall ensure that the vibration levels do not exceed 0.5 centimeters per second beyond any source property boundary or 30 meters from any moving source.	Contractors will operate on the basis of maximum permissible noise levels contained in the First Schedule of the Regulations. Provisions relating to licensing procedures for various site activities shall also be complied with throughout construction and operation phases of the project.
Water quality Regulations 2006	These Regulations address the challenges of pollution of water resources and conservation. It consists of VI parts and eleven schedules dealing with protection of sources of water for domestic use to miscellaneous provisions.	The proponent and contractor will implement measures to prevent water pollution from construction activities and effluent discharge during project operation phase. Periodic water quality monitoring will be carried out throughout project operation phase
Occupational Safety and Health Act 2007	This Act provides for the general duties of occupiers of work places. In Part II Section 6(1), it states that every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace. Part VI on health general provisions has provisions for cleanliness, overcrowding, ventilation, lighting and drainage of floors. On machinery safety, the Act provides for safe use of plant, machinery and equipment and examination and testing of plants. The Act also has permits to work provisions, protective clothing and appliances and offences and general penalty	The contractor will continuously improve the safety and health standards at the construction site making safety concern everyone's responsibility. Emergency response plan, warning signs, machinery safety and construction safety provisions of the Act which are aimed at managing occupational accidents, incidents and injuries at the work place will be put in place. All requisite trainings, approval and permits including Workplace Registration Certificate shall be procured by the proponent/ contractor as applicable
The Malaria Prevention Act (CAP 246)	This Act provides measures to curb the breeding of mosquitoes on development sites. Measures proposed in the Act to control the breeding of the vector include: maintenance of free drainage channels, removal of stagnant water from any land around an area to prevent larvae breeding, removal of waste and broken bottles among	The contractor will backfill and drain all open pits and water pools that may act as mosquito breeding grounds. These will control the vectors which transmit malaria within the project area.

	other measures.	
The Physical and Land Use Planning Act, 2019	This is an Act of Parliament to make provision for the planning, use, regulation and development of land and for connected purposes. The objects of this Act include among others to provide the principles, procedures and standards for the preparation and implementation of physical and land use development plans at the national, county, urban, rural and cities level; the procedures and standards for development control and the regulation of physical planning and land use; and a robust, comprehensive and responsive system of physical and land use planning and regulation. The Plan has provisions for development control which strives to ensure among others orderly physical and land use development.	The proponent will operate within the provisions of this Act during development execution. The proponent will obtain pertinent approvals and requisite operational licenses as may be necessary from the County government of Kisumu.
The County Government Act, 2012	The new constitution grants County Governments the powers to grant or to renew business licenses or to refuse the same. To ensure implementation of the provisions of the new constitution, the County Governments are empowered to make by-laws in respect of all such matters as are necessary or desirable for the maintenance of health, safety and well-being of the general public.	The Act gives right to access private property at all times by the County Government officers and servants for inspection purposes and the proponent shall comply with this requirement both during construction and operation phases of the project.
The Employment Act of 2007	The Act covers such critical issues including discrimination in employment, sex harassment at work, contract of service protection of wages, rights and duties in employment such as hours of work and termination of service, protection of children and dispute resolution procedures. The Act therefore declares and defines the fundamental rights of employees, to provide basic conditions of employment of employees and to regulate employment of children. The Act prohibits all forms of child labour.	The project proponent is expected to comply with provisions of this Act as they relate to terms of employment and working hours. Equal opportunity shall be given to all communities around the project area so as to improve the socio-economic status of the local community. No person below the age of 18 years shall be employed at any workplace throughout project construction period.
Children Act Cap 141	This is an Act of Parliament to make provision for parental responsibility, fostering, adoption, custody, maintenance,	Protection of child rights as envisioned in this Act shall be complied with at all times by the project proponent

	guardianship, care and protection of children; to make provision for the administration of children's institutions; to give effect to the principles of the Convention on the Rights of the Child and the African Charter on the Rights and Welfare of the Child and for connected purposes. That Act provides that in all actions concerning children, whether undertaken by public or private social welfare institutions, courts of law, administrative authorities or legislative bodies, the best interests of the child shall be a primary consideration. The Act also protects children from harmful cultural rites, sexual exploitation and drugs.	and other stakeholders in the construction process. Sexual abuse, exploitation and harassment of children by construction workers shall be dealt with decisively by all stakeholders in the construction process. Employment of persons below the age of 18 years shall be strictly prohibited.
Sexual Offences Act 2006	This is an Act of Parliament to make provision about sexual offences, their definition, prevention and the protection of all persons from harm from unlawful sexual acts, and for connected purposes. The Act has provisions for attempted rape, sexual assault, defilement and attempted defilement. The Act also has provisions on sexual offences relating to position of authority and persons in position of trust	Sexual harassment of construction workers and members of the local community shall be avoided at all times throughout project construction and operation periods. Those in position of authority especially persons in charge of hiring labour shall not use those positions to exploit job seekers.
5.3.11 Traffic Act (Cap 403)	The Act prohibits obstruction of traffic, either by persons or facilities constructed in such a way as to interfere with the flow of traffic on roads or road reserves. The law also regulates the quality of exhaust emissions from such mobile vehicles.	Vehicles and machinery to be used for purposes of project implementation shall comply with provisions of Traffic Act as it relates to the use of public roads
The Wildlife Conservation and Management Act, 2013	This is an Act of Parliament to provide for the protection, conservation, sustainable use and management of wildlife in Kenya and for connected purposes. The Act is the main legal force behind the management and administration of national parks in Kenya. Apart from setting out the mandate of for KWS, the Act also sets the parameters for hunting, developments inside parks, general regulations, offences and punishments.	The Act will be significant in the management of aquatic wildlife resident in Lake Victoria and other habitats within the project area throughout construction period.
Air Quality Regulations 2014	These regulations are aimed at controlling, preventing and abating air pollution to ensure clean and healthy ambient	The proponent is obliged to address any source of air pollution associated with construction and operation of

	air.	the project
Environment Management and Coordination Act (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	The EMCA Wetlands, River Banks, Lake Shores and Sea Shore Management Regulations – 2009 ensures the conservation and sustainable use of wetlands, river banks, lake shores and sea shore. This regulation provides guidelines on management of these areas. This regulation also provides precautionary principal when working near wetlands in order to conserve them.	The principle of public participation in the management of wetlands; the polluter-pays principle; the pre-cautionary principle; and the principle of public and private good shall be used in the management of wetland resources within project area of Influence.
The Public Health Act Cap 242 Laws of Kenya	The Act contains comprehensive provisions on discharges of pollutants into watercourses among other prohibitions. The Act makes it the duty of every local authority (in the capacity of "health" authority) to take all lawful, necessary and reasonably practicable measures to safeguard and promote public health. The Act also makes provision for protecting from pollution sources of drinking water supply. Section 129 makes it the duty of the Local authorities to prevent such pollution, to purify a pollution source and to prosecute the polluters.	Health issues will be integrated into the project to ensure that occupational and public health issues are adequately addressed. The proponent and the contractor will work together to ensure compliance with provisions of this Act. Through consultation with other key stakeholders, the proponent will also put in place measures to mitigate all forms of nuisances including noise, air and water pollution.
Work Injury Benefits Act (WIBA)	This is an Act of Parliament to provide for compensation to workers for injuries suffered in the course of their employment. It outlines employer's liability for compensation for death or incapacity resulting from accident; compensation in fatal cases; compensation in case of permanent partial incapacity; compensation in case of temporary incapacity; and persons entitled to compensation and methods of calculating the earning. No compensation shall be payable under this Act in respect of any incapacity or death resulting from a deliberate self-injury. Notice of an accident, causing injury to a workman, of such a nature as would entitle him for compensation shall be given in the prescribed form to the director.	The proponent and/or his agents shall comply with obligations of employers as contained in the Act. In this regard, the proponent and/or his agents shall obtain and maintain an insurance policy, with an insurer approved by the Minister in respect of any liability that the employer may incur under the Act to any of his employees and shall register with the Directorate of Occupational Safety and Health Services as provided for in the Act. Employee compensation will be in compliance with provisions of the Act.
The National Land Commission Act 2012	An Act of Parliament to make further provision as to the functions and powers of the National Land Commission, qualifications and procedures for appointments to the	Land acquisition for purposes of implementation of the proposed project will be carried out in compliance with the provisions of this Act.

	Commission; to give effect to the objects and principles of devolved government in land management and administration, and for connected purposes. The objectives and functions of the National Land Commission as elaborated in the Act include management and administration of land in accordance with the principles of land policy set out in Article 60 of the Constitution and the national land policy.	

5.6 International Agreements and Conventions

Table 5. 3: International Agreements and Conventions Relevant to the Project

Agreement/Convention	Description	Relevance
Vienna Convention for the Protection of the Ozone Layer, 1985	Protection of the ozone layer, came into force in 1988,	Control of release of Ozone depleting gases into the atmosphere
Montreal Protocol on Substances that Deplete the Ozone Layer, 1989	Protection of the ozone layer.	Control of release of Ozone depleting gases into the atmosphere
United Nations Framework Convention on Climate Change (UNFCC), 1994	Control of greenhouse gas emissions.	Control of release of Greenhouse gases into the atmosphere
The Geneva Convention, 1979	Establishes protocols for emissions of sulphur dioxide, nitrogen oxides, volatile organic hydrocarbons, ammonia, persistent organic pollutants, and heavy metals	These gases must be managed in such a way that they are not released into the atmosphere
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1971	The conservation and sustainable utilization of wetlands, i.e. to stem progressive encroachment on and loss of wetlands now and in the future, recognizing the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value.	Release of raw effluents into the neighbouring Lake Victoria should not be allowed in compliance with the provisions of this convention
United Nations Convention on Biological Diversity, 1992	Promotes development of national strategies for the conservation and sustainable use of biological diversity. Often seen as the key document regarding sustainable development.	All biological resources within the project area should be sustainably managed for sustainability reasons
Constitution of the International Labour Organization	Promotes opportunities for women and men to obtain decent and productive work, in conditions of freedom, equity, security and human dignity.	Dignity of all employees engaged at this site should be maintained both during construction and operation phases of the project

5.7 Regulatory Framework

5.7.1 The Water Sector Regulations

5.7.1.1 General

The National Policy on Water Resources Management and Development and the Water Act 2016, presently guides water resources management. The overall goal of the National Water Development Policy is to facilitate the provision of water in sufficient quantity and quality and

within a reasonable distance to meet all competing uses in a sustainable, rational and economical way. This policy separates policy formulation, regulation and services provision and defines clear roles for sector actors within a decentralized institutional framework and includes private sector participation and increased community development. The following institutions are relevant for the successful implementation of the proposed project.

5.7.1.2 Ministry of Water & Sanitation and Irrigation (MWSI)

This is the overall ministry in charge of water in Kenya. It is responsible for policy development; sector co-ordination; monitoring and supervision to ensure effective water and sewerage services in the country; sustainability of water resources; and development of water resources for irrigation, commercial, industrial, power generation and other uses. Its mission statement is to contribute to national development by promoting and supporting integrated water resource management to enhance water availability and accessibility.

5.7.1.3 Water Resources Authority (WRA)

The Authority is responsible for sustainable management of the nation's water resources; implementation of policies and strategies relating to management of water resources; development of principles, guidelines and procedures for the allocation of water; development of catchments level management strategies including appointment of catchments area advisory committees; regulation and protection of water resources quality from adverse impacts; and classification, monitoring and allocation of water resources.

5.7.1.4 Water Services Regulatory Board (WASREB)

The Regulatory Board is responsible for the regulation of the water and sewerage services in partnership with the people of Kenya. Its mandate include among others regulating the provision of water and sewerage services including licensing, quality assurance, and issuance of guidelines for tariffs, prices and disputes resolution; overseeing the implementation of policies and strategies relating to provision of water services; licensing of Water Services Boards and approving their appointed Water Services Providers; monitoring the performance of the Water Service Boards and Water Service Providers; inform the public on the sector performance; and gives advice to the Minister in charge of water affairs.

5.7.1.5 Lake Victoria South Water Works Development Agency (LVSWWDA)

Lake Victoria South Water Works Development Agency (LVSWWDA) is a state corporation under the Ministry of Water and Sanitation. It was preceded by Lake Victoria South Water Service Board (LVSWSB) established under the Water Act 2002 through Gazette Notice No. 1714 of 12th March 2004 with the mandate of ensuring efficient and economic provision of Water and Sanitation Services in its area of jurisdiction. The Agency is among the 8 Water Works Development Agencies established all over the country. The Water Act 2016 requires that LVSWWDA contracts agents i.e. Water Service Providers (WSP) to provide water and sanitation services on its behalf.

5.7.1.6 Water Sector Trust Fund (WSTF)

This body assists in the financing of the provision of water services to areas of Kenya that are without adequate water services. This shall include providing financing support to improved water services towards capital investment to community water schemes in underserved areas; capacity building activities and initiative among communities' water services activities outlined in the water services strategic plan as prioritized by the government; awareness creation and information dissemination regarding community management of water services; and active community participation in the management of water services

5.7.1.7 Kisumu Water and Sanitation Company Limited (KIWASCO)

Kisumu Water and Sanitation Company Ltd was established through the reforms that took place in the water sector nationally and based on the decision to privatise essential services. The Company was established in July 2003 as an independent company after the transformation of the water and sewerage department of the then Kisumu Municipal Council. The core objective of KIWASCO is to make the water and sewerage services provision water and sanitation services within their area of jurisdiction.

5.7.1.8 The County Government of Kisumu

The passage of Kenya's 2010 constitution has had a wide set of implications for the water sector. Primarily, the constitution acknowledges access to clean and safe water as a basic human right and assigns the responsibility for water supply and sanitation service provision to 47 newly established counties. The County government of Kisumu is therefore mandated to spearhead water and sanitation provision within Kisumu city in partnership with the local water service board.

5.7.2 National Environment Management Authority (NEMA)

NEMA is the administrative body that is responsible for the coordination of the various environmental management activities in Kenya. NEMA is also the principal government authority for implementing all environmental policies. NEMA is also responsible for granting EIA approvals and for monitoring and assessing activities in order to ensure that the environment is not degraded by such project activities.

5.8 European Investment Bank (EIB) Environmental and Social Standards

5.8.1. Assessment and Management of Environmental and Social Impacts and Risks

This Standard applies to all operations likely to have significant and material environmental and social impacts and risks. These impacts and risks need be taken into account at the earliest possible stage in all the technical planning and decision-making processes. The standard requires project proponents to carry out an environmental and social assessment for any project which is likely to have significant environmental and social impacts and risks.

5.8.2 Pollution Prevention and Abatement

Pollution prevention and control are key pillars of EU environmental policy that, in general, contribute significantly to the EU's broader objectives of smart, sustainable and inclusive growth. The objectives of this Standard include among others the avoidance of any deterioration in the quality of human health or the environment, and any loss of biodiversity, by avoiding, reducing and, if possible, compensating/remedying significant adverse effects of projects supported by the EIB.

5.8.3 Biodiversity and Ecosystems

Biodiversity and healthy ecosystems are necessary for human survival and a good quality of life, but are being lost and degraded at a greatly accelerated rate because of human activities. Underpinning the Biodiversity and Ecosystem Standard of the EIB is the overall goal of maintaining the integrity of areas important for biodiversity as well as the natural functions, processes, and resilience of ecosystems, with the aim of achieving no net loss or a net gain of biodiversity and ecosystem.

5.8.4 Climate-Related Standards

The EIB Climate Standards, related to the value added by the EIB, require that its financing as a whole is aligned with EU climate policy. Specifically, the EIB is committed to making its lending portfolio more climate-friendly by promoting climate change mitigation projects in various sectors and promoting the adoption of energy efficient solutions in the projects financed; mainstream climate risk considerations generally into the project cycle and to promote adaptation projects or projects with adaptation components and measures, in the interests of long term sustainability among others.

5.8.5 Cultural Heritage

The objective of this Standard is to outline the proponent's responsibilities in terms of cultural heritage management, involving the actions taken to identify, assess, decide and enact decisions regarding the impact on cultural heritage associated with operations supported by the EIB. The standard aims to support the conservation of cultural heritage in the context of EIB operations and to protect cultural heritage from adverse impacts of project activities by promoting the cultural heritage impact assessment and management.

5.8.6 Involuntary Resettlement

The objectives of this Standard are to avoid or, at least minimise, project-induced resettlement whenever feasible by exploring alternative project designs and avoid and/or prevent forced evictions and provide effective remedy to minimise their negative impacts should prevention fail. The standard also aims to ensure that any eviction which may be exceptionally required is carried out lawfully, respects the rights to life, dignity, liberty and security of those affected who must have access to an effective remedy against arbitrary evictions. Respect individuals', groups' and communities' right to adequate housing and to an adequate standard of living, as well as other rights that may be impacted by resettlement are also provided for in the standard.

5.8.7 Rights and Interests of Vulnerable Groups

Some individuals or groups may be less resilient to risks and adverse impacts than others. Within the context of EIB operations, individuals and/or groups who are at a higher risk of being unable to anticipate, cope with, resist and recover from project-related risks and/or adverse impacts are considered vulnerable. Vulnerable individuals or groups may include women, children, the elderly, the poor, ethnic, religious, cultural or linguistic minorities, or indigenous groups. This standard sets out to avoid or minimise, or otherwise mitigate and remedy, potential harmful effects of EIB operations to vulnerable individuals and groups whilst seeking that these populations duly benefit from such operations.

5.8.8 Labour Standards

The workforce is a valuable asset for any company. Sound management of human resources and of worker relations is key for sustainable business practices. The development of fair, safe and healthy working conditions based on respect for workers' rights fosters efficiency and productivity. In contrast, the failure to create and maintain sound worker-management relationships can undermine workforce commitment and effective project implementation. In these standards, the responsibilities of the project proponent are defined to ensure that the project embraces the principles of International Labour Standards.

5.8.9 Occupational and Public Health, Safety and Security

Projects often bring employment, economic growth and social improvement opportunities to both workers and communities. Project activities, however, can also increase exposure to hazards, risks and negative impacts in terms of public health and safety. These may arise through or be amplified by project-related occurrences such as increased environmental pollution; elevated noise levels the spread of communicable diseases or disproportionate use of violence by private or public security forces. These standards lay procedures to protect and secure public and occupational health, safety and security and promote dignity of workers and citizens affected by EIB operations.

5.8.10 Stakeholder Engagement

A meaningful engagement process allows for the efficient implementation of a financed operation and, in particular, the early and effective identification, assessment, and management of any environmental and social risks, impacts, and opportunities. The views, interests, and concerns of project affected communities and other interested stakeholders are heard, understood, and taken into account throughout the project lifecycle. The standard outlines a systematic approach to stakeholder engagement that the project proponent is expected to build and maintain by way of a constructive relationship with relevant stakeholders.

5.9 World Bank Environmental and Social Standards (ESS)

5.9.1 ESS1: Assessment and Management of Environmental and Social Risks and Impacts

These standards set out the Borrower's responsibilities for assessing, managing and monitoring environmental and social risks and impacts associated with each stage of a project supported by the Bank through Investment Project Financing (IPF), in order to achieve environmental and social outcomes consistent with the Environmental and Social Standards (ESSs).

5.9.2 ESS2: Labour and Working Conditions

This standard recognizes the importance of employment creation and income generation in the pursuit of poverty reduction and inclusive economic growth. Borrowers can promote sound worker-management relationships and enhance the development benefits of a project by treating workers in the project fairly and providing safe and healthy working conditions.

5.9.3 ESS3: Resource Efficiency and Pollution Prevention and Management

This standard recognizes that economic activity and urbanization often generate pollution to air, water, and land, and consume finite resources that may threaten people, ecosystem services and the environment at the local, regional, and global levels. This ESS sets out the requirements to address resource efficiency and pollution prevention and management throughout the project life-cycle.

5.9.4 ESS4: Community Health and Safety

This standard addresses the health, safety, and security risks and impacts on project-affected communities and the corresponding responsibility of Borrowers to avoid or minimize such risks and impacts, with particular attention to people who, because of their particular circumstances, may be vulnerable.

5.9.5 ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement

Involuntary resettlement should be avoided. Where involuntary resettlement is unavoidable, it will be minimized and appropriate measures to mitigate adverse impacts on displaced persons (and on host communities receiving displaced persons) will be carefully planned and implemented.

5.9.6 ESS10: Stakeholder Engagement and Information Disclosure

This standard recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

CHAPTER 6

6.0 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.1 Introduction

This chapter presents the assessment of the issues likely to arise as a result of implementation of the proposed project. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity, probability, and the stakeholders and/or values affected. In accordance with best practice, the analysis includes issues relating to the project's environmental and social sustainability. For potential negative impacts judged to be significant and require mitigation, the analysis is followed by notes on mitigation options. Impacts and their possible mitigation are combined in this chapter, for easy reference. As in most impact studies, the analyses focus on potential problems and their solutions. Appropriate actions are included in the EMP (Chapter 9), and recommended immediate next steps are highlighted in Chapter 12.

6.2 Impact identification

6.2.1 Sources of impacts

The impacts associated with the proposed project will emanate from project inputs, activities and outputs. The project inputs that shall be potential sources of impacts include materials taken from the local and external sources including sand and cement; skilled and unskilled workforce that will exert direct and indirect demand for energy, water supply, sanitation, health services etc.; and machinery to be used at the project site for various activities. The project activities that shall be potential sources of impacts include extraction of raw materials; transportation of raw materials, machinery and labour to the site; site preparation and clearance; topsoil removal; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works and compaction. Project outputs likely to lead to adverse impacts include solid wastes (including sludge) from construction and operation (water treatment) activities; emissions from the site (hydrocarbons, Carbon dioxide, and particulate matter); noise pollution from construction activities and machinery and hazardous waste spillage

Table 6. 1: Sources of impacts

Project Inputs	Project Activities	Project Outputs
• Materials taken from local and external sources • Skilled and unskilled workforce • Machinery used at the project site	• Raw material extraction • Transportation of raw materials • Transportation of machinery • Transportation of labour • Site clearance • Excavation works • Spoil and waste disposal • Backfilling and compaction	• Waste generated • Gaseous emissions from the site • Noise from site activities • Oil spills

6.2.2 Receptors of impacts

The anticipated negative impacts will be received by both the physical and human environmental elements. Human environment likely to be affected by project activities include private properties located along the path of the raw water mains and residential housed located at the raw water intake point. Natural environment likely to be affected by project activities include surface water resources within the vicinity of the project (Lake Victoria) and vegetative materials located along the path of the proposed raw water mains.

Table 6. 2: Receptors of impacts

Human Environment	Physical Environment
• Residential houses within project vicinity • Business premises • Academic institutions including schools • Churches • Workers at the site	• Surface water resources • Ground water resources • Plants and animals within project vicinity • Ecologically sensitive areas • Soil

6.3 Impact Assessment Criteria

The impact assessment criteria applied in this study is based on industry standards for impact assessment, adopted for use in the assessment of the proposed project. The purpose of impact assessment is to assign relative significance to predicted impacts associated with the project, and to determine the manner in which impacts are to be avoided, mitigated or managed. The rating of impacts assumes that standard construction and operating procedures present in the project design will be implemented. The impact assessment criteria include the spatial context of project impacts, temporal context, reversibility, magnitude and significance of potential impacts of project construction and operation. The potentially significant environmental impacts have been identified based on the nature of the receiving environment, a review of the proposed activities, and the issues raised in the public participation process.

6.4 Impact Assessment Methodology

In the impact assessment stage of the ESIA, identified issues are analysed and expected impacts are defined. This analysis identifies the types of impact; predicts the magnitude, probability of occurrence and extent of the impact; and determines the overall significance of the impact

6.4.1 Identification of environmental aspects and impacts

The outstanding environmental issues identified as having significance have been assessed using the following methodology.

(i) First, the issues identified have been described giving consideration to the associated activity and the aspect of that activity that is likely to result in an impact;
(ii) The nature of the impact has been described;
(iii) Once this was undertaken, the significance of the impact was determined.

6.5 Description of aspects and impacts

The accumulated knowledge and the findings of the environmental investigations form the basis for the prediction of impacts. Once a potential impact has been determined during screening and scoping process, it is necessary to identify which project activity will cause the impact, the probability of occurrence of the impact, and its magnitude and extent (spatial and temporal). This information is important for evaluating the significance of the impact, and for defining mitigation and monitoring strategies and has been used in this study. The aspects and impacts identified have been described based on the following criteria.

6.5.1 Spatial scope

The spatial scope for each aspect, receptor and impact has been defined. The geographical coverage (spatial scope) description has taken account of the following factors:

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

The spatial scope of the impact has been rated on the following scale:

Activity specific	1	Area specific	2	Whole site	3	Regional/ neighbouring areas	4	National	5

6.5.2 Duration

Duration refers to the length of time that the aspect may cause a change either positively or negatively on the environment. The environmental assessment has distinguished between different time periods by assigning a rating to duration based on the following scale:

One day to one month	1	One month to one year	2	One year to ten years	3	Life of operation	4	Post closure	5

6.5.3 Severity

The severity of environmental aspect has been determined by the degree of change to the baseline environment, and has included consideration of the following factors:

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

The following ratings have been used

Insignificant/ non-harmful	1	Small/ potentially harmful	2	Significant/ slightly harmful	3	Great/ harmful	4	Disastrous/ extremely harmful	5

6.5.4 Frequency of Activity

Frequency of activity has considered the repetitiveness of various project activities and how this may impact on the various receptors of the impacts. The following ratings have been used

Annually or less	1	6 monthly	2	Monthly	3	Weekly	4	Daily	5

6.5.5 Frequency of the impact

The frequency of the impact occurring refers to how often the aspect impacts or may impact either positively or negatively on the environment. After describing the frequency the findings have been indicated on the following scale:

Almost never/ almost impossible	1	Very seldom/ highly unlikely	2	Infrequent/ unlikely/ seldom	3	Often/ regularly/ likely/ possible	4	Daily/highly likely/ definitely	5

6.6 Assessment of significance of impacts

6.6.1 General

The purpose of impact evaluation is to assign relative significance to predicted impacts associated with the project, and to determine the manner in which impacts are to be avoided, mitigated or managed. The information presented above in terms of identifying and describing the aspects and impacts have been summarised in a tabular form and significance has been assigned with supporting rationale. Significance has been determined before and after mitigation, taking into consideration all the factors described above. A definition of a "significant impact" for the purposes of this study is: "An impact which, either in isolation or in combination with others, could, in the opinion of the specialist, have a material influence on the decision-making process, including the specification of mitigating measures."

6.6.2 Significance determination

The environmental significance rating is an attempt to evaluate the importance of a particular impact, the consequence and likelihood of which has already been assessed by the relevant specialist. The description and assessment of the aspects and impacts undertaken is presented in a consolidated table (Table 6.2) with the significance of the impact assigned using the process and matrix detailed below. The sum of the first three criteria (spatial scope, duration and severity) provides a collective score for the CONSEQUENCE of each impact. The sum of the last two criteria (frequency of activity and frequency of impact) determines the LIKELIHOOD

of the impact occurring. The product of CONSEQUENCE and LIKELIHOOD leads to the assessment of the SIGNIFICANCE of the impact, shown in the significance matrix below.

Table 6. 3: Significance Assessment Matrix

CONSEQUENCE (Severity + Spatial Scope + Duration)															
LIKELIHOOD (Frequency of activity + Frequency of impact	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150

Table 6. 4: Positive and Negative Mitigation Ratings

Colour Code	Significance Rating	Value	Negative Impact Management Recommendation	Positive Impact Management Recommendation
	Very high	126-150	Improve current management	Maintain current management
	High	101-125	Improve current management	Maintain current management
	Medium-high	76-100	Improve current management	Maintain current management
	Medium-low	51-75	Maintain current management	Improve current management
	Low	26-50	Maintain current management	Improve current management
	Very-low	1-25	Maintain current management	Improve current management

The model outcome is then assessed in terms of impact certainty and consideration of available information. Where a particular variable rationally requires weighting or an additional variable requires consideration, the model outcome is adjusted accordingly. Arguments for such adjustments are presented in the text and associated table.

Table 6. 5: Framework for Assessing Environmental Impacts

SPATIAL SCOPE	RATING	DURATION	RATING	SEVERITY	RATING
Activity specific	1	One day to one month	1	Insignificant/ non-harmful	1
Area specific	2	One month to one year	2	Small/ potentially harmful	2
Whole site / plant	3	One year to ten years	3	Significant/ slightly harmful	3
Regional (neighbouring areas)	4	Life of operation	4	Great/harmful	4
National	5	Permanent	5	Disastrous/ extremely harmful	5

FREQUENCY OF ACTIVITY	RATING	FREQUENCY OF IMPACT	RATING
Annually or less	1	Almost never / almost impossible	1
6 monthly	2	Very seldom / highly unlikely	2
Monthly	3	Infrequent / unlikely / seldom	3
Weekly	4	Often / regularly / likely / possible	4
Daily	5	Daily / highly likely / definitely	5

SIGNIFICANCE OF IMPACT	TIMING
Very Low (1-25) Low (26-50) Medium -Low (51-75) Medium-High (76-100) High (101-125) Very High (126-150)	Pre-construction Construction Operation

6.7 Description of Feasible Alternatives

Although alternatives were investigated in detail during screening and scoping process, a review of the options based on the impact assessment have been undertaken in comparison with the preferred option.

6.8 Mitigation

Measures to avoid, reduce or manage impacts consistent with best practice have been proposed and the effectiveness of such measures assessed in terms of their ability to avoid, remove an impact entirely, render it insignificant or reduce its magnitude. In assessing the significance of the impact, natural and existing mitigation have been taken into account. Natural and existing mitigation measures are defined as natural conditions, conditions inherent in the project design and existing management measures that alleviate (control, moderate or curb) impacts. In addition, the significance of impacts has been assessed taking into account any mitigation measures that are proposed.

6.9 Potential impacts and mitigation measures during construction phase

6.9.1 Disruption of socio-economic activities within the project area

Impacts on socio-economic front associated with the proposed project have been looked at from the point of view of individual properties that may be adversely affected during construction of project infrastructure. Most of the properties in question include business premises among them kiosks and eateries. Most of these are located very close to project alignment areas and business operations may be affected during construction process. The disruptions of the socio-economic activities have the potential of leading to losses of revenue.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	4	9	9	81
	Whole site	One month to one year	Harmful	Daily	Likely			Medium- high
Mitigation Measures	• Kiosk owners who have constructed their kiosks within road reserves will be advised in advance to remove the kiosks before excavation activities begin. They will be allowed to reconstruct their kiosks after the pipes have been layed and trenches backfilled. The impacts will therefore be short term. • In situations where the facilities are outside the road reserve but have to be affected by the works, the affected individuals shall be compensated as per provisions of World Bank OP 4.12 and applicable Kenyan legislations. • Other option available is to reconstruct the affected structure on behalf of the Project Affected Person (PAP) • Loss of revenue from disrupted services shall be mitigated through compensation for the losses							
With mitigation Measures	1	1	1	4	1	3	6	15
	Activity specific	One day to one month	Non harmful	Weekly	Almost impossible			Very Low

6.9.2 Disruption of services within the project alignment area

Construction of the project and associated infrastructure may lead to disruption of water services due to breakage of underground water pipes during construction Works. Underground power and optic fibre cables may also be disrupted during excavation and trenching works.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	3	9	8	72
	Whole site	One month to one year	Harmful	Daily	Infrequent			Medium- Low
Mitigation Measures	• Consultations with the service providers to ascertain location of service lines will be carried out before commencement of construction process; • The contractor shall liaise with Kisumu Water and Sanitation Company (KIWASCO) and private water service providers to restore all disrupted water services as soon as pipe laying and backfilling of trenched areas are finalised • The contractor shall liaise with Kenya Power Company to restore power cables cut during excavation activities as soon as pipe laying and backfilling of trenched areas are finalised.							
With mitigation Measures	1	1	1	4	1	3	5	15
	Activity specific	One day to one month	Non harmful	Weekly	Almost impossible			Very Low

6.9.3 Impact on fences and perimeter walls

These impacts shall emanate from destruction of fences along project alignment areas during construction works to provide working space for construction workers. These include live

fences, barbed wire fences and perimeter walls. The fences could either be accidentally demolished or live fences uprooted during trenching works.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	2	9	7	63
	Whole site	One month to one year	Harmful	Daily	Very seldom			Medium- Low
Mitigation Measures	• The destroyed fences will either be restored by the contractor • Where destruction is significant, owners compensated after resettlement Action Plan are carried out and the properties valued.							
With mitigation Measures	1	1	1	4	2	3	6	18
	Activity specific	One day to one month	Non harmful	Weekly	Very seldom			Very Low

6.9.4 Impact on public infrastructure

There are instances where the proposed project infrastructure will cross public roads thus disrupting traffic flow. Access roads within the project area are likely to be temporarily blocked by excavated materials. Road surfaces may also be interfered with as a result of trenching works

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	2	9	7	63
	Whole site	One month to one year	Harmful	Daily	Very seldom			Medium- Low
Mitigation Measures	(i) All excavated soil shall be used for backfilling of trenched areas and site restoration. (ii) Damaged road surfaces shall be adequately restored to pre-excavation conditions. (iii) Excess spoil materials shall be disposed of in approved tips in compliance with existing laws, rules and regulations							
With mitigation Measures	1	2	1	4	2	3	6	18
	Activity specific	One day to one month	Non harmful	Weekly	Very seldom			Very Low

6.9.5 Blockage of drainage channels

Drainage blockages due to temporary disruption of surface runoff as a result of the construction process are anticipated.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	4	5	2	9	7	72
	Whole site	One month to one year	Harmful	Daily	Very seldom			Medium- Low
Mitigation Measures	(i) Working under dry weather conditions and unclogging all blocked storm water drainage channels shall be implemented.							
With mitigation Measures	1	1	1	4	2	3	6	18
	Activity specific	One day to one month	Non harmful	Weekly	Very seldom			Very Low

6.9.6 Impacts of obtaining construction materials

The project will require some amount of materials for construction of project related infrastructure. Specific sources for these materials have not been identified. The project will require both borrow pits (for soil) and quarries (for rock). These need to be sited, accessed, operated and closed so as to avoid archaeologically sensitive sites, minimise impacts on land users and avoid the creation of safety or health hazards (e.g. steep slopes, malarial ponds). The project will also require sand. Sand mining from rivers is associated with habitat destruction due to changes in channel morphology.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	4	2	3	4	4	9	8	72
	Regional	One month to one year	Significant	Weekly	Likely			Medium- Low
Mitigation Measures	• Maximise the re-use of excavated materials in the works, as fill. • Site quarries and borrow pits carefully so as to minimise impacts on existing land uses. • Strip all available topsoil from borrow pits and quarries and store it safely for use in site restoration. • Close all borrow pits and quarries in accordance with an approved plan to maximise their long-term biological productivity (capacity for plant growth) and minimise health and safety hazards. • Carry out EIA for quarry site if new quarries are to be opened for purposes of this project • Include a provision in the tender documents that where goods and services are of equal quality, those sourced from an organisation implementing a certified EMS and/or CSR approach will be preferred.							
With mitigation Measures	2	1	1	2	1	4	3	12
	Area specific	One day to one month	Non harmful	Six monthly	Almost impossible			Very Low

6.9.7 Accidents and Injuries to workers and residents

Activities associated with construction such as excavating of trenches, movement of construction vehicles, the use of equipment and the congregation of workers and staff on site increase the risk of injury. Construction activities will also result in access of the area by vehicles delivering materials to the site that may result in accidents/incidents. Work at the proposed site may involve hazards such as accidental falls into open trenches, slippery walkways, working at heights, exposure to energized circuits, and heavy equipment. Work at the project site may also involve entry into confined spaces, including manholes and storage tanks among others.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	4	2	4	5	4	10	9	90
	Regional	One month to one year	Harmful	Daily	Likely			Medium-High
Mitigation Measures	• The Contractor shall conform to all the stipulations of the Occupational Health and Safety Act, 2007. The Act requires the designation of a Health and Safety representative when more than 20 employees are deployed; • The contractor shall provide ample warning signs, guard rails, warning tape, etc., around open excavations, stacks of material, debris, etc. and shall be held liable for all claims as a result of neglect of such precautions and provisions; • Proper access control should be enforced to ensure that no unauthorised persons enter the site; • Material delivery vehicles should be under the control of competent personnel. Ensure that persons handling equipment							

	and materials are suitably trained, supervised and adequately instructed; • Install railing around all process tanks and pits. Require use of a life line and personal flotation device (PFD) when workers are inside the railing, and ensure rescue buoys and throw bags are readily available; • Implement a confined spaces entry program that is consistent with applicable national requirements and internationally accepted standards. • Valves to storage tanks should be locked to prevent accidental flooding during maintenance; • Use of requisite Personal Protective Equipment (PPE) at all times during construction works • Use fall protection equipment when working at heights; • Maintain work areas to minimize slipping and tripping hazards; • Use proper techniques for trenching and shoring; • When installing or repairing mains adjacent to roadways, implement procedures and traffic controls, such as establishment of work zones so as to separate workers from traffic and from equipment as much as possible; reduction of allowed vehicle speeds in work zones to 10km/hr; and use of high-visibility safety apparel for workers in the vicinity of traffic							
With mitigation Measures	4	2	1	4	1	7	5	35
	Regional	One month to one year	Non harmful	Weekly	Almost impossible			Low

