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Government of Uganda
Ministry of Water and Environment

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR WATER SUPPLY AND SANITATION PROJECT IN MAJANJI, LUMINO, BUHEHE, MASAFU, MASABA, DABANI, BUTEBA, MASINYA and SIKUDA SUB-COUNTIES; BUSIA MUNICIPALITY, BUSIA DISTRICT.

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FINAL REPORT

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

SUBMITTED BY:

SURVESIS	in joint venture with	Savimaxx Limited "...Further linking the environment to economic development."
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LIST OF ACRONYMS AND ABBREVIATIONS

Abbreviation	Meaning
%	Per cent
AMSL	Above Mean Sea Level
$CaCO_3$	Calcium Carbonate
CFU	Coliform Forming Units
DWD	Directorate of Water Development
ECQ	Hydrological Extreme Value
EIA	Environmental Impact Assessment
EMMP	Environmental Management and Monitoring Plan
ES	Environmental Score
ESIA	Environmental and Social Impact Assessment
ET	Evapotranspiration
FS	Faecal Sludge
FSTP	Faecal Sludge Treatment Plant
GoU	Government of Uganda
GPS	Global Positioning System
HF	Horizontal Flow
HH	Household
IEC	Information, Education and Communication
IUCN	International Union for Conservation of Nature
Km	Kilometre
L	Litre
LC	Local Council
m	Meter
mg	Milligrams
MWE	Ministry of Water and Environment
NEMA	National Environment Management Authority
NFA	National Forestry Authority
NTU	Nephelometric Turbidity Unit
NURP	Northern Uganda Reconstruction Program
NWSC	National Water and Sewerage Corporation
PAPs	Project Affected Persons
PIA	Project Impacted Area
PIPs	Project Impacted Persons
PPE	Personal Protection Equipment
ppm	Parts Per Million
PtCo	Platinum - Cobalt Scale; to evaluate pollution level in waste water
RIAM	Rapid Impact Assessment Matrix
ToR	Terms of Reference
TSS	Total Suspended Solids
UBOS	Uganda Bureau of Statistics
UMEME	Electricity Distribution Company in Uganda

Abbreviation	Meaning
UTM	Universal Transverse Mercator
VF	Vertical Flow
WETSPRO	Water Engineering Time Series Processing
WMDP	Water Management and Development Project
WSS	Water Supply and Sanitation
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant
µg	Microgram
CAO	Chief Administrative Officer
ACAO	Assistant Chief Administrative Officer

0 EXECUTIVE SUMMARY

0.1 Introduction

The Government of Uganda (GoU) through the Ministry of Water and Environment (MWE), with financial assistance from the World Bank, is implementing the Water Management and Development Project (WMDP) in towns and rural growth centres. WMDP, aimed at providing safe water within reach and improving sanitation, is comprised of three components: -

i. Investment in Integrated Water Resources Development and Management;

ii. Infrastructure Investments in Urban Water Supply and Sanitation/Sewerage and Catchment/Source Protection; and

iii. Strengthening institutions for effective project implementation.

Component 2, being implemented by the Directorate of Water Development (DWD) of the MWE, is to be achieved through the provision of infrastructure and commercialized management of installed facilities. In general, it is envisaged that economic growth will be stimulated in the recipient towns and growth centres.

The DWD is focusing on eight small towns and rural growth centres that have been categorized into Lot 1 and Lot 2 towns. Lot 1 towns include Busia, Pallisa and Ngora-Nyero-Kumi. Lot 2 towns include Rukungiri, Katwe-Kabatoro and Koboko.

The design review, feasibility study and detailed engineering design of Water Supply and Sanitation components of Lot 1 and Lot 2 towns have already been carried out.

As a requirement for projects with potential impact to the environment and social settings and in line with the MWE Environmental Impact Assessment guidelines for water resources related projects in Uganda and the requirements of the project co-financer, the World Bank, the MWE procured the consultancy services of Survesis in joint venture with Savimaxx Limited in undertaking ESIA and Resettlement Action Plan (RAP) for Lot 1 and Lot 2 project components. However, this report is concerned with the ESIA of Busia Town Water Supply and Sanitation Project.