6.9.8 Risks to local residents

The public as well as workers are at risk from major civil engineering projects such as this project, particularly from construction traffic, and local women through sexually transmitted diseases. The project will generate substantial amount of traffic compared to the non-project situation. This traffic will be travelling on the public roads within the project area. Accidents could occur due to excessive speeds, unsafe loading, poor road surfaces, poor vehicle maintenance, and unwary pedestrians, especially drunken men, and children. Local women may take advantage of the cash available to male project workers. They may therefore be involved in unsafe sex and be at high risk of becoming infected with (and subsequently passing on) sexually transmitted infections including HIV/AIDS. This is a significant gender issue.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	4	2	4	5	4	10	9	90
	Regional	One month to one year	Harmful	Daily	Likely			Medium- high
Mitigation Measures	• Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials. The code should focus on safety, especially speed, and loading, especially banning all carriage of staff, workers and passengers except in seats. • Establish and implement an HIV/AIDS prevention programme specifically related to the project's construction phase. The programme should include, at a minimum, the identification of specific risk groups (e.g. bar workers, truck drivers), specific AIDS awareness campaigns for these risk groups and HIV/AIDS tests for identified sex workers and the provision of Anti retro-virals.							
With mitigation Measures	4	2	1	5	1	7	6	42
	Regional	One month to one year	Non harmful	Daily	Almost impossible			Low

6.9.9 Solid waste generation

Construction will result in the generation of various solid wastes, principally surplus aggregates, metal scraps, plastics (wrappings and pipes) and wood. During operation phase, the project will generate a variety of waste types which must be disposed of in accordance with national laws and regulations.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	2	5	3	7	8	56
	Whole site	One month to one year	Potentially harmful	Daily	Likely			Medium to low
Mitigation Measures	• Express condition shall be put in the contract that before the contractor is issued with a completion certificate; he will clear the site of all debris and restore it to a state acceptable to the supervising architect and environmental consultant; • Construction site management plans will be required for all works. This plan will include a waste management plan for all activities during the construction period. • Bins/ receptacles shall be placed at appropriate locations within the site as collection centres to facilitate separation and sorting of the various types of wastes; • The contractor shall work hand in hand with private waste handlers and local council to facilitate sound waste management; and • The wastes shall be properly segregated and separated to encourage recycling of some useful waste materials.							
With mitigation Measures	1	1	1	5	1	3	6	18
	Activity specific	One month to one year	Non harmful	Daily	Almost impossible			Very Low

6.9.10 Minimal soil erosion

Soil erosion may occur due to uncontrolled excavation of trenches during rainy seasons, from inadequacies in backfilling works and improper drainage of storm water. Excavation works will expose soil to agents of erosion leading to soil erosion problems. Occurrence of the impact will be short term and will be restricted to construction phase of the project. Implementation of mitigation measures can reduce the impact to significance of low to negligible.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	2	5	4	7	9	63
	Whole site	One month to one year	Potentially harmful	Daily	Likely			Medium- Low
Mitigation Measures	• Avoid hampering drainage of surface water and plan for restoration measures after construction. • At the end of construction works, level off the soils and facilitate vegetation regeneration.							
With mitigation Measures	3	1	1	3	1	5	4	20
	Activity specific	One day to one month	Non harmful	Monthly	Almost impossible			Very Low

6.9.11 Atmospheric Pollution

The expected air pollutants from the proposed project will include dust, particulate matter and gaseous emissions from construction materials. Dust will be generated from the excavations, batching activities, earth moving and materials delivery. Particulate matter will be generated by dry construction materials including sand, cement, gravel, murram, etc. Smoke, hydrocarbons and nitrogenous gases will be emitted from machinery exhausts. These will be expected to increase slightly and will be localized hence expected to be experienced within 30m radius of the project. Air pollution is expected to be a low key impact during the construction period.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance

Without Mitigation	4	2	3	5	3	9	8	72
	Regional	One month to one year	Harmful	Daily	Infrequent			Medium- Low
Mitigation Measures	• Impose speed limits (10 km/h in all areas within the site boundaries). • Damping down of access roads, stockpiles and cleared areas must take place to minimize dust pollution. • Ensure that no refuse wastes are burnt on the premises or surroundings. Refuse wastes should be removed by an official contractor and dumped at an approved site in compliance with local laws and regulations. More significantly, an Integrated Solid Waste Management system is encouraged. • Proper rehabilitation and restoration of disturbed areas is required in order to minimize bare patches. • Vehicles to be used during the construction phase are to be kept in good working condition and should not be the source of excessive fumes. • Transported materials must be done in such a manner that they do not fly or fall off the vehicle by covering or wetting friable materials. • Sprinkle water before undertaking very dusty operations to reduce dust pollution. • Dust and air pollution due to dust when excavated material is stock piled, should be limited by means of wetting (particularly dry season), covering with foil or working in small sections so that the trenches are backfilled with excavated soil within shortest possible period (maximum 2 days).							
With mitigation Measures	4	1	1	3	1	6	4	24
	Regional	One day to one month	Non harmful	Monthly	Almost impossible			Very Low

6.9.12 Noise Impact

Construction activities associated with the proposed project are likely to increase noise level to more than what is experienced under non project scenario. Use of construction machinery will lead to significant noise levels. Fabrication of site equipment and concrete mixing both at the contractor's workshop and at the construction site will generate significant noise levels. Material delivery is also expected to lead to significant noise levels during construction phase.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	3	2	2	5	4	7	9	63
	Whole site	One month to one year	Potentially harmful	Daily	Likely			Medium to Low
Mitigation Measures	• Schedule road traffic movements to normal working hours (08H00 –17H00). • Silencers on equipment such as generators will be properly designed. • Where need be, all exposed workers will be provided with functional ear muffs, whose use is mandatory, and closely enforced, monitored and supervised.							
With mitigation Measures	3	2	1	4	1	6	5	30
	Whole site	One month to one year	Non harmful	Weekly	Almost impossible			Low

6.9.13 Water supply disruption

Possible temporary disruption to water supply services may occur during excavation and backfilling works. Excavation activities may lead to disruption of underground water pipes leading to service disruptions. Disruption of water supply due to shutting off valves during construction works may also lead to service disruption in some service areas during construction period.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without	4	2	2	5	4	8	9	72

Mitigation	Regional	One month to one year	Potentially harmful	Daily	Likely			Medium- Low
Mitigation Measures	• Give warning to consumers so that they can store water that can last them within the period of disruption • Notify KIWASCO in writing to enable then disconnect water services ahead of excavation works • Ensure that water services are restored within 24 hours and keep records of restoration as evidence.							
With mitigation Measures	4	1	1	4	1	6	5	30
	Regional	One day to one month	Non harmful	Weekly	Almost impossible			Low

6.9.14 Exposure to Corona Virus

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. The virus that causes COVID-19 is mainly transmitted through droplets generated when an infected person coughs, sneezes, or exhales. These droplets are too heavy to hang in the air, and quickly fall on floors or surfaces. People can be infected by breathing in the virus if they are within close proximity of someone who has COVID-19, or by touching a contaminated surface and then your eyes, nose or mouth. In the wake of global corona virus (COVID- 19) pandemic, a number of guidelines, standards and protocols to contain its spread have been issued by the Ministry of Health, World Bank, the Directorate of Occupational Safety and Health Services (DOSHS) and National Construction Authority (NCA). Covid 19 shall be a major health risk at the site with high significance rating if containment protocols are not complied with.

Significance of Impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	5	2	5	4	5	12	9	108
	National	One month to one year	Extremely harmful	Weekly	Highly likely			High
With mitigation Measures	2	1	1	3	1	4	4	16
	Area specific	One day to one month	Non harmful	Monthly	Almost impossible			Very Low

7.6.11.1 Mitigation Measures for COVID 19 infections

(i) The Health and Safety Officer who will be in charge of sensitisation of workers on Covid 19 shall be stationed at the construction sites. S/He will create awareness amongst site personnel on COVID-19 throughout project construction period;

(ii) Body temperatures of construction workers and any other personnel visiting project sites shall be taken on arrival at the site and when they leave for home using non-contact infrared thermometer;

(iii) Administrative controls to aid in site worker separation and reducing people density shall be put in place. This shall be done through rotating shifts, separating trades/crews by piecework and other scheduled alternatives in line with the stipulated working hours by the Government of Kenya;

(iv) Anyone who has a fever or flu-like symptoms shall not be allowed to access construction site. If a worker develops a fever or flu-like symptoms while at work, they shall be advised accordingly, return home immediately and follow the Ministry of Health's guidelines on self-

isolation. The worker shall not return to work until their period of self-isolation has been completed and upon clearance by a medical doctor from a government Institution;

(v) In addition to the normal construction site personal protective equipment (PPE) meant to protect the workers from hazards and dangers on the site, construction workers shall be provided with facemasks for protection against COVID-19 infection. All equipment, plants and tools shall be sanitized at the start of works twice daily, in the morning and at closure of site;

(vi) Hand washing station shall be provided at site entrance. The station shall be supplied with soap and clean running water at all times. Alcohol based sanitisers will also be provided at the site. All workers shall wash or sanitize their hands severally and before entering or leaving the site; and

(vii) The COVID-19 toll free number shall be displayed within construction sites throughout construction period for use in case of Covid-19 related emergency in the course of construction works.

6.10 Potential impacts and mitigation measures during operation phase

6.10.1 Water system leaks and loss of pressure

Water system leaks can reduce the pressure of the water system compromising its integrity and ability to protect water quality (by allowing contaminated water to leak into the system) and increasing the demands on the source water supply and the quantity of chemicals. Leaks in the distribution system can result from improper installation or maintenance, inadequate corrosion protection, stress from traffic and vibrations and overloading among other factors.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	2	2	4	5	3	8	8	64
	Area specific	One month to one year	Harmful	Daily	Infrequent			Medium- High
Mitigation Measures	• Ensure construction meets applicable standards and industry practices; • Conduct regular inspection and maintenance; • Implement a leak detection and repair program (including records of past leaks and unaccounted- for water to identify potential problem areas); • Consider replacing mains with a history of leaks or with a greater potential for leaks because of their location, pressure stresses, and other risk factors.							
With mitigation Measures	2	1	1	1	1	4	2	8
	Area specific	One day to one month	Non harmful	Annually or less	Almost impossible			Very Low

6.10.2 Water Discharges

Water lines may be periodically flushed to remove accumulated sediments or other impurities that have accumulated in the pipe. Flushing is performed by isolating sections of the distribution system and opening flushing valves or, more commonly, fire hydrants to cause a large volume of flow to pass through the isolated pipeline and suspend the settled sediment. The major environmental aspect of water pipe flushing is the discharge of flushed water, which may be high

in suspended solids, residual chlorine, and other contaminants that can harm surface water bodies.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	2	1	2	2	2	5	4	20
	Area specific	One day to one month	Potentially harmful	Six monthly	Highly unlikely			Very low
Mitigation Measures	• Where possible, flushed water should be carried in bowsers for discharge into a municipal sewerage system; • Discharge the flush water into a separate storm sewer system with storm water management measures such as a detention pond, where solids can settle and residual chlorine consumed before the water is discharged; • Where water is flushed into the environment, erosion should be minimised during flushing by avoiding discharge into areas that are susceptible to erosion and spreading the flow to reduce flow velocities.							
With mitigation Measures	2	1	1	2	1	4	3	12
	Area specific	One day to one month	Non harmful	Six monthly	Almost impossible			Very Low

6.10.3 Contamination of drinking water from treatment operations

An adequate supply of clean drinking water is critical to community health and hygiene. Hazardous chemical associated with this project is chlorine. If residual levels of chlorine are beyond the recommended limits, there would be long term impacts on health of the consumers.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	2	1	2	5	3	5	8	40
	Area specific	One day to one month	Potentially harmful	Daily	Infrequent			Low
Mitigation Measures	• Install alarm and safety systems, including automatic shutoff valves that are automatically activated when a chlorine release is detected; • Use corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with chlorine, and keep this equipment free from contaminants, including oil and grease; • Ensure that treatment capacity is adequate to meet anticipated demand; • Construct, operate and maintain the water treatment facility in accordance with national requirements and internationally accepted standards to meet national water quality standards and WHO Guidelines for Drinking Water Quality ; • Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures; and • Evaluate the vulnerability of the treatment system and implement appropriate security measures, such as background checks of employees, perimeter fencing and video surveillance and improve the electrical power feeds to the facilities.							
With mitigation Measures	2	1	1	5	1	4	6	24
	Area specific	One day to one month	Non harmful	Daily	Almost impossible			Very Low

6.10.4 Deficiencies in water distribution system

The water distribution system is a critical component in delivery of safe potable water. Even if water is effectively treated to remove contaminants and destroy pathogens, waterborne diseases outbreaks can occur because of deficiencies in the water distribution system. Exposure of water to pathogens from storage facilities and from external sources may lead to long term impacts whose effects will be experienced regionally. The severity of the impacts will be high without mitigation measures.

Significance of impact

Mitigation status	Spatial extent	Duration	Severity	Frequency of activity	Frequency of Impact	Consequence	Likelihood	Significance
Without Mitigation	2	2	4	5	4	8	9	72
	Area Specific	One day to one month	Harmful	Daily	Likely			Medium - High
Mitigation Measures	(i) Construct, operate, and manage the water distribution system in accordance with applicable national requirements and internationally accepted standards; (ii) Construct and maintain the distribution system so that it acts as a barrier and prevents external contamination from entering the water system by: • Inspecting storage facilities regularly, and rehabilitating or replacing storage facilities when needed. This may include draining and removing sediments, applying rust proofing, and repairing structures • Ensuring that all installation, repair, replacement, and rehabilitation work conforms to requirements for sanitary protection and materials quality • Testing material, soil, and water quality and implementing best practices to prevent corrosion, such as cathodic protection • Preventing cross- connections with sewerage systems. • Separating water lines and sewer pressure mains (e.g., at least 10 ft apart or in separate trenches, with the sewer line at least 18 inches below the water line) (iii) Maintain adequate water pressure and flow throughout the system by: • Implementing a leak detection and repair program • Reducing residence time in pipes • Maintaining positive residual pressure of at least 20 pounds per square inch (psi) • Monitoring hydraulic parameters, such as inflows, outflows, and water levels in all storage tanks, discharge flows and pressures for pumps, flows and/or pressure for regulating valves, and pressure at critical points, and using system modeling to assess the hydraulic integrity of the system (iv) Prevent introduction of contamination from the distribution system itself by: • Minimizing microbial growth and biofilm development (e.g. by ensuring adequate residual disinfection levels). Collect samples from several locations throughout the distribution system, including the farthest point, and test for both free and combined chlorine residuals to ensure that adequate chlorine residual is maintained • Using construction materials that do not contribute to release undesirable metals and other substance or interact with residual disinfectants							
With mitigation Measures	2	1	1	5	1	4	6	24
	Area specific	One day to one month	Non harmful	Daily	Almost impossible			Very Low

CHAPTER 7

7.0 PROJECT SCENARIOS/ ALTERNATIVES/OPTIONS

7.1 Introduction

This ESIA Study Report will be prepared based on sound desk and field studies made by the ESIA team. The findings and recommendations are based on the proposed site, materials and the proposed technologies to be used in the implementation of the proposed project. Various project scenarios/ alternatives have been considered as indicated in sections below.

7.2 Groups of Investments Proposed for Implementation

The groups of investments are formed in order to answer the different priorities highlighted by the stakeholders, if possible regrouped in different locations, and in order to provide alternatives in terms of budget, between themselves and with the works proposed for the adjacent localities below.

7.2.1 Phase 1A – Core Group

Phase 1A, corresponds to the core group, with networks in the informal settlements of Bandani, Obunga, Manyatta and Nyamasaria, as well as in the areas of Migosi, Wathorego and Kadero. This will be accomplished through rehabilitation and extension of 59km of OD63 to OD450. This group includes works necessary to reduce NRW, increase the water coverage in Kisumu area (especially in the North and the East) and in the informal settlements, as well as in areas where wastewater network works is planned as part of Works Package 1.

7.2.2 Phase 1 B

Phase 1B is focused on investment for Obwolo's area, including the rehabilitation of Obwolo pumping station and the construction of a 250 m³ ground reservoir, with 16.8km of OD63 to OD200 of network works. In addition to transition from direct pumping distribution to gravity distribution in Obwolo area and extending the coverage there, it includes some network extensions in the East and network reinforcements next to Kisumu airport.

7.2.3 Phase 1C

Phase 1C is focused on network works in Kanyamedha and Otonglo distribution area, as well as in Riat Hills, between Mamboleo and Kanyamedha reservoirs. This will be accomplished through rehabilitation and extension of 18.1km of OD63 to OD315. This group mostly aims at increasing the water coverage in the West of Kisumu area, where the Otonglo WWTP is expected to be constructed in the future.

7.2.4 Phase 1E

Phase 1E is focused on the network rehabilitation works in Kisumu centre requested by KIWASCO, as well as on reinforcement works for Dunga village area. This will be accomplished through rehabilitation and extension of 7km of DN110 to OD250. This group includes works which should reduce NRW.

7.2.5 Works for Maseno area

Maseno University (with a target population of 15,000 students and 1,250 employees) and Maseno town presently rely on the supply from Zaaba River WTP in Vihiga County, as well as from five boreholes (with a cumulated yield of 496 m³/ day). As a recent Belgian project has increased the capacity of the WTP by 5,000 m³/ day to 7,450 m³/ day, rehabilitated Maseno's reservoir of 500 m³ and laid a new DN200 line to supply it, it is proposed to make the most of this source. With the new DN200 supplying Maseno reservoir, Zaaba River WTP could supply 2,000 – 2,500 m³/day to Maseno area. The works include the following:

(i) A new reservoir of 1,000 m³;
(ii) 25.7km of OD63 to OD200 of transmission and distribution network works;
(iii) Drilling and equipment of two boreholes;
(iv) Rehabilitation of Millennium springs and kiosks

7.2.6 Works for Gee Area

Gee reservoir area, including Kiboswa, Nyahera-Mkendwa scheme and the upper part of the recently completed OBA project is currently only supplied from Orinde springs. Although the springs have just been rehabilitated, their production, estimated at around 450 m³/ day, cannot satisfy the current and projected demand for the area – 2,362 m³/ day for 2018 and 6,513 m³/ day for 2048. The works include the following:

- Kalai springs: and Bar K'oraro springs, and the related reservoirs and pumping stations
- 13km of DN90 to OD225 of transmission and distribution network works.
- A new reservoir of 1000 m³, which could be expanded in the future

7.3 Proposed Phases

The budget for the Works Package 2 Lot 1 Water network works has been defined as nineteen million two hundred thousand euros (Euros 19.2m), including contingencies. It is therefore necessary to phase the works presented above in order to fit into the allocated budget. The priorities of the stakeholders have been taken into account for this task. In order to provide flexibility to the stakeholders in the final choice on the investments to be made, works have been distributed into different investment groups and a multi-criteria analysis has helped in the decision-making process.

7.4 Priorities of stakeholders for water supply

Stakeholders in water supply system in Kisumu County are LVSWWDA and KIWASCO. They presented the following priorities to be included as part of Works Package 2 – Lot 1.

7.4.1 LVSWWDA water supply priorities

LVSWWDA's priorities for Works Package 2 – Lot 1 Water works were established as follows:

(i) Increase water coverage in Kisumu City;
(ii) Improve present and future supply and distribution in satellite towns. Interventions should be planned in at least two of them;
(iii) Improve present and future distribution in informal settlements; and
(iv) Support KIWASCO by carrying out the necessary works in areas where they face difficulties, especially for improving NRW.

7.4.2 KIWASCO water supply priorities

KIWASCO's priorities for Works Package 2 – Lot 1 Water works were established as follows:
(i) Reduce NRW;
(ii) Increase the number of connections, including in adjacent localities;
(iii) Include the following in the scope of works:
- Replacement of DN350 line from Dunga WTP to Jaramogi Oginga Odinga Teaching and Referral Hospital;
- Replacement of the two main lines along the ring road – one on each side - from Harambee road (to Dunga WTP) to just before Nairobi road;
- Replacement of the pumps at Obwolo pumping station and construction of an elevated tank to supply this area by gravity; and

(iv) Include trunk distribution lines; KIWASCO will take care of the smaller ones.

7.5 Programme of works

Taking into account the priorities of the stakeholders as presented above, the programme of works has been defined, using the following project horizons:

(i) Network works: 2048;
(ii) Reservoirs: 2048, staged for 2028;
(iii) Pumping stations and corresponding pumping mains: 2048, staged for 2028

7.6 Project Scenarios (Alternatives)

7.6.1 No Project Scenario

This alternative presupposes that the status quo with regard to water supply remains. It was noted during this study that water supply within greater sections of Kisumu city is inadequate and local inhabitants are forced to look for water from sources majority of which are unreliable. Some of the sources relied upon by the local people are unprotected and thus aggravates incidents of waterborne diseases. Although sections of Kisumu city are currently covered by water supply system, significant parts of the city still remain without reliable water supply. Some residents get their drinking water from polluted sources like shallow wells, unprotected springs and boreholes and more often than not take it raw without any further treatment. Water supply within the town is also unreliable due to periodic power outages that are commonplace in Kisumu city and its environs.

7.6.2 Investment Scenarios

Scenarios have been constructed by combining different groups of investments presented above to correspond to the defined budget of 19.2 million Euros for Works Package 2 Lot 1. The following table presents the different scenarios:

Table 7. 1: Scenarios

Scenario	Description	Total cost Euros, incl. contingencies
C1	Kisumu City Phase 1A, 1B, 1C and 1D	19,285,137
C2	Kisumu City Phase 1A, 1B and 1E	19,321,972
C3	Kisumu City Phase 1A, 1D and 1E	19,191,311
C4	Kisumu City Phase 1A, Maseno and Gee areas	19,259,614
C5	Kisumu City Phases 1A and 1B and Gee area	19,326,960
C6	Kisumu City Phases 1A and 1D and Gee area	19,196,300
C7	Kisumu City Phases 1A and 1E and Maseno area	19,254,625
C8	Kisumu City Phases 1A, 1B and 1C and Maseno area	19,348,451
C9	Kisumu City Phases 1A, 1C and 1D and Maseno area	19,217,790

7.6.3 Project indicators

Based on the priorities identified by the stakeholders in *7.4 Priorities of stakeholders for water supply*, the following indicators have been proposed in order to study the benefits of the different scenarios identified above:

(i) Population reached for investment cost;
(ii) Operational and maintenance cost;
(iii) Informal population reached; and
(iv) Projected number of new connections.

7.6.3.1 Population reached

Based on the population projections established for the project, and the areas identified as benefiting from the different groups of investments, the following population is estimated to be reached by the different scenarios:

Table 7. 2: Scenarios: Population reached

Description		C1	C2	C3	C4	C5	C6	C7	C8	C9
Population reached	2018	175,591	176,178	171,960	172,070	175,233	171,015	173,015	176,646	172,428
	2028	195,149	187,528	183,725	191,758	195,516	191,713	183,770	195,194	191,391
	2038	219,637	201,611	198,758	220,496	224,874	222,021	197,233	218,112	215,259
	2048	249,188	219,437	218,014	255,783	261,091	259,668	214,129	245,303	243,880

7.6.3.2 Population reached for investment costs

Using the population reached and the Capital Expenditure (CAPEX) obtained for the different horizons, the following indicator is obtained:

Table 7. 3: Scenarios: Population reached / Investment costs

Description	C1	C2	C3	C4	C5	C6	C7	C8	C9
Ipop18 (EUR/inh)	110	110	112	112	110	112	111	110	111
Ipop28 (EUR/inh)	99	103	104	100	99	100	105	99	100
Ipop38 (EUR/inh)	88	96	97	87	86	86	98	89	89
Ipop48 (EUR/inh)	77	88	88	75	74	74	90	79	79
IpopAV (EUR/inh) (average)	**93**	**99**	**100**	**94**	**92**	**93**	**101**	**94**	**95**

As can be seen, Scenario C5 (Kisumu City Phases 1A and 1B and Gee area) obtains the best average ratio Population reached / Investment costs on the different horizons.

7.6.3.3 Operation and maintenance costs (OPEX)

The following operation and maintenance will have to be carried out for the implementation of this solution:

(i) OPEX for the water network: estimated at 3% per year of the related CAPEX;
(ii) OPEX for tanks: estimated at 2% per year of the related CAPEX.
(iii) OPEX for the pumping station: estimated at 8% per year of the related CAPEX for the electromechanical component and 2% per year for the civil works;
(iv) OPEX for the valves: estimated at 5% per year of the related CAPEX. The following OPEX are obtained for the different scenarios:

Table 7. 4: Scenarios: OPEX

Description	C1	C2	C3	C4	C5	C6	C7	C8	C9
OPEX (EUR/year)	507,296	508,219	501,977	499,829	515,692	509,450	492,355	497,675	491,432

While the scenarios obtain similar OPEX, scenario C5 (Kisumu City Phases 1A and 1B and Gee area), with the pumping stations works for the supply of Gee tank and the new Obwolo SR tank would be the most expensive to operate and maintain.

7.6.3.4 Informal population reached

Based on the population projections established for the project, and the informal settlements identified as benefiting from the different groups of investments, the following informal population is estimated to be reached by the different scenarios:

Table 7. 5: Scenarios: Informal population reached

Description		C1	C2	C3	C4	C5	C6	C7	C8	C9
Informal population reached	2018	76,598	80,612	81,752	75,458	75,458	76,598	80,612	75,458	76,598
	2028	78,731	82,410	83,887	77,254	77,254	78,731	82,410	77,254	78,731
	2038	81,449	84,694	86,608	79,535	79,535	81,449	84,694	79,535	81,449
	2048	84,916	87,597	90,078	82,435	82,435	84,916	87,597	82,435	84,916

As can be seen on the table above, as most of the investments in the informal settlements are linked to the core group of investment since it was defined as a priority by the stakeholders, there is little difference between the scenarios on this criterion.

7.6.3.5 Projected number of new connections

The number of new connections for each scenario has been calculated based on the quantities of extension works planned. The average number of connection in KIWASCO's distribution network was in 2018 1 connection per 20m. It is proposed to use the same ratio here. The following number of connections is obtained for the different scenarios:

Table 7. 6: Project indicators for the different scenarios

Description	C1	C2	C3	C4	C5	C6	C7	C8	C9
Extensions (lm)	60,751	43,897	41,683	65,980	56,048	53,834	53,828	72,896	70,682
Projected new connections	3,032	2,191	2,080	3,293	2,797	2,687	2,687	3,638	3,528

As can be seen in the table above, scenarios C8 (Kisumu City Phases 1A, 1B and 1C and Maseno area) and C9 (Kisumu City Phases 1A, 1B and 1C and Maseno area) have the higher linear of network extensions (and thus less reinforcement and renewal of network) and therefore of new connections projected.

7.6.4 Multi-criteria analysis

7.6.4.1 Attribution of scores

Each scenario must, for each criterion, be attributed scores. As all criteria considered here are quantitative (as opposed to qualitative), the following methodology of quantitative distribution for numerical criteria was used. For example, for the Ipop AV (investment per capita reached), the following was calculated:

(i) Average Ipop AV of 95.8 EUR/Capita reached between the 9 scenarios;
(ii) With a standard deviation of 3.3.

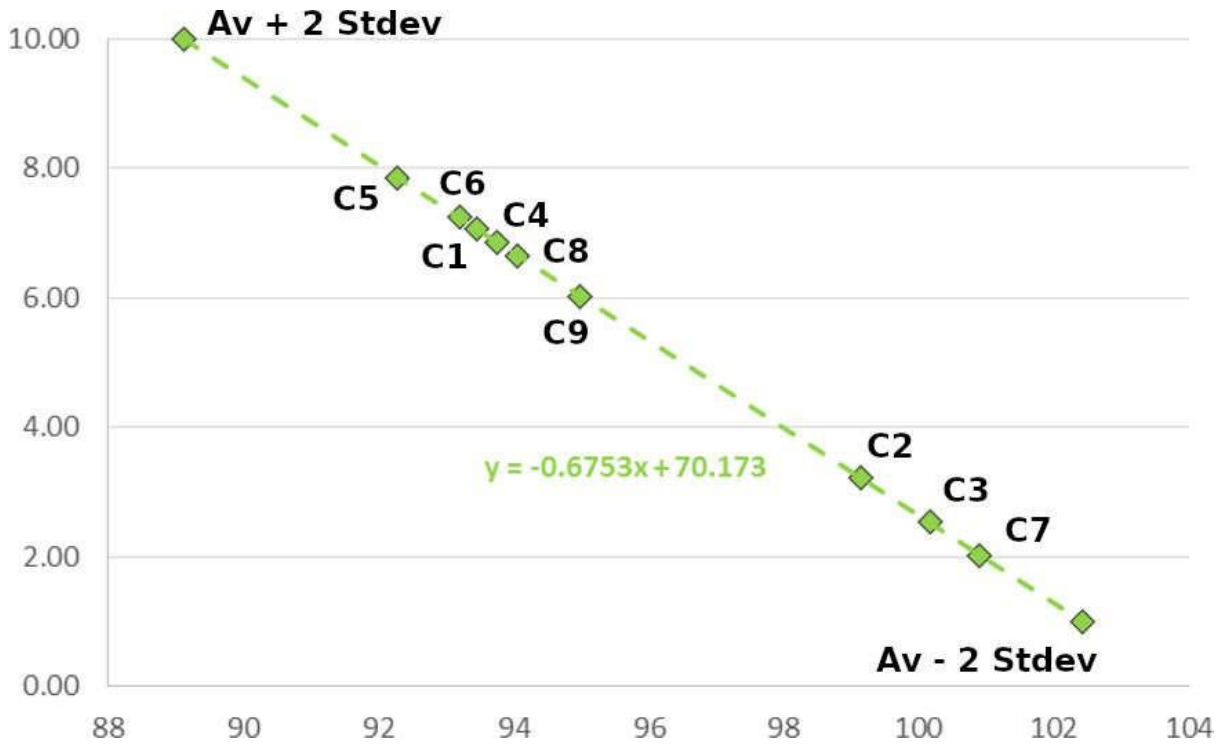
A line was traced between (X = Average + 2 x Standard deviation (=102.4), Y = 1 (worse score))and (X = Average - 2 x Standard deviation (=89.1), Y = 10 (best score)).

The factor 2 for the addition or subtraction of standard deviations was taken in order to ensure thatall options fall within the established bracket.

The scores of the different options were then computed with the line's equation:
Y = -0.675 x + 70.2

The following is obtained:

Figure 4: Example of attribution of scores: IpopAV



7.6.4.2 Weights

The following weights were adopted for the different criteria:

Table 7. 7: Multi-criteria analysis - Weights

Description	Criterion Weight
Score for Ipop AV	0.4
Score for Informal population reached	0.2
Score for Projected new connections	0.2
Score for OPEX	0.2

Emphasis is here being placed on the population reached since it was identified as priority 1 for thestakeholders.

7.6.4.3 Results

The total scores obtained for each scenario were then computed.

For example, the total score for Scenario C1 was calculated by multiplying the scores obtained for each criterion by the weights assigned to them:

$$Score = \sum_{1}^{n}(Weight_{crtierion\ x}\ X\ Score_{criterion\ x}$$

0.4 x 7.06 + 0.2 x 5.22 + 0.2 x 6.12 + 0.2 x 4.22 = 5.94

The table below presents the result of the multi-criteria analysis based on the project indicators identified above:

Table 7. 8: Multi-criteria analysis

Description	C1	C2	C3	C4	C5	C6	C7	C8	C9	Criterion Weight
Score for IpopAV	7.06	3.22	2.54	6.86	7.86	7.24	2.04	6.66	6.03	0.4
Score for Informal population reached	5.22	7.45	9.51	3.15	3.15	5.22	7.45	3.15	5.22	0.2
Score for Projected new connections	6.12	2.65	2.20	7.20	5.15	4.70	4.70	8.62	8.16	0.2
Score for OPEX	4.22	3.97	5.69	6.28	1.91	3.63	8.34	6.87	8.59	0.2
Total Score	5.94	4.10	4.49	6.07	5.19	5.61	4.91	6.39	6.81	1
Rank	4	9	8	3	6	5	7	2	1	

Based on the results of the multi-criteria analysis, it was recommended to implement scenario C9.

CHAPTER 8

8.0 PUBLIC CONSULTATION AND STAKEHOLDER ENGAGEMENT

8.1 Background

Informing and consulting the public are integral tasks within any environmental assessment process in Kenya and forms part of best practice. Accordingly, the ToR required the ESIA consultant to organise and implement a public consultation exercise while undertaking the ESIA process. Consultations of interested and affected parties (IAPs) in this project were carried out to inform the local people and key stakeholders about the proposed project and its objectives; to seek views, concerns and opinions of the project stakeholders concerning the proposed project; and to establish if the local people foresee any positive or negative environmental and social impacts which may arise as a result of implementation of the proposed project and how they would like the identified adverse impacts to be addressed.

8.2 Approaches

Informing the local people, leaders and key stakeholders about the proposed project was carried out through direct interviews, key informant interviews, questionnaire administration, public meetings, email communication and telephone calls. Stakeholders consulted were provided with information regarding the proposed project including its objectives; technologies of implementation; possible impacts associated with its implementation and mitigation measures proposed to deal with adverse environmental and social impacts noted.

8.3 Determination of who should be involved in the ESIA

The ESIA study benefited from targeted stakeholder consultations with a critical people who have roles in implementation of the proposed project and also those who may be affected in one way or the other due to project implementation. This was achieved through stakeholder analysis which was conducted to identify stakeholders who should be involved in the ESIA process. The basis of inclusion of these stakeholders was informed by their relevance, significance and importance in implementation of the proposed project.

Stakeholder relevance was determined through consideration of stakeholder activities within the project area and how various elements and components of the proposed project are likely to impact on specific stakeholder groups. Stakeholder importance and significance were looked at from the point of view of roles of various stakeholders in the provision and management of water and sanitation services within the project area.

Stakeholders were categorised into two groups for purposes of this study. The first group consisted of institutional stakeholders and the second group consisted of community stakeholders. The institutional stakeholders were drawn from Lake Victoria South Water Works Development Agency; officials of the national and county governments within Kisumu County; members of various groups operating within the project area and representatives of Kisumu Water and Sanitation Company (KIWASCO). Community stakeholders on the other hand mainly consisted of members of the public residing within the project area.

8.4 Methods used to consult various stakeholders

The following is a summary of the methods used to consult various stakeholders during the ESIA process.

8.4.1 Key informant interviews

One-on-one interviews with key stakeholders within the project area were undertaken in order to gather baseline information of the project area and also to assist in analysis of existing and anticipated impacts of project activities to the environment, local community and institutions within the project area. These interviews were conducted to augment and confirm data and information obtained using other tools and methodologies. The interviews were focused on getting information from key stakeholders within the project area and focused on stakeholders in water and sanitation sector within the project area. Among those consulted through this method include local administrators and individuals within Lake Victoria South Water Works Development Agency.