0.2 Project Description

Given a design horizon of the ultimate year 2040, intermediate year of 2028 and 2016 as the initial year, the Busia Water Supply and Sanitation Project will comprise of: -

i. A water supply system and

ii. Sanitation management facilities (on-site and off-site).

The total estimated project cost is capital investment costs is USD 6,004,825.

A population of 70,482 and 97,033 has been designed for in the intermediate (2028) and ultimate (2040) years within Busia Municipality. Similarly, a population of 64,837 and 89,262 has been designed for in the en-route and satellite towns.

A project maximal water demand of 6,363 m³/day, 9,100 m³/day and 12,988 m³/day was estimated for the initial, intermediate and ultimate year. Thus, in the design, the system was sized based on the water demand of 9,100 and 12,988 m³/day.

0.2.1 Water supply system components

The water supply system will comprise: water intake infrastructure; a water treatment plant infrastructure; treated water transmission main; reservoirs; a booster station; and distribution mains.

0.2.2 Onsite sanitation management facilities

A public toilet facility with 8 stances, has been proposed for Busia Municipality.

0.2.3 Offsite sanitation management facility

The offsite sanitation management (faecal sludge disposal) facility proposed for the project is a hybrid constructed wetland. The plant will comprise: solid/liquid separation in planted drying beds; pre-treatment of the liquid portion by vertical flow constructed wetlands; polishing treatment of the liquid portion by horizontal rock filters and final treatment of the liquid portion in natural wetlands.

0.3 ESIA Methodology

A team of professionals including Registered Environmental Practitioners, Sociologists, Hydrologists, Botanists, Mammologist, Herpitile Specialist, Avian Specialist and Butterfly Specialist were engaged in the ESIA study.

A blend of consultative and site technical activities were employed. Investigations and surveys focused on strategies to contribute to the mitigation of impacts of project activities on the environment and society, thus were embedded in the design of an Environment and Social Management Plan (ESMP).

Desk studies to review relevant available literature was carried out as part of Environmental Screening prior to field studies.

Qualitative and quantitative methods of research were used to gather information from stakeholders. These included but not limited to: interviews, in-depth interviews and focus group discussions. A questionnaire was used to guide community and public consultations.

Hydrological analysis techniques, with a focus on determining extreme low and high lake water levels for the intake source, were employed. This was used in determining the sustainability of the project with respect to meeting demand and protection of infrastructure against floods.

Standard methods for measurements of terrestrial vegetation, capturing and identifications of butterflies, collection of herptiles, survey of birds, and recording of mammals were employed. The conservation status of the studied flora and fauna was then measured against the IUCN Red Listing.

0.4 Policy, Legislation and Regulations

Two frameworks in regard to policy, legislation and regulations have been reviewed i.e. World Bank safeguard policies and Uganda national policy, legal and institutional framework.

The following World Bank safeguards will be trigged:

Environmental Assessment OP/BP 4.01 as a result of the construction and operational activities; Natural Habitats OP/BP 4.04 because the intake is located in a wetland and along the shores of Lake Victoria; Physical Cultural Resources OP/BP 4.11 because construction excavations may unearth chance finds; and Involuntary Resettlement OP/BP 4.12 as a result of compulsory land acquisition. However, there will be no displacement of Project Affected Persons.

The main Ugandan national policies, laws and regulations that the project will trigger are those that deal with water, environment, land, labour, child abuse and gender. These include but not limited to: - the Water Act Cap 152; the National Environment Act Cap 153; the Land Act Cap 227; the Land Acquisition Act Cap 226; the Occupational Safety and Health Act No. 9, 2006; Employment Act, 2006; Workers' Compensation Act 2000 and Child Act 2006.