Table 8. 1: Key informants consulted during the study

No	Name	Designation	Telephone Contact
1	Eng. Paul Agwanda	Project Manager, LVSWWDA	0720371592
2	Eng. Felix Okuta	Project Engineer, LVSWWDA	0711632328
3	George Ageng'o	Environmentalist, LVSWWDA	0722589782
4	Madam Agnes	Assistant Chief Manyatta A	0728005222
5	Mr. James Odondo	Assistant Chief Manyatta B	0726351613
6	Mr. John O. Migun	Assistant Chief Northern Sub Location	0702329344
7	Mr. Paul Ramoli	Village elder Ondiek Estate	0706073999
8	Mr. Charles Boro	Village Administrator Kaloleni Ward	0720737242
9	Bernard Odawo	Village Administrator, Korando	07211871821
10	Mr. Felix	Kaloleni Ward Administrator	0727690609
11	Mr. Samson Owino Ayieta	Village elder Metameta Unit Manyatta A	0712672097
12	Madam Florence Nziza	Village Elder Lower Migosi	0713687362
13	Mr. Gaston Oketch	Village Elder Central Migosi	0722599713
14	Madam Joan Osir	Village Elder Upper Migosi	0726495134
15	Mr. Kabisai	Chief Kolwa West	0720640637
16	Mr. David Ouko	Assistant Chief Nyalenda A	0721127658
17	Mr. Joshua O. Obiero	Village Administrator- Nyalenda A	0724329954
18	Madam. Lena Jobita	Assistant Chief Nyalenda B	0718687490
19	Mr. Joseph Ndati Ondoro	Village Elder Nyalenda B	0702761666
20	Madam Hulda	Village Elder Nyalenda B	0707820275
21	Mr. Tobias Omollo	Chief -Kajulu West Location	0701286503
22	Mr. Julius Alila	Assistant Chief, Konya Sub Location	0727871083
23	Mr. Elisha Menya	Assistant Chief Kodero Sub Location (Gita)	0710410570
24	Mr. Philip Ombuor	Village Elder (Simu Village)	0726935961
25	Mr. Onyango Tom	Assistant Chief Wathorego Sub Location	0734311533

No	Name	Designation	Telephone Contact
26	Mr. Martin Oindo	Assistant Chief West Karateng (Maseno)	0722448877
27	Mr. Kennedy Ochieng	Assistant Chief East Karateng (Nyawita)	0721927580
28	Madam Rhoda Nyambega	Nyawita Village Elder	0702396120
29	Mr. Chrispo Odhiambo	Assistant Chief Bar A (Sidika Area)	0736664131
30	Mr. Peter Anyang Omoth	Chief Kisumu North	0724704512
31	Mr. Churchill Oremo	Assistant Chief Nyahera	0725271899

8.4.2 Direct interviews

Interviews were conducted within the project area and this targeted those living within the proposed project area and who were unable to fill in the questionnaires for one reason or the other. The interviews were conducted to augment and confirm data and information obtained using other tools and methodologies and focused on water and sanitation issues and problems experienced by area residents. Respondents were also asked how they would like the identified negative impacts to be addressed both during project construction and operation phases.

8.4.3 Questionnaire administration

Questionnaires were prepared and administered to the various stakeholders identified at the initial stages of the study. The questionnaires contained questions on water quality and access; wastewater and solid waste management; physical and biotic factors; and anticipated project impacts on the environment, neighbouring populations and facilities. Those to whom questionnaires were administered were mainly individuals living within the vicinity of the project site and who could be affected by project activities in one way or the other. The assessors visited them in their homes and business premises where they were guided to fill in the questionnaires. Sample questionnaires have been annexed to Appendix 1 of this Project Report.

8.4.4 Consultative meetings

A number of consultative meetings were held with a cross section of project stakeholders during ESIA process. The meetings served two purposes; first they offered an opportunity for stakeholder sensitisation on the proposed project. Secondly, they presented an opportunity for the ESIA study team to gather data and information on contentious issues relating to implementation of the proposed project. To better address the later objective, participants were first taken through the key highlights of the issues to be explored under the ESIA study. Through a question and answer session, stakeholders were given opportunity to understand the implication of the proposed project on the environment and local populations. The Table below gives a summary of those consulted during the meetings

Table 8. 2: Attendees of consultative meetings held during ESIA study

No	Name	Position	Telephone Contacts
1	Hon. Judith Ogaga	Member of County Assembly, Kisumu	0700930667
2	Moses Barasa	Lands Officer, NLC	0712464450
3	Tom Togo	County Director of Environment, NEMA	0722154665
4	Gerald Gawo	Opinion Leader	0115860560
5	Wycliffe Otwal	Opinion Leader	0725233112
6	Simeon Orwa	Chief, Central Kisumu	0722976558
7	Philip Olang	Kisumu County	0721268912
8	Kennedy Owuondo	Ass Chief, Korando B	0728334967
9	Michael O. Nyaguh	Chairperson, Magnum Environment Network	0721728653
10	Johnson Adipo	Opinion Leader	0711986022
11	Grace L. Saino	ACC	0722410486
12	Daisy Okal	Ward Admin, Central Ward	0723116342
13	Zack Okoyo	Deputy Com., Kisumu West	0720178577
14	Fanuel Onyango	WRA, Kisumu	0720128503
15	M.N. Wanyonyi	DCC, Kisumu West	0724122941
16	Maurice Oricho	SCA	0718031572
17	Vincent Mosiria	ACC1	0700194585
18	Eng. Paul Agwanda	Project Manager, LVSWWDA	0720371592
19	Eng. Felix Okuta	Project Engineer, LVSWWDA	0711632328
20	Bernard Odawo	Village Administrator, Korando	07211871821
21	George Ageng'o	Environmentalist, LVSWWDA	0722589782
22	Salmon Orimba	CECM, WENRCC, Kisumu County Government	0722904229

8.4.5 Public meetings

Four public meetings were held during ESIA study within various locations across the project area. The meetings were held in Maseno town, Nyawita area of Maseno, Gita area in Kajulu and Nyahera area. The meetings were part of public consultation process and were meant to inform the local community about the proposed water project and also seek their views about the same. The meetings also presented the community members and the potentially affected persons (PAPs) with the opportunity to freely express their views concerning the proposed project. The meeting was open to members of the public and the mobilization of community members was done by the Area Chiefs and/ or their representatives. Appendix 2 of this report contains minutes of public meetings. The table below gives list of meetings held during the ESIA study

Table 8. 3: Summary of Stakeholders and Community Meetings

No.	Date	Venue	Participants	Number present	Topic of discussion	Resolutions made
1.	21/7/2021	Ojolla Hall, Kisumu West Sub County	Leaders meeting attended by National Government Administrative Officials (NGAOs), opinion leaders, political leaders, LVSWWDA and project consultants	26	Community Sensitisation	The project should be implemented on the basis of applicable rules and regulations governing implementation of projects of this nature. Public consultations should be a continuous activity throughout project implementation phase.
2.	28/7/2021	Tieng're Hall, Kisumu West Sub County	Leaders meeting attended by National Government Administrative Officials (NGAOs), opinion leaders, political leaders, LVSWWDA and project consultants	39	Community sensitisation on environmental impacts and land acquisition requirements	Another meeting should be held after the survey has been finalised to strategize on the next course of action. Land owners to work as a team for the benefit of all the Project Affected Persons. The Project Affected Persons should appoint a leader who will be presenting their issues to the proponent and consultant to enable the entire project implementation process run smoothly
3.	20/8/2021	Lickwick Restaurant Hall, Maseno	Public Meeting attended by members of the local community, project consultants and LVWWDA	14	Public participation in ESIA for the proposed rehabilitation and extension of water supply infrastructure in Kisumu city and Satellite towns	Project implementation to be carried out on the basis of applicable rules and regulations and compensation for damaged properties should be effected. Consultations with the local community should be continuous during project implementation period. The local people expressed their support for implementation of the proposed project
4.	20/8/2021	Kwa Abok open field, Nyawita centre-Maseno	Public Meeting attended by members of the local community, project consultants and	26	Public participation in ESIA for the proposed rehabilitation and extension of water supply infrastructure in	Project implementation to be carried out on the basis of applicable rules and regulations and compensation for damaged properties should be effected. Consultations with the local community

No.	Date	Venue	Participants	Number present	Topic of discussion	Resolutions made
			LVWWDA		Kisumu city and Satellite towns	should be continuous during project implementation period. The local people expressed their support for implementation of the proposed project
5.	23/8/2021	Gita Community Hall, Kajulu	Public Meeting attended by members of the local community, project consultants and LVWWDA	27	Public participation in ESIA for the proposed rehabilitation and extension of water supply infrastructure in Kisumu city and Satellite towns	Project implementation to be carried out on the basis of applicable rules and regulations and compensation for damaged properties should be effected. Consultations with the local community should be continuous during project implementation period. The local people expressed their support for implementation of the proposed project
6.	23/8/2021	Area Member of Parliament's office	Political leadership, LVSWWDA and Project Consultants	12	Informing the MP for Kisumu West Constituency about LVWATSAN	The project should be implemented on the basis of applicable rules and regulations governing implementation of projects of this nature. Public consultations should be a continuous activity throughout project implementation phase.
7	30/8/2021	PAG Church, Nyahera	Public Meeting attended by members of the local community and project consultants	24	Public participation in ESIA for the proposed rehabilitation and extension of water supply infrastructure in Kisumu city and Satellite towns	Project implementation to be carried out on the basis of applicable rules and regulations and compensation for damaged properties should be effected. Consultations with the local community should be continuous during project implementation period. The local people expressed their support for implementation of the proposed project

8.5 Comments from those consulted

8.5.1 Comments from Consultative meetings

The issue of compensation for the affected individuals featured prominently during the consultative meetings. It was agreed that the community should be adequately sensitised about land acquisition process and those who cannot afford the cost of succession process should be assisted by the project proponent. All impacts associated with implementation of the proposed project should be adequately addressed in order to ensure that its implementation does not adversely affect neighbouring communities. Employment of local people also featured during the meetings and it was suggested that priority should be given to the local people during recruitment process.

It was also indicated during the consultative meetings that water and sanitation is a problem in Kisumu city and satellite towns and most households have no access to KIWASCO services. The proposed project was therefore seen as one of the ways of dealing with the issues and all leaders were tasked with sensitisation of the local people in order for them to be part of project implementation and operation. Involvement of the youth in the project in order to ensure its acceptability was also stressed during the meetings.

Plate 4: Meeting with area Member of Parliament at his Ojolla office

8.5.2 Comments from Public meetings

A number of issues regarding implementation of the proposed project were raised by stakeholders during public meetings and it is their wish that these issues are addressed amicably during project implementation to ensure sustainability. One of the main issues raised by stakeholders consulted is that of water availability to everyone within the service area.

Stakeholders wanted water to be available to all individuals within the service area in order to deal with the deficit being experienced at the moment. Compensation for land and property damaged also featured significantly during the consultations. Those consulted are of the opinion that compensations should be made before project implementation commences.

It also came out during the meetings that compensations were not made for the existing pipeline wayleaves and land owners may want further engagements during implementation of the proposed project. Those consulted indicated that there were no agreements made with land owners at the time the existing pipelines were laid. Stakeholders also wanted to know measures that will be put in place during implementation phase of the project to ensure that water supply is not interrupted.

Other issues raised during public meetings include employment for local youths and experts; the need to make provisions for stand pipes and water kiosks for those who may not be in apposition to connect directly to their houses; the need to have different rates for rural and urban dwellers; and the need of the proponent to be involved in corporate social responsibility initiatives within the project area. Stakeholders consulted also felt that KIWASCO should consider reviewing their connection fees which are felt to be prohibitive and beyond the reach of majority of local people. For more on comments during public meetings, see Appendix 2 on Minutes of Public meetings

Plate 5: Public meeting forum at Nyawita area in Maseno

8.5.3 Comments from questionnaire administration

The stakeholders contacted during ESIA study are happy with the proposed rehabilitation and extension of water supply network in Kisumu and satellite towns. Their position is based on the current conditions of various water supply infrastructures within Project Area of Influence. They feel that rehabilitation and extension will lead to improved service delivery and will make water available to a majority of Kisumu residents. Those consulted are supportive of implementation of the proposed project due to its anticipated benefits. The Table below gives sample responses from stakeholders consulted through questionnaire administration.

Table 8. 4: Sample responses from questionnaire administration

No	Name	Phone No.	ID Number	Area	Comment
1	Otieno Kenas	0704635023	33437560	Gita	There will be safe and clean water for domestic and commercial uses. Water reliability will be assured. Regular maintenance of project infrastructure should be carried out to mitigate water shortages due to pipeline leakages.
2	Philip Ombuor	0726935961	9088063	Kadero	The project will enable the community to access clean water for both domestic and commercial uses. All community members should be connected to the network to enable them enjoy the service.
3	Vincent Otieno	0701848548	39276490	Konya	The project will increase access to clean water for the local community. The project should be implemented in a manner to ensure continuous water availability.
4	Meresia Orimba James	0727946961	16083403	Ukweli	The project will reduce the cost of buying water. The community will have access to quality water.
5	Eric Olela	0710666844		Nyalenda A	The project will minimize water shortages. The excavation process should be done in a way that does not interfere with community activities. Community notification should be done before commencement of project activities
6	Christine Kanini	0717455531	31108416	Nyalenda B	The project will lead to availability of higher volume of water which will address water shortages.

7	Wilkister Owenga	0729767683	31690778	Kondele	An emergency response team should be on standby to respond to injuries during the project implementation.
8	Stephen Biko Otieno Omondi	0799044029	22917409	Arina	The project will lead to connection of more people to water. Compensation should be made in case of any impact to private property
9	Penina Kemunto	0713844415	9892693	Manyatta B	The project should be implemented expeditiously to ensure service delivery to the people. The connection fee should be subsidized.
10	Lewis Okoth Odhiambo	0798198865	38405226	Mamboleo	The project will ensure water availability especially for those living in hire areas. It will also create employment opportunities to the local people. The project proponent should however be involved in Corporate Social Responsibility initiatives among local schools. Mamboleo market should be allowed free access to water.
11	Sylvia Amboko	0799926064		Kasule	The project will enable the community to have access to clean water and water shortages will be minimized. Those affected by project construction should be compensated for days not worked.
12	Dan Mangondo	0718677826	466879	Migosi	The project will make water to be readily available to the community. Businesses affected during project construction should be relocated to other areas.
13	Corazone Juma	0769560815	25344569	Carwash	The project will enable the community to have access to safe and clean water.
14	Samuel Odhiambo Thigo	0702562797		Coptic-Manyatta B	The project will enable the community to have access to safe and clean water. Properties affected should be compensated accordingly. Community members should be employed during project implementation.
15	Juma Ramadhan	0714420594	31432337	Nyawita	Amount of water supplied in the

				Kaego	area will increase due to implementation of the proposed project. There should however be mutual prior agreement between the client and the affected on compensation procedures. In cases of pipe leakages, the company should respond promptly.
16	Collins Otieno	0705238332	30290648	Nyahera Sidika	Plenty water will be available for domestic and commercial uses. Chemicals used in water treatment should be added in recommended quantities.
17	Jashmine Achieng Deya	0721569753	22671352	Maseno	Sufficient water will be available to the local community.
18	Mr. P Nyawach	0720737551	21484898	Maseno School	The school will have easy access to clean and cheap water. The project will address water challenges leading to outbreak of waterborne diseases.
19	Omware Joash Odhiambo	0740464623		Maseno-Nyawita	The project will lead to availability of safe reliable water at affordable costs. The new water line should run along the existing line and should be laid along riparian land.
20	John Mwenda	0704325804	35491060	CBD- Aga Khan	The community will have access to safe and affordable water. Every household should be connected to water after completion of the project.

CHAPTER 9

9.0 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

9.1 Introduction

This Environmental and Social management and Monitoring Plan (ESMP) focuses on mitigating the impacts identified during the environmental assessment. It is an instrument that will allow the project proponent and the contractor to integrate environmental management measures during the various phases of the proposed project. This plan is meant to establish measures and procedures to control the identified impacts and monitor progress of implementation of the recommended mitigation measures.

9.2 Organisational structure, roles and responsibilities

The organisational structure identifies and defines the responsibilities and authority of the various role-players (individuals and organisations) involved in the project as discussed below.

9.2.1 The Client

The Client (LVSWWDA) is the holder of authorisations issued by the relevant environmental regulating authorities responsible for authorising and enforcing environmental compliance. The Client, either directly or through Supervising Consultant will ensure that all project operations are conducted in accordance with the applicable environmental regulations and in accordance with this ESMP. The Client will ensure that the ESMP and other requirements related to health, safety and environment are implemented in full.

9.2.2 The Engineer

The Engineer will be appointed by, and act for, the Client as the Client's on-site implementing agent and shall carry the responsibility to ensure that the contractor undertakes its construction activities in such a way that the Client's environmental responsibilities are not compromised. The Engineer will be responsible for issuing instructions to the Contractor's Environmental Specialist where environmental considerations call for action to be taken.

9.2.3 The Contractor

The contractor will be responsible for project delivery in accordance with the prescribed specifications, among which this ESMP shall be included. The contractor shall receive and implement any instruction issued by the Engineer relating to compliance with the ESMP. Compliance with the provisions contained herein or any condition imposed by environmental approvals shall become the responsibility of the contractor through an approved Environment, Social, Health and Safety (ESHS) Manager. The contractor shall nominate a person from among his site personnel to fulfill this function and submit to the engineer the *curriculum vitae* of the proposed ESHS Manager.

Table 9. 1: Construction phase Environmental and Social Management Plan

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
Poor environmental, health, safety and social management	Hire an Environmental Specialist	Contractor	• Environmental Specialist available on site	Observation during weekly site inspections	One off	840,000.00
	Hire a Health and Safety Specialist	Contractor	• Health and Safety Specialist available on site	Observation during weekly site inspections	One off	840,000.00
	Hire Sociologist	Contractor	• Sociologist available on site	Observation during weekly site inspections	One off	840,000.00
Encroachment of neighbouring facilities during civil works	All civil works shall be restricted to within project alignment areas.	Contractor	• Approved program of works	Observation during weekly site inspections	Weekly during construction phase	Nil- Standard Best Practice
Solid waste generation at contractor's camp	Place solid waste collection bins in offices at the contractor's camp	Contractor	• Presence of solid waste collection bins at the contractor's camp	Observation during monthly site inspections	Monthly during construction phase	5,000.00
	Segregate waste generated into various waste streams for easy disposal	Contractor	• Evidence of waste segregation at the contractor' site	Observation during monthly site inspections	Monthly during construction phase	Use internal capacity
	Solid waste generated from offices at the camp should be temporarily stored at a weather proof	Contractor	• Evidence of weather proof solid waste holding area.	Observation during monthly site inspections	Monthly during construction phase	50,000.00

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	solid waste holding area pending collection for disposal by a contracted solid waste handler					
Spoil generation as a result of excavation works	All spoil generated as a result of excavation and trenching works shall be used to backfill the trenched pits and for restoration of disturbed areas within the work places.	Contractor	• Evidence of restoration of the work areas • Number of complaints from local residents filed with either the contractor or consultant	Observation during weekly site inspections	Weekly during construction phase	To be determined
Storm water Management and control	The contractor shall restore all storm water drainage channels blocked as a result of his activities at the site.	Contractor	• Presence of unclogged storm water drainage channels within construction area	Observation during weekly site inspections Periodic checks of storm water drainage channels for blockages	Weekly during construction phase	To be determined
Fire incidents at the contractor's camp	Reasonable and precautionary steps to be put in place to manage fire incidents including having a method statement on management of fire	Contractor	• Presence of write ups on fire precautions • Presence of method statement on management of	Document reviews during weekly site inspections	Weekly during construction phase	Use internal capacity

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	incidents at the contractor's camp and providing firefighting equipment at the camp.		fire incidents • Service schedules of firefighting equipment			
	All fire incidents at the site shall be recorded and reported to relevant authorities as soon as they occur.	Contractor	• Presence of fire incident records • Availability of evidence of fire incident report to the authorities	Document review during weekly site inspections	Weekly during construction phase	Use internal capacity
Dust pollution during material transportation	All vehicles transporting construction materials shall be covered with tarpaulins to minimise material being blown away by wind during transportation	Contractor/ material suppliers	• Presence of tarpaulins on material delivery vehicles	Observation during material deliveries	*Ad hoc* basis	Nil- Standard Best Practice
Occupational accidents from machinery failures	All vehicles, trucks, plants and general construction machinery shall be maintained in good condition to mitigate premature failure which may result to occupational injuries	Contractor	• Machinery servicing schedules • Maintenance records of site equipment and machinery	Document review during monthly site inspections	Monthly during construction phase	Construction costs
	Only suitably qualified personnel to operate	Contractor	• Academic and professional	Document review during	Weekly during	Nil- Standard Best Practice

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	construction vehicles and machinery.		certificates as evidence of personnel qualifications	weekly site inspections	construction phase	
	Handling of equipment and materials to be supervised and adequately instructed.	Contractor	• Inspection notes as evidence of supervision of material handling	Document review during weekly site inspections	Weekly during construction phase	Construction costs
Occurrence of workplace accidents during work executions or other emergencies	The contractor shall prepare method statements covering procedures and emergency and preparedness action plans for the main activities which could generate emergency situations at the work areas including among others: • Accidental fires • Accidental leaks and spillages • Vehicle and plant accidents • Blasting at the quarry site • Etc.	Contractor	• Availability of emergency and preparedness action plans and corresponding staff and equipment; • Availability of method statements on accidental fires; management of accidental leaks and spillages; management of vehicle accidents at the site and blasting at the quarry site • Availability of	Document review during weekly site inspections	Weekly during construction phase	Use internal capacity

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
			equipped First Aid kit • Evidence of staff training on emergency procedures • Number of emergencies recorded			
Lack of records of accidents, incidents and dangerous occurrences	The contractor to prepare an accident incident form for daily recording of accidents, incidents and dangerous occurrences at workplaces	Contractor	• Presence of an accident/ incident form	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity
	The contractor to provide all supervisors with the forms for daily recording of accidents, incidents and dangerous occurrences at their places of work.	Contractor	• Presence of the forms at the work areas	Document review during weekly site inspections	Weekly during site inspections	Use internal capacity
	Supervisors to submit the forms on a daily basis to the office manager for filing in an accident/incident register	Contractor	• Presence of the forms in a file at the contractor's office	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity
Lack of requisite	All staff shall be provided	Contractor	• Evidence of	Observation	Weekly	250,000.00

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
Personal Protective Equipment by workers	with requisite PPEs including safety shoes, hand gloves eye shields, nose masks, ear muffs and reflector jackets		provision of PPEs to staff	during weekly site inspections	during construction phase	
Lack of First Aid kit at the contractor's site office and work areas	The contractor to provide a standard first aid kit at the main office at the contractor's camp and at all work areas	Contractor	• Presence of First Aid kit in offices and other work areas	Observation during weekly site inspections	Weekly during construction phase	20,000.00
Inadequate sanitation facilities	The contractor to provide adequate sanitation facilities for the construction workers at the contractor's camp and in all work areas	Contractor	• Evidence of sanitation facilities at the contractor camp and work areas	Observation during weekly site inspections	Weekly during construction phase	To be determined
Resettlement Impacts	A Resettlement Action Plan (RAP) will be prepared in accordance with World Bank OP 4.12, European Investment Bank (EIB) standards on Involuntary Resettlement and applicable Kenyan laws. Project Affected Persons (PAPs) will be identified	Project Proponent	RAP Report	Document review before start of construction works	One off before construction works	1,500,000.00

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	and assets affected valued. Restorations and compensations will be made in compliance with applicable rules and regulations.					
	Business owners who have erected temporary structures within road reserves will be advised in advance to remove their temporary structures before commencement of excavation process. They will be allowed to reconstruct their kiosks after the pipes have been laid and trenches backfilled.	Project Proponent	List of businesses affected	Document review before start of construction works	One off before construction works	To be determined
	All private properties affected by construction works will be compensated in accordance with World Bank OP 4.12, European	Project Proponent	• List of businesses affected and value of losses	Document review before start of construction	One off before construction works	To be determined

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	Investment Bank (EIB) standards on Involuntary Resettlement and applicable Kenyan laws			works		
	Loss of income due to business disruption will be compensated in compliance with World Bank OP 4.12, EIB standards on Involuntary Resettlement and applicable Kenyan laws	Project Proponent	• List of businesses affected and value of losses	Document review before start of construction works	One off before construction works	To be determined
Gender Based Violence (GBV)	All employees shall be sensitised on Gender Based Violence (GBV) and Violence Against Children (VAC) issues during recruitment. They will be required to report suspected or actual acts of GBV by a fellow worker to authority for action.	Contractor	• Evidence of sensitisation and training on GBV including signed attendance list	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity
	GBV and VAC issues shall form part of agenda for the contractor's	Contractor	• Proceedings of GRC meetings including	Document review during monthly site	Monthly during construction	Use internal capacity

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	Grievance Redress Committee (GRC) meetings. All reported cases shall be reviewed at this meeting and corrective measures for pending cases implemented accordingly		minutes of the meetings	inspections	phase	
	The Sociologist who shall be the contractor's 'Focal Point' on the GBV and VAC Compliance Team (GCCT) will address GBV and VAC issues throughout construction period. S/he will also carry out sensitisation and awareness trainings to both workers and members of the local community on what constitutes GBV and reporting procedures to be adopted.	Contractor	• Proceedings of sensitisation meetings including minutes of the meeting and attendance list	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
Complaints and grievances arising in the course of construction process	The contractor shall prepare a Grievance Redress Mechanism (GRM) specifying how grievances arising in the course of construction process will be addressed	Contractor	• Presence of Grievance Redress Plan	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity
	Grievance redress forms for purposes of logging grievances by community members and other stakeholders who may be affected by project activities during construction process shall be prepared for use during construction period	Contractor	• Presence of grievance Redress forms	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity
	A Grievance Redress Committee (GRC) composed of representative of the contractor, supervision consultant and local community shall be constituted to deal with grievances arising in the course of construction process. The committee	Contractor	• Presence of GRC including stakeholder representation • Proceedings of committee meetings including minutes and attendance list	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	shall meet at least once a month during construction period to address issues arising in the course of construction process					
	Grievances shall be expeditiously addressed as soon as they are launched to inspire confidence of the local community	Contractor	• Time taken to address grievances launched	Document review during monthly site inspections	Monthly during construction phase	Use internal capacity
Noise and vibration pollution during work executions	Construction and the use of construction machinery to be limited to working hours between 0600hr and 1800hr. No construction works should be carried out at night	Contractor	• Presence of work schedule for construction works	Observation during weekly site inspections	Weekly during construction phase	Nil- Standard Best Practice
	Construction equipment shall be routinely serviced to mitigate excessive noise	Contractor	• Presence of service logs for site machinery	Observation during weekly site inspections	Weekly during construction phase	To be determined
Tree/Vegetation removal	Effectively monitor the working strip required for the construction of the water supply and sanitation infrastructure	Contractor	• Presence of monitoring records	Document review during weekly site inspections	Weekly during construction phase	Nil- Standard Best Practice

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
	to prevent excessive vegetation removal					
	Adequately compensate individuals whose crops and trees may be destroyed during construction process	Contractor	• Availability of payment vouchers to Project Affected Persons (PAPs)	Document review during monthly site inspections	Monthly during construction phase	To be determined
Water service disruptions during construction activities	Notify Kisumu Water and Sanitation Company (KIWASCO) in writing to enable then disconnect water services ahead of excavation works Ensure that water services are restored within 24 hours and keep records of restoration as evidence.	Contractor	• Evidence of notification of KIWASCO • Evidence of service restorations	Document review during weekly site inspections	Weekly during construction phase	To be determined
Blocked drainages due to excavation works	All storm water drainage systems should be inspected prior to commencement of works	Contractor	• Photographic evidence of pre-construction condition of drainage systems	Observation during weekly site inspections	Weekly during construction phase	Nil- Standard Best Practice
	All drainages should be unblocked to pre-construction conditions	Contractor	• Evidence of unblocking of drainage systems	Observation during weekly site inspections	Weekly during construction phase	To be determined

Anticipated Impacts	Mitigation Measures	Responsibility	Parameters to monitor	Monitoring Means	Frequency of monitoring	Estimated Annual cost (Kshs)
Total						**4,345,000.00**

Table 9. 2: Operation Phase Environmental and Social Management Plan

Anticipated Impacts	Mitigation measures	Responsible for implementation	Monitoring Means	Periodicity	Estimated Amount (Kshs)
Installation of meters leading to high water bills	• Sensitize people on the long term benefits of rational utilization of water resources.	Lake Victoria South Water Works Development Agency / KIWASCO	Carry out surveys to ascertain the level of consumer satisfaction.	One off	Use internal capacity
Exposure to hazardous chemicals used in the water treatment process	• Minimize the amount of chlorination chemicals stored on site while maintaining a sufficient inventory to cover intermittent disruptions in supply; • Develop and implement a prevention program that includes identification of potential hazards, written operating procedures, training, maintenance, and accident investigation procedures; • Develop and implement a plan for responding to accidental releases.	Lake Victoria South Water Works Development Agency/ KIWASCO	Carry out analysis of Physico-chemical and bacteriological parameters for water quality. Verify the degree of compliance in implementing the proposed mitigation measures	Quarterly	Operation costs
Water system leaks and loss of pressure	• Ensure construction meets applicable standards and industry best practice; • Conduct regular inspection and maintenance;	Lake Victoria South Water Works Development Agency / KIWASCO	Verify the degree of compliance in implementing the proposed mitigation	Weekly	Use internal capacity

Anticipated Impacts	Mitigation measures	Responsible for implementation	Monitoring Means	Periodicity	Estimated Amount (Kshs)
	• Implement a leak detection and repair program (including records of past leaks and unaccounted- for water to identify potential problem areas); • Consider replacing mains with a history of leaks or with a greater potential for leaks because of their location, pressure stresses, and other risk factors.		measures		
Discharge of flushed water that may contain suspended solids and residual chlorine into the environment	• Where possible, flushed water should be carried in bowsers for discharge into a municipal sewerage system ; • Discharge the flush water into a separate storm sewer system with storm water management measures such as a detention pond, where solids can settle and residual chlorine consumed before the water is discharged; • Where water is flushed into the environment, erosion should be minimised during flushing by avoiding discharge into areas that are susceptible to erosion and spreading the flow to reduce flow velocities.	Lake Victoria South Water Works Development Agency / KIWASCO	Verify the degree of compliance in implementing the proposed mitigation measures	Quarterly	Use internal capacity
Exposure of water to	• Construct, operate, and manage the	Lake Victoria South	Carry out analysis	Quarterly	Operation

Anticipated Impacts	Mitigation measures	Responsible for implementation	Monitoring Means	Periodicity	Estimated Amount (Kshs)
pathogens from storage facilities and from external sources	water distribution system in accordance with applicable national requirements and internationally accepted standards; • Construct and maintain the distribution system so that it acts as a barrier and prevents external contamination from entering the water system by: ➢ Inspecting storage facilities regularly, and rehabilitate or replace storage facilities when needed. This may include draining and removing sediments, applying rust proofing, and repairing structures ➢ Preventing cross- connections with sewerage systems. ➢ Separating water lines and sewer pressure mains (e.g., at least 10 ft apart or in separate trenches, with the sewer line at least 18 inches below the water line) • Maintain adequate water pressure and flow throughout the system by: ➢ Implementing a leak detection and repair program	Water Works Development Agency / KIWASCO	of physico-chemical and bacteriological parameters for water quality. Verify the degree of compliance in implementing the proposed mitigation measures		costs

Anticipated Impacts	Mitigation measures	Responsible for implementation	Monitoring Means	Periodicity	Estimated Amount (Kshs)
	➢ Maintaining positive residual pressure of at least 20 pounds per square inch (psi) ➢ Monitoring hydraulic parameters, such as inflows, outflows, and water levels in all storage tanks, discharge flows and pressures for pumps, flows and/or pressure for regulating valves, and pressure at critical points, and using system modeling to assess the hydraulic integrity of the system • Prevent introduction of contamination from the distribution system itself by: ➢ Minimizing microbial growth and biofilm development (e.g. by ensuring adequate residual disinfection levels). Collect samples from several locations throughout the distribution system, including the farthest point, and test for both free and combined chlorine residual to ensure that adequate chlorine residual is maintained ➢ Using construction materials that do not contribute to				

Anticipated Impacts	Mitigation measures	Responsible for implementation	Monitoring Means	Periodicity	Estimated Amount (Kshs)
	release undesirable metals and other substance or interact with residual disinfectants				

Table 9. 3: Decommissioning phase Environmental and Social Management Plan

Anticipated Impacts	Mitigation Measures Proposed	Responsibility for Implementation	Monitoring Means	Periodicity of monitoring	Estimated Cost
Traffic Impacts from transportation vehicles and associated injuries	Erection of signs along access roads within the project area warning motorists of the heavy/construction vehicles operating along the roads	Contractor	Observation during inspections	Weekly during decommissioning	10,000.00
	Posting appropriate traffic warning signs, informing road users of presence of construction site and instructing motorists to reduce speed, shall be posted along the access roads within the project area of influence	Contractor	Periodic checks	Weekly during decommissioning	5,000.00
	Flagmen will be stationed at the road intersessions to control traffic to and from construction sites	Contractor	Observation during inspections	Weekly during decommissioning	Use internal capacity
	Water will be regularly sprinkled along the haul roads to suppress dust	Contractor	Observation during inspections	Weekly during decommissioning	50,000.00
Air quality impacts including dust generated as a result of movement of machinery and	Watering of haul roads at regular intervals	Contractor	Periodic checks	Weekly during decommissioning	As traffic impacts
	Provision of dust filters / mask to workers working at highly dust prone and affected areas	Contractor	Periodic checks	Weekly during decommissioning	50,000.00
	Utmost care will be taken to prevent	Contractor	Observation during	Weekly during	Nil- Standard

Anticipated Impacts	Mitigation Measures Proposed	Responsibility for Implementation	Monitoring Means	Periodicity of monitoring	Estimated Cost
trucks transporting materials; loading and unloading of materials and emissions from vehicles and machineries	spillage of spoils and stone from the trucks		inspections	decommissioning	Best Practice
	Covering transportation vehicles with tarpaulin to mitigate blowing away of materials with wind	Contractor	Observation during inspections	Weekly during decommissioning	Nil- Standard Best Practice
Noise Pollution from vehicles transporting materials for use in site restoration	Proper maintenance, oiling and greasing of machines at regular intervals will be done to reduce generation of noise	Contractor	Document review	Weekly during decommissioning	Nil- Standard Best Practice
	Adequate silencers will be provided in all the diesel engines	Contractor	Periodic checks	Monthly during decommissioning	Nil- Standard Best Practice
	Periodical monitoring of noise will be done	Contractor	Document review	Weekly during decommissioning	50,000.00
	The occupational noise exposure to the workers in the form of eight hourly time weighted average will be maintained well within the prescribed Occupational Safety and Health Act (OSHA) 2007 standard limits	Contractor	Periodic noise monitoring	Weekly during decommissioning	Nil- Standard Best Practice
	Adequate PPE will be provided to the staff exposed to noise risks	Contractor	Random checks	Weekly during decommissioning	50,000.00
	Acoustic silencers will be provided in equipment wherever necessary	Contractor	Periodic checks	Weekly during decommissioning	Nil- Standard Best Practice
	Use of personal protective equipments/devices such as ear-muffs, ear plugs etc. will be strictly enforced for the workers engaged in	Contractor	Random checks	Weekly during decommissioning	Nil- Standard Best Practice

Anticipated Impacts	Mitigation Measures Proposed	Responsibility for Implementation	Monitoring Means	Periodicity of monitoring	Estimated Cost
	high noise areas;				
	Periodic maintenance of the equipment to be used in the developmental works will be carried out. Worn out parts will be replaced and rotating parts will be lubricated to minimize noise emissions	Contractor	Periodic checks	Monthly during decommissioning	Nil- Standard Best Practice
Occupational Health and Safety Impacts including injuries to project personnel	Adoption of dust suppression measures like spraying water on haul roads and dumping yards, use of drill with dust collection system or wet drills etc.	Contractor	Random checks	Weekly during decommissioning	As per air quality impacts
	Implementation of emergency response plan that includes installation of emergency response equipment to combat accidental events	Contractor	Document review	Monthly during decommissioning	50,000.00
	On-site first aid facilities will be available for employees	Contractor	Periodic checks	Weekly during decommissioning	50,000.00
	All staff and workers will be provided with PPE to guard against excess noise levels	Contractor	Random checks	Weekly during decommissioning	As per Air quality and noise impacts
	All staff will be provided with safety Helmets, goggles, safety boots, ear muffs, gas masks, etc.	Contractor	Random checks	Weekly during decommissioning	50,000.00
Scraps material and other debris	Use of an integrated solid waste management system i.e. through a hierarchy of options.	Contractor	Document review	Monthly during decommissioning	Nil- Standard Best Practice
	Wastes generated as a result of facility decommissioning activities will	Contractor	Document review	Weekly during decommissioning	Nil- Standard Best Practice

Anticipated Impacts	Mitigation Measures Proposed	Responsibility for Implementation	Monitoring Means	Periodicity of monitoring	Estimated Cost
	characterized in compliance with standard waste management procedures.				
	The contractor will select disposal locations in consultation with the local council based on the properties of the particular waste generated.	Contractor	Periodic checks	Weekly during decommissioning	Nil- Standard Best Practice
Machinery/ Equipment	All buildings, machinery, equipment, structures and partitions that will not be used for other purposes should be removed and reused or rather sold/given to scrap material dealers.	Contractor	Document review	Monthly during decommissioning	150,000.00
	Where recycling/reuse of the machinery, equipment, structures and other waste materials is not possible the materials should be taken to approved dumpsites.	Contractor	Document review	Monthly during decommissioning	150,000.00
Vegetation disturbance Land deformation soil, erosion, drainage problems	Implement an appropriate re-vegetation programme to restore the site to its original status.	Contractor	Observation during inspections	Weekly during decommissioning	100,000.00
	During the vegetation period, appropriate surface water run off controls will be taken to prevent surface erosion	Contractor	Observation during inspections	Weekly during decommissioning	Nil- Standard Best Practice
	Monitoring and inspection of the area for indications of erosion will be conducted and appropriate measures taken to correct any occurrences;	Contractor	Observation during inspections	Weekly during decommissioning	Nil- Standard Best Practice
	Fencing and signs restricting access will be posted to minimize	Contractor	Observation during inspections	Weekly during decommissioning	50,000.00

Anticipated Impacts	Mitigation Measures Proposed	Responsibility for Implementation	Monitoring Means	Periodicity of monitoring	Estimated Cost
	disturbance to newly-vegetated areas.				
Loss of income among construction workers	Assist with re-employment and job-seeking of the involved workforce.	Contractor	Document review	At the end of project life	Nil- Standard Best Practice
Loss of quality of life due to loss of jobs	Compensate and suitably recommend the workers to help in seeking opportunities elsewhere.	Contractor	Document review	At the end of project life	To be determined
Loss of benefits i.e. medical, insurance cover etc.	Offer advice and counseling on issues such as financial matters	Contractor	Document review	At the end of project life	Nil- Standard Best Practice
Total					**815,000.00**

9.3 Environmental Monitoring and Audit (EM and A)

Environmental Monitoring and Audit (EM and A) will be carried out during construction and operation phases of the project to ensure effective implementation of mitigation measures recommended in the Environmental and Social Impact Assessment (ESIA) Study Report, and relevant environmental protection and pollution prevention and control legislations. The EM and A programme will be used to assess the effectiveness of, *inter alia*, the implementation of the recommended mitigation measures, and to identify any further need for additional mitigation measures or remedial actions. Monitoring and audit during construction stage aims to provide systematic procedures for monitoring, auditing and minimizing the environmental impacts associated with construction works. Findings, recommendations and requirements of the ESIA; all relevant requirements under the Environmental Management and Coordination Act (EMCA) 1999 and other environmental legislations; and the Kenyan planning standards and laws have been adopted in these monitoring and audit procedures.

Table 9. 4: Monitoring Framework for Environment, Health, Safety and Social Issues

Main Issues/ Impacts	Parameters to monitor	Monitoring Indicators	Monitoring Methods	Frequency of monitoring	Responsibility for monitoring
Compliance with Regulatory requirements	Operation licenses and permits	NEMA license for project construction, contractor camps, quarry sites, borrow sites and crushing plant in place	Review of records	Monthly	Supervision Consultant
		Blasting permit from Mines and Geology Department in place	Review of records	Monthly	Supervision Consultant
		Health certificates for food handlers in place	Review of records	Monthly	Supervision Consultant
	Audit reports	Health and Safety, Fire Safety, Environmental Audit and Risk Assessment reports available	Document Review	Monthly	Supervision Consultant
Training and awareness on environmental, health and safety issues	Induction training on Environment, health and safety issues	List of staff trained	Review of records	Monthly	Supervision Consultant
		Signed attendance list	Review of records	Monthly	Supervision Consultant
	Staff training on health and safety	List of staff trained	Review of records	Monthly	Supervision Consultant
		Signed attendance list	Review of records	Monthly	Supervision Consultant
	Staff training on environmental issues	List of staff trained	Review of records	Monthly	Supervision Consultant
		Signed attendance list	Review of records	Monthly	Supervision Consultant
	Staff training on fire safety	List of staff trained	Review of records	Monthly	Supervision Consultant
		Signed attendance list	Review of records	Monthly	Supervision Consultant
Human	Environment,	Health and Safety Officer available	Review of	Monthly	Supervision Consultant

Main Issues/ Impacts	Parameters to monitor	Monitoring Indicators	Monitoring Methods	Frequency of monitoring	Responsibility for monitoring
Resource Management	Health Safety and Social personnel		records		
		Designated Environment Officer (DEO) available	Review of records	Monthly	Supervision Consultant
		Community Liaison Officer (Sociologist) available	Review of records	Monthly	Supervision Consultant
Occupational Health and Safety issues	Health and Safety Management	Work Health and Safety Plan in place	Review of records	Monthly	Supervision Consultant
		First Aid kits available on site	Periodic checks	Monthly	Supervision Consultant
		Number of condom dispensers loaded with male condoms	Periodic checks	Monthly	Supervision Consultant
		Number of toilets available on site	Periodic checks	Monthly	Supervision Consultant
	Health and safety committee in place	Minutes of committee meetings	Review of records	Monthly	Supervision Consultant
		Attendance list of committee meetings	Review of records	Monthly	Supervision Consultant
	Provision of Personal Protective Equipment (PPE)	Number of workers provided with safety shoes	Periodic checks	Daily	Supervision Consultant
		Number of workers provided with helmets	Periodic checks	Daily	Supervision Consultant
		Number of workers provided with reflective jackets	Periodic checks	Daily	Supervision Consultant
		Number of workers provided with eye shield	Periodic checks	Daily	Supervision Consultant
		Number of workers provided with nose masks	Periodic checks	Daily	Supervision Consultant
		Number of workers provided with hand gloves	Periodic checks	Daily	Supervision Consultant

Main Issues/ Impacts	Parameters to monitor	Monitoring Indicators	Monitoring Methods	Frequency of monitoring	Responsibility for monitoring
		Number of workers provided with overalls	Periodic checks	Daily	Supervision Consultant
		Number of workers provided with nose masks	Periodic checks	Daily	Supervision Consultant
	Occurrence of Accidents and incidents	Accident/ Incident forms available	Review of records	Monthly	Supervision Consultant
		Number of injuries reported	Review of records	Monthly	Supervision Consultant
		Number of off days due to injuries	Review of records	Monthly	Supervision Consultant
		Number of injury related treatments	Review of record	Monthly	Supervision Consultant
		Number of compensations launched	Review of records	Monthly	Supervision Consultant
Traffic related issues	Construction traffic management	Traffic Management Plan in place	Review of records	Monthly	Supervision Consultant
		Traffic signs in place	Random checks	Weekly	Supervision Consultant
		Speed limits in place	Random checks	Weekly	Supervision Consultant
		Traffic diversion signs in place	Random checks	Weekly	Supervision Consultant
Labour, employment, gender and HIV/AIDS	Labour and employment management	Labour and working conditions plan in place	Review of records	One off	Supervision Consultant
		Number of employees who have signed code of conduct	Review of records	Monthly	Supervision Consultant
	Compliance with labour laws	Number of underage workers employed	Random checks	Daily	Supervision Consultant
		Number of workers with	Review of	Monthly	Supervision Consultant

Main Issues/ Impacts	Parameters to monitor	Monitoring Indicators	Monitoring Methods	Frequency of monitoring	Responsibility for monitoring
		employment contracts	records		
	HIV/AIDS awareness	HIV/AIDS awareness Plan in place	One off	Monthly	Supervision Consultant
		List of staff	Review of records	Monthly	Supervision Consultant
		Attendance list	Review of records	Monthly	Supervision Consultant
Record keeping	Presence of records of site activities	Filled in Designated Environment Officer (DEO) diary	Review of records	Monthly	Supervision Consultant
Water quality	Chemical components	Temperature, pH, Conductivity, dissolved Oxygen, Nitrates, Alkalinity, Total suspended solids, Total dissolved solids	Sampling for analysis in NEMA accredited laboratories	Quarterly	Contractor
			Sampling for analysis in NEMA accredited laboratories	Annually	External NEMA licensed Expert
	Bacteriological components	Total coliforms per 100ml, Feacal coliforms per 100ml	Sampling for analysis in NEMA accredited laboratories	Quarterly	Contractor
			Sampling for analysis in NEMA accredited laboratories	Quarterly	External NEMA licensed Expert

Main Issues/ Impacts	Parameters to monitor	Monitoring Indicators	Monitoring Methods	Frequency of monitoring	Responsibility for monitoring
Noise impacts	Noise pollution	Noise levels in Db (A)	Onsite measurement and analysis using noise meter	Weekly	Contractor
			Onsite measurement and analysis using noise meters	Annually	External NEMA licensed Expert
Emission impacts	Air quality	Sulphur Oxides (SO_X), Oxides of Nitrogen, (NO_X), Carbon Dioxide (CO_2), Suspended Particulate Matter (SPM), Respirable Particulate Matter (RPM) (<10µm), $PM_{2.5}$, Nitrogen Dioxide	Onsite analysis of environmental parameters	Monthly	Contractor
			Onsite analysis of environmental parameters	Annually	External NEMA licensed Expert
Waste management	Solid and hazardous waste management infrastructure	Waste Management Plan in place	Review of records	Monthly	Supervision Consultant
		Waste collection bins in place	Inspections	Monthly	Supervision Consultant
		Weather proof waste storage area in place	Inspections	Monthly	Supervision Consultant
		Contract with NEMA-licensed solid waste handler in place	Review of records	Monthly	Supervision Consultant
		NEMA licence for solid waste handler available	Review of records	Monthly	Supervision Consultant

CHAPTER 10

10.0 DECOMMISSIONING

10.1 Introduction

Decommissioning normally takes place both at the end of construction period and during the final phase of a project life-cycle. Environmental planning is therefore necessary before any decommissioning activities should be allowed to commence. The reason for this is because a project earmarked for decommissioning has in all likelihood been operational for some time, and as such, the environment within which it lies has stabilised in response to the presence of the associated infrastructure, activities and facilities. At the end of construction phase, decommissioning mainly targets temporary facilities associated with construction camps and site restorations. The decommissioning of one or all components of the proposed project will therefore have some effect on the environmental status quo of the project site, either in a positive or in a negative way. This section contains various environmental guidelines which will assist decision makers to take environmentally responsible and sustainable decisions in terms of which infrastructure to retain, which to develop further (and how to do this), and which to remove completely in so far as construction and operations of this project are concerned. In this way, the positive aspects of decommissioning may be maximized and the negative aspects minimized or even avoided.

10.2 Purpose and objectives of decommissioning

The generally accepted purpose of decommissioning is the release of valuable assets such as machinery and sites for alternative use, recycling and reuse of materials and the restoration of environmental amenity. In all cases, the basic objective is to achieve an end-point that is sensible in technical, social and financial terms, that properly protects workers, the public and the environment and, in summary, complies with the basic principles of sustainable development. Stringent regulatory controls protect the public, the environment and workers from the hazards associated with decommissioning activities.

10.3 Decommissioning at the end of construction phase

The construction process for the proposed project site will involve a number of activities which may contribute to some changes in the local environmental conditions. The decommissioning exercise will involve dismantling of site facilities; backfilling all disturbed areas and transportation of materials out of site for disposal or re- use in similar future projects. Materials from the site will be basically remains from construction activities and include scrap metals and plastic pipes among others. These materials can be reused, recycled and donated to other organizations. Scrap materials, can often be reused or refurbished. Some items could be used by the proponent for their next job, and many items can be sold to used - materials stores, scrap

recyclers, waste exchanges or other outlets. Various items shall be accumulated separately to facilitate recycling. The table below gives a summary of mitigation measures proposed for decommissioning during construction stage

Table 10. 1: Decommissioning at the end of Construction Phase

Issue	Action Required	Responsibility
Impacts related to procurement of construction materials	Close all borrow pits in accordance with an approved plan to maximise future use and minimise health and safety hazards.	Contractor
Solid waste arising from construction activities	The site is to be cleared of all construction materials, including litter prior to hand over	Contractor, LVSWWDA, KIWASCO
Fences, barriers and demarcations	Fences, barriers and demarcations associated with the construction phase must be removed from the site	Contractor
Disturbed areas	The site must be fully rehabilitated and stabilised (for example, through revegetation)	Contractor
Contractor camp	Decommission all contractor camp services including electricity, water and sanitation facilities	Contractor
Site remediation	A meeting must be held on site between the Engineer, Environmentalist and the Contractor to approve all remediation activities and ensure that the site has been restored to a condition approved by the Engineer	Contractor and supervising consultant
Hazard to workers	(i) Implement full H&S programme (Health and Safety Plan) and labour welfare provisions. (ii) Establish and operate an emergency evacuation procedure for casualties.	Contractor
Environmental cases identified	Rehabilitation Activities of Environmental Cases identified must continue throughout the defect liability period	Contractor and supervising consultant

10.4 Decommissioning during final phase of the project

Decommissioning of the project infrastructure is anticipated to be after the end of design life of the water supply and sanitation infrastructure. During decommissioning, the following steps should be considered in order to undertake the procedure in a structured manner.

Table 10. 2: Decommissioning during the final phase of the project

Step	Activity	Actions required	Responsible party
Step 1	Initiation	• Development of an objective	Proponent

		worksheet and checklist incorporating references, legal and policies	
Step 2	Prepare road map for decommissioning design	• Conduct design review to validate elements of the design and ensure design features are incorporated in the decommissioning design. • Carry out public consultations	Proponent
Step 3	Prepare and award contract	• Prepare a contract that incorporates validated project information and award to a contractor as per the procurement rules.	Proponent
Step 4	Implement the project.	• Implement design elements and criteria on the project in accordance with specifications and drawings. • Inspect during decommissioning and at project completion to ensure that all design elements are implemented according to design specifications.	Contractor and proponent
Step 5	Non-conformance, corrective/preventive action	• Determine root cause • Propose corrective measures • Propose future preventive measures.	All responsible

CHAPTER 11

11.0 ENVIRONMENT, HEALTH AND SAFETY (EHS)

11.1 EHS Management and Administration

The EHS is a broader and holistic aspect of protecting the worker, the workplace, the tools / equipment and the biotic environment. It is an essential tool in determining the ESIA study. The objective of EHS on the proposed project is to develop rules that will regulate environmentally instigated diseases and occupational health and safety issues during construction, operation and decommissioning phases of the proposed project through avoidance of injuries; provision of safe and healthy working environment for workers comfort so as to enhance maximum output; control of losses and damages to plants, machines, equipment and other products; and enhancing environmental sustainability through developing sound conservation measures.

11.2 Policy, Administrative and Legislative Framework

It is the primary responsibility of the contractor to promote a safe and healthy environment at the workplace and within the project neighbourhood by implementing effective systems to prevent occupational diseases and ill-health, and to prevent damage to property. The EHS Management Plan when completed will be used as a tool and a checklist by project stakeholders in planning and modification of the construction of the proposed project infrastructure. The plan will also provide for the establishment of an appropriate legal and institutional framework for the implementation of EHS in conformity to relevant statutes like; the Public Health Act Cap. 242; Occupational Safety and Health Act (OSHA), 2007; Environmental Management and Co-ordination Act (EMCA) 1999; Workmen Compensation Act Cap. 236 and other accompanying laws and by-laws already mentioned elsewhere in this report

11.3 Organization and implementation of the EHS Management Plan

The contractor(s) shall use the EHS plan at the proposed project site during construction and operation phase of the project with the assistance of EHS personnel who shall enforce its provision throughout the project duration.

11.4 Occupational Health and Safety Management

The proponent shall ensure, so far as is reasonably practicable, the health, safety and welfare at work of his employees including those of his sub-contractors and of all other persons on site. The Contractor shall comply with OSHA 2007, the Public Health Act; the Work injury benefits Act, the Employment Act and other Statutory Regulations, rules and bylaws regarding occupational health, safety and gender. The Proponent's responsibilities shall, *inter alia*, include requirements contained in the sections below.

11.4.1 Safe constructional plant, equipment and methods of work

The proponent and/ or his agents shall provide and maintain project equipment and systems of work that are safe and without risks to health and safety of workers and visitors to the site. This shall include maintaining equipment, engines, and related electrical installations in good working order; maintaining a clean and tidy work space; providing signals; providing work site rules, safe working procedures and allocating appropriate places to carry out the work.

11.4.2 Safe handling, storage, transport and disposal

The proponent and/ or his agents shall execute suitable arrangements for ensuring safety and absence of risk to health in connection with the use, handling, storage, transport and disposal of articles and substances. Transportation of any material by the Proponent and/ or his agents shall be in suitable vehicles which when loaded does not cause spillage and all loads shall be suitably secured. Any vehicle that does not comply with this requirement or any of the local traffic regulations and laws shall be removed from the site. The Proponent and/or his agents must ensure that all stores are located such as to reduce risks to the workers on site. Arrangements for the safe use, handling, storage, transport and disposal of articles and substance are to be made before work commences to the satisfaction of the supervising Engineer.

11.4.3 Protective Clothing, Equipment etc.

Provision of protective clothing and equipment, first aid stations with such personnel and equipment as are necessary and such information, instruction, training and supervision as are necessary to ensure the health and safety at work of all persons employed on the works all in accordance with the Laws of Kenya. The Proponent and /or his agents shall provide, at his own expense, protective clothing and safety equipment to all staff and labour engaged on the works to the satisfaction of the supervising Engineer. Such clothing and equipment shall include, at a minimum high visibility vest for workers directing traffic; protective boots and gloves for the workforce operating excavation machines and equipment; protective footwear, gloves, goggles, and dust mask for the workforce at the construction site; and ear protectors and dust mask for the workforce engaged in rock drilling or in using vibrating equipment.

11.4.4 Safety Officer

The Proponent shall designate a qualified Safety Officer from one of his senior staff who has specific knowledge of safety regulations, experience of safety precautions on similar works and who shall advise on all matters affecting the safety of the workforce and on measures to be taken to promote such safety. The Safety Officer shall work full time directly on the project at the project site. He/she might have other obligations in relation to similar topics, e.g. environment, social and/or medical aspects including HIV/AIDS prevention, as long as at least 50% of his/ her time is devoted to Occupational Health and Safety. The Safety Officer shall have specific training in the Proponent's safety and health management system and procedures, practice, etc. and before commencement of the Works, the Safety Officer shall receive training in (or receive a

refresher course in) industrial first aid (or the equivalent). The Safety Officer shall routinely provide workers with training in safe work practices and general awareness of potential danger situations to avoid injuries. Trained first aid personnel, transport for sick or injured workers, and a stocked first aid kit shall be available at the site at all times. The Proponent shall establish emergency evacuation procedures to enable a rapid response to accidents.

11.4.5 Safety courses

All employees shall be given training on how to ensure their own personal safety and on ways to reduce the accident risk on those sites where large, mobile heavy vehicles and equipment or equipment with moving parts are in use. The Safety Officer shall provide training in safe work practices and general awareness of potential danger situations to avoid injuries. In addition, all employees handling dangerous/toxic materials shall be trained in how to handle dangerous/toxic materials.

All the Proponent's and contractor's personnel shall, before starting to work, have an induction course on safety and health at the site. The information and training shall be on the site and have duration of at least two hours. It shall be conducted in English and, if necessary, also in a relevant local language to ensure that all personnel can understand the information and instructions. The Site Manager shall take part in at least the first part of the training. He shall present the Proponent's safety policy and goal, the responsibilities and roles in relation to safety and health of all individuals, and the more specific responsibilities and roles of key staff (Site Manager, Safety Officer, foremen, and others). The topics of the course shall be, but are not limited to:

(i) Proponent's/ Contractor's safety policy and goal;
(ii) Organization of safety and health at work and the responsibilities and roles of the Site Manager, the superintendents/supervisors/foremen, the Safety Officer and of each individual worker;
(iii) Mandatory use of personal protective equipment on the site;
(iv) Specification of the type of equipment, where and when to use it and how it shall be used, stored, cleaned and maintained correct;
(v) Placement and content of first aid equipment and fire extinguishers;
(vi) Use of fire extinguishers;
(vii) How to use the equipment and information on who are specially trained in first aid and how to contact them;
(viii) How to transport an injured person to a medical doctor or to the hospital;
(ix) Safety rules for the site, e.g. in relation to the use of different equipment, tools, vehicles, fuel, oil, chemicals, explosives and abrasives;
(x) Cleaning, housekeeping and maintenance of the site, including vehicles, equipment, tools, workshops, houses etc;
(xi) If work permits are required for specific tasks;

(xii) Manual handling, transport, storage and disposal of equipment, goods, etc. in a safe way preventing accidents and too heavy burdens;
(xiii) How to ensure that equipment, goods, etc. will not be an obstacle imposing a risk to other persons due to inadequate placement and protection of it;
(xiv) Welfare facilities and access to drinking water and water in case of skin burns on the site;
(xv) The use of safety signs and protective barriers;
(xvi) Safe use of fuel, oil, chemicals, explosives;
(xvii) Prevention of dust generation and exposure;
(xviii) Road safety aspects, sign posting and principles and measures for minimising the risk of traffic accidents;
(xix) HIV/AIDS prevention (only an introduction, more information shall be provided within one month of the employment on the site); and
(xx) Consequences of breach of discipline and not complying with rules

11.4.6 Safe access

The Proponent and his agents shall provide and maintain access to all places on the site in a condition that is safe and without risk of injury.

11.4.7 Latrines and other sanitary arrangements

The Proponent and/ or his agents shall provide an adequate number of suitable latrines and other sanitary arrangements at sites where work is in progress to the satisfaction of the supervising Engineer.

11.4.8 Reporting of accidents

The Proponent and/ or his agents shall report details of any accident to the relevant authorities, if appropriate, as soon as possible after its occurrence.

11.4.9 Occupational health hazards

The Proponent and /or his agents shall reduce occupational health hazards, such as:

(i) Physical hazards (continuous noise and vibrations, prolonged stay in high temperatures);
(ii) Chemical hazards (exposure to fumes, chemicals and dust including solvents, paints, and exhaust gases);
(iii) Mechanical hazards (unguarded or exposed moving objects and other dangers from the use and operation of machines);
(iv) Risk of accidents with hand tools (slips, falls, eye injuries) heavy items (the accidental dropping of heavy items) and vehicles;
(v) Thermal hazards (heat stroke from long hours working in direct sunlight and burns due to contact with hot items);
(vi) Electrical, fire or explosion hazards;

(vii) Ergonometric risk factors (personal injuries associated with poor working postures, heavy lifting, repetitive work, repetitive hand arm vibrations, manual transport); and
(viii) Sanitation hazards (including contaminated drinking water, poor food practices, improper waste disposal, unhygienic toilet and washing facilities, contact with solid and/or biological waste).

11.4.10 Means of reducing Occupational health hazards

The means of reducing occupational health hazards shall include:

(i) Using vibration-reduced and sound-reduced equipment;
(ii) Providing shade at stationary work places and at welfare facilities;
(iii) Having only trained and experienced persons use dangerous chemicals and operate the machines;
(iv) Providing safety awareness training for all workers;
(v) Providing easily movable equipment to reduce risk of injury associated with heavy lifting or & work;
(vi) Varying job functions (to avoid excessive repetitive motions);
(vii) Providing on the site, throughout working hours, adequate and easily accessible supplies of safe drinking water, access to washing facilities (because of chemical and biological hazards), proper eating places and waste disposal facilities;
(viii) Provide adequate signing, fencing and guards to ensure that unauthorised persons shall be kept off the site. This is especially relevant for the dangerous parts of the site, e.g. the storage areas for oil, fuel, chemicals, machines, the car park, and the work shop, near deep holes, and power lines;
(ix) The Proponent and/ or his agents shall keep the site free from all unnecessary obstructions, and shall store or dispose of any equipment or surplus of materials. The Proponent and/ or his agents shall clear away and remove from the site any wreckage, rubbish and temporary works which are no longer required;
(x) The Proponent and/ or his agents are responsible for providing safe passage around and through the work site for all kinds of traffic, including non-motorised traffic and pedestrians. Traffic signs, traffic control signals and barriers shall be used for direction and control of traffic and to inform drivers of the importance to slow down and drive carefully;
(xi) Vehicles shall at all times be maintained in accordance with original manufacturer's specifications and service manual. This will ensure low noise generation, low emission of diesel particulate emission and that the vehicle will not result in accidents due to inadequate maintenance. Special inspection and maintenance is required for brakes, steering wheel, light, horn, tyres, oil and water. Seat belts shall be installed and used. All heavy vehicles shall have reverse warning signal. The operators shall be instructed in avoiding spillage, not overturning or overloading and not to drive at too fast speed. Operators shall be

protected against the sun and a cabin shall protect against injuries if the vehicle is tipping around; and

(xii) All accidents shall be recorded and analyzed by the proponent and/ or his agents in order to prevent similar accidents in the future. Fatal accidents shall also be reported to the Police. Accident records shall be submitted to the authorities in accordance with applicable regulations.

11.4.11 Monitoring process

The proponent and/or his agents shall by daily inspections monitor:

(i) The use of specified personal protective equipment;
(ii) The cleanliness of the working area which is to be kept tidy with no unnecessary obstacles;
(iii) Dust generation and exposure and appropriate watering if required;
(iv) The presence of any new workers on the site, or plans to hire in the near future, and therefore need for induction courses;
(v) The position and adequacy of signing, barriers and fencing; and
(vi) The Safety Officer shall, at least on a monthly basis, monitor all site activities and prepare a report on his findings. The report shall include:
   a. Number and type of accidents, and preventive measures implemented to minimise future similar accidents;
   b. Number of workers who have attended (and not attended) an induction course;
   c. Number of workers who have received special training because they started on a new work function, and the total number of workers who should have received such training;
   d. Stock of personal protective equipment and quantities issued;
   e. Maintenance of the vehicles: tyres, brakes, light, steering wheel, oil, water;
   f. Condition of first aid equipment in place with quantities and requirements for replenishment; and
   g. The change in number of workers and their work functions.

11.5 HIV/AIDS, STI and COVID-19 prevention

The Proponent's Management Plan for HIV/AIDS and STI shall include details of the measures he proposes to adopt to combat the spread of HIV/AIDS and sexually transmitted Infections (STI) between his staff, labour and the local community. The plan shall also outline workplace policies and programmes for employees living with HIV/AIDS, information and awareness campaigns and effective screening and counselling policies for STI and HIV/AIDS cases of his project staff. In any case, the Proponent shall comply with the HIV and AIDS Prevention and Control Act (2006) which prohibits discrimination of persons living with HIV and AIDS.

The Proponent and his agents shall further conduct a COVID-19 awareness program via an approved service provider and shall undertake such other measures to reduce the risk of the

transfer of the virus between and among the construction personnel and the local community to promote early diagnosis and to assist affected individuals.

The proponent and/ or his agents will work closely with Kenya National Aids Control Council and MoH to put in place non-discriminatory workplace measures to protect the employees living with HIV/AIDS and to ensure that they are treated and counselled. Prevention measures will also be established to protect others against any risk of illness and injury, which can result in HIV/AIDS infection and transmission.

The Proponent and/ or his agents shall advise all site staff and labour of the danger and impacts of STI's in general and HIV/AIDS in particular. To this end, the Proponent shall conduct information, education and consultation (IEC) campaigns at least every other month, targeting the aforementioned site staff, labour, and the immediate local communities. The Safety Officer or another of the Proponent's staff may carry out the awareness training if qualified; otherwise a person from outside (e.g. from Hospital) may be hired to carry out the awareness training.

11.6 Gender

The Proponent's Management Plan for Gender shall include description of recruitment policy and procedures, awareness raising meetings, gender sensitive working conditions and facilities to be provided at the workplace, and participatory gender sensitive monitoring of site conditions. The Proponent and/ or his agents shall ensure that recruitment procedures and working conditions and facilities are gender sensitive and in particular that:

(i) Announcement notices of equal employment opportunities are posted in visible and popular places in the local communities and that such notices also reach women and youth leaders;
(ii) Both men and women are represented in any information and consultative meetings held at the site and that gender and social issues are raised and analyzed; and
(iii) Equal payment is made to men and women for similar work and that payment of wages is made to the workers and not to representatives;

CHAPTER 12

12.0 STUDY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

12.1 Study findings

A number of findings came out of the ESIA study and they include the following:

(i) From the EIA study, it was noted that Kisumu city, Maseno and Kiboswa area have a number of development challenges that need to be addressed to ensure sustainable implementation of the proposed water project. Water supply within great sections of the project area is inadequate and local inhabitants are forced to look for water from unreliable sources.

(ii) It was noted during the study that some of the water sources relied upon by the local people are unprotected and thus aggravates incidents of waterborne diseases.

(iii) Although significant sections of Kisumu city are currently covered by water supply network, Maseno and Kiboswa area still struggle with the problem of inadequate water supply. It was noted that some residents within these areas still get their drinking water from unprotected sources like shallow wells, springs and open rivers. This water, which is increasingly polluted, is often used without any treatment.

(iv) It emerged during the study that compensations were not made for some of the existing pipeline wayleaves in the previous projects and land owners may want further engagements during implementation of the proposed project. Those consulted indicated that there were no agreements made with land owners at the time the existing pipelines were laid. Stakeholders also wanted to know measures that will be put in place during implementation phase of the project to ensure that water supply is not interrupted.

(v) Water supply in the project area can also be unreliable due to pipe bursts due to relatively old pipes and vandalism by sections of the public. It is therefore important that a lasting solution to the water supply issue is realised and the proposed project timely: the local population will significantly benefit from it.

(vi) It was noted during this study that the proposed project will lead to a number of environmental and social impacts both during construction and operation phases of the project. The adverse impacts will be on private properties, natural environment and neighbouring land uses. Analysis of the anticipated adverse impacts revealed that most of the impacts are low in significance and can be adequately mitigated through implementation of the recommended mitigation measures contained elsewhere in this ESIA Study Report.

(vii) The project will result in better access to safe drinking water leading to improved standard of living and changes in exposure to both communicable and non-communicable diseases.

(viii) Project implementation will promote a more sustainable use of water resources with improvements in the infrastructure to reduce losses and introduction of better metering and billing procedures to encourage more efficient use of water.

(ix) Cases of pipe bursts will be reduce thanks to the proposed project. Other benefits associated with the proposed project include reduced exposure to water related diseases; availability of clean water in recommended quantities and creation of employment opportunities to the local people among other benefits.

12.2 Conclusion

The process followed in this study was aimed at providing opportunity to the neighbouring community to express their views, fears and expectations with regard to the proposed rehabilitation and extension of water supply infrastructure within Kisumu city and Satellite towns. The consultation process was open and unbiased. The objective of the consultation process was to discern what the public expect from the project proponent whilst clarifying the technical aspects of the project. The ESIA study and public consultation was conducted under an atmosphere of mutual trust and the local people were willing to spare their time to give audience to the ESIA consultants and also provide their input in the entire process. Those consulted did not raise any significant issues with regard to implementation of the proposed project and it can be concluded that stakeholders are supportive of the project. Their support for the project is based on the difficulties currently faced by residents of the area with regard to water supply. They also feel that the project has more benefits and should therefore be implemented as proposed.

12.3 Recommendations

A number of measures for sustainable implementation of the proposed project and associated infrastructure are contained in Chapter 9 that deals with Environmental and Social Management Plan (ESMP). The Project proponent is advised to implement these additional recommendations to ensure sustainable coexistence of the project and neighbouring populations and land uses.

12.2.1 Implementation of the project as proposed

Based on the findings from field study and public consultation, the project should be implemented as proposed. The project does not have any unique features that may result in adverse impacts to the physical environment and neighbouring community. Similar projects have been implemented within Kisumu County and elsewhere without any reported adverse environmental and social impacts. Those consulted are in support of project implementation and the NEMA should therefore grant the project proponent licence to implement the project.

12.2.2 Resettlement Action Plan (RAP)

Implementation of the proposed project will involve minimal interference with existing developments some of which are on private lands while others are on road reserves. Sections of these developments may be impacted on during project implementation and the Project Affected Persons (PAPs) should be properly identified and assets affected valued under the auspices of resettlement Action Plan (RAP). Restorations and compensations should be made in

compliance with applicable rules and regulations. More importantly, land will be required for locating project infrastructure including water pipelines and storage tanks. Easements will be required for pipeline wayleaves while land for location of storage tanks will be permanently acquired making resettlement action planning an important aspect of project implementation.

12.2.3 Community Sensitisation

Local community members should be sensitised about the project ahead of construction activities. This sensitisation will enable those who have erected developments on or close to water lines to remove them in advance of development activities to avoid losses. Where businesses may be temporarily affected during construction process, affected individuals should be allowed to reconstruct their businesses after construction works

12.2.4 A re-look into the Agreements for Existing Wayleaves

The proposed project will involve rehabilitation and extension of water supply infrastructure within Kisumu city and satellite towns. This would ideally mean that compensation will only be made to those whose land shall be affected within the areas earmarked for extensions. It however emerged during public meetings that compensations were not made for the existing pipeline wayleaves and land owners may want further engagements during implementation of the proposed project. Those consulted indicated that there were no agreements made between project implementers and a section of land owners when the existing pipelines were laid. This matter if not addressed in good time has the potential of leading to conflicts pitting the land owners and LVSWWDA during implementation of the proposed project.

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ANNEXES

Annex 1: Sample Survey Questionnaire Administered

Annex 2: Minutes of Public Meetings

Annex 3: List of Public Meeting Attendees

Annex 4: List of Persons consulted during ESIA study

Annex 5: Consolidated List of Persons consulted

Annex 6: NEMA Licence of ESIA Expert

Annex 7: Curriculum Vitae of Key Personnel

Annex 8: Approval Letter for Terms of Reference

Annex 1: Sample Survey Questionnaire Administered

BODABODA BAVE

STAKEHOLDER QUESTIONNAIRE NO_____

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

15 Years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	3	<1km	10 litres	4	3
2	Domestic use (Cleaning, washing etc)					
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

- A lot of people will have easy access to water.

4. (a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children	✓	
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants	✓	
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills	✓	
7	Pollution of surface water due to construction activities	✓	
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing	✓	
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

N/A

6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [✓] No [ ]

(b) If your answer to the above question is yes, what additional comments do you have?

The local community should be considered during employment.

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name FRANCIS ONYANGO ID No .....

Area MANYATTA B Tel Contacts 0708270247

Signature ..... Date 20/07/2021

JUMAH BODABODA - (CHAIRMAN)

BUNEN

STAKEHOLDER QUESTIONNAIRE NO_____

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

10 years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	2	<1Km	6 litres	4	3
2	Domestic use (Cleaning, washing etc)	2	<1Km	60 litres	4 ~~60 litres~~	3
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

It will increase access to clean water

4. (a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children	✓	
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants	✓	
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills	✓	
7	Pollution of surface water due to construction activities	✓	
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing	✓	
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [ ] No [✓]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

- Find us alternative places where I can work on I used for the project to be completed.
- Compensate me for to cover the loss I will incur.

6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [ ] No [ ]

(b) If your answer to the above question is yes, what additional comments do you have?

.....

.....

.....

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name ...BENTER ADHIAMBO OLOO... ID No ...20850162...

Area ...MANYATTA B... Tel Contacts ...0719781017...

Signature ..... Date ...20/07/21...

STAKEHOLDER QUESTIONNAIRE NO 7

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

Over 15 years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	Q	<100m		4	4
2	Domestic use (Cleaning, washing etc)	Q	<100m	40litre	4	4
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

- It will increase access to water

4. (a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children	✓	
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants	✓	
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills	✓	
7	Pollution of surface water due to construction activities	✓	
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing	✓	
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [ ] No [✓]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

- Displaced persons should be compensated for the period they will be out of business.