0.5 Description of the Potential Affected area

0.5.1 Raw water intake site

The raw water intake will be located in Lake Victoria at Namundiri 'A' Village, Majanji Parish, Majanji Sub County (GPS coordinate: UTM 36N 0609830 E 0028672 N). The raw water mains will be supported by a pier bridge that will traverse at least 300 m into the lake. All the plants, butterflies, herptiles, and bird species recorded at the site are not listed in the IUCN Red List. However, the near threated hippopotamus footprints were seen and is classified as near threatened.

0.5.2 Water treatment plant (WTP) site

Located at Namundiri 'A' Village, Majanji Parish, Majanji Sub County (GPS coordinate: UTM 36N 0618817 E 0028201 N), the WTP site is on the land belong to the Uganda Peoples´ Defence Forces, Bwire Barack Enos, and Aggrey Awori. This will need land acquisition. The site has 24 plant species, 21 species of butterflies distributed into 30 individuals, four amphibian species, 18 bird species and 9 mammalian species. The only species mentioned in the IUCN Red List is the hippopotamus whose footprints were seen at the site. It is classified as near threatened.

0.5.3 Reservoir sites

The project has three reservoirs: -

- Reservoir 1: located at Namundiri 'A' Village, Majanji Parish, Majanji Sub County (GPS coordinate: UTM 36N 0609923 E 0029247 N);

- Reservoir 2: to be located at Daha Village, Buhasaba Sub County (GPS coordinate: UTM 36N 0612546 E 00406655 N) and;

- Reservoir 3: to be located at Dabani Sub County Headquarters (GPS coordinate: UTM 36N 0618235 E 0049811 N).

The land at Reservoirs 1 and 2 are privately owned, thus there will be compulsory land acquisition from the land owners. Meanwhile Reservoir 3 land is public government property (Dabani Sub County headquarters).

All reservoir sites are located near built up environments, therefore their natural vegetation has been lost to either agriculture or settlements. Hence, all the biodiversity seen were those tolerant to staying in a built up environment.

0.5.4 Water transmission and distribution mains

Transmission mains are about 23.4 km, with distribution mains at 44.6 km and are mainly on road reserves. Only crops and trees will be damaged, thus will have to be compensated for.

0.5.5 Faecal sludge treatment plant site

The Faecal sludge treatment plant will be located at Okame - Amagoro Village, Mawero Parish, Buteba Sub County (GPS coordinate: UTM 36N 0624057 E 0056320 N). The land will have to paid for because it is privately owned. None of the plants, butterflies, herptiles, birds and mammals recorded is listed in the IUCN Red List.

0.6 Public Consultation

The communities consulted, including the key stakeholders, expressed support for the project since they expect it to accrue benefits such as provision of reliable, safe and clean water supply in Busia Municipal Council and its environs along the Sub Counties of Majanji, Lumino, Buhehe, Buteba and Dabani.

However, public consultation and sensitization should continue during the disclosure and implementation period, in order to capture any other issues that could have been left and educate communities on the values of improved water supply and sanitation services.

0.7 Project Impacts

To harmonize positions of the multidisciplinary team on the assignment and reduce subjectivity in evaluating the significance levels of the identified potential environmental impacts of the project, there was need to use a method that is flexible, transparent and most importantly free from subjectivity. In this light, the Rapid Impact Assessment Matrix (RIAM) developed by Pastakia (1998) for EIA was suitably chosen.

0.7.1 Positive impacts

Table 1 below shows a summary of the identified positive impacts, including ranking and the project phase under which each impact will be achieved. Furthermore, as can be seen from Table 2, the benefits of *improved public health, hygiene and household health status*; *improved living standard/well-being*; *employment*; *incomes and market for produce and products*; and *skills and technology transfer* have all

the characteristics of being immediate, long-term (permanent) and cumulative in benefit. The benefits accruing from *improved gender awareness* and the *economy* will be long-term and cumulative but not immediate. On the other hand, the benefit of *Land/property compensation* will be immediate but temporary and non-cumulative.