6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [✓] No [ ]

(b) If your answer to the above question is yes, what additional comments do you have?

- Notify us in advance to allow us relocate with ease.

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name GEORGE NGANGA ID No [illegible]

Area NYALENDA A Tel Contacts 0728152567

Signature [illegible] Date 21/7/2021

STAKEHOLDER QUESTIONNAIRE NO 1

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUM CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science a Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Techni Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under La Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management a Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessme (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satelli towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouri areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementatic of the proposed project that is located within your neighbourhood by responding to questions in th questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

7 years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	2	1.5km	10 litres	4	3
2	Domestic use (Cleaning, washing etc)	2	Brought to doorstep	40 litres	1	2
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

1). Availability of reliable water for domestic purposes

4.(a) Do you think that implementation of the Project may lead to any of the impacts listed in the tab

No.	Environmental, Social, Health and Safety Impacts	Yes	No
1	Injuries to local residents including children	✓	
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants	✓	
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills	✓	
7	Pollution of surface water due to construction activities		✓
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing	✓	
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		
	Possible destruction of existing structures		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agent the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative in to be addressed?

N/A

6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [✓] No [ ]

(b) If your answer to the above question is yes, what additional comments do you have?

(i) The company should ensure reliability of water supply to the community.

7. Thank you for responding to these questions. Kindly share with us the following information as proof that y have been consulted during this audit

Name Elizabeth Okun ID No —

Area Nyamira - Masena Tel Contacts 0720434589

Signature Date 11/08/2021

STAKEHOLDER QUESTIONNAIRE NO 6

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

7 years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	2	10m	10 litres	2	3
2	Domestic use (Cleaning, washing etc)	2	10m	50 ltrs	2	3
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

1) Free access to the water

4. (a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children	✓	
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants		✓
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills	✓	
7	Pollution of surface water due to construction activities	✓	
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing		✓
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses		
11	Other Impacts (Specify) —		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

N/A

6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [ ] No [✓]

(b) If your answer to the above question is yes, what additional comments do you have?

N/A

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name George Odwor ID No .....

Area Kisumu Boys Tel Contacts 0720142635

Signature ..... Date 12/08/2021

STAKEHOLDER QUESTIONNAIRE NO_____

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

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1. How long have you lived in your current address

Three years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	2	100m	20litres	5	4
2	Domestic use (Cleaning, washing etc)	4	100m	100litres	5	4
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

i) Availability of clean and accesible water to people.

4.(a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children	✓	
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants		✓
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills		✓
7	Pollution of surface water due to construction activities		✓
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing		✓
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

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6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [ ] No [✓]

(b) If your answer to the above question is yes, what additional comments do you have?

.....

.....

.....

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name Diana Anyango ..... ID No .....

Area Migosi ..... Tel Contacts 0796745174

Signature ..... Date 3/08/2021

MOWOTOD

STAKEHOLDER QUESTIONNAIRE NO 1

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

34 Years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	2	<200m	100litre	3	2
2	Domestic use (Cleaning, washing etc)	2	<200m	400litre	3	2
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [ ] No [✓]

(b) If your answer to the above question is yes, which are these benefits?

.....

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4. (a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children		✓
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants	✓	
5	Noise pollution from construction machinery		✓
6	Soil pollution from site activities and oil spills		✓
7	Pollution of surface water due to construction activities		✓
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing		✓
9	Accidents from moving vehicles		✓
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [ ] No [✓]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

- We should be compensated for the property that will be destroyed.

6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [✓] No [ ]

(b) If your answer to the above question is yes, what additional comments do you have?

- We want easy access to water because the pipe passes through my land but I still buy water
- Teams in the community to be employed during the project.

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name ROSE AMAYI OWITI ID No [illegible]

Area KUOYO - MANYATTA B Tel Contacts 0725722525

Signature [signature] Date 04/08/2021

STAKEHOLDER QUESTIONNAIRE NO 17

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

2 years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	2	<100m		5	4
2	Domestic use (Cleaning, washing etc)	2	<100m		5	4
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [ ] No [✓]

(b) If your answer to the above question is yes, which are these benefits?

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.....

4.(a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children	✓	
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works		✓
4	Destruction of environmentally significant plants		✓
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills	✓	
7	Pollution of surface water due to construction activities		✓
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing	✓	
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

N/A

6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [✓] No [ ]

(b) If your answer to the above question is yes, what additional comments do you have?

- The project should be taken where water is needed most.
- Forced eviction or forced use of land should not be be.

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name BENTER OMOLLO ID No

Area MAMBOLEO Tel Contacts 0722356196

Signature Date 2/08/21

BUSINESS

STAKEHOLDER QUESTIONNAIRE NO_____

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

4 Years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	3				
2	Domestic use (Cleaning, washing etc)	3			1	3
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

It will help the community to get clean water and for those doing farming as well do good irrigation

4. (a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children		✓
2	Dust pollution due to transportation of materials	✓	
3	Land degradation due to excavation works	✓	
4	Destruction of environmentally significant plants		✓
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills	✓	
7	Pollution of surface water due to construction activities	✓	
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing	✓	✓
9	Accidents from moving vehicles	✓	
10	Resettlement Impacts including displacement of local businesses		
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

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6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [ ] No [✓]

(b) If your answer to the above question is yes, what additional comments do you have?

.....

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.....

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name ....NOBERT JUMA.... ID No .....

Area ....UKWELI.... Tel Contacts ....0741876310....

Signature .....[signature]..... Date ....22/7/21....

STAKEHOLDER QUESTIONNAIRE NO_____

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

HOUSEHOLD

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

.....2 years.....

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	1	0		3	3
2	Domestic use (Cleaning, washing etc)	1	0		3	3
3	Irrigation	NA				

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

.....We will have good quality Water.....

.....

.....

4. (a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children		✓
2	Dust pollution due to transportation of materials		✓
3	Land degradation due to excavation works		✓
4	Destruction of environmentally significant plants		
5	Noise pollution from construction machinery	✓	
6	Soil pollution from site activities and oil spills		✓
7	Pollution of surface water due to construction activities		✓
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing		✓
9	Accidents from moving vehicles		✓
10	Resettlement Impacts including displacement of local businesses	✓	
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

.....

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6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [ ] No [✓]

(b) If your answer to the above question is yes, what additional comments do you have?

.....

.....

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7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name Mary Awour Odhiambo ID No .....

Area Arina Estate Tel Contacts 0722458313

Signature ..... Date 19/07/2021

STAKEHOLDER QUESTIONNAIRE NO 7

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR THE PROPOSED REHABILITATATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS

Lake Victoria South Water Works Development Agency (LVSWWDA) has contracted Integrated Science and Engineering Projects Limited (ISEP) and Bourg la Reine Ingenierie (BRL) as Consultants to carry out Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite towns under Lake Victoria Water and Sanitation (LVWATSAN) Program. In Compliance with Environmental Management and Coordination Act (EMCA) 1999, the consultant is carrying out Environmental and Social Impact Assessment (ESIA) for the proposed rehabilitation and extension of water supply networks within Kisumu City and Satellite towns. The projects will involve rehabilitation and extension of water lines within Kisumu city and neighbouring areas including Kajulu, Obwolo, Gee and Maseno areas. Public participation is a significant component of Environmental Impact studies and as a stakeholder; you are invited to give your views regarding implementation of the proposed project that is located within your neighbourhood by responding to questions in this questionnaire. This information will be used strictly for this study and will be treated in utmost confidence.

1. How long have you lived in your current address

32 years

2. What is your main source of water for the stated uses?

No	Use	Source	Distance to source	Quantity used per day (litres)	Reliability	Quality
		1. Piped to the house 2. Piped to Community drawing point 3. Rain catchment 4. Borehole 5. Shallow well 6. River 7. Lake Victoria			1.Not reliable 2.Fairly Reliable 3.Moderately Reliable 4. Reliable 5. Very Reliable	1.Very Poor 2.Poor 3.Good 4.Very Good
1	Drinking	5	<300m	20litres	5	4
2	Domestic use (Cleaning, washing etc)	5	<300m	180litres	5	4
3	Irrigation					

3. (a) Are there any benefits in your opinion that shall accrue to members of the local community as a result of implementation of the proposed project ? Yes [✓] No [ ]

(b) If your answer to the above question is yes, which are these benefits?

- I will have access to water
- We will be able to irrigate our farms.

4.(a) Do you think that implementation of the Project may lead to any of the impacts listed in the table below:

No.	Environmental, Social, Health and Safety impacts	Triggered by the Project	
		Yes	No
1	Injuries to local residents including children		✓
2	Dust pollution due to transportation of materials		✓
3	Land degradation due to excavation works		✓
4	Destruction of environmentally significant plants	✓	
5	Noise pollution from construction machinery		✓
6	Soil pollution from site activities and oil spills		✓
7	Pollution of surface water due to construction activities	✓	
8	Creation of breeding ground for mosquitoes and from open pits created as a result of quarrying and material borrowing		✓
9	Accidents from moving vehicles		✓
10	Resettlement Impacts including displacement of local businesses		✓
11	Other Impacts (Specify)		

(b) In your opinion, do you think Lake Victoria South Water Works Development Agency and its agents have the capacity to address the negative impacts identified above? Yes [✓] No [ ]

(c) If your answer to question 4b above is No, how in your opinion would you like the above negative impacts to be addressed?

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6. (a) Do you have any additional comments to make about implementation of the proposed project?
Yes [✓] No [ ]

(b) If your answer to the above question is yes, what additional comments do you have?

I support the project because water is a necessity.

.....

.....

7. Thank you for responding to these questions. Kindly share with us the following information as proof that you have been consulted during this audit

Name DORCAS DUNUKA OTURA ID No 34814845

Area SIDIKA Tel Contacts 0707344857

Signature [signature] Date 06/08/21

Annex 2: Minutes of Public Meetings

PROCEEDINGS OF PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR REHABILITATION AND EXTENSION OF WATER SUPPLY NETWORK IN KISUMU CITY AND SATELLITE TOWNS

Time: 11.30 am.
Venue: Lickwick Restaurant Hall, Maseno
Date: 20th August 2021

Attendance (List Attached)

Agenda

1. To inform the local people, leaders and other stakeholders about the proposed project and its objectives;
2. To seek views, concerns and opinions of members of the local community concerning implementation of the proposed water supply project;
3. To establish if the local people foresee any positive or negative environmental impacts from the project and if so, how they wish the perceived negative impacts to be addressed; and
4. AOB

Min 001/20-08-2021: Introduction
This meeting was part of public consultation exercise and was meant to inform the local community about rehabilitation and extension of water supply network within Kisumu city and satellite towns. The meeting also presented members of the local community and the potentially affected persons (PAPs) with the opportunity to freely express their views concerning the proposed project. The meeting was open to members of the public and the mobilization of community members was done by the Assistant Chief of the area.

Min 002/20-08-2021: Opening Remarks
The meeting began at 11.30am with a word of prayer from one of the community members. Mr. Michael Ndaria who had helped in community mobilisation told those in attendance that the mission of the EIA team was to inform the community of the intended rehabilitation and extension of water supply network within Kisumu city and Satellite towns and seek their views about the same. The community leader further told the gathering that the process of consultation has been ongoing and several consultative meetings had been held with other key stakeholders in different fora and advised members of the public to be attentive and actively participate in the deliberations. He further told those in attendance that other members of the Consultant team have also been gathering various data within the project area and asked community members to cooperate with them in order to achieve the objectives of the project. Mr. Ndaria further told the meeting that everyone was free to air their views concerning the proposed project as this was a good opportunity to have their fears and expectations about the proposed project addressed. The community leader then invited Mr. Amimo Odongo, the Lead Environmental Impact Assessment (EIA) Expert, to take the meeting through the agenda of the day.

Min 003/20-08-2021: Deliberations by the EIA expert

Mr. Amimo started off by thanking those who had attended the meeting, telling them that this was an opportunity for them to understand what the project is about in order for them to make informed decisions as to the benefits or costs that may result from implementation of the project. This, he said was significant if the community was to feel part of the decision making process with regard to implementation of the proposed project. He made the participants aware that the EIA process for the proposed project had started much earlier and various stakeholders have been consulted at different levels and the day's meeting was for members of the local community to have their input in the project planning process. Mr. Amimo told those in attendance that the EIA team had been in the area earlier and had been collecting data within the project area through administration of questionnaires, observation and interviews. He further told participants that the EIA process is a planning tool and is in keeping with local and international regulations with the main objective being to anticipate impacts in advance of decision making. This, he said makes the local community aware of upcoming developments, a state of affairs that increases project acceptability and ownership by the local community. Mr. Amimo told participants that the only way their views and concerns about the proposed project could be addressed is if they participated openly by asking the critical questions in order to help in the planning process. These views would enable Lake Victoria South Water Works Development Agency (LVSWWDA) make informed decisions in the process of implementing the proposed project.

Min 004/20-08-2021: The proposed project

Mr. Amimo told participants that the proposed project is a water supply project whose objective is to supply water to residents of Kisumu city and Satellite towns. He told participants that the project will involve rehabilitation, reinforcement and extension of water supply infrastructure in Kisumu city to reduce Non-Revenue Water (NRW); improvement of water supply within Northern and Eastern Kisumu through laying of secondary distribution network from Mamboleo, Kibuye, Obwolo and Kanyamedha tanks; and rehabilitation and extension of water supply to adjacent localities including Kiboswa, Daraja Mbili and Maseno (transmission mains, pumping stations, storage tanks, and distribution network). He further told participants that activities associated with the proposed project and which may lead to adverse environmental and social impacts to members of the public include site clearance; topsoil removal; demolition works; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works; compaction; and surface restorations and reinstatement

Min 005/20-08-2021: Environmental and Social Impacts

With regard to environmental and Social Impacts, participants were told that implementation of the project will result in both positive and adverse impacts to physical and human environments. Among the impacts associated with the proposed project include disruption of socio-economic activities within the project area; disruption of services within the project alignment area; impact on fences and perimeter walls; and impacts on public infrastructures. Other impacts include possible blockage of drainage channels; accidents and Injuries to workers and residents; solid waste generation; atmospheric Pollution; and noise Impact. Mr. Amimo

finished off his presentation by inviting Mr. George Agengo from LVSWWDA to make comments about the proposed project.

Min 006/20-08-2021: Deliberations by George Agengo- LVWWDA Representative

Lake Victoria Water Works Development Agency (LVSWWDA) is the project proponent. They have an office in Kisumu and report to the head office in Nairobi. LVSWWDA is doing projects in eight counties and the proposed project falls under Kisumu LVWATSAN. The Agency is also expanding into satellite towns. Maseno is lucky because it has been considered ahead of other towns. Mr. Agengo indicated that the consultants for the project are already on the ground and are dealing with feasibility study and design of the project. He indicated that there are various methods to be used to get water to Maseno. These include boreholes and getting water from the neighbouring river. He told participants that ESIA study was part of the feasibility study and was carried out to find out environmental and social impacts that may arise due to implementation of the proposed project with a view to suggesting mitigation measures for the adverse impacts. The ESIA process requires community engagement and that is the reason why the meeting was organised. This is also in line with the requirements of the Kenyan constitution. Maseno has a lot of water problems and currently boreholes and shallow wells are in use within the town. The proponent intends to come up with a number of interventions for water scarcity within the town including boreholes and shallow wells although the long term plan is to get water from neighbouring rivers. The proposed project will be implemented along the road reserve although a number of impacts may arise in the process of project implementation. These include impacts on private properties located within project alignment areas.

Min 007/20-08-2021: Deliberations by the community members

After presentation by the Lead EIA Expert, participants were invited to air their views concerning the agenda of the day and they responded as follows:

No	Name	Comments	Answer to the questions
1	Michael Ndaria- Village Elder	Thanked the project proponent for the water project. He however wanted to know whether the water will be available to the community free of charge. He also wanted to know whether the project proponent was part of the County Council. Mr. Ndaria also wanted to know whether the local people will be considered for employment opportunities and whether those whose properties could be affected will be compensated. He indicated that the meeting will be held in an open area next time to avoid conflicts among members of the local community	The water will not be available free but consumers will pay some amount to KIWASCO based on the tariffs in use. Unskilled labour will be recruited from within the local community and those whose properties may be affected during project implementation will be compensated accordingly.
2	Henry Kondere- Business man	Mr. Kondere indicated that he has a container next to the project path and wanted to know whether they will excavate very close to it. He also said that	The water line will run along road reserves and anything out of that area will not be affected. If the container

		there is a local provider within the area who has done pipes to people's premises and wanted to know what happens to his investments. This fear could be one of the reasons why many people failed to attend the meeting.	may be affected then it will be removed out of the project alignment area and then returned. Operation of local water businesses will not be affected by the proposed project.
3	Fredrick Oduor-Business man-Maseno	Mr. Oduor is in support of the project but would like businessmen to be informed in advance of construction plan so as not to make losses. He would also like the damages caused to be rectified by the proponent.	An advance team will go ahead of project construction to inform those located along project alignment area of the construction plans. Anybody whose property will be damaged will be compensated accordingly
4	Dan Ochieng	Mr. Ochieng is supportive of the project. He however would like the proponent to put up water kiosks to benefit those who may not be in a position to make house connections	The present project will involve construction of the main line. Last mile connection will be done by KIWASCO. Installation of water kiosks will be considered

Min 008/20-08-2021: Meeting Resolutions

The EIA consultants told the community that they had taken note of issues raised and that the project will be implemented in a way that does not negatively affect members of the local community and the environment. The following was agreed on:

(i) That project implementation will be on the basis of applicable rules and regulations and no individual property will be affected
(ii) That there will be continuous consultations with the local community during project implementation period.
(iii) That the local people have no objection to implementation of the proposed project and approved its construction

There being no other business, the meeting ended at 13.30 pm with a word of prayer from one of the participants.

Minutes Prepare by:

Name	Amimo Samuel Odongo ……..	Position	Lead EIA Expert
Signature	……..	Date	20/08/2021

Minutes Confirmed by:

Name	Michael Ndaria ……	Position	Village Elder ……..…..
Signature	……	Date	22/08/2021 …….

PROCEEDINGS OF PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR REHABILITATION AND EXTENSION OF WATER SUPPLY NETWORK IN KISUMU CITY AND SATELLITE TOWNS

Time: 14.30 pm.
Venue: Kwa Abok Open Field, Nyawita Centre
Date: 20th August 2021

Attendance (List Attached)

Agenda

1. To inform the local people, leaders and other stakeholders about the proposed project and its objectives;
2. To seek views, concerns and opinions of members of the local community concerning implementation of the proposed water supply project;
3. To establish if the local people foresee any positive or negative environmental impacts from the project and if so, how they wish the perceived negative impacts to be addressed; and
4. AOB

Min 001/20-08-2021: Introduction
This meeting was part of public consultation exercise and was meant to inform the local community about rehabilitation and extension of water supply network within Kisumu city and satellite towns. The meeting also presented members of the local community and the potentially affected persons (PAPs) with the opportunity to freely express their views concerning the proposed project. The meeting was open to members of the public and the mobilization of community members was done by the Assistant Chief of the area.

Min 002/20-08-2021: Deliberations by the EIA expert
Mr. Amimo started off by thanking those who had attended the meeting, telling them that this was an opportunity for them to understand what the project is about in order for them to make informed decisions as to the benefits or costs that may result from implementation of the project. This, he said was significant if the community was to feel part of the decision making process with regard to implementation of the proposed project. He made the participants aware that the EIA process for the proposed project had started much earlier and various stakeholders have been consulted at different levels and the day's meeting was for members of the local community to have their input in the project planning process. Mr. Amimo told those in attendance that the EIA team had been in the area earlier and had been collecting data within the project area through administration of questionnaires, observation and interviews. He further told participants that the EIA process is a planning tool and is in keeping with local and international regulations with the main objective being to anticipate impacts in advance of decision making. This, he said makes the local community aware of upcoming developments, a state of affairs that increases project acceptability and ownership by the local community. Mr. Amimo told participants that the only way their views and concerns about the proposed project could be addressed is if they participated openly by asking the critical questions in order

to help in the planning process. These views would enable Lake Victoria South Water Works Development Agency (LVSWWDA) make informed decisions in the process of implementing the proposed project.

Min 003/20-08-2021: The proposed project

Mr. Amimo told participants that the proposed project is a water supply project whose objective is to supply water to residents of Kisumu city and Satellite towns. He told participants that the project will involve rehabilitation, reinforcement and extension of water supply infrastructure in Kisumu city to reduce Non-Revenue Water (NRW); improvement of water supply within Northern and Eastern Kisumu through laying of secondary distribution network from Mamboleo, Kibuye, Obwolo and Kanyamedha tanks; and rehabilitation and extension of water supply to adjacent localities including Kiboswa, Daraja Mbili and Maseno (transmission mains, pumping stations, storage tanks, and distribution network). He further told participants that activities associated with the proposed project and which may lead to adverse environmental and social impacts to members of the public include site clearance; topsoil removal; demolition works; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works; compaction; and surface restorations and reinstatement

Min 004/20-08-2021: Environmental and Social Impacts

With regard to environmental and Social Impacts, participants were told that implementation of the project will result in both positive and adverse impacts to physical and human environments. Among the impacts associated with the proposed project include disruption of socio-economic activities within the project area; disruption of services within the project alignment area; impact on fences and perimeter walls; and impacts on public infrastructures. Other impacts include possible blockage of drainage channels; accidents and Injuries to workers and residents; solid waste generation; atmospheric Pollution; and noise Impact. Mr. Amimo finished off his presentation by inviting Mr. George Agengo from LVSWWDA to make comments about the proposed project.

Min 005/20-08-2021: Deliberations by George Agengo-LVWWDA Representative

Mr. Agengo told participants that Lake Victoria Water Works Development Agency (LVSWWDA) is the project proponent. He further told them that the Agency has an office in Kisumu and report to the head office in Nairobi. Mr. Agengo said that the proposed project is a national government project which aims to construct water infrastructure within service area. The service area is composed of eight counties and Kisumu County is one of them. He told participants that what the Authority is doing is expanding water services in Kisumu city and Satellite towns. He said that the consultant has been hired to do the feasibility of water services coming in Maseno and Environmental and Social Impact Assessment is part of the feasibility study. He made participants aware that the constitution requires involvement of the public in projects and that is why the meeting had been organised. With regard to project funding, he told those in attendance that the project is funded by French Development Agency (AFD) and the president recently signed a loan agreement for all the projects earmarked for funding by AFD. Mr. Agengo told participants that the best source of water for the area is Vihiga County although cross County water supply is not considered appropriate. He told those in attendance that there are two boreholes that will be done within Maseno to provide water to the

residents. The project will run along road reserve in attempt to avoid negative impacts on individual properties. He told those in attendance that the project is a big one and will cover Kisumu city and Maseno town. He assured those present that a project implementation team will be put in place to deal with project related issues including community complaints

Min 006/20-08-2021: Deliberations by the community members

After presentation by the Lead EIA Expert, participants were invited to air their views concerning the agenda of the day and they responded as follows:

No	Issues raised	Comments	Answers to the question asked
1	Jerime Otieno	Mr. Jerome wanted to know whether the water will be available throughout the day. He also expressed his shock at the realisation that it is KIWASCO that is going to run the services due to their past experience with the service provider.	He was told that water will be available throughout the day although there could be service disruptions for one reason or the other. If water is not adequately available, water rationing will be effected. He was told that the best water service provider is KIWASCO. KIWASCO is better than the community due to the fact that they have the capacity. Community projects depend on harambees and local leaders to fundraise while KIWASCO has the capacity. The law requires that each county should have one water service provider. KIWASCO can however go into bulk service agreement with local companies.
2	Richard Okulo	Mr. Okulo wanted to know the prospective areas for the boreholes. Will they be located in government or private land	The areas for locating the boreholes have not been identified. The identification process will be preceded with hydrogeological investigations which will identify areas conducive for locating the boreholes.
3	Judith Ochieng	Judith wanted to know the source of water and whether it will serve all households within the area. She also wanted to know whether the water will get into the houses and how much it will cost. Will it be the same line	With regard to the source of water, it was indicated that the short term intervention is boreholes and the long term intervention is getting water from River Yala. The present project will involve construction of the main line and does not include the component of household connections. KIWASCO will however carry out the last mile connections using their standards. The old lines will be rehabilitated but extensions will be

			made in areas which are not presently covered with water services

Min 007/20-08-2021: Meeting Resolutions

The EIA consultants told the community that they had taken note of issues raised and that the project will be implemented in a way that does not negatively affect members of the local community and the environment. The following was agreed on:

(i) That project implementation will be on the basis of applicable rules and regulations and no individual property will be affected
(ii) That there will be continuous consultations with the local community during project implementation period.
(iii) That the local people have no objection to implementation of the proposed project and approved its construction

There being no other business, the meeting ended at 16.30 pm with a word of prayer from one of the participants.

Minutes Prepare by:

Name	Amimo Samuel Odongo ……....	Position	Lead EIA Expert
Signature	……..	Date	20/08/2021

Minutes Confirmed by:

Name	Henry Abuom ……	Position	Community Mobiliser ……
Signature	……	Date	22/08/2021 ……

PROCEEDINGS OF PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR REHABILITATION AND EXTENSION OF WATER SUPPLY NETWORK IN KISUMU CITY AND SATELLITE TOWNS

Time: 11.30am.
Venue: Gita Community Hall
Date: 23rd, August 2021

Attendance (List Attached)

Agenda

1. To inform the local people, leaders and other stakeholders about the proposed project and its objectives;
2. To seek views, concerns and opinions of members of the local community concerning implementation of the proposed water supply project;
3. To establish if the local people foresee any positive or negative environmental impacts from the project and if so, how they wish the perceived negative impacts to be addressed; and
4. AOB

Min 001/23-08-2021: Introduction
This meeting was part of public consultation exercise and was meant to inform the local community about rehabilitation and extension of water supply network within Kisumu city and satellite towns. The meeting also presented members of the local community and the potentially affected persons (PAPs) with the opportunity to freely express their views concerning the proposed project. The meeting was open to members of the public and the mobilization of community members was done by the Assistant Chief of the area.

Min 002/23-08-2021: Opening Remarks
The meeting began at 11.30 am with a word of prayer from one of the community members. Mr. Jacob Panyako Abila who had helped in community mobilisation told those in attendance that the mission of the EIA team was to inform the community of the intended rehabilitation and extension of water supply network within Kisumu city and Satellite towns and seek their views about the same. The community mobiliser further told the gathering that the process of consultation has been ongoing and several consultative meetings had been held with other key stakeholders in different fora and advised members of the public to be attentive and actively participate in the deliberations. He further told those in attendance that other members of the Consultant team have also been gathering various data within the project area and asked community members to cooperate with them in order to achieve the objectives of the project. Mr. Abila further told the meeting that everyone was free to air their views concerning the proposed project as this was a good opportunity to have their fears and expectations about the proposed project addressed. The community mobiliser then invited Mr. Amimo Odongo, the Lead Environmental Impact Assessment (EIA) Expert, to take the meeting through the agenda of the day.

Min 003/23-08-2021: Deliberations by the EIA expert

Mr. Amimo started off by thanking those who had attended the meeting, telling them that this was an opportunity for them to understand what the project is about in order for them to make informed decisions as to the benefits or costs that may result from implementation of the project. This, he said was significant if the community was to feel part of the decision making process with regard to implementation of the proposed project. He made the participants aware that the EIA process for the proposed project had started much earlier and various stakeholders have been consulted at different levels and the day's meeting was for members of the local community to have their input in the project planning process. Mr. Amimo told those in attendance that the EIA team had been in the area earlier and had been collecting data within the project area through administration of questionnaires, observation and interviews. He further told participants that the EIA process is a planning tool and is in keeping with local and international regulations with the main objective being to anticipate impacts in advance of decision making. This, he said makes the local community aware of upcoming developments, a state of affairs that increases project acceptability and ownership by the local community. Mr. Amimo told participants that the only way their views and concerns about the proposed project could be addressed is if they participated openly by asking the critical questions in order to help in the planning process. These views would enable Lake Victoria South Water Works Development Agency (LVSWWDA) make informed decisions in the process of implementing the proposed project.

Min 004/23-08-2021: The proposed project

Mr. Amimo told participants that the proposed project is a water supply project whose objective is to supply water to residents of Kisumu city and Satellite towns. He told participants that the project will involve rehabilitation, reinforcement and extension of water supply infrastructure in Kisumu city to reduce Non-Revenue Water (NRW); improvement of water supply within Northern and Eastern Kisumu through laying of secondary distribution network from Mamboleo, Kibuye, Obwolo and Kanyamedha tanks; and rehabilitation and extension of water supply to adjacent localities including Kiboswa, Daraja Mbili and Maseno (transmission mains, pumping stations, storage tanks, and distribution network). He further told participants that activities associated with the proposed project and which may lead to adverse environmental and social impacts to members of the public include site clearance; topsoil removal; demolition works; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works; compaction; and surface restorations and reinstatement

Min 005/23-08-2021: Environmental and Social Impacts

With regard to environmental and Social Impacts, participants were told that implementation of the project will result in both positive and adverse impacts to physical and human environments. Among the impacts associated with the proposed project include disruption of socio-economic activities within the project area; disruption of services within the project alignment area; impact on fences and perimeter walls; and impacts on public infrastructures. Other impacts include possible blockage of drainage channels; accidents and Injuries to workers and residents; solid waste generation; atmospheric Pollution; and noise Impact. Mr. Amimo

finished off his presentation by inviting Mr. George Agengo from LVSWWDA to make comments about the proposed project.

Min 006/23-08-2021: Deliberations by the community members

After presentation by the Lead EIA Expert, participants were invited to air their views concerning the agenda of the day and they responded as follows:

No	Name	Questions asked/ Comments	Answer to the question asked
1	Jacob Panyako Abila	Wanted to know whether the water will supply up to Rae School	The present phase will not cover Rae area due to sparse population over there. The area may be considered during future expansion
2	Mamile Murubo	Mr. Murubo wanted to know whether there will be compensation for houses and land. He also wanted to know when the project will start.	The project will be implemented along the main road and within existing wayleaves where present pipelines are located. Buildings will therefore not be affected. Compensation for land will be done only in areas where there will be extension of services. Otherwise, rehabilitation will occur within existing wayleaves
3	Pastor Michael	When the work starts, will water be there or water will be lost for six months during the construction process. Will there be payments for properties affected by construction of the proposed project and will the costs be standard.	Rehabilitation of lines will be done parallel to existing lines and there will be no water disruption. All affected persons will be compensated on the basis of damages done to their properties
4	Calvince Odhiambo	There were no agreements during implementation of the existing project. The government just implemented the project. Will the construction process be machine or human labour based	It is the belief of the consultants that agreements were made during implementation of the project. Follow up with the client will be made to ascertain the truth with regard to compensation
5	Pastor Michael	The youth in this area do not have jobs, will the project engage the local youths during construction process or labour will be imported from elsewhere.	Unskilled labour will be sourced from within members of the local community. Local community members with skills in various trades will also be considered to the extent of their qualifications
6	Emily Odero	There is need for a meeting with those whose properties will be affected by the proposed project so that an agreement on the compensation process is reached.	Meetings will be held with directly affected persons during RAP studies
7	Victor Otieno	What happens if the project is	Project Affected Persons will be

		implemented in farms that are occupied with crops?	allowed to harvest their crops in situations where their farms are occupied with crops. Compensation at prevailing rates will be done in cases where the crops cannot be harvested
8	Maurice Mumbo	The pipes should be put where the public can access water. Stand pipes will be ideal for majority who may not be in a position to do individual house connections. The rate of payment should also be different so that the local people are not charged the same rates as those in town. He also wanted to know whether compensation will be made first before accessing the land. The proponent should be involved in Corporate Social Responsibility initiatives among the community members.	The scope of the project shall involve construction of main lines. Last mile connection shall be carried out by KIWASCO who will also consider provisions for stand pipes and water kiosks. Compensations will be done before commencement of project implementation
9	Collins Odhiambo	The proponent should work with the local people closely so as to win their support. We would appreciate if a person from Kajulu area is considered for position of Board Member in KIWASCO board	The proponent is always willing to work with members of the local community to ensure that project implementation run smoothly and this will continue even in this project. Appointment of KIWASCO board members is normally done on the basis of certain guidelines
10	Pastor	This water is for the benefit of the society and local people should be considered for employment opportunities during project implementation.	Unskilled labour will be sourced from within members of the local community. Local community members with skills in various trades will also be considered to the extent of their qualifications
11	Joseph Otede	KIWASCO should consider reviewing their connection fees because whatever they are charging at the moment is very prohibitive and beyond the reach of majority of local people.	Water tariffs are regulated by the Water Resources Regulatory Board and KIWASCO is obliged to comply with approved tariffs.
12	John Okun	The rates for water have been fluctuating over time. The rates should however be those that are affordable to the local people. Those in villages should not be charged the same rates as those in town.	The tariffs are set at levels that do not hurt the consumer as government is not in the business of selling water. The tariffs are in line with the cost of delivering water to the consumers
13	Victor Otieno	Mr. Otieno wanted to know whether somebody can build a	No developments are allowed within project alignment areas as

		permanent structure on top of the pipe. He also wanted to know whether one can ask for stand pipe alone. He indicated that the population of Kisumu has grown and there is need for maintenance office at the sub county level. He also wanted to know application procedure if one wanted to use water from the river to do any project	this will interfere with operation and maintenance activities. Individuals will be supplied with water depending on their diverse needs and application procedures can be obtained from KIWASCO offices

Min 007/23-08-2021: Meeting Resolutions

The EIA consultants told the community that they had taken note of issues raised and that the project will be implemented in a way that does not negatively affect members of the local community and the environment. The following was agreed on:

(i) That project implementation will be on the basis of applicable rules and regulations and no individual property will be affected
(ii) That there will be continuous consultations with the local community during project implementation period.
(iii) That the local people have no objection to implementation of the proposed project and approved its construction

There being no other business, the meeting ended at 13.00 pm with a word of prayer from one of the participants.

Minutes Prepare by:

Name	Amimo Samuel Odongo ……....	Position	Lead EIA Expert
Signature	……..	Date	23/08/2021

Minutes Confirmed by:

Name	Jacob Panyako Abila ……	Position	Village Elder ……..
Signature	……	Date	25/08/2021 ……...

PROCEEDINGS OF PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR REHABILITATION AND EXTENSION OF WATER SUPPLY NETWORK IN KISUMU CITY AND SATELLITE TOWNS

Time: 10.00 am.
Venue: PAG Church, Sidika
Date: 30th August 2021

Attendance (List Attached)

Agenda

1. To inform the local people, leaders and other stakeholders about the proposed project and its objectives;
2. To seek views, concerns and opinions of members of the local community concerning implementation of the proposed water supply project;
3. To establish if the local people foresee any positive or negative environmental impacts from the project and if so, how they wish the perceived negative impacts to be addressed; and
4. AOB

Min 001/30-08-2021: Introduction
This meeting was part of public consultation exercise and was meant to inform the local community about rehabilitation and extension of water supply network within Kisumu city and satellite towns. The meeting also presented members of the local community and the potentially affected persons (PAPs) with the opportunity to freely express their views concerning the proposed project. The meeting was open to members of the public and the mobilization of community members was done by the Assistant Chief of the area.

Min 002/30-08-2021: Opening Remarks
The meeting began at 10.00 am with a word of prayer from one of the community members. Mr. Samuel Ochuko who had helped in community mobilisation told those in attendance that the mission of the EIA team was to inform the community of the intended rehabilitation and extension of water supply network within Kisumu city and Satellite towns and seek their views about the same. The community leader further told the gathering that the process of consultation has been ongoing and several consultative meetings had been held with other key stakeholders in different fora and advised members of the public to be attentive and actively participate in the deliberations. He further told those in attendance that other members of the Consultant team have also been gathering various data within the project area and asked community members to cooperate with them in order to achieve the objectives of the project. Mr. Ochuko further told the meeting that everyone was free to air their views concerning the proposed project as this was a good opportunity to have their fears and expectations about the proposed project addressed. The community leader then invited Mr. Amimo Odongo, the Lead Environmental Impact Assessment (EIA) Expert, to take the meeting through the agenda of the day.

Min 003/30-08-2021: Deliberations by the EIA expert

Mr. Amimo started off by thanking those who had attended the meeting, telling them that this was an opportunity for them to understand what the project is about in order for them to make informed decisions as to the benefits or costs that may result from implementation of the project. This, he said was significant if the community was to feel part of the decision making process with regard to implementation of the proposed project. He made the participants aware that the EIA process for the proposed project had started much earlier and various stakeholders have been consulted at different levels and the day's meeting was for members of the local community to have their input in the project planning process. Mr. Amimo told those in attendance that the EIA team had been in the area earlier and had been collecting data within the project area through administration of questionnaires, observation and interviews. He further told participants that the EIA process is a planning tool and is in keeping with local and international regulations with the main objective being to anticipate impacts in advance of decision making. This, he said makes the local community aware of upcoming developments, a state of affairs that increases project acceptability and ownership by the local community. Mr. Amimo told participants that the only way their views and concerns about the proposed project could be addressed is if they participated openly by asking the critical questions in order to help in the planning process. These views would enable Lake Victoria South Water Works Development Agency (LVSWWDA) make informed decisions in the process of implementing the proposed project.

Min 004/30-08-2021: The proposed project

Mr. Amimo told participants that the proposed project is a water supply project whose objective is to supply water to residents of Kisumu city and Satellite towns. He told participants that the project will involve rehabilitation, reinforcement and extension of water supply infrastructure in Kisumu city to reduce Non-Revenue Water (NRW); improvement of water supply within Northern and Eastern Kisumu through laying of secondary distribution network from Mamboleo, Kibuye, Obwolo and Kanyamedha tanks; and rehabilitation and extension of water supply to adjacent localities including Kiboswa, Daraja Mbili and Maseno (transmission mains, pumping stations, storage tanks, and distribution network). He further told participants that activities associated with the proposed project and which may lead to adverse environmental and social impacts to members of the public include site clearance; topsoil removal; demolition works; excavation works; disposal of excavated materials; disposal of surplus demolition and excavated materials; backfilling works; compaction; and surface restorations and reinstatement

Min 005/30-08-2021: Environmental and Social Impacts

With regard to environmental and Social Impacts, participants were told that implementation of the project will result in both positive and adverse impacts to physical and human environments. Among the impacts associated with the proposed project include disruption of socio-economic activities within the project area; disruption of services within the project alignment area; impact on fences and perimeter walls; and impacts on public infrastructures. Other impacts include possible blockage of drainage channels; accidents and Injuries to workers and residents; solid waste generation; atmospheric Pollution; and noise Impact. Mr. Amimo

finished off his presentation by inviting Mr. George Agengo from LVSWWDA to make comments about the proposed project.

Min 006/30-08-2021: Deliberations by the community members

After presentation by the Lead EIA Expert, participants were invited to air their views concerning the agenda of the day and they responded as follows:

No	Name	Question/Concern Raised	Answer to the question
1	Pastor James Onyango	Pastor Onyango indicated that the quality of the pipe should be improved to avoid cases of leakages. He also felt that another elevated tank should be added to supplement the already existing tank at Buoye. Pastor Onyango requested that a representative from the community should be present during the collection and testing of the water sample and was willing to donate land for the tank so that the storage tank can be situated within the community.	The pastor was told that the proponent is willing to make any adjustment that would make the project serve people well. He was assured that everything related to the project will be done in compliance with applicable standards
2	Thomas Omedo	Mr. Omedo wanted to know whether the pipes will be laid in Koraro or the project team will work with the existing lines	He was told that the project will involve replacement and extension of lines in various areas
3	Samuel Ochuko	Mr. Ochuko wanted to know how soon the project will commence. He however affirmed his unwavering support for the project	The project will commence as soon as feasibility study is finalised, designs prepared and tender awarded to successful contractor. This may take about seven months from the date of the meeting
4	Harrison Odhiambo	Mr. Odhiambo wanted to know how the water will flow back to the community after being pumped to the storage tanks at Gee area	The water will be pumped to the highest point from where it will flow by gravity to consumers
5	Collins Otieno	He wanted to know how deep the trenches will be and whether the line will follow a specific route along the road or it will pass through some homes. He also wanted to know security measures that have been put in place to ensure that the pipes are not vandalized and whether there will be a system that alerts KIWASCO of any leakages. He indicated that water from Kamangombe swamp may not be safe and enough to serve the community since there	The trenches will not be very deep and the pipeline will run along the road to avoid destruction of private properties. The community should ensure that nobody vandalizes project infrastructure as this may interfere with availability of water to community members. Only water that

		is a Chinese contactor who drilled water to the water table and has left the trench open. The same contractor also used harmful chemicals. There is a pending case in the court concerning the activity.	meets standard quality will be provided to the community
6	Sarah Omwon	Mr. Omwon wanted to know whether laying of the pipes will begin at the source or at the point where the storage tank will be located and whether locals will be allowed to make connections into their homes.	The proposed project will involve laying of the main lines. House connections will be done later by KIWASCO
7	Joseph Otieno Ochuka	Mr. Ochuka wanted to know whether the project team was informed about the existence of Koraro spring at the border of Kisumu and Vihiga counties and whether the concerned departments from Vihiga County have been contacted and an agreement reached. He also wanted to know whether the community will have daily access to water after completion of the project.	Consultation with all stakeholders in this project has been going on and all individuals with specific stakes in the project have been consulted. It is intention of the proponent that water be available to consumers on a daily basis
8	Erick Odhiambo	Mr. Odhiambo indicated that one of the swamps (Kamangombe) is in Vihiga County and may bring a lot of wrangles between the two neighboring counties. He therefore suggest that the project team should use Koraro and replace Kamangombe spring with Kalai spring because Kalai is within Kisumu County and has a lot of water than Kamangombe spring.	All efforts will be put in place to ensure that the project is implemented in a way that does not lead to any wrangles among stakeholders. Adequate consultations and agreements will be made
9	Elly Ayieko	My Ayieko indicated that Koraro spring currently has already laid pipes for a water project that stalled and wanted to know whether the proposed project will make use of the already existing pipes or new pipes will be laid.	The proposed project will be implemented on the basis of plans that have been made by the client and consultants. It will not depend on other projects for any material
10	Roseline Otieno	Ms Otieno expressed her unhappiness because they were not consulted during the design phase before a decision was reached for water to be first pumped to Gee before flowing back to our community. She feels the project team should look for an elevated area within our community to locate the storage tank.	Project design is based on a number of factors and these inform where various project infrastructures are to be located. Altitude of an area plays a very significant role in projects where water is to flow by gravity
11	Margaret Otana	Ms Margaret wanted to know what will be used in digging the trenches. She also wanted to know whether there will be employment opportunities for the locals.	Trenches will be dug using hand tools and local labour will be used in this activity

Min 007/30-08-2021: Meeting Resolutions

The EIA consultants told the community that they had taken note of issues raised and that the project will be implemented in a way that does not negatively affect members of the local community and the environment. The following was agreed on:

(i) That project implementation will be on the basis of applicable rules and regulations and no individual property will be affected
(ii) That there will be continuous consultations with the local community during project implementation period.
(iii) That the local people have no objection to implementation of the proposed project and approved its construction

There being no other business, the meeting ended at 12.30 pm with a word of prayer from one of the participants.

Minutes Prepare by:

Name	Amimo Samuel Odongo ……....	Position	Lead EIA Expert
Signature	……..	Date	03/09/2021

Minutes Confirmed by:

Name	Samuel Ochuko ……	Position	Community Mobiliser ……..…..
Signature	……	Date	05/09/2021 …….

Annex 3: List of Public Meeting Attendees

List of Leaders Consulted During ESIA Study

No	Name	Position	Telephone Contacts
1	Hon. Judith Ogaga	Member of County Assembly, Kisumu	0700930667
2	Moses Barasa	Lands Officer, NLC	0712464450
3	Tom Togo	County Director of Environment, NEMA	0722154665
4	Gerald Gawo	Opinion Leader	0115860560
5	Wycliffe Otwal	Opinion Leader	0725233112
6	Simeon Orwa	Chief, Central Kisumu	0722976558
7	Philip Olang	Kisumu County	0721268912
8	Kennedy Owuondo	Ass Chief, Korando B	0728334967
9	Michael O. Nyaguh	Chairperson, Magnum Environment Network	0721728653
10	Johnson Adipo	Opinion Leader	0711986022
11	Grace L. Saino	ACC	0722410486
12	Daisy Okal	Ward Admin, Central Ward	0723116342
13	Zack Okoyo	Deputy Com., Kisumu West	0720178577
14	Fanuel Onyango	WRA, Kisumu	0720128503
15	M.N. Wanyonyi	DCC, Kisumu West	0724122941
16	Maurice Oricho	SCA	0718031572
17	Vincent Mosiria	ACC1	0700194585
18	Johnson Odipo	Opinion Leader	0711986022
19	Eng. Paul Agwanda	Project Manager, LVSWWDA	0720371592
20	Eng. Felix Okuta	Project Engineer, LVSWWDA	0711632328
21	Bernard Odawo	Village Administrator, Korando	07211871821
22	George Ageng'o	Environmentalist, LVSWWDA	0722589782
23	Salmon Orimba	CECM, WENRCC, Kisumu County Government	0722904229
24	Madam Agnes	Assistant Chief Manyatta A	0728005222
25	Mr. James Odondo	Assistant Chief Manyatta B	0726351613
26	Mr. John O. Migun	Assistant Chief Northern Sub Location	0702329344
27	Mr. Paul Ramoli	Village elder Ondiek Estate	0706073999
28	Mr. Charles Boro	Village Administrator Kaloleni Ward	0720737242
29	Mr. Felix	Kaloleni Ward Administrator	0727690609
30	Mr. Abdulrahaman Salim	Village elder Kaloleni and Shauri Moyo	
31	Mr. Samson Owino Ayieta	Village elder Metameta Unit Manyatta A	0712672097
32	Madam Florence Nziza	Village Elder Lower Migosi	0713687362
33	Mr. Gaston Oketch	Village Elder Central Migosi	0722599713
34	Madam Joan Osir	Village Elder Upper Migosi	0726495134
35	Mr. Kabisai	Chief Kolwa West	0720640637
36	Mr. David Ouko	Assistant Chief Nyalenda A	0721127658
37	Mr. Joshua O. Obiero	Village Administrator- Nyalenda A	0724329954
38	Madam. Lena Jobita	Assistant Chief Nyalenda B	0718687490
39	Mr. Joseph Ndati Ondoro	Village Elder Nyalenda B	0702761666
40	Madam Hulda	Village Elder Nyalenda B	0707820275
41	Mr. Tobias Omollo	Chief -Kajulu West Location	0701286503

42	Mr. Julius Alila	Assistant Chief, Konya Sub Location	0727871083
43	Mr. Elisha Menya	Assistant Chief Kodero Sub Location (Gita)	0710410570
44	Mr. Philip Ombuor	Village Elder (Simu Village)	0726935961
45	Mr. Onyango Tom	Assistant Chief Wathorego Sub Location	0734311533
46	Mr. Martin Oindo	Assistant Chief West Karateng (Maseno)	0722448877
47	Mr. Kennedy Ochieng	Assistant Chief East Karateng (Nyawita)	0721927580
48	Madam Rhoda Nyambega	Nyawita Village Elder	0702396120
49	Mr. Chrispo Odhiambo	Assistant Chief Bar A (Sidika Area)	0736664131
50	Mr. Peter Anyang Omoth	Chief Kisumu North	0724704512
51	Mr. Churchill Oremo	Assistant Chief Nyahera	0725271899

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR REHABILITATION AND EXTENSION OF WATER SUPPLY SYSTEM IN KISUMU AND SATELLITE TOWNS

VENUE KWA ABOK OPEN FIELD NYAWITA CENTER DATE 20/08/2021

NO.	NAME OF PARTICIPANT	AREA/ESTATE	ID NO	TELEPHONE CONTACTS	DATE
1	CYNTHIA ISHITSUKANE	BRL/ISED	30888115	0729716197	20/8/2021
2	CHRISTINE PONDE	BRL/ISED	31296271	0727300852	20/8/2021
3	JOHN OMINO	NYAWITA	11095580	0722167018	20/8/2021
4	HENRY O. ABUOM	NYAWITA	25088066	0710992564	20/8/2021
5	ALICE DIMONDI	NYAWITA	21903126	0700895974	20/8/2021
6	Benjamin Rehuoch	Nyawita	20420730	0725364152	20/8/202
7	Jerom Otero	Nyawitta	30622393	0115965829	20/8/2021
8	Moline Asyingo	Nyawita	25881368	0710708994	20/8/2021
9	Mary Agolla	NYAWITA	2664353	0720030526	20/8/21
10	Rose Omino	NYAWITA	26405501	0718939 79	20/8/21
11	JUDITH OCHIENG	NYAWITA	16075364	0743151165	20/8/021
12	Caroline Nyamai	Nyawita	8620240	0721590730	20/8/21
13	WINNIE AUENO	NYAWITA	30814893	0707215208	20/8/2021

14	EUNICE ADHIAMBO	NYAWITA	21896059	0794763798	20/8/21
15	Lewnida Adongo	nyawita.	13603785	0742176682	20/8/21
16	Elizabeth SOY	Nyawita	0715060316	24195418	20/8/21
17	ELIZABETH ATIENO	Nyawita	0717945777	14588215	20/8/21
18	Richard Okudo	Nyanta	2685106	0722-225351	20/8/21
19	John Abok	Nyawitah	28327199	0741978009	20/8/21
20	Odhiambo Victor	LVSWWDA.	LVS 0053	072842 9313	20/8/21
21	EUGENE AKELLO -N	NYAWITA	34211703	0721340174	20/08/21
22	MASON AKELLO	NYAWITA			
23	Agneta Amor	Nyawita	27AG 5656	0700452530	20/08/21
24	Grace A Ahomba	Nyawita	20089192	0729410803	20/08/21
25	Rebecca Odhiambo	LVSWWDA	31132831	0711396237	20/08/21
26	NORAH OPITO	GULF WATER	24985137	0723334064	20/08/21
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TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR REHABILITATION AND EXTENSION OF WATER SUPPLY SYSTEM IN KISUMU AND SATELLITE TOWNS

VENUE GITA COMMUNITY HALL DATE 23RD AUGUST 2021

NO.	NAME OF PARTICIPANT	AREA/ESTATE	ID NO	TELEPHONE CONTACTS	SIGNATURE
1	CYNTHIA SHITSUKANE	BRL/ISEP	30888115	0729716197	
2	OMONDI JULIUS	BRL/ISEP	29268267	0711499041	
3	CHRISTINE PONDE	BRL/ISEP	31290271	0727300852	
4	CALVIN ODHIAMBO	GITA	25680553	0728790317	
5	WILSON OUMA OLUOCH	GITA	36148667	0740203292	
6	RONNY OMONDI	GITA	28019422	0704832628	
7	VICTOR OLUOCH OTIENO	GITA	22997660	0713174902	
8	JOSEPH OTENE MIDIGO	GITA	12705584	0728977974	
9	MIRIA A. ADUDA	GITA	12055556	0713925	
10	ABRAHAM O. TIENO	GITA	28202132	0701139255	
11	ELLIUD AMOLO	GITA	38471034	0100668849	
12	DANIEL OMONDI MIKWANA	GITA	22156584	0728388471	
13	EUGELINE OMONDI	Gita	22872197	0722265841	

14	JACOB PAMYAKO ABIZA	Gita	21 858052	0727226876	
15	Joseph. Ouino. Ouma	Kamolo. VILEG	2540214	0703155221	
16	JANE AKOTH JUMA	KAMOLO A	8780225	0704318664	JA
17	MAURICE MUMBO	OSINDE	8191585	0728290126	
18	Donald Matengo	Gita	33238890	~~0742~~ 0718779464	
19	ELLIS ONYITY	GITA	25536429	0724915017	
20	Vincent Adhiong	LVSWWDA	32573648	0723607764	
21	Samuel Sunga Mnuka	Kamolo A	21459655	0795473160	
22	Rebecca Odhiambo	LVSWWDA	31132831	0711396237	
23	Odungi Victor	LVSWWDA	LVS-0083	0728429313	
24	OKUN J.WO	Gita	3490109 ~~0728852761~~	0728852761	
25	Pr. Michael Osoó	Gita	7018780	0724 674276	
26	Miriam Atieno	Gita	14668975 ~~0712147956~~	0712147956	
27	RUTH ODONGO	Gita			
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TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDE
LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

PUBLIC MEETING FOR ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY FOR REHABILITATION AND EXTENSION OF WATER SUPPLY SYSTEM IN KISUMU AND SATELLITE TOWNS

VENUE ...LICKWICK RESTAURANT HALL... DATE ...20/08/2021...

NO.	NAME OF PARTICIPANT	AREA/ESTATE	ID NO	TELEPHONE CONTACTS	DATE
1	CHRISTINE PONDE	ISEP LTD/BRL	31296271	0727300852	20/08/2021
2	CYNTHIA ISHITSUKANE	ISEP LTD/BRL	30888115	0729716197	20/8/2021
3	MARVIN AGAMA	BRL/ISEP	28501885	0727782219	20/8/2021
4	MICHAEL NDARUA	V-LEADER MSN	6611762	0743928286	20/8/202
5	HENRY ONDIERE	MASENO TOWN BUSINESSMAN MSN	26194440.	0791341605	20/08/2021
6	Fredrick Odwor	Maseno town Business man	25552055	0729332741	20/08/2021
7	Dan Odallo	MASENO TOWN BUSINESSMAN	3507 9806	0798742369	20/08/021
8	Josphat Kimani	Maseno Businessperson	37548058	0713260726	20/08/021
9	V. Ochungi	LVSWWDA.	LVS/0053	~~0728498~~	"
10	Vincent Adhiang	LVSWWDA	32573698	0723607764	"
11	Rebecca Odhiambo	LVSWWDA	31132831	0711396237	"
12	Daniel Samoita	Business. man	33457354	0792414601	"
13	George Agungo	LVSWWDA	12709085	0725357872	"

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15	Ammo odmg	15EP/BRL	1798526	0724402871	26/8/2021
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Annex 4: List of Persons consulted during ESIA study

MASENO

TECHNICAL STUDIES, DESIGN AND SUPERVISICN OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	REFKA ACHIENG	MASENO	0797452235	RA	09/08/21
2	Brian Eliakim	Maseno	0741136315	[illegible]	09/08/21
3	ROSELINE ACHIENG	MASENO	0712653982	[illegible]	09/08/21
4	PETER NGUYI	MASENO	0743364003		09/08/21
5	Jim Wao	Maseno	0729440772	[illegible]	09/08/21
6	James Mainer	Maseno	0713330118	[illegible]	09/08/21
7	NICHOLAS MAUNDU	MASENO	0700385564	[illegible]	09/08/21
8	LUCY AMUKO	MASENO	0712649708	[illegible]	09/08/21
9	Victoria Nyambok	Maseno	0741220773	[illegible]	09/08/21
10	Sylviah Bayani	Maseno	0710532447	[illegible]	09/08/2021.
11	TABITHA ONGONDO	MASENO	0713359171	[illegible]	09/08/21
12	ODUOR SALIM MBEKI	MASENO	0702292140	[illegible]	09/08/21
13	JAMES KUSUI	MASENO	0704017773	[illegible]	9/8/021

14	Rose Adhiambo	Maseno	0701490399		09/08/21
15	Alex Muma	Maseno	0792193852		09/08/21
16	DAN ODALLOH	MASENO	0794722369		09/08/21
17	Christine Aclera	Maseno	0705513010		09/08/21
18	Okal Omgl Steve	Maseno	0707189016		09/08/21
19	Geoffrey Muga	Maseno	0720231693		09/08/21
20	JASHMINE DETA	MASENO	0721569753		10/08/21
21	Carolyne Achieng	Maseno	0704866349		10/08/21
22	MILLICENT OCHIENG	MASENO	0717917373		10/08/21
23	Daniel Samoita	Maseno	0792414601		10/08/2021
24	BEATRICE	MASENO	0768613045		10/8/2021
25	JOSPHAT KIMANI	MASENO	0713260726		10/08/21
26	GULALI DONALD	MASENO	0724353552		10/08/21
27	Elly Osimbo	MABUNGO-MASENO	0725700221		11/08/21
28	RAGOT D. SETH.	EMABUNGO	0791374277		11/08/21.
29	Grace Aketch Alomba	NYAWITA	0729410803		11/08/21

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	JOYCE MUNGUTI	MASENO - NYAWITA	0720049729		11/08/2021
2	VITERA ANDITI	MASENO - NYAWITA	0740076316		11/08/2021
3	Jackline Oluoch	MASENO - NYAWITA	0748237942		11/08/2021
4	VALARY AWUOR	MASENO - NYAWITA	0700452530		11/08/2021
5	Elizabeth Soy	Maseno - Nyawita	0715060316		11/08/2021
6	Moguku Rodgers	Maseno - Nyawita	0724890071		11/08/2021
7	Omware Joash Odhiambo	Maseno - Nyawita	0740464623		11/08/2021
8	IRENE AKOTH OHINDO	MASENO - NYAWITA	0757461279		11/08/2021
9	Christine Auma	Maseno Nyawita	0714640501		11/08/2021
10	Elizabeth Okuk	Maseno Nyawita	0720434789		11/8/21
11	Levy Wairimu Addere	Maseno Nyawita	0790 506388		11/8/2021
12	Lewnida Adongo Auko	Nyawita - Maseno	0742176682		11/8/2021
13	Mr. P. NYANACH	MASENO SCHOOL	0720737551	P.N	11/8/2021

(MIGOSI (KIBOS ROAD) (

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	Diana Anyango	Migosi	0796745174	[illegible]	3/08/2021
2	Dan Mangunda	Migosi	0718677826	[illegible]	3/8/2021
3	Tom Otieno	Migosi	0718037849	T.O	3/08/2021
4	Joram Otieno	Migosi	0713386994	J.O	3/08/2021
5	Corazone Juma	Carwash	0769560815	[illegible]	03/08/2021
6	Mary Oketch	Carwash	0701734190	[illegible]	03/08/2021
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MAMBOLEO

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	Franci Omyango	Estate Mamboleo	0792-300-156		30-7/21
2	Josphine Akinyi	Mamboleo	0722838722		30/7/21
3	LEVIS OKOTH O.	MAMBOLEO	0798198865		30/07/21
4	FREDRICK JUMA	MAMBOLEO	0793595191		30/7/21
5	EVELINE ATIENO	MAMBOLEO	0714299726		30/7/21
6	KENEDY OPIYO	MAMBOLEO	0727265731		30/7/21
7	FREDRICK OUMA	MAMBOLEO	0712852313		30/7/21
8	WILLIAM OPEPO	MAMBOLEO	0726561133	W.O	30/7/21
9	KENNEDY OGENDO	MAMBOLEO	0725379259		30/7/21
10	MONICA KIPERA	MAMBOLEO - POMPOMILL	0723536534		30/7/21
11	LINDA AKOTH	MAMBOLEO - POMPOMILL	0710254392		30/07/21
12	JOY AISHA	MAMBOLEO - POSHO	0711942174		30/7/21
13	CHRISTINE NANUNZI MALIMO	MAMBOLEO - POMPOMILL	0720253615	christin	30/7/21

14	BENTER OMOLLO	MAMBOLEO	0722356196		02/08/21.
15	KEVINE ODHIAMBO	MAMBOLEO	0704513952		02/08/21
16	Thomas Orege	Mambdeo	0721953650		02/08/21
17	ESTHER AWINO MIJOA	MAMBOLEO	0723434013		30/07/2021
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KASULE

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	Caleb Odhiambo	Kasule	0740067598		03/08/21
2	SYLVIA AMBOKO	Kasule	0799924064		3/8/21
3	Ruben Sande	Kasule	0799564336		3/8/21
4	FANUEL WENDO	KASULE.	0769209060		3/8/21
5	Carolyne Atieno	Kasule	0745551543		3/8/21
6	LYDIA ATIENO	KASULE	0718383867		3/8/21
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NYAMAVARIA

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	Rose Akinyi Owiti	Kuoyo Manyatta B	0725722525		4/8/2021
2	Samwel Odhiambo Thigo	Coptic Manyatta B	0702562797		4/8/2021
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TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position, Area/Estate	Telephone Contacts	Signature	Date
1	Joseph Wabwire	Migosi-Ahwa	0725773028	[illegible]	5/8/2021
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TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	CALEB ONYANGO OUINO	SIDIKA	0727664466		06/08/2021
2	PETER OMIRO ALUVALA	SIDIKA	0758099892		06/08/2021
3	Clarice Oleche	Sidika	0793026263		06/08/2021
4	ARNOLDA WANDERA	Sidika	0720648395		06/08/2021
5	COLLINS OTIENO	SIDIKA	0705238339		06/08/2021
6	JOSEPH OTURA OCHUKA	SIDIKA	0720338119		06/08/2021
7	Dorcas Ochuka Otura	Sidika	0707344857		06/08/2021
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NYALENDA

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	FLORENCE ANYANGO	NYALENDA A'	0724947696		21/7/2021
2	ERIC OLELPY	JI	0710666844		21/7/21
3	CAROLINE ATIENO	NYALENDA A	0729385294		21/7/2021
4	MILKA ATIENO	NYALENDA A	0742241703		21/07/2021
5	JACQUELINE A. OMOLO	NYALENDA A.	0721849366		21/07/2021
6	GEORGE NGANGA	NYALENDA A	0728152567		21/07/21
7	GEORGE OKETCH	NYALENDA A	0705525559		21/07/21
8	CHRISTINE KANINI	NYALENDA B.	0717455531		21/07/2021
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UKWELI

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	CAROLINE WANJALA	UKWELI JUNCTION	0712308412		22/07/2021
2	JOSEPHAT OTIENO BANGO	UKWELI JUNCTION	0702420688		22/07/2021
3	NORBERT JUMA	UKWELI JUNCTION	0741876310		22/7/2021
4	Vincent Otieno	Konya	0701848548		22/07/2021
5	DEBRA ADIRA	UKWELI JUNCTION	0724620187		22/07/2021
6	MERESIA ORUMBA JAMES	UKWELI	0727946961		22/7/2021
7	FAITH NYANGASI	UKWELI	0712251856		22/7/2021
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ARINA

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Teiephone Contacts	Signature	Date
1	WILKISTER OWENGA	KONDELE	0729767683		19/07/2021
2	MARY AWUOR ODHIAMBO	KONDELE	0722458313		19/7/2021
3	JOYCE F ODERA	ARINA	0716829226		19/7/2021
4	FREDRICK OBADO	ARINA	0719301565		19/7/2021
5	STEPHEN BIKO OTIENO OMONDI	KONDELE/ARINA	0799044029		19/7/2021
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MANYATTA B

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	PENINA KEMUNTO	MANYATTA B	0713844415		20/07/2021
2	JUDITH A CHIENG	MANYATTA B(KOMER	0708517446		20/7/2021
3	CAROLINE ATIENO OLHIENG	MANYATTA B	0794229749		20/7/2021
4	LILIAN ATIENO JAZAMBA	MANYATTA B	0797746159		20/7/2021
5	LUCY AKINYI	MANYATTA B	0768660642		20/7/2021
6	DOROTHY ATIENO ONYANGO	MANYATTA B(KOMER	0748515764		20/7/2021
7	HARZEL NANDI	MANYATTA B(KOMER)	0769648685		20/7/2021
8	BENTER ADHIAMBO OLDO	MANYATTA B	0719781017		20/7/2021
9	ANASTACIA AKONGO AMOLLO	MANYATTA B	0702986749		20/7/2021
10	FRANCIS ONYANGO	MANYATTA B	0702270247		20/7/2021
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GITA

TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	DOMINIC OKOTH	GITA	0711611903		23/7/2021
2	JENIFFER DEIE OLOO	GITA	0701242445	J.D.O	23/7/2021
3	ISAACK OMONDI OGULA	GITA	0111403671		23/7/2021
4	JUDITH ACHIENG	GITA	0725661278		23/7/2021
5	ANNE OKELLO	GITA	0714239448	A.O	23/7/2021
6	OTIENO KENAS	GITA	0704635023		23/07/2021
7	KINNIE ACHIENG OLUOCH	KAMOLLO	0111819522		23/07/2021
8	BEATRICE AWINO	KAMOLO	0751516558		23/7/2021
9	Gordon Matengo	Kamolo	0724741436		23/7/21
10	PHILIP OMBUOR GUMBA	SIMU VILLAGE (KADIBO)	0726935961		23/7/2021
11					
12					
13					

KONYA

14	JAMES NYAMENYA	KONYA	0716525997	[illegible]	23/7/2021
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TECHNICAL STUDIES, DESIGN AND SUPERVISION OF WORKS PACKAGES 1 AND 2 IN KISUMU CITY AND SATELLITE TOWNS UNDER LAKE VICTORIA WATER AND SANITATION (LVWATSAN) PROGRAM

STAKEHOLDER CONSULTATION FORM

No	Name	Position/ Area/Estate	Telephone Contacts	Signature	Date
1	John MWENDA	Aga Khan	0704325804	[illegible]	12/8/21
2	George Oduor	Kisumu Boys	0720142635	J.O	12/08/21
3	Kevin Duma Okello	Ksm Boys	0725493167	[illegible]	12/08/21
4	Mark Odhiambo	Kisumu Boys	0729974854	M.O	12/08/21
5	Muhamud Duayo	Otieno Otoo road	0721 169247	[illegible]	12/08/21
6	Stephen Okeyo Ochuodho	KSM Boys	0797696004	[illegible]	12/08/21
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Annex 5: Consolidated List of Persons consulted

LIST OF STAKEHOLDER CONSULTED

No	Name	Phone No.	ID Number	Area
1	Dominic Okoth	0711611903		Gita
2	Jennifer Dete Oloo	0701242445	2694317	Gita
3	Isaac Omondi Ogula	01114039671	33880468	Gita
4	Judith Achieng	0725661278		Gita
5	Anne Okello	0714239448		Gita
6	Otieno Kenas	0704635023	33437560	Gita
7	Winnie Achieng Oluoch	01111819522		Kamolo
8	Beatrice Awino	0751516558	27891990	Kamolo
9	Gordon Matengo	0724741436		Kamolo
10	Philip Ombuor	0726935961	9088063	Kadero
11	James Nyamenya	0716525997		Konya
12	Caroline Wanjala	0712308412		Ukweli Junction
13	Josephat Otieno Bango	0702420688		Ukweli Junction
14	Nobert Juma	0741876310		Ukweli Junction
15	Vincent Otieno	0701848548	39276490	Konya
16	Debra Adira	0724620187		Ukweli Junction
17	Meresia Orimba James	0727946961	16083403	Ukweli
18	Faith Nyangasi	0712251856		Ukweli
19	Florence Anyango	0724947696		Nyalenda A
20	Eric Olela	0710666844		Nyalenda A
21	Caroline Atieno	0729385294		Nyalenda A
22	Milka Atieno	0742241703		Nyalenda A
23	Jacqueline A. Omollo	0721849366		Nyalenda A
24	George Nganga	0728152567		Nyalenda A
25	George Oketch	0705525559		Nyalenda B
26	Christine Kanini	0717455531	31108416	Nyalenda B
27	Wilikister Owenga	0729767683	31690778	Kondele
28	Mary Awuor Odhiambo	0722458313		Kondele
29	Joyce F. Odera (Arina Primary)	0716812926/0728073347	4841264	Arina
30	Fredrick Obado/Joe Orindo	0719305565	26313503	Arina
31	Stephen Biko Otieno Omondi	0799044029	22917409	Arina
32	Penina Kemunto	0713844415	9892693	Manyatta B
33	Judith Achieng	0708517446	28179690	Manyatta B
34	Carolie Atieno Ochieng	0794229749	30114150	Manyatta B
35	Lilian Atieno Jaramba	0797746159	24179306	Manyatta B
36	Lucy Akinyi	0768660642	31245721	Manyatta B
37	Dorothy Atieno Onyango	0748515764		Manyatta B
38	Harzel Nandi	0769648685		Manyatta B
39	Benter Adhiambo Oloo	0719781017		Manyatta B
40	Anastacia Akogo Amollo	0702986749	21780712	Manyatta B
41	Francis Onyango (Juakali Bodaboda)	0702270247		Manyatta B
42	Francis Onyango	0792300156	33652290	Mamboleo
43	Josephine Akinyi	0722838722		Mamboleo
44	Fredrick Juma	0793595191		Mamboleo

45	Lewis Okoth Odhiambo	0798198865	38405226	Mamboleo
46	Eveline Atieno	0714299726		Mamboleo
47	Kennedy Opiyo	0727265731	23916125	Mamboleo
48	Fredrick Ouma	0712852313	25816494	Mamboleo
49	William Opepo	0726561133		Mamboleo
50	Kennedy Ogendo (Mamboleo Poshomill Bodaboda)	0725379259		Mamboleo
51	Monica Kirera	0723536534		Mamboleo
52	Linda Okoth	0710254392		Mamboleo
53	Joy Aisha	0711942174		Mamboleo
54	Christine Nasunzi Macho	0720253615		Mamboleo
55	Benter Omollo	0722356196		Mamboleo
56	Kevine Adhiambo	0704513952		Mamboleo
57	Thomas Orege	0721953650	10842430	Mamboleo
58	Esther Awino Misori	0723434013	31444901	Mamboleo
59	Caleb Odhiambo	0740067598		Kasule
60	Sylvia Amboko	0799926064		Kasule
61	Reuben Sande	0799564336		Kasule
62	Fanuel Wendo	0769209060		Kasule
63	Carolyne Akinyi	0745551543		Kasule
64	Lydia Atieno	0718383867		Kasule
65	Diana Anyango	0796745174		Migosi
66	Dan Mangondo	0718677826	466879	Migosi
67	Tom Otieno	0718037849		Migosi
68	Joram Otieno	0713386994		Migosi
69	Corazone Juma	0769560815	25344569	Carwash
70	Mary Oketch	0701734190		Carwash
71	Samwel Ochieng (Sega Mkokoteni Boda boda Shade)	0723479734		Migosi
72	Cosby Ochieng	0711417604		Migosi
73	Rose Akinyi Owiti	0725722525		Kuoyo- Manyatta B
74	Samule Odhiambo Thigo	0702562797		Coptic-Manyatta B
75	Juma Ramadhan	0714420594	31432337	Kaego
76	Jacob Juma	0720462705		Kaego
77	Joseph Wabwire	0725773028	8376622	Migosi
78	Caleb Onyango Owino	0727664466		Sidika
79	Peter Omiro Alwala	0758099892		Sidika
80	Clarice Oleche	0793026263		Sidika
81	Arnolda Wandera	0720648395		Sidika
82	Collins Otieno	0705238332	30290648	Sidika
83	Joseph Otura Ochuka	0720338119		Sidika
84	Dorcas Ochuka Otura	0707344857	34814845	Sidika
85	Rafka Achieng	0797452235		Maseno
86	Brian Eliakim	0741136315		Maseno
87	Roseline Achieng	0712653982		Maseno
88	Peter Nguyi	0743364003		Maseno
89	Jim Wao	0729440772		Maseno
90	James Maina	0713330118		Maseno

91	Nicholas Maundu	0700385564		Maseno
92	Lucy Amuko	0712649708		Maseno
93	Victoria Nyabok	0741220773		Maseno
94	Sylvia Boyani	0710532447		Maseno
95	Tabitha Ongondo	0713359171		Maseno
96	Aduor Salim Mbeki	0702282140		Maseno
97	James Kisoi	0704017773		Maseno
98	Rose Adhiambo	0701490399		Maseno
99	Alex Mumo	0792193852		Maseno
100	Dan Adalloh	0794722369		Maseno
101	Christine Adera	0705513010		Maseno
102	Okoth Omijah Steve	0704189016		Maseno
103	Geoffrey Otieno Muga	0720231693		Maseno
104	Jashmine Achieng Deya	0721569753	22671352	Maseno
105	Carolyne Achieng	0704866349		Maseno
106	Millicent Ochieng	0717917373		Maseno
107	Daniel Samoita	0792414601		Maseno
108	Beatrice Awino	0768618045		Maseno
109	Josephat Kimani	0713260726		Maseno
110	Mr. P Nyawach	0720737551	21484898	Maseno School
111	Gulali Donald	0724353552		Maseno
112	Elly Osimbo	0725700221		Maseno- Mabungo
113	Ragot Daniel Seth	0791374277		Maseno- Emabungo
114	Grace Aketch Alomba	0729410803		Maseno- Nyawita
115	Joyce Munguti	0720049729		Maseno- Nyawita
116	Sheba Anditi	0740076316		Maseno- Nyawita
117	Jackline Oluoch	0748237942		Maseno- Nyawita
118	Valary Awuor	0700452530		Maseno- Nyawita
119	Elizabeth Soy	0715060316		Maseno- Nyawita
120	Mogutu Rodgers	0724890071		Maseno- Nyawita
121	Omware Joash Odhiambo	0740464623		Maseno- Nyawita
122	Irine Akoth Ohindo	0757461279		Maseno- Nyawita
123	Christine Akinyi	0714640501		Maseno- Nyawita
124	Elizabeth Okun	0720434789		Maseno- Nyawita
125	Lucy Wairimu Adero	0794506388		Maseno- Nyawita
126	Lewnida Adongo Owiti	0742176682		Maseno- Nyawita
127	John Mwenda	0704325804	35491060	Aga Khan
128	George Oduor	0720142635		Kisumu Boys
129	Kevin Ouma Okello	0725493167		Kisumu Boys
130	Mark Odhiambo	0729974854		Kisumu Boys
131	Muhamud Dayo	0721149247		Otieno Oyoo Road
132	Stephen Okeyo Ochuodho	0797696004		Kisumu Boys

Ukweli
Nyalenda
Arina
Manyatta
Mamboleo

Kasule
Migosi (Kibos Road)
Nyamasaria
Manyatta-Kaego
Migosi
Nyahera
Maseno
CBD

Annex 6: NEMA License of ESIA Expert

FORM 7 (r.15(2))

nema

mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY(NEMA)

THE ENVIRONMENTAL MANAGEMENT AND CO-ORDINATION ACT

ENVIRONMENTAL IMPACT ASSESSMENT/AUDIT (EIA/EA) PRACTICING LICENSE

License No : NEMA/EIA/ERPL/14310

Application Reference No: NEMA/EIA/EL/18857

M/S **Samuel Odongo Amimo**
(individual or firm) of address

P.O Box 1674-00100, Nairobi

is licensed to practice in the

capacity of a (Lead Expert/Associate Expert/Firm of Experts) **Lead Expert**
registration number **0844**

in accordance with the provision of the Environmental Management and Coordination Act Cap 387.