Table 1: Summary of identified positive impacts.

Positive Impact	Project Phase		Rank	Description
	C	O		
Improved public health, hygiene and household health status	**x**	√	+4	Significant positive change
Improved living standard/well-being	**x**	√	+4	Significant positive change
Reduction of domestic violence	**x**	√	+2	Positive change
Improved gender awareness	√	√	+3	Moderate positive change
Employment	√	√	+3	Moderate positive change
Incomes and market for produce and products	√	√	+3	Moderate positive change
Improve the economy	√	√	+3	Moderate positive change
Skills and technology transfer	√	√	+2	Positive change
Land/property compensation	√	**x**	+2	Positive change

Key: **C** = construction phase; **O** = operation phase, √ = applicable; **x** = not applicable.

Table 2: Summary of Immediate, Long-term and Cumulative positive impacts.

Positive Impact	**Immediate**	**Long-term**	**Cumulative**
Improved Public Health, Hygiene and Household Health Status	√	√	√
Improved living standard/well-being	√	√	√
Reduction of domestic violence	√	√	√
Improved gender awareness	**x**	√	√
Employment	√	√	√
Incomes and market for produce and products	√	√	√
Economy	**x**	√	√
Skills and Technology Transfer	√	√	√
Land/property compensation	√	**x**	**x**

Key: √ = applicable; **x** = not applicable.

0.7.2 Negative impacts

Table 3 below shows a summary of the identified negative impacts, including ranking and the project phase under which each impact will be achieved.

As can be seen from Table 4, all construction phase negative impacts will be immediate. However, the impact of *loss of land and damage to property* will be long-term (permanent) given that land portions will have to be permanently

acquired for the benefit of the project. Furthermore, the impact of *increase in HIV/AIDS and STDs*, if not curtailed, can be cumulative.

Furthermore, as can be seen from Table 5, all operation phase impacts will be immediate. Additionally, the impacts of *degradation of source water*, *degradation of FSTP effluent disposal route* and *odour generation* will also be long-term (permanent) and cumulative in effect. However, the impacts of *occupational health and safety*, *solid waste generation*, *pressure on existing utilities* and *accidents* will not be long-term though they could be cumulative. Lastly, the impact of *sediment swirl up and transport* will not be long-term nor cumulative.

Table 3: Summary of identified negative impacts.

Negative Impact (Environmental or social factor)	**Project Phase**		**Rank**	**Description**
	C	**O**		
(Soil)				
Erosion and loss of top soil	√		-2	Negative change
(Water Resources)				
Sediment swirl up and transport		√	-2	Negative change
Degradation of source water		√	-2	Negative change
Degradation of FSTP effluent disposal route		√	-2	Negative change
(Flora and Fauna)				
Loss of vegetation cover	√		-1	Slight negative change
Loss of fauna	√		-3	Moderate negative change
(Air Quality)				
Noise and vibration from vehicles	√		-2	Negative change
Dust generation	√		-2	Negative change
Exhaust emissions from vehicles	√		-3	Moderate negative change
Odour generation		√	-2	Negative change
(Land Use)				
Land loss and damage to property	√		-1	Slight negative change
Raw material extraction	√		-2	Negative change
(Population and Settlement)				
Conflicts due to influx of immigrant labour	√		-2	Negative change
Child abuse and early age pregnancies	√		-2	Negative change
Child labour	√		-2	Negative change
Increase in HIV/AIDS and STDs	√		-3	Moderate negative change
Occupational health and safety at construction phase	√		-2	Negative change
Occupational health and safety at operation phase		√	-3	Moderate negative change
Solid waste generation at construction	√		-2	Negative change
Solid waste generation at operation		√	-2	Negative change

Negative Impact (Environmental or social factor)	Project Phase		Rank	Description
	C	O		
Bio solid generation		√	-3	Moderate negative change
Human waste generation	√		-2	Negative change
Pressure on existing utilities		√	-2	Negative change
Accidents	√	√	-3	Moderate negative change

Key: **C** = construction phase; **O** = operation phase.