Issued Date: **3/17/2021** Expiry Date: **12/31/2021**

Signature.....

(Seal)
for Director General
The National Environment Management Authority

P.T.O.

Annex 7: Curriculum Vitae of Key Personnel

CV NO. 1. WATER TREATMENT SPECIALIST

POSITION TITLE AND NO.	WATER TREATMENT SPECIALIST
NAME OF EXPERT	CALEB W. OPATI
DATE OF BIRTH	24th September 1967
COUNTRY OF CITIZENSHIP/ RESIDENCE	KENYAN
EDUCATION	• Bachelor of Engineering (Civil Engineering), 1990, University of Nairobi.

EMPLOYMENT RECORD RELEVANT TO THE ASSIGNMENT:

Period	Employing organization and your title/position. Contact information for references	Country	Summary of activities performed relevant to the Assignment
May – October 2015	Integrated Science and Engineering Projects Ltd Tel. + 254 020 5208520 Email: isep.ltd@gmail.com Korea International Cooperation Agency, Kenya Office Tel. 254 020 2391889 Position Held: Project Manager	Kenya	Detailed design and tender documentation and assistance to tender process for Water Supply Project in Chwele Area, Bungoma County
2011 - Till Date	ISEP Ltd/Lahmeyer GKW Consult GmbH (Formerly Poyry Environment GmbH). / Team Leader/Project Manager. Integrated Science and Engineering Projects Ltd Tel. + 254 020 5208520 Email: isep.ltd@gmail.com	Kenya	Overall guidance to the team and control of activity schedules, output reports checking for quality, Bills of Quantities and Cost Estimates. Assistance to the client on tendering process and selection of contractor.
2008 – 2011	ISEP Ltd /Lahmeyer GKW Consult GmbH (Formerly Poyry Environment GmbH)/ Project Manager Integrated Science and Engineering Projects Ltd Tel. + 254 020 5208520 Email: isep.ltd@gmail.com	Kenya, Tanzania	Responsible for preparation of Bidding Documents to World Bank format, assistance to tendering, contract negotiations and award of Contract, Contract Administration and Management, Preparation of Addenda, Evaluation of Claims for the construction supervision of pipeline rehabilitation works, Substantial Completion Certificate and Final Account
2003 - 2008	Seureca Consulting Engineers / Project Manager/Water Supply Engineer Seureca Consulting Engineers contact.seal@seureca.com Tel 254 20 3754243	Kenya, Tanzania, Ethiopia	Involved in the feasibility study (of complementary diagnosis, flow measurements campaign, environmental impact assessment) Detailed Design and Tender Documentation and tendering and Supervision of Construction and Contract Administration
1999 - 2004	Maks Consulting Engineers. / Co-Director, Water Supply and Sewerage Engineer	Tanzania, Kenya, Ethiopia	Contractor Manager/Contract administration and management and preparation of the Final Measurements jointly with the Contractor and prepared the Final Account for the Project. Resolved unfolding dispute between Client and Contractor through determination of final measurements as per Conditions of Contract.
1990 - 1999	Wanjohi Consulting Engineers. / Water Supply and Sewerage Engineer	Kenya, Swaziland	Carried out design and assisted in preparation of Tender documents. Responsible for Sewerage reticulation on an extremely flat stretch of land with pipe sizes ranging from 225- 525 mm concrete and total length 137 km; Water reticulation involving distribution mains of 100 mm diameter.
1991 – 1998	Wanjohi Consulting Engineers. + 254 722466928	Kenya Malawi	Design Engineer forTenwek Mission Hospital in Bomet District Sewerage System. Review and Updating of Design and Tender

	Position Held: Water Supply and Sewerage Engineer		**documents** for 4 Urban and 9 District Centres Water Supply Schemes for the Ministry of Water and Irrigation, Malawi. Sanitary Engineer and Assistant Resident Engineer for Kericho Sanitation Project. Feasibility study, preliminary design and cost estimate for Othaya Town Council sewerage system.

MEMBERSHIP IN PROFESSIONAL ASSOCIATIONS AND PUBLICATIONS	• Corporate Member (MIEK) of the Institution of Engineers of Kenya (M 1955) • Registered Engineer (R. Eng.), Engineers Registration Board (A2040) • Licensed Water Engineer(LWE), Ministry of Water and Irrigation, Kenya

LANGUAGES SKILL		READ	WRITE	SPEAK
	English	Excellent	Excellent	Excellent
	French	Good	Good	Good
	Kiswahili	Good	Good	Good

ADEQUACY FOR THE ASSIGNMENT:

DETAILED TASKS ASSIGNED ON CONSULTANT'S TEAM OF EXPERTS

- In charge of the administrative tender documents production for the WWTP
- Provide expert advice of procurement processes and preparation of procurement and technical tender documents
- In control of Contract Administrative issues and prevention and management of disputes and claims
- will in liaison with the Client develop the best type of contracts to apply for the various components of works, development of Conditions of Contract, Bills of Quantities
- Reports production, inception reports, design review reports, contract documents.

REFERENCE TO PRIOR WORK/ASSIGNMENTS THAT BEST ILLUSTRATES CAPABILITY TO HANDLE THE ASSIGNED TASKS

Name of Assignment or Project: Consultancy Services for the Design, Preparation of Bid Documents & Construction Supervision of Phase Two (2) of the Export Processing Zones Authority (EPZA) Wastewater Treatment Plant (WWTP)
Year: 2015 – Till Date
Location: Kenya
Client: Export Processing Zone Authority (EPZA)
Main Project Features: The main project component included accommodate the anticipated increased discharge, EPZA intends to construct Phase II of WWTP with an additional dosing capacity of 20,000m3 /day.
Position Held: Resident Engineer
Activities Performed: Design & preparation of DPR, Bidding documents of 20 MLD capacity WWTP & Design of sewer network

Name of Assignment or Project: Consultancy for Detailed Design for Water Supply Project in Chwele Area, Bungoma County
Year: May2015 – Till Date
Location: Bungoma, Kenya
Client: Korea International Cooperation Agency, Kenya Office-KOICA
Main Project Features: Project involves feasibility study and development of a water supply project on Kuywa River, with intake of 10,500 m3/day. Water Treatment Plant of 10,500 m3/day comprising of sedimentation and filtration unions. Total transmission of 12 km and Distribution mains of 48 km.
Position Held:Project Manager
Activities Performed: Overall guidance to the team and control of activity schedules, output reports checking for quality, Bills of Quantities and Cost Estimates. Assistance to the client on tendering process and selection of contractor.

Name of Assignment or Project: Consultancy for Bulk Water Services- Studies on Technical, Financial and Institutional and Human Resources functions for the Improvement of Bulk Water Supply Services in 5WSPs under Coast Water Services Board.
Year: May 2011 –Till Date
Location: Mombasa, Kenya
Client: Coast Water Services Board
Main Project Features: This mainly a project to address Non-Revenue Water Issues through the process of rehabilitation of the physical works including installation of bulk meters and setting up Bulk System Boundaries as well as Institutional issues including Human Resources recruitment, training and development and re-engineering of organisation structure. Total water production in by Coast Water Services Board is approximately 140,000 m3/day with NRW of 36% in the transmission.
Position Held:Team Leader/Project Manager
Activities Performed: As Team Leader

Coordinating a multi-disciplinary Team of Experts undertaking Condition Surveys and documentation of the 450 km of transmission pipelines: for 215 km of Mzima-Mazeras gravity main for 38,000 m3/d, 104 km of Baricho-Mombasa pumped main for 90,000 m3/d,30 km of Baricho-Malindi main,42 km of Marere-Changamwe for 12,000 m3/d gravity main ,the Sabaki Wellfield on Sabaki River, the Baricho High Lift Station and the Tiwi Boreholes System; preparation of design documents on bulk metering system, the bulk monitoring System on AMR technology, Non-Revenue Water, Energy Audit, institutional, human and financial aspects, action plan for improvement of technical operations of the infrastructure and operationalisation the Coast Bulk Water Supply Company Ltd.

As Project Manager: Responsible for preparation of Bidding Documents to World Bank format, assistance to tendering, contract negotiations and award of Contract, Contract Administration and Management, Preparation of Addenda, Evaluation of Claims for the construction supervision of pipeline rehabilitation works, Substantial Completion Certificate and Final Account.

Name of Assignment or Project: Consultancy Services for Detailed Engineering Design and Preparation of Tender Documents for Sewerage in Musoma Municipality and Detailed Engineering Design and Preparation of Tender Documents for Water Supply for Mugumu, Bunda and Tarime Townships and Mugango/Kiabakari National Project and Musoma Sewerage System.
Year: July 2010 – May 2011
Location: Musoma, Tanzania
Client: Musoma Urban Water and Sewerage Authority
Main Project Features:For the Musoma Sewerage and Drainage component, all the drainage is towards the lake but it presents problems of siting a common Wastewater Treatment Plant. This therefore requires division of the town into wastewater districts with some areas requiring use of lifting stations to raise sewage to the treatment districts.
Position Held: Water Supply Engineer
Activities Performed:Data collection, review and finalisation of feasibility studies, definition of topographical surveys and geotechnical investigations and water quality analysis and preparation of detailed designs for water treatment plants, transmission and distribution mains, booster stations and reservoirs. For Musoma Sewerage Project, design and preparation of Bidding Documents for 104 km sewerlines, 5No. Pumping stations along the lake and Wastewater treatment plant (35,000 m3/day Western District WWTP and 18,000 m3/d Easter WWTP).
Compilation of Bidding Documents to World Bank format in FIDIC YELLOW Book for Water Treatment Plants and Pumping Stations and RED Book type of contracts for transmission and reticulation mains.

Name of Assignment or Project: Preparation of Investment Proposal for Water Supply and Sanitation Improvement Project-Additional Finance (WaSSIP-AF) financed by the World Bank
Year: July 2010- Sep 2010
Location: Nairobi, Kenya
Client: Individual Consultant to Athi Water Services Board
Main Project Features:Examination of various projects and proposal of new investment projects from a backlog of projects previously prepared but not implemented in the main cities of Kenya. Development of average unit rates of construction of water supplies and sewerage treatment works per cubic meter of flow, unit contruction rates for various types of pipes for water supply and sewerage in urban built up areas as well as rural satellite towns of Nairobi and Coast Region.
Position Held: Individual Consultant under World bank/Investment Advisor.
Activities Performed: Carried out review of documents on feasible projects, scope of works identification (for consultancy services and works contractor) and preparation of project cost estimates and recommendations, review existing Bidding Documents in World Bank format and ranking for implementation. Prepared investment documents for financing by the Work Bank and continuously reviewed progress with the Client, the project procurement plan. Some key projects reviewed included: Rehabilitation of Kabete Water Treatment Plant-62,000 m3/d, Limuru Sewerage System-15,000 m3/d (Activated Sludge Process), Rehabilitation and Uprating of Kariobangi Conventional Mechanical Works for installation of Anaerobi Tanks for Methane Gas harvesting -68,000m3/day, reinforcement of Nairobi Distribution Network following hydraulic modelling, Rehabilitation of sewerage network in Industrial Area and eastern parts of City-265km.

For Mombasa, reviewed and recommended measures for rehabilitation of Kizingo Wastewater Treatment Plant-4000 m3/day. Recommended type of Contract for every project-whether based on YELLOW Book or RED Book.
Assignment carried out for both Athi Water Services Board and Coast Water Services Board. Total Investments recommended-US$209M for Athi Water and US$ 90M for Coast Water.

Name of Assignment or Project: Package 2: Ngethu-Sasumua Water Production Improvement Project under Athi Water Services Board:
Year: July 2006- April 2009
Location: Nairobi, Kenya
Client: Athi Water Services Board.
Main Project Features:Securing the original design capacity of intakes, raw water transmission tunnels, water treatment plants and clear water transmission mains.
Position Held: Team Leader/Construction Manager
Activities Performed: Team Leader/Water Supply Engineer: Involved in the feasibility study (of complementary diagnosis, flow measurements campaign, environmental impact assessment) Detailed Design and Tender Documentation and Ttendering and Supervision of Construction and Contract Administration of Ngethu-Sasumua Water Production Improvement Project for Nairobi City, under AfD funding. Ngethu Water Production system has capacity 437,000 m3/day and Sasumua has capacity of 65,000 m3/day. The scope of works includes swabbing of DN1200 and DN1400 raw water mains and control of rehabilitation works on treatment plants to restore and improve capacity and water quality and efficiency (November 2006 to April 2009).
Construction Manager responsible for Contract Administration, quality control and review and approval of Contractor's Payment Applications, Substantial Completion Certificate and Final Account.

Name of Assignment or Project: Construction of Lavinton-Riruta Trunk Sewers Extension under the Water and Sanitation Service Improvement Project (WaSSIP I):
Year: September 2009- April 2009
Location: Nairobi, Kenya
Client: Athi Water Services Board
Main Project Features: Development of sewerage project and controlling construction works in congested settlements requiring a lot of care on Human Resettlement Action Plans under World Bank procedures.
Position Held: Water Supply Engineer/Team Leader/Resident Engineer
Activities Performed: Project Manager involved in design review of profiles and alignments for 76km of Trunk Sewers of DN300-800 in an urban and built-up environment with significant Resettlement Action Plan issues. Reviewed bidding documents to World Bank format.
Responsible for Contract Administration and Management and checking and approval of Contractor's Payment Applications and Final Account. Maintained all key liaison contacts with the client, Athi Water Services Board. Project funded by the World Bank.

Name of Assignment or Project: Moshi Urban Water Supply and Sewerage Improvements Project
Year: August 2008- March 2009
Location:Moshi, Tanzania
Client: Moshi Urban Water and Sewerage Authority (MUWASCO)
Main Project Features: Assessment and design review of the sewerage system for Moshi of capacity 22,000 m3/day. Review existing designs and propose sewerage rehabilitation plans for Mbuyuni, Mkombozi, Black Star and Majengo areas and new works for the sewerage extensions to the other unserved areas identification and proposals for the separation of existing sewerage network.
Analyse and make recommendations for the improvement of the existing waste stabilisation ponds and generally make recommendations for future improvements/extensions to the entire sewerage system for 89 km sewer length.
Also preparation of the tender documentations.
Position Held: Sewerage Engineer
Activities Performed: Responsible for overall incharge of the project. Involved in site visit, data collection, preparation of feasibility report, cost estimate detailed design, preparation of Manuals of Standards and Specification for all components including intake, WTP & pumping stations.

Name of Assignment or Project: Consultancy Services for the Increase of Short-Term Availability of Drinking Water for the City of Addis Ababa.
Year: Sept 2005- March 2009
Location:Addis Ababa, Ethiopia
Client: Addis Ababa Water and Sewerage Authority (AWWSA)
Main Project Features: Examination of Hydrology to determine additional water availability at dire dam. Review of transmission to Legedadi and rehabilitation and expansion proposal for treating additional water as well as improving efficiency of existing water treatment plant.
Position Held: Team Leader/Water Supply Engineer
Activities Performed:During Feasibility Stage: Feasibility Studies, Preliminary Designs, Costing and definition of project implementation Schedules. Actively involved in the development of the leakage control programme. Responsible for the preparation of the requisite

Documentation (reports, manuals etc.)-2005 to 2007
During Design Stage: Condition survey and other data collection for the detailed designs and preparation of tender documents for the Rehabilitation of Legedadi water treatment plant (under YELLOW Book) and the rehabilitation of the clear water DN900 and DN1000 Transmission mains-from 2008 to 2009.

Name of Assignment or Project: Project Arche(funded by French Embassy):Kenya Water Institute (KEWI) - Consultancy Services for the Detailed Design and Construction Supervision and Contract Management for a Training Platform
Year: April 2007- May 2007
Location: Nairobi, Kenya
Client: The French Embassy in Kenya
Main Project Features: Enforcement of Provision of Contract quantities measurements and certificate payment procedures.
Position Held: Contract Administration Manager
Activities Performed:Contractor Manager/Contract administration and management and preparation of the Final Measurements jointly with the Contractor and prepared the Final Account for the Project. Resolved unfolding dispute between Client and Contractor through determination of final measurements as per Conditions of Contract.

Name of Assignment or Project: Kisumu Water Supply and Sanitation project (Kenya)
Year:March 2004- April 2005 and 2008 to 2010
Location: Kisumu
Client:Lake Victoria South Water Services Board
Main Project Features:Project to improve existing water supply and sewerage systems of the City of Kisumu. Water Supply based on 2 sources. Sewerage System based on 2 collection districts.
Position Held: Project Manager
Activities Performed:
Preparation of Designs and Tender Documents and assisting the Client in the Tendering Procedures and Contract Award for both Works Contractor and Supervision Consultant for the Short Term Action Plan (STAP).
As Design Engineer, prepared drawings and data analyses and prepared Feasibility Report and Cost Estimates for the Long Term Action Plan (LTAP) for Water Supply System as well as for the Sewerage Collection and Treatment.

During Construction stage for the Long Term Action Plan as Senior Resident Engineer for expansion of Dunga Water Treatment Plant-24,000 m3/day and Review of Tender Documentations and assistance to Tendering for second water supply based on Kajulu-48,000 m3/day and Wastewater Treatment Plant Rehabilitation and Extension-Kisat Mechanical-7,500 m3/day and Nyalenda Ponds-54,000m3/day..

Name of Assignment or Project: Feasibility Study for the Water Supply and Sanitation Project for Bukoba, Musoma and Missungwi (Tanzania)
Year: February 2004- August 2004
Location: Bukoba, Musoma, Missungwi Towns, Tanzania.
Client: Ministry of Water, Livestock Development and Marketing
Main Project Features:In each town, the Consultant was required to prepare feasibility for expansion and improvement of the water supply and also development of a new sewerage system for the town. The towns had no existing sewerage system despite the large and rapidly growing populations. Project was under AfD finance.
Position Held: Team Leader/Water Supply and Sanitation Engineer
Activities Performed: Water Supply and Sanitation Engineer responsible for the data collection, water network modeling, sewerage proposals (network and wastewater treatment facilities), and preparation of Feasibility Study and production of all outputs of the assignment.

- Bukoba Water Supply-36,00m3/day and Sewerage System of 22,000 m3/day
- Musoma Water Supply-60,000 m3/day and Sewerage System of 32,000 m3/day
- Misssungwi Water Supply-7,500 m3/day and Sewerage System of 2,000 m3/day.

Name of Assignment or Project: Dodoma Water Supply and Sewerage Project (Tanzania)
Year: August 2003- January 2004
Location: Dodoma City, Tanzania
Client: Ministry of Water, Livestock Development and Marketing
Main Project Features: Dodoma City required expansion of its main water supply from the Makutopora Wellfield to approximately 60,000 m3/day and a corresponding construction of the sewerage system to the town which was not served. The challenge for the sewerage development was flat areas that make gravity sewer design extremely challenging and sandy soils that require special treatment to reduce permeability at the ponds.
Position Held: Deputy Team Leader/Water Supply and Sanitation Engineer.
Activities Performed:Responsible for, definition of scope of topographical survey works, supervision thereof, preparation of detailed designs of the transmission and distribution system for work for a water capacity of 60,000 m3/day from a wellfield, highlift pumping

station. Prepared detailed designs of waste stabilization ponds for the sewerage works of capacity 42,940 m3/day. Total pipeline length of 350 km comprising of DN150-DN600 pipes for Water Supply and 205 km of DN225-DN700 for Concrete Sewers
Prepared bidding documents for 3 lots (Source Works, Transmission System and Distribution and reticulation lots) to World Bank System, and One Contract for the Sewerage System.

Name of Assignment or Project: Tabora Water Supply Project (Tanzania)
Year: August 2003- January 2004
Location: Tabora City, Tanzania.
Client: Ministry of Water, Livestock Development and Marketing
Main Project Features: This project involved expansion of the existing water sources from Igombe Dam and the Treatment Plant and the Development of a new Sewerage System. The challenge for the sewerage development was flat areas that make gravity sewer design extremely challenging and sandy soils that require special treatment to reduce permeability at the ponds.
Position Held:Deputy Team Leader/Water Supply and Sewerage Engineer
ActivitiesPerformed: Water Supply Engineer responsible for, definition of scope of topographical survey works, supervision thereof, preparation of detailed designs of the water treatment plant, pumped transmission and terminal reservoirs at Kahe Hill and distribution systems for work for a water capacity of 46,000 m3/day based on Igombe Dam. Total pipeline length of 270 km comprising of DN150-DN600 pipes. Sewerage System was for waste stabilization ponds of 15,000 m3/day and 88 km of concrete sewers of DN200-400
Prepared bidding documents for 3 lots (Source Works, Transmission System and Distribution and reticulation lots) to World Bank System. Sewerage System was in one Main Contract.

Name of Assignment or Project: Kisumu Sewerage Rehabilitation Project, under World Bank financing.
Year: January 2000- January 2001,
Location: Kisumu, Kenya
Client: Kisumu Municipal Council
Main Project Features:
Position Held: Sewerage Engineer
Activities Performed: Carried out design data collection, condition survey, analysis and design, preparation of drawings and tender documents for the rehabilitation of the above project. Facilities involved were:
At Conventional System (7,500m3/d): Siphon on railway inlet works; Oil separators; 6 No. Primary sedimentation tanks with scraper bridges; 8 No. Rotary trickling filters; 8 No. Secondary sedimentation tanks with scraper bridges; 6 No. sludge digestorswith agitators; Sludge drying beds; various transfer sludge pumps
Waste stabilization ponds – 48,000m3/d; 2 No. anaerobic ponds; 3 No. facultative ponds; Inlet works and lifting pumping station; Reticulation System; 275 km of various upvc.steel and concrete pipelines (225 – 1100 mm diameter); 4 No. sewage pumping stations.

Name of Assignment or Project: Four Urban+ Nine District Centres Water Supply Project
Year:April 1997 –February 1998
Location: Lilongwe, Malawi and Nairobi, Kenya
Client: Department of Water, Malawi
Main Project Features: Development of water supply systems in towns by identifying the viable sources including dams, river intakes and different treatment options.
Position Held:Water Supply Engineer
Activities Performed: Was involved in Review and Updating of Design and Tender documents for 4 Urban and 9 District Centres Water Supply Schemes for the Ministry of Water and Irrigation, under ADB funding. 2 towns required a dam over river to assure supply, other towns required various river intake structures including weirs and wells. Reviewed design of all treatment works which involved sedimentation tanks, filtration, disinfection, clear water storage and rising mains. Reviewed distribution mains and reservoirs where necessary.

Name of Assignment or Project: Kericho Sanitation Project
Year: October 1991 –April 1997
Location: Kericho, Kenya
Client: Ministry of Local Government on behalf of Kericho Municipal Council
Main Project Features: This project involved expansion of the sewerage system using two different technologies. The existing technology was a mechanical system with sedimentation tanks and trickling filters. The capacity was expanded using waste stabilization ponds. The collection system involved new sewer lines and lifting of sewage from a low lying area using a pumping station.
Position Held:Sanitary Engineer
Activities Performed:Initially involved as the Sanitary Engineer in the Design of Kericho Sanitation Project in joint venture with GKW Consult of Germany. Assignment Involved:-Conventional system of 2,200 m3/day; Inlet works stormwater overflow, system, trickling filters, primary and secondary sedimentation tanks, sludge digestors and sludge drying beds and pumping stations; Waste stabilization ponds (7 No. ponds on area of 3.0 Ha.); Solid waste disposal site including leachate treatment; 15 Km sewer rehabilitation; 7.5 km stormwater drainage; Sewerage and drainage Maintenance Equipment identification.

During supervision phase, as the Assistant Resident Engineer, responsible for:Control of quality of workmanship and control of measurements of work and processing of contractors interim certificates of payments (IPC), Evaluation of variation of prices, Preparation of Variation orders, Final Project Account, As – built drawings, and Compilation of Operation and Maintenance Manuals and as built drawings.

Name of Assignment or Project: Feasibility study, preliminary design and cost estimate
Year: April 1992 –February 1995,
Location: Nairobi, Kenya
Client: Othaya Town Council
Main Project Features:
Position Held: Sanitary Engineer
Activities Performed: Carried out feasibility study, preliminary design and cost estimate for Othaya Town Council sewerage system of capacity 1000 m3/day. Investigated 2 options as follows: Waste stabilization pond system (but was restricted by land and high density population in neighbourhood; Aerated Lagoon System with final sedimentation and grass plot.

Name of Assignment or Project: Mbabane City Council Abattoir
Year: January 1992 –April 1993
Location: Mbabane, Swaziland and Nairobi, Kenya
Client: Mbabane City Council,
Main Project Features:
Position Held: Water Supply and Sewerage Engineer
Activities Performed: Carried out design of effluent Pre – Treatment Works for Mbabane City Council abattoir in Swaziland. The system involved pre - treatment of 97m3 of wastewater from a BOD5 of 1700 mg/l to 270 mg/l.
The flow diagram involved:-Collection from killing floor and lairages; Anaerobic digester; Activated Sludge process for plug flow conditions; Maturation ponds for effluent polishing; Connection to city council mains; Carried out design of sewerage reticulation and wastewater treatment works for Mankayane Hospital in Swaziland. Also prepared tender documents; The sewerage system involved new collection mains, waste stabilization ponds and an out fall to the river; Carried out design of sewerage reticulation and wastewater disposal system for Mbuluzi Army Barracks also in Swaziland. Prepared tender documents

Name of Assignment or Project: Embakasi South Industrial Area Infrastructural project
Year:July 1990 –September 1991
Location:Nairobi, Kenya
Client: Ministry of Lands and Housing
Main Project Features:
Position Held:Sewerage Engineer
Activities Performed:Carried out design and assisted in preparation of Tender documents for Embakasi South Industrial Area Infrastructural project. Responsible for Sewerage reticulation on an extremely flat stretch of land with pipe sizes ranging from 225- 525 mm concrete and total length 137 km; Water reticulation involving distribution mains of 100 mm diameter. .

CV NO.2: EIA Lead Expert

PERSONAL INFORMATION:

Position:	EIA Lead Expert
Name of the firm:	Integrated Science and Engineering Projects Limited (ISEP**)**
Name of staff:	Amimo Samuel Odongo
Profession:	Environmental Planner
Date of Birth:	9th August 1973
Contacts:	P.O Box 1674-00100, Nairobi
Cell phone:	0724-402-871
E-mail:	amimo.odongo@gmail.com
Years with the firm:	Six (6) years
Marital Status:	Married
Nationality:	Kenyan (by birth)
Languages:	English, Kiswahili and Luo (Spoken and written)

MEMBERSHIP OF PROFESSIONAL SOCIETIES

- NEMA EIA/EA Lead Expert
- Member, Environment Institute of Keny (EIK)

DETAILED TASKS ASSIGNED:

- Review of environmental policies, legislative and institutional frameworks;
- Review of data on planned and existing key development projects proposed for implementation within the project area;
- Collection of baseline data on environmental conditions;
- Assessment of the impacts of future similar projects on the environment within the project area;
- Gather data and information on existing environmental problems within the project area;
- Propose measures to mitigate existing and future adverse impacts;
- Consider options to improve the environmental benefits;
- Carry out analysis of alternative means of implementing the projects;
- Recommend feasible and cost effective mitigation measures for negative impacts;
- Develop an Environmental/Social Management and Monitoring Plan;
- Lead field team and ensure that data collection exercise is carried out as per schedule;
- Coordinate report writing and ensure that all relevant information are included in the report;
- Compile Draft and Final ESIA Reports;
- Present draft reports to the Client as per schedule; and
- Incorporate Comments from the client into the draft report and prepare final report

KEY QUALIFICATIONS:

Mr. Amimo holds a Bachelors degree in Environmental Studies (Planning and Management) from Kenyatta University. He is an Environmental Planner with twenty one (21) years of work and research experience in technical and practical aspects of physical and participatory planning; feasibility studies, project management, construction supervision, resource conservation and environmental management. Mr. Amimo is an experienced environmental health and safety specialist who has participated in a number of Environmental Impact Assessment studies, environmental audit studies, health and safety audits, Strategic Environmental Assessments (SEAs), feasibility studies, Resettlement Action Plans (RAP) and construction supervisions. He has carried

environmental studies in a number of sectors including construction, transport (roads and airports), water and sanitation, energy, agricultural (irrigation), housing, industrial and telecommunications. Mr. Amimo has over the years been a team leader and Project Director in key projects that have been successfully implemented. Among the key projects in which Mr. Amimo was a Team Leader include construction of wastewater treatment plant in Kinanie area of Machakos County; construction of Kisumu Airport; expansion of Isiolo Airport; expansion of Wilson Airport and development of Central Radioactive Waste Processing Facility in Oloolua, Ngong Division, Kajiado District. Mr. Amimo has also been instrumental as a Project Director in a number of projects which have been successfully implemented. He has over the years observed high moral integrity while undertaking his assignments and has never been involved in any act of corruption or moral impropriety. Mr. Amimo has special skills in Environmental Impact Assessment (EIA), planning, management, auditing, monitoring and action planning; Health and Safety Audits; Risk Assessments; Strategic Environmental Assessment (SEA), Resettlement Action Planning (RAP) and construction supervision. Mr. Amimo is a NEMA licensed Lead Expert in Environmental Impact Assessment/Audit.