Table 4: Summary of characteristics of construction phase negative impacts.

Negative Impact	Immediate	Long term	Cumulative
Loss of land and damage to property	√	√	**x**
Conflicts due to influx of immigrant labour	√	**x**	**x**
Child abuse and early age pregnancies	√	**x**	**x**
Child labour	√	**x**	**x**
Increase in HIV/AIDS and STDs	√	**x**	√
Loss of vegetation cover	√	**x**	**x**
Loss of fauna	√	**x**	**x**
Erosion and loss of top soil	√	**x**	**x**
Noise and vibration from vehicles	√	**x**	**x**
Dust generation	√	**x**	**x**
Exhaust emissions from vehicles	√	**x**	**x**
Occupational health and safety	√	**x**	**x**
Solid waste generation	√	**x**	**x**
Human waste generation	√	**x**	**x**
Raw material extraction	√	**x**	**x**
Accidents	√	**x**	**x**

Key: √ = applicable; **x** = not applicable.

Table 5: Summary of characteristics of operation phase negative impacts.

Negative Impact	Immediate	Long-term	Cumulative
Degradation of source water	√	√	√
Degradation of FSTP effluent disposal route	√	√	√
Sediment swirl up and transport	√	**x**	**x**
Odour generation	√	√	√
Occupational health and safety	√	**x**	√
Solid waste generation	√	**x**	√
Pressure on existing utilities	√	**x**	√
Accidents	√	**x**	√

Key: √ = applicable; **x** = not applicable.

0.8 Conclusions

The project will supply up to 82.4 and 78.8% of the people of Busia Municipality in, respectively, the intermediate and ultimate years with sustainable and safe water within easy reach. Furthermore, the project will eliminate the reliance on the current piped water system, built in the period 1999 – 2000, that is intermittent, rationed and unreliable (refer to Fichtner and M&E, 2015a).

With respect to sustainable environmental flows and requirements of other water users downstream of Lake Victoria, the project will abstract, at the maximum, 13,637 m^3/day (0.16 m^3/s). This is about 0.04% of the minimal observed (381.88 m^3/s) Lake Victoria outflow. Furthermore, the minimal observed Lake Victoria outflow has a return period of about 300 years. Thus, the effect of water withdrawal for the project on other water users is insignificant.

Most of the land to be acquired for the project is government owned, with the exception of the privately owned 0.568, 2.0 and 0.289 acres at, respectively, the WTP, FSTP and Reservoir 2 sites. Furthermore, only portions of the private land will be acquired with the owners being left with enough land to carry on. Thus, resettlement is not necessary but rather compensation will be undertaken as costed in the RAP report for the project. The World Bank Operational Policies, Indigenous Peoples OP/BP 4.10 and Projects in Disputed Areas OP/BP 7.60, are not triggered given that there are no indigenous peoples or disputed areas within the project domain.

The implementation of the ESMP for the project will cost UGX 500.2 million in total, including the cost of RAP that has been valued at UGX.300.2 million. In general, the construction phase is at UGX.435.2 million and the operation phase at UGX 65 million.

0.9 Recommendations

The WTP site, including the periphery, is a forage ground for the near threated Hippopotamus. A Wildlife Management Plan (Appendix 5) has been developed for the project. It is the responsibility of the Contractor/Operator that it is implemented prior to start of construction works.

The FSTP site at Okame - Amagoro Village, Mawero Parish, Buteba Sub County has no natural wetland for discharging its effluent, thus direct discharge of phosphorous loads into the receiving stream will occur given that only sand and gravel is to be utilized in the designed FSTP. Increased phosphorous loads in receiving water leads to eutrophication. To overcome this, the Design Team should preferably change the media of the constructed wetlands in the FSTP with phosphorus removing materials such as granular slag. Furthermore, the project should extend piped water to the communities at the vicinity of the FSTP, including sensitization on the dangers of consuming polluted water. This water extension could be in the form of household connection, yard taps or communal kiosks.

Protection of the source and catchment area for the project's water supply is indispensable in order to meet the project objectives, namely: provision of sufficient water and sanitation services of good quality to the Municipality. It is necessary to protect the lake and its catchment from pollution and to maintain a high retention potential of precipitation in the upper catchment. In general, the formation of a Catchment Protection Unit (CPU), one of the activities under Component 1.2 of the

WMDP be fast tracked with the aim of protecting the catchment area of Lake Victoria and other rivers and streams in the region.

During the ESIA study, consultations were conducted with relevant stakeholders. The Developer should liaise with them to ensure effective implementation of the proposed mitigation measures for the anticipated negative impacts. An Environmental and Social Management Plan (ESMP) has been developed for the Client, Contractor(s) and Operator to implement. Environmental concerns will be addressed through this plan so that environmental laws and policies will be complied with through the existing institutional frame works. However, strict control and supervision of the Contractor will ensure compliance with required mitigation measures.

The Environmental Practitioners are of the view that the project should be implemented "as is" provided that the suggested mitigation measures are put in place.

1 INTRODUCTION

1.1 The Water Management and Development Project (WMDP)

The Government of Uganda (GoU) through the Ministry of Water and Environment (MWE), with financial assistance from the World Bank, is implementing the Water Management and Development Project (WMDP) in towns and rural growth centres. MWE is directly responsible for implementation of WMDP in small towns and rural growth centres whereas the National Water and Sewerage Corporation (NWSC) is responsible for the same in large towns.

WMDP, a three component project whose proposed interventions will contribute to achievement of the National Development Plan 2010 – 2015 (refer to NDP II), aims at providing safe water and improving sanitation. The three components of WMDP are:

i. Investment in Integrated Water Resources Development and Management;

ii. Infrastructure Investments in Urban Water Supply and Sanitation/Sewerage and Catchment/Source Protection; and

iii. Strengthening institutions for effective project implementation.

The Directorate of Water Development (DWD) of MWE is implementing Component 2 in selected small towns and rural growth centres across the country. The objective of Component 2 is to improve the health, living standards and productivity of the population in the project towns, regardless of their social status or income through equitable provision of adequate and good quality water supply and improved sanitation services, at an acceptable cost and on a sustainable basis. This is to be achieved through the provision of infrastructure and commercialized management of installed facilities. In general, it is envisaged that economic growth will be stimulated in the recipient towns and growth centres.

MWE through DWD is focusing on twelve urban centres of which eight are small towns and rural growth centres, directly under the DWD, and four are large towns under the NWSC. The eight small towns and rural growth centres are further categorized into Lot 1 and Lot 2 towns. Lot 1 towns are Busia, Pallisa and Ngora-Nyero-Kumi. Lot 2 towns are Rukungiri, Katwe-Kabatoro and Koboko.

1.2 Current Water Supply and Sanitation in Busia

1.2.1 Status of urban water supply

The Water and Sanitation sector defines urban areas as those with population of 5,000 people and above (MWE, 2007). Busia Municipality, at a population of 55,958 (UBOS, 2014), can be categorized as a large town.

Constructed in the period 1999 - 2000 under the Small Towns Water and Sanitation Project, Phase IIB- IDA, and currently under the management of JOWA Engineering Services Limited, Busia piped water system consists of seven (7) national grid powered boreholes, two (2) sumps (each with chlorine dozers), transmission lines, and a water distribution network.

The sumps, each at 100 m^3 capacity, serve as suctions for the high lift pumps that deliver water to the storage and distribution reservoirs. The sumps are basically ground level tanks constructed in reinforced concrete. Chlorination, the only water treatment provided, is carried out at the inlet to the sumps.

Two storage and distribution reservoirs at 250 and 300 m^3 are provided. The reservoirs, constructed in pressed steel sections and elevated 12 m above ground, are securely fenced and provided with a gate.