EDUCATION BACKGROUND:

1993 - 1997:	Kenyatta University, Bachelor of Environmental Studies (Planning and Management)
1988 - 1991:	Mbita High School, Kenya certificate of Secondary Education, KCSE, Mean Grade B- (Minus) 78 points

OTHER TRAININGS:

February 14th – 15th 2019	Safeguard training at World Bank offices, Nairobi
Jan.- March 2014	Basic Occupational Safety and Health Training
May, 2007:	Training on Community Project Cycle (CPC) organized by Tana Water Service Board (TWSB) for professionals involved in the implementation of rural water supply and sanitation projects at Embu EAST College
Dec. 2005	One day training by GTZ/PSDA/NEMA on waste and wastewater treatment technologies for value addition.
May, 2001	Training on airside operational safety at the Kenya Airports Authority Training School, Embakasi.
March - May 1999	Bredlan Consultants, Certificate in Computer Systems and applications

WORK EXPERIENCE:

Name of Organisation	**Mazingira Limited**
Position	Managing Consultant
Period	May 2006 To date
Activities performed	Liaison with the client, resource mobilisation and allocation, definition of tasks and work programmes for consultants, maintenance of work standards and quality control and liaison with field team
References	Email: info@mazingiralimited.co.ke
Name of Organisation	**Integrated Science and Engineering Projects Limited (ISEP)**
Position	Environment Health and Safety Associate Consultant
Period	August 2013 to Date
Activities performed	Carrying out Environmental Risk/Impact/Audit Assessments, Resettlement Action Plans, feasibility studies, design reviews and construction supervision for various projects
References	Eng. Caleb Opati, Managing Director; Email: opaticaleb@gmail.com

Name of Organisation	**Ecosite Development Consultants Limited**
Position	Environmental and Social Development Officer
Period	June 2010 to July 2017
Activities performed	Carrying out Environmental Risk/Impact/Audit Assessments, Resettlement Action Plans, feasibility studies, design reviews for various projects.
References	Eng. Mimano, Managing Director; Email:ecositeconsultants@gmail.com
Name of Organisation	**Plumbers Without Frontiers/ Quadrant Engineering Consultants Limited**
Position	Environment Health and Safety Associate Consultant
Period	June 2004 to Date
Activities performed	Carrying out Environmental Risk/Impact/Audit Assessments, Resettlement Action Plans, feasibility studies, design reviews for various projects.
References	Eng. Stephen Auma, Managing Director; Email: steveauma2000@yahoo.com
Name of Organisation	**Africa 21st Century Organisation**
Position	Environment and Community Development Officer
Period	April 2003- November 2004
Activities performed	Identification and facilitation of appropriate trainings and workshops for partner Community Based Organizations (CBOs); Resource mobilization through proposal writing, field data collection and report writing
References	Patrick Muraguri, Managing Director; Email: p_murguri@yahoo.com

SUMMARY OF MAJOR ASSIGNMENTS UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE THE TASKS ASSIGNED

Name of Assignment	**Water Resources and Wastewater Master Plan in Kisumu County under Lake Victoria water and Sanitation (LVWATSAN) Program**
Year	September 2018 to Date
Location	Kisumu County, Kenya
Client	Lake Victoria South Water Services Board (LVSWSB)
Main project features	Preparation of a water resources master plan for Kisumu County, preparation of a wastewater master plan for Kisumu city and satellite towns and preparation and implementation of water quality monitoring plan
Position Held	Environmental Specialist
Activities performed	Data collection for feasibility studies; Data collection for Environmental and Social Impact Assessment (ESIA) studies; data collection for Strategic Environmental Assessment (SEA) study; and preparation of ESIA and SEA reports.
Name of Assignment	**Consultancy Services for Short Term Technical Assistance (STTA) for Coast Water Service Board (CWSB) for the Launching of the "Improvement of Drinking Water and Sanitation System in Mombasa – Mwache Project"**
Year	May 2018 to Date
Location	Mombasa and Kwale Counties, Kenya
Client	Coast Water Services Board (CWSB)
Main project features	Feasibility study, preparation of detailed design, preparation of tender documents and supervision of works

Position Held	Environment, Health and Safety Specialist
Activities performed	Data collection for feasibility studies; data collection for ESIA studies; preparation of ESIA report and construction supervision.
Name of Assignment:	**Implementation Support Consultancy for Improvement of Flood Mitigation Structures (IFMS) on Lower Nzoia River and Lower Nzoia Irrigation Project (LNIP) Phase I**
Year	January 2018 to Date
Location	Siaya and Busia Counties, Kenya
Client	Ministry of Water and Irrigation (Kenya Water Security and Climate Resilience Project- KWSCRP)
Main project features	Supervision and coordination of construction works
Position Held	Environmental Specialist
Activities performed	Review and approval of Contractor's ESIA for sub- projects; review and approval of contractor's construction ESMPs; review and approval of contractor's site specific management plans; review and approval of contractor's method statements; monthly site inspections; participation in scheduled and other meetings and preparation monthly progress reports.
Name of Assignment:	**Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite Towns Under Lake Victoria Water and Sanitation (LVWATSAN) Program**
Year	September 2017 to Date
Location	Kisumu city, Kenya
Client	Lake Victoria South Water Services Board (LVSWSB)
Main project features	Feasibility study, design review, preparation of tender documents and supervision of works
Position Held	Environment, Health and Safety Specialist
Activities performed	Design review, data collection for ESIA studies; data collection for RAP study; preparation of ESIA and RAP reports; construction supervision and preparation of weekly, monthly and quarterly progress reports.
Name of Assignment:	**Greater Maputo Water Supply Expansion Project (GMWSP): Consultancy Services for design check and supervision of network at Intaka**
Year	July 2018 to Date
Location	Maputo, Mozambique
Client	Ministry of Public Works, Housing and Water Resources
Main project features	Design review and supervision of construction works of water network at Intaka.
Position held	Environment, Health and Safety Specialist
Activities Performed	Design review; review and approval of contractor's construction ESMPs; review and approval of contractor's site specific management plans; review and approval of contractor's method statements; monthly site inspections; participation in scheduled and other meetings and preparation monthly progress reports.
Name of Assignment	**Environmental, Safety and Health and Fire Safety audits for Safaricom Facilities and Base Transceiver Station (BTS) sites.**
Year	April 2015 to Date
Location	Nairobi, Western, Eastern, Coast, Nyanza, South Rift, Central Rift and North Rift Regions, Kenya
Client	Safaricom PLC
Main project features	Environmental, Health and Safety and fire safety audit of Safaricom

	main buildings, Care Centres, Call centres, Mobile Switching Rooms (MSR), Mobile Switching Centres (MSCs), Base Transceiver Station Sites (BTS)
Position held	Project Director and Lead Auditor
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Environmental and social Impact Assessment for the proposed water supply and sanitation projects in Migori and Homa Bay towns**
Year	January 2016 to August 2018
Location	Migori and Homa Bay Counties, Kenya
Client	Lake Victoria South Water Services Board
Main project features	Construction and rehabilitation of solid waste disposal facility, water supply and sanitation infrastructure for Migori and Homa Bay towns
Position held	Environmental Specialist
Activities Performed	Data collection for feasibility studies; data collection for Environmental and Social Impact (ESIA) studies and report writing.
Name of Assignment:	**Consulting service for design review and supervision of Ruiru Sewerage Network Improvement Project.**
Year	January 2017 to January 2018
Location	Ruiru area, Kiambu County, Kenya
Client	Athi Water Services Board (AWSB)
Main project features	Design review of Ruiru Sewerage network; supervision of construction works and preparation of Resettlement Action Plan (RAP) in collaboration with the client.
Position held	Environment, Health and Safety Specialist
Activities Performed	Data collection for RAP report; preparation of RAP report; review and approval of contractor's construction ESMPs; review and approval of contractor's method statements; weekly and monthly site inspections; participation in scheduled and other meetings and preparation of weekly, monthly and quarterly progress reports.
Name of Assignment	**Environmental and social Impact Assessment for the proposed construction of wastewater treatment plant in Kinanie area of Machakos County**
Year	February 2016 to December 2016
Location	Kinanie area, Machakos County, Kenya
Client	Export Processing Zones Authority (EPZA)
Main project features	Construction of a 20,000m^3/day wastewater treatment plant and associated infrastructure
Position held	Environmental Specialist
Activities performed	Data collection for Environmental and Social Impact Assessment study; data analysis; stakeholder consultations and report writing.
Name of Assignment	**Strategic Environmental Assessment (SEA) for Tana and Athi River Basins**
Year	November 2014-April 2016
Location	Tana and Athi River Basins, Kenya
Client	National Irrigation Board (NIB)
Main project features	Construction and rehabilitation of irrigation infrastructure within Tana and Athi River basins by National Irrigation Board (NIB)
Position held	SEA Coordinator
Activities performed	Define tasks and work programmes, establish and maintain quality control, maintain work standards, manage the flow of information and liaison with the field team

Name of Assignment	**Environmental and social Impact Assessment for the proposed Nyabomite Cluster Irrigation Development Project in Nyamira County**
Year	March 2013-November 2015
Location	Nyamira County, Kenya
Client	Lake Victoria South Water Services Board (LVSWSB)
Main project features	Construction of irrigation infrastructure within 2000 hectares of land to support small scale farmers
Position held	Environmental Specialist
Activities performed	Data collection for Environmental and Social Impact Assessment study; data analysis; stakeholder consultations and report writing.
Name of Assignment	**Environmental and social Impact Assessment for the proposed Karunkunku Irrigation Development Project in Buuri Sub County and Ruungu Irrigation Development Project in Tharaka Nithi County**
Year	April 2014 to April 2015
Location	Buuri Sub County, Meru County and Marimanti area, Tharaka Nithi County, Kenya
Client	National Irrigation Board (NIB)
Main project features	Construction of irrigation infrastructure within 900 hectares of land to support small scale farmers
Position held	Environmental Specialist
Activities performed	Data collection for Environmental and Social Impact Assessment study; data analysis; stakeholder consultations and report writing.
Name of Assignment	**Environmental Impact Assessment for the proposed Ring 9 fibre optic cable within Nairobi and surrounding areas**
Year	October 2014 to January 2015
Location	Nairobi and Machakos Counties, Kenya
Client	Ericsson Kenya Limited
Main project features	Laying of 150 km fiber optic cable to support telecommunication
Position held	Project Director and Lead EIA Expert
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Environmental Impact Assessment for the proposed water project in Ugenya Sub County, Siaya district**
Year	August 2013 to November 2013
Location	Siaya County, Kenya
Client	Ministry of Devolution and Planning
Main project features	Construction of water supply infrastructure for a local community group
Position	Project Director and Lead EIA Expert
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Environmental and Social Impact Assessment for the Proposed Wikithuki Irrigation Development Project (WIDP), Tseikuru District, Kitui County**
Year	January 2012 to July 2013
Location	Wikithuki area, Kitui County, Kenya
Client	National Irrigation Board (NIB)
Main project features	Construction of irrigation infrastructure within 2000 hectares of land to support small scale farmers
Position	Environmental Specialist
Activities performed	Data collection for Environmental and Social Impact Assessment

	study; data analysis; stakeholder consultations and report writing.
Name of Assignment	**Environmental Impact Assessment for the proposed fibre optic cable within Kisumu and surrounding areas**
Year	July 2012 to December 2012
Location	Kisumu and Kakamega Counties, Kenya
Client	Ericsson Kenya Limited
Main project features	Upgrade the Safaricom telecommunication systems particularly data services in order to increase capacity and make the systems more reliable and of better quality. Ring 1 and 4 Fibre optic cable installation project involved laying of a 190 kilometre FTTx (fibre optics to the building, curbs and homes)
Position	Project Director and Lead EIA Expert
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Environmental Impact Assessment for the proposed construction of Butere Technical Training Institute.**
Year	July 2014 to September 2014
Location	Butere Mumias, Kakamega County, Kenya
Client	Ministry of Higher Education, Science and Technology
Main project features	Construction of classrooms, laboratories, workshops and hostels for the Technical Training Institute
Position held	Project Director and Lead EIA Expert
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Feasibility Study, EIA, design, development of tender documents, procurement of contractors and supervision of works for Katani Water Supply Project**
Year	November 2012 to September 2013
Location	Katani Area, Machakos County, Kenya
Client	Waumini SACCO Society Limited
Main project features	Construction of water supply infrastructure
Position held	Project Director and Lead EIA Expert
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Environmental Impact Assessment for decommissioning of Hominin Sites and Paleolakes drilling sites in West Turkana area**
Year	August 2012 to March 2013
Location	Baringo and Turkana counties, Kenya
Client	University of Arizona/ University of Nairobi
Main project features	Backfilling boreholes and material sites and removal of facilities from the site
Position held	Project Director and Lead EIA Expert
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Environmental Impact Assessment and Resettlement Action Plan (RAP) for the proposed construction of Homabay and Manda Airstrips**
Year	April 2012 to October 2012
Location	Homa Bay and Lamu Counties
Client	Kenya Airports Authority (KAA)
Main project features	Rehabilitation and expansion of airport infrastructure including expansion of Runway, taxiway, Apron area and construction of

	Terminal building
Position held	Environmentalist
Activities performed	Data collection for Environmental and Social Impact Assessment study; data analysis; stakeholder consultations and report writing.
Name of Assignment	**Environmental Impact Assessment for the proposed Hominin sites and Paleolakes drilling project in Baringo-Tugen area and West Turkana site**
Year	August 2012 to March 2013
Location	Baringo and Turkana Counties, Kenya
Client	University of Arizona
Main project features	Collection of continuous and long Paleolakes strategic records from basins spanning critical intervals in human evolutionary history to test hypothesis linking local environmental conditions/changes/variability to human evolution. This was achieved by drilling of a single borehole of approximately 200 meters through a mixture of mudstone, sandstone and diatomite lithogens.
Position held	Project Director and Lead EIA Expert
Activities performed	Liaison with the Client, resource allocation, definition of tasks, coordination of field team and review of reports for quality control,
Name of Assignment	**Environmental Impact Assessment and Resettlement Action Plan (RAP) studies for the proposed upgrading of Embu Airstrip**
Year	August 2010 to February 2011
Location	Embu County, Kenya
Client	Kenya Airports Authority
Main project features	Rehabilitation and expansion of airstrip infrastructure including expansion of the Runway, Taxiway and construction of terminal building
Position held	Environmental Specialist
Activities performed	Data collection for Environmental and Social Impact Assessment study; data analysis; stakeholder consultations and report writing.

CERTIFICATION:
I, the undersigned, certify that these data correctly describe me, my qualifications, and my experience.

_____Date_____
Signature of staff member

_____Date_____
Signature of authorized representative of the firm

Amimo Samuel Odongo
Full name of staff member_____

Amimo Samuel Odongo
Full name of authorized representative_____

CV. NO. 4- EIA ASSOCIATE EXPERT

PERSONAL INFORMATION:

Position:	EIA ASSOCIATE EXPERT
Name of the firm:	Mazingira Limited
Name of staff:	Mr. Stephen Ochieng Odera
Profession:	Environmentalist
Date of Birth:	5th April 1990
Contacts:	P.O. Box 49476-00100, Nairobi, Kenya
Cell phone:	+254 711975892
E-mail:	sochieng21@gmail.com
Years with the Firm:	One(1) year
Marital Status:	Single
Nationality:	Kenyan (by birth)
Languages:	English, Kiswahili and Luo (Spoken and written)

MEMBERSHIP OF PROFESSIONAL SOCIETIES:

- Member Environmental Institute of Kenya (EIK).
- Registered EIA/EA Expert by National Environmental Management Authority (NEMA).

DETAILED TASKS ASSIGNED:

- Review of environmental policies, legislative and institutional frameworks;
- Review of data on planned and existing key development projects proposed for implementation within the project area;
- Collection of baseline data on environmental conditions;
- Assessment of the impacts of future similar projects on the environment within the project area;
- Gather data and information on existing environmental problems within the project area;
- Proposition of measures to mitigate existing and future adverse impacts;
- Consideration options to improve the environmental benefits; and
- Recommendation feasible and cost effective mitigation measures for negative impacts.

KEY QUALIFICATION:

Mr. Odera is a trained Environment scientist with a bias in natural resources management. He holds a Bachelor of Science degree in Environmental Science and has five (5) years of work experience in technical and practical aspects of physical and participatory planning; feasibility studies; project management resource conservation and environmental management. Over the years, he has gained valuable knowledge and experience in research methods, technical report preparation, public participation methodologies and advocacy. He has carried environmental studies in a number of sectors including construction, transport (roads and airports), water and sanitation, energy, agricultural (irrigation), housing, industrial and telecommunications. Mr. Odera has participated in several EIA studies while at Mazingira Limited among them construction of Safaricom facilities, Base Transceiver Station sites, Mobile Switching Centres and Fibre Optic Cables (2016 to date), improvement of water supply in Likoni, Mombasa County (2018), construction of hangar and office block in Wilson Airport (2018), construction of industrial plant for manufacture of liquid, powder and resin based solutions for the construction industry (2016), construction of wastewater treatment plant in Kinanie area of Machakos County (2017), construction of Kisumu Water Supply and Sanitation

Project (2018) and improvement of Dunga Raw Water Intake and Water Treatment Plant (2018). Mr. Odera has over the years observed high moral integrity while undertaking his assignments and has never been involved in any act of corruption or moral impropriety. He has special skills in Environmental Impact Assessment (EIA), planning, management, auditing, monitoring and action planning; Strategic Environmental Assessment (SEA), Resettlement Action Planning (RAP) risk and hazard management; project design, planning, management, implementation, evaluation and monitoring.

EDUCATION:

2010-2014:	Egerton University, BSc Environmental Science. 2nd Class Upper Division
2009-2010:	Pafof College of information and Technology, Certificate of information Technology. Credit
2005-2008:	Kisumu Boys High School, Certificate of Secondary Education, B Plain (66 points)
1997-2004:	Magadi Primary School, Certificate of Primary Education, 392 marks

EMPLOYMENT RECORD:

Name of Organisation	**Mazingira Limited**
Position	Field Assistant
Period	January 2016 to date
Activities performed	As Environmental and Community Development Officer, Mr. Odera's responsibilities include data collection for Environmental Impact Assessment (EIA) studies, Environmental Audits (EAs), Strategic Environmental Assessments (SEA), feasibility studies and Resettlement Action Plans (RAPs). This is done through secondary data collection through literature review; primary data collection through questionnaire administration, stakeholder consultation, site walks and photography; environmental test measurements against NEMA, ICNIRP and WHO standards for generator noise levels, emission levels and electromagnetic frequency levels; attendance of scheduled meetings; report writing and presentation of report to the Client.
Name of Organisation	**Freelance writer**
Position	Online Freelance Writer
Period	January 2017 to date
Activities performed	Article writing; creating content for website's landing pages; editing biographical content to enhance readability; proofreading transcripts against audio files and paraphrasing written content
Name of Organisation	**Oligerm Holdings Limited (Resource Management and Environmental Consultants)**
Position	Field Assistant
Period	March 2015 to December 2016
Activities performed	As Environmental and Community Development Officer, Mr. Odera's responsibilities include data collection for Environmental Impact Assessment (EIA) studies, Environmental Audits (EAs), Strategic Environmental Assessments (SEA), feasibility studies and Resettlement Action Plans (RAPs). This is done through secondary data collection through literature review; primary data collection through questionnaire administration, stakeholder consultation, site walks and photography; environmental test measurements against NEMA, ICNIRP and WHO standards for generator noise levels,

	emission levels and electromagnetic frequency levels; attendance of scheduled meetings; report writing and presentation of report to the Client.
Name of Organisation	**Research Solutions Africa on CABI-AIR Plantwise Clinic Survey**
Position	Research Assistant
Period	June 2014
Activities performed	Participating in the Initial field work briefings and questionnaires review; arranging for field trips to sampling points; field data collection; uploading data to the server; participating in the after field work debriefs; and capturing and recording GPS coordinates
Name of Organisation	**Research Solutions Africa**
Position	Team leader on KENYA AGRESULTS Project Baseline Survey
Period	May 2014
Activities performed	Participating in the Initial field work briefings; reviewing questionnaires; arranging for field trips to various sampling points; chairing after field work debriefs; assigning sampling areas to team members; and transporting deliverables such as smartphones to the sampling areas
Name of Organisation	**National Environment Management Authority (NEMA)**
Position	Intern
Period	June –August 2013
Activities performed	Conducting site visits and compiling site visit reports; assisting in the registration and licensing of EIA experts; managing a database that tracked the flow of project reports among reviewers; briefing clients on the status of their projects reports; assisting in the allocation of project and study reports to various reviewers; and dispatching various project and study reports to the lead agencies.
Name of Organisation	**KEMRI/CDC**
Position	Data Clerk, KEMRI/CDC'S International Emerging Infections Program (IEIP)
Period	June –August 2011
Activities performed	Managing entry and update of PITC data from the CCC section; designing clinic reporting template for outpatient services and HIV counseling & testing on monthly basis; managing entry and update of blood culture and stool culture records from the labs into their respective databases

MAJOR ASSIGNMENTS UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE THE TASKS ASSIGNED:

Name of Assignment	**Environmental Impact Assessment for Safaricom Facilities, Base Transceiver Station sites, Mobile Switching Centres and Fibre Optic Cables**
Year	May 2015 to date
Location	Kenya
Client	Safaricom PLC
Main project features	Construction of base transceiver station sites, mobile switching centres and fibre optic cables
Position held	Field Assistant
Activities performed	Literature review, questionnaire administration, collection of environmental baseline data and stakeholder consultation.
Name of Assignment	**Environmental Audit, Health &Safety Audits and Fire Safety**

	Audits for Safaricom Facilities, Base Transceiver Station sites, Mobile Switching Centres and Fibre Optic Cables
Year	May 2015 to date
Location	Kenya
Client	Safaricom PLC
Main project features	Audit of operation status of Base Transceiver Station sites, Retail shops, Offices and Mobile Switching Centres associated with past and present activities
Position held	Field Assistant
Activities performed	Literature review, site visits, stakeholder consultation and photography. Test measurements against NEMA, ICNIRP and WHO standards were carried out for noise, EMF and emission levels. Control/mitigation measures for existing and foreseeable impacts associated with site activities were recommended
Name of Assignment	**Water Resources and Wastewater Master Plan in Kisumu County under Lake Victoria water and Sanitation (LVWATSAN) Program**
Year	September 2018 to Date
Location	Kisumu County, Kenya
Client	Lake Victoria South Water Services Board
Main project features	Preparation of a water resources master plan for Kisumu County, preparation of a wastewater master plan for Kisumu city and satellite towns and preparation and implementation of water quality monitoring plan
Position Held	Field Assistant
Activities performed	Data collection for feasibility studies; Data collection for Environmental and Social Impact Assessment (ESIA) studies; data collection for Strategic Environmental Assessment (SEA) study; and preparation of ESIA and SEA reports.
Name of Assignment	**Feasibility study, detailed design and supervision of works for improvement of water supply in Likoni, Mombasa County**
Year	May 2018 to Date
Location	Mombasa City, Kenya
Client	Coast Water Services Board
Main project features	Feasibility study, preparation of detailed design, preparation of tender documents and supervision of works
Position Held	Field Assistant
Activities performed	Data collection for ESIA studies; data collection for RAP report; preparation of ESIA and RAP reports; monitoring ESMP and RAP implementation and preparation of monthly and quarterly progress reports and environmental completion report.
Name of Assignment:	**Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite Towns Under Lake Victoria Water and Sanitation (LVWATSAN) Program**
Year	September 2017 to Date
Location	Kisumu city, Kenya
Client	Lake Victoria South Water Services Board (LVSWSB)
Main project features	Feasibility study, preparation of detailed design, preparation of tender documents and supervision of works
Position Held	Field Assistant
Activities performed	Data collection for ESIA studies; data collection for RAP study; preparation of ESIA and RAP reports; monitoring ESMP and RAP implementation and preparation of weekly, monthly and quarterly

progress reports and environmental completion report.

CERTIFICATION:

I, the undersigned, certify that these data correctly describe me, my qualifications, and my experience.

_____Date_____
Signature of staff member

_____Date_____
Signature of authorized representative of the firm

Full name of staff member Stephen Ochieng Odera

Full name of authorized representative Amimo Samuel Odongo

CV. NO.4- SOCIOLOGIST

PERSONAL INFORMATION

Position:	Sociologist
Name of the firm:	Mazingira Limited
Name of staff:	Christine Amondi Ponde
Profession:	Sociologist
Date of Birth:	12th December, 1994
Contacts:	P.O Box 68 - 40222, OYUGIS
Cell phone:	0727-300-852
E-mail:	christineponde@gmail.com
Years with the Firm:	One (1) years
Marital Status:	Single
Nationality:	Kenyan (by birth)
Languages:	English, Kiswahili and Luo (Spoken and written)

MEMBERSHIP OF PROFESSIONAL SOCIETIES:

- NEMA EIA/EA Associate Expert
- Member, Environment Institute of Keny (EIK)

DETAILED TASKS ASSIGNED:

- Review environmental policies, legislative and institutional frameworks;
- Review available reports and documents from previous studies;
- Asses the impacts of future similar projects on social environment within the project area;
- Gather data and information on existing social problems within the project area;
- Carry out social analysis of potential impacts using PRA methods;
- Carry out analysis of the implications of anticipated emergence of new social challenges with the aim of recommending appropriate mitigation measures;
- Consider options to improve social benefits;
- Carry out analysis of alternative means of implementing the projects;
- Recommend feasible and cost effective mitigation measures for negative social impacts;
- Develop a Social Management and Mitigation Plan; and
- Develop a monitoring plan.

KEY QUALIFICATION

Ms. Ponde has a Bachelor of Arts (Sociology) degree from Moi University. She is has two years of work experience in technical and practical aspects of physical and participatory planning; community mobilization and sensitization; Participatory Rural Appraisal; Social-economic analysis; Project evaluation and monitoring; Project appraisal, Environmental Impact Assessment and Audit and needs assessment. Ms Ponde has carried environmental studies in a number of sectors including construction, transport (roads and airports), water and sanitation, energy, agricultural (irrigation), housing, industrial and telecommunication sectors. In the course of her work, she has been involved in the planning, design, coordination and collection of baseline data for socio-economic studies; EIA/EA studies; Strategic Environmental Assessment (SEA) studies and feasibility studies. Ms. Ponde has been a social development expert in various projects including construction of Safaricom facilities, Base Transceiver Station sites, Mobile Switching Centres and Fibre Optic Cables (2017 to date), improvement of water supply in Likoni, Mombasa County (2018), construction of hangar and office block in Wilson Airport (2018), construction of wastewater treatment plant in Kinanie area of

Machakos County (2017), construction of Kisumu Water Supply and Sanitation Project (2018) and improvement of Dunga Raw Water Intake and Water Treatment Plant (2018). She has special skills in Environmental Impact Assessment (EIA), planning, management, auditing, monitoring and action planning and community participatory methodologies Ms. Ponde has over the years observed high moral integrity while undertaking her assignments and has never been involved in any act of corruption or moral impropriety. She is NEMA- registered Associate Expert in EIA/EA.

EDUCATION:

2013-2017	**Moi University**, Bachelor of Arts (Sociology)
2008-2012	**Kwoyo Oyugis Secondary**, Kenya Certificate of Secondary Education (KCSE)
1997-2006	**Kotieno Primary School,** Kenya Certificate of Primary Education (KCPE)

OTHER TRAININGS:

March 2018:	Africa Nazarene University, Environmental Impact Assessment and Environmental Audit (EIA&EA)
December 2018:	LVCT Health, HIV Testing and Counseling (HTC)
October 2015:	Kenya Red Cross, First Aid Training
January 2013:	One Touch Computer Training College. Certificate in Computer Studies

WORK EXPERIENCE:

Name of Organisation	**Mazingira Limited**
Position	Sociologist
Period	January 2019 to date
Activities performed	As Sociologist, Ms. Ponde's responsibilities include carrying out Environmental Impact Assessment (EIA) and Audit studies in line with the current National and international legislations and protocols. This is done through collection of baseline data and information; generation of primary data through field visits, participant observation and questionnaire administration; generation of secondary data through literature review; onsite analysis of noise and emission levels; collection of soil and water samples for analysis in NEMA accredited laboratories and general office work
Name of Organisation	**Safe Water and AIDS Project (SWAP)**
Position	Enumerator
Period	March 2019
Activities performed	Duties in this position included field data collection through interviews, questionnaire administration, focused group discussions and report writing
Name of Organisation	**Kenya Red Cross, Kisumu Branch**
Position	Intern
Period	September – December 2015
Activities performed	As an intern, Ms Ponde was involved undertaking a number of activities assigned to her by her supervisor. These included attending training on HIV/AIDS prevention, care and treatment and carrying out documentation; keeping records and carrying out follow up activities in regards to adherence to drugs; facilitating on the importance of carrying out preventive measures among concordant

and discordant partners and advising on how they can bear healthy children; attending training of Community Health Volunteers (CHVs) on effective ways of offering care giving services and giving reports; adolescent counselor; carrying out Tracing and re-uniting families of lost children, adults and inmates in custody without their families knowledge as well as following up on cases of children in Remand Home and drawing effective treatment plans to rehabilitate and incorporate the back to the society; administering First Aid; and creating awareness on importance of family planning and cervical cancer screening.

MAJOR ASSIGNMENTS UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE THE TASKS ASSIGNED

Name of Assignment	**Environmental Impact Assessment for Safaricom Facilities, Base Transceiver Station sites, Mobile Switching Centres and Fibre Optic Cables**
Year	May 2015 to date
Location	Kenya
Client	Safaricom PLC
Main project features	Construction of base transceiver station sites, mobile switching centres and fibre optic cables
Position held	Field Assistant
Activities performed	Literature review, questionnaire administration, collection of environmental baseline data and stakeholder consultation.
Name of Assignment	**Environmental Audit, Health &Safety Audits and Fire Safety Audits for Safaricom Facilities, Base Transceiver Station sites, Mobile Switching Centres and Fibre Optic Cables**
Year	May 2015 to date
Location	Kenya
Client	Safaricom PLC
Main project features	Audit of operation status of Base Transceiver Station sites, Retail shops, Offices and Mobile Switching Centres associated with past and present activities
Position held	Field Assistant
Activities performed	Literature review, site visits, stakeholder consultation and photography. Test measurements against NEMA, ICNIRP and WHO standards were carried out for noise, EMF and emission levels. Control/mitigation measures for existing and foreseeable impacts associated with site activities were recommended
Name of Assignment	**Water Resources and Wastewater Master Plan in Kisumu County under Lake Victoria water and Sanitation (LVWATSAN) Program**
Year	September 2018 to Date
Location	Kisumu County, Kenya
Client	Lake Victoria South Water Services Board
Main project features	Preparation of a water resources master plan for Kisumu County, preparation of a wastewater master plan for Kisumu city and satellite towns and preparation and implementation of water quality monitoring plan
Position Held	Field Assistant
Activities performed	Data collection for feasibility studies; Data collection for Environmental and Social Impact Assessment (ESIA) studies; data

	collection for Strategic Environmental Assessment (SEA) study; and preparation of ESIA and SEA reports.
Name of Assignment:	**Technical Studies, Design and Supervision of Works Packages 1 and 2 in Kisumu City and Satellite Towns Under Lake Victoria Water and Sanitation (LVWATSAN) Program**
Year	September 2017 to Date
Location	Kisumu city, Kenya
Client	Lake Victoria South Water Services Board (LVSWSB)
Main project features	Feasibility study, preparation of detailed design, preparation of tender documents and supervision of works
Position Held	Field Assistant
Activities performed	Data collection for ESIA studies; data collection for RAP study; preparation of ESIA and RAP reports; monitoring ESMP and RAP implementation and preparation of weekly, monthly and quarterly progress reports and environmental completion report.
Name of Assignment	**Environmental Impact Assessment for the proposed construction of hangar and office block in Wilson Airport**
Year	July to November 2018
Location	Kenya
Client	Kasas Limited
Main project features	Construction of a hangar for maintenance of aircrafts and office block for administrative functions
Position held	Field Assistant
Activities performed	Literature review, questionnaire administration, collection of environmental baseline data and stakeholder consultation.
Name of Assignment	**Environmental Audit for Fosroc factory located in Laxmanbhai Complex, Industrial area- Nairobi.**
Year	2017 and 2018
Location	Kenya
Client	Fosroc Kenya Limited
Main project features	Audit of the operation status of the factory associated with its past and present activities
Position held	Field Assistant
Activities performed	Literature review, questionnaire administration, collection of environmental baseline data and stakeholder consultation.

CERTIFICATION:

I, the undersigned, certify that these data correctly describe me, my qualifications, and my experience.

_____Date_____
Signature of staff member

_____Date_____
Signature of authorized representative of the firm

Full name of staff member Christine Amondi Ponde

Full name of authorized representative Amimo Samuel Odongo

CURRICULUM VITAE

Position Title and No.	Assistant Water Supply and Sanitation Engineer
Name of Expert:	Julius O. Odhiambo
Date of Birth:	21st March 1992
Country of Citizenship/Residence:	Kenya
Contact details:	Phone: 0711499041 email: omondijulius41@gmail.com

Education:

Institution	Egerton University
Date: from (month/year) to (month/year)	August 2012 to December 2017
Degree(s) or Diploma(s) obtained	Bachelor of Science (Water and Environmental Engineering)

Language Skills: (1 - excellent; 5 - basic)

Language	Reading	Speaking	Writing
English	1	1	1
Kiswahili	1	1	1

Computer Literacy: Well-versed with the following computer applications: MS Office Suite (Word, Excel, Power Point presentation, MS Project), AutoCAD, EPANET for water supply network simulation, QGIS.

Employment Record

Period	Employing Organization and your Title/Position Contact Info for References	Country	Summary of Activities performed
February 2018 – present	**Employing Organisation:** Integrated Science and Engineering Projects (ISEP) Limited. **Position Held**: Assistant Water and Sanitation Engineer **Contact Reference:** Eng. Caleb W. Opati Managing Director ISEP LTD. Tel. +0722306748 Email: opaticaleb@gmail.com	Kenya	**Technical Studies, Design and Supervision of Construction of Works Package 1 and 2 in Kisumu City and Satellite Towns under LVWATSAN programme and Water Resources and Sanitation Masterplan for Kisumu County under LVWATSAN Programme** Involved in flow measurements campaigns, diagnosis of key infrastructure; Raw water intake structures, water treatment plants, wastewater treatment plants, and pumping stations, sewer lines and appurtenances. Supervision of survey for 33km sewer lines ranging from DN 200-DN600 Supervision of Geotechnical and structural investigations on proposed sewer alignments and existing facilities. Survey of On-site wastewater treatment methods across Kisumu county satellite towns and informal settlements. Bathymetric survey of Nyalenda waste stabilization ponds and Dunga raw water in Lake Victoria. Participated in water quality monitoring; identification of sampling points and sampling exercise, Technical working group and project progress workshops.
Sept 2017 –January 2018	**Employing Organisation:** Lake Victoria South Water Works Development Agency (LVSWWDA)	Kenya	Carried out among other tasks, evaluation of tender documents, design of compact filtration unit (CFU), Bills of quantities and valuation, construction supervision of Kaptumeiyo water project in Nandi

Period	Employing Organization and your Title/Position Contact Info for References	Country	Summary of Activities performed
	Position Held: Graduate Engineer Intern **Contact Reference:** Jeremiah Oteng' Manager Urban Water Services LVSWWDA. Tel. 072287871 Email: jerryoteng@gmail.com		county, Nyakoora water project in Kisii county. Performance monitoring of WSPs; KIWASCO and SIBOWASCO. Technical CAD drawing and reporting.
July – December 2015	**Employing organization:** Seureca East Africa Ltd (SEAL) **Position Held:** Technical Assistant to Resident Engineer Eng. Gilbert Bett Kisumu LTAP Package 3 Tel. + 0721277329 Email: contact @seureca.com	Kenya,	**Kisumu Water supply and sanitation project: Long Term Action Plan (LTAP) package 3: Construction of sewerage system, Nyalenda Ponds and Pumping Stations.** Supervision of Nyalenda Ponds rehabilitation; desludging of 2 No. Facultative ponds and 4 No. Maturation ponds, inlet works construction, slope protection. Sewerline and manhole construction, and supervision of pumping station construction and pump installation and commissioning of Tom Mboya PS. Preparation of As-built drawings and valuations.

CURRICULUM VITAE

Position Title and No.	Assistant Water and Sanitation Engineer
Name of Expert:	Cynthia S. Shitunduhu
Date of Birth:	10th April 1994
Country of Citizenship/Residence	Kenya

Education:

Institution	Egerton University
Date: from (month/year) to (month/year)	September 2012 to December 2017
Degree(s) or Diploma(s) obtained	Bachelor of Science(Water and Environmental Engineering)

Other Trainings.

Undertaken training on the use of a hydrozoom to analyze the condition of a live sewer network.

Computer Literacy: Well-versed with the following computer applications: MS Word, Excel, Power Point presentation, MS Project, AutoCAD, and QGIS.

Employment Record relevant to the Assignment

Period	Employing Organization and your Title/Position Contact Info for References	Country	Summary of Activities performed relevant to the Assignment
March 2018 – Till Date	**Employing Organisation:** ISEP Ltd: Chief Executive Officer Email: opaticaleb@gmail.com **Position Held:** Assistant Water and Sanitation Engineer **Contact Reference:** Integrated Science and Engineering Projects Ltd Marvin Agama Administrative Assistant Tel. + 0727782219 Email: isep.ltd@gmail.com Tel. 254 020 2391889	Kenya	**Consultancy Services Technical Studies, Design and Supervision of Works Package 1 and 2 in Kisumu City and Satellite Towns under LVWATSAN Programme** Diagnostic of the water and wastewater network in Kisumu City and Satellite towns. The diagnosis was meant to advise the rehabilitation and replacement exercise for the networks. **Tasks Performed:** Manholes investigation by opening and taking real time measurements about the sewage flow and manholes condition. Day and night investigation of the wastewater network, hydro zoom investigation. Visits to the satellite towns and data collection on the water and wastewater coverage Bathymetry survey of Nyalenda ponds to guide the desludging exercise. Bathymetry survey for Dunga Intake. Preparation of reports.
December 2018 – Till Date	**Employing Organisation:** ISEP Ltd: Chief Executive Officer Email: opaticaleb@gmail.com **Position Held:** Assistant Water and Sanitation Engineer **Contact Reference:** Integrated Science and Engineering Projects Ltd Marvin Agama Administrative Assistant	Kenya	**Consultancy Services Preparation of Water Resources and Wastewater Master Plan for Kisumu City under LVWATSAN Programme** Feasibility studies for priority works and a Water Quality Monitoring Programme, and to carry out thematic training. Approx. 970,000 inhabitants concerned. Catchment area 2085.9 sq.km. Sewerage network: 160km; wastewater treatment plants: activated sludge with a capacity of 6800 m3/d and natural lagooning with a capacity of 11000 m3/d. **Tasks Performed:**

	Tel. + 0727782219 Email: isep.ltd@gmail.com Tel. 254 020 2391889		Visits to the satellite towns and data collection on the water and wastewater coverage. Preparation of reports.
August 2017-September 2017	**Employing Organisation:** Norken International Ltd Head of Water Department Email: lkuria@norken.co.ke **Position Held:** Intern Water Engineering Department **Contact Reference:** Norken International Ltd. Engineer Lawrence Kuria Head of Water Engineering Department Tel. +254722729573 Email: lkuria@norken.co.ke	Kenya	**Consultancy for Nairobi Satellite Towns Water and Sanitation Development Programme (NSTWSDP) Phase 1: Ruiru-Juja and Kiserian- Ongata Rongai Water Supply** **Projects** **Tasks performed** Previsit study to identify the route for the network. Other site visits to ongoing and completed projects

Membership in Professional Associations and Publications:

1. Graduate Engineer Registration Underway

Language Skills: (1 - excellent; 5 - basic)

Language	Reading	Speaking	Writing
English	1	1	1
Kiswahili	2	2	2
French	5	5	5

Expert's Contact Information:

PHONE: 0729716197 **E-MAIL:** cynthia.shitsukane@isep.co.ke

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications and my experience and I am available to undertake the assignment in case of an award.
I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client.

Cynthia S. Shitsukane **19.06.2020**

Name of Expert	**Signature**	**Date**
Name of authorized Representative of the Consultant (the same who signs the Proposal)	**Signature**	**Date** **19.06.2020**

Annex 8: Approval Letter for Terms of Reference

nema
mazingira yetu | uhai wetu | wajibu wetu

NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

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

P.O. Box 67839, 00200
Popo Road, Nairobi, Kenya
E-mail: dgnema@nema.go.ke
Website: www.nema.go.ke

NEMA/TOR/5/2/315 **4th August, 2021**

The Chief Executive Officer
Lake Victoria South Water Works Development Agency
Lavictors House, off Ring Road Milimani
P O Box 3325-40100
KISUMU

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

We acknowledge the receipt of TOR for the above subject.

Pursuant to the Environmental Management and Coordination Act, 1999 the second schedule and the Environmental (Impact Assessment and Audit) Regulations 31 and 35, your terms of reference for the Environmental Impact Assessment (EIA) for the proposed **REHABILITATION AND EXTENSION OF WATER SUPPLY NETWORK WITHIN KISUMU CITY AND SATELLITE TOWNS IN KISUMU COUNTY** has been approved.

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

MARRIAN KIOKO
HEAD OF EIA SECTION