The water distribution system consists of approximately 9.3 km of uPVC and HDPE piping network and serves only twelfth (12) out of the twenty-five (25) villages within the Municipality. These are mostly in the core of the Municipality. Furthermore, the boreholes are overstretched, particularly in the dry seasons, as they have to operate 24 hours a day and still do not meet demand as they are pumped dry necessitating frequent rest periods for recharge. This is further aggravated by the fact that only five (5) boreholes are currently functional.

1.2.2 Status of urban sanitation facilities

Sanitation facilities within Busia Municipality depend largely on the level of service of water supply. The Municipality has no sewer system, thus the population is served by onsite sanitation facilities, including pit latrines and waterborne toilets that are connected to septic tanks. Furthermore, there is no excreta disposal system in Busia District in that households and institutions simply abandon filled-up pit latrines as new ones are built. There are only five (5) public sanitation facilities within the Municipality, including one (1) in the Main Market Place, one (1) at the Fish Market, two (2) at Sophia Wholesale Market, and one (1) at the Taxi Park. Most of these toilets are not in very good shape and inadequate to cope with the number of users, including vendors/traders, nearby local communities and visitors. They are supervised by caretakers who charge UGX 200 per user.

1.3 The Feasibility Study

The design review, feasibility study and detailed engineering design of Water Supply and Sanitation components of Lot 1 and Lot 2 towns have already been carried out. Two design Consultants, Fichtner Water and Transportation in association with M&E Associates Limited and SGI Studio Galli Ingegneria S.p.A., were contracted by the MWE. Fichtner Water and Transportation in association with M&E Associates Limited carried out design review, feasibility study and detailed engineering design for Lot 1 towns. SGI Studio Galli Ingegneria S.p.A. undertook the same for Lot 2 towns.

From the feasibility study, there are a total of 1660 piped water connections in Busia Municipality of which 1512 are household level (private connections), 115 are institutional (offices, lodges, schools, Police and Banks), 31 public stand posts, and 2 non-functional kiosks. The current piped water system can supply up to a maximum of 500 m^3/day. This is far below the current Municipality demand that is at 4,292 m^3/day.

1.4 Project Location

The Busia Water Supply and Sanitation Project Facilities will be located in Busia District, south-eastern part of the Eastern region of Uganda (Figure 1). At 202 km by road from Kampala, and at an average elevation of 1,180 m AMSL, Busia is located

approximately between 33°05' E 00°10' N and 34°01' E 00°35' N (Busia District Report, 2009; NEMA, 2004).

Covering 730.9 km² in land size, Busia District is bordered by Tororo District to the north, Kenya to the east, Lake Victoria to the south, Namayingo District to the southwest and Bugiri District to the west.

Administratively, Busia District is divided into three constituencies, each forming a representation in the Ugandan Parliament. These constituencies are Samia Bugwe North, Busia Municipality and Samia Bugwe South (FHRI, 2009). The Municipality, the administrative centre of Busia District, is divided into 2 Divisions (Local Council III offices) which in turn are divided into 8 Parishes (Local Council II offices). These parishes are further sub-divided into 25 villages (Local Council I). The Municipality consists of the district headquarters, municipal council offices, a hospital, health centres (grade III facilities), lodges, agro-processing plants, shops, schools (primary and secondary), fuel stations, banks, etc. (Fichtner and M&E, 2015a).

Planned with a focus on the Municipality, the Busia Water Supply and Sanitation Project will equally serve satellite towns in the Sub-counties of Majanji, Lumino, Buhehe, Masafu, Masaba, Dabani, Buteba, Masinya and Sikuda. The proposed satellite towns in the Sub-counties of Majanji, Lumino, Buhehe, Masafu, Masaba and Dabani are located between the proposed water source (Lake Victoria) and Busia Municipality. Meanwhile, the satellite towns in the Sub-counties of Masinya, Sikuda and Buteba border Busia Municipality to the North.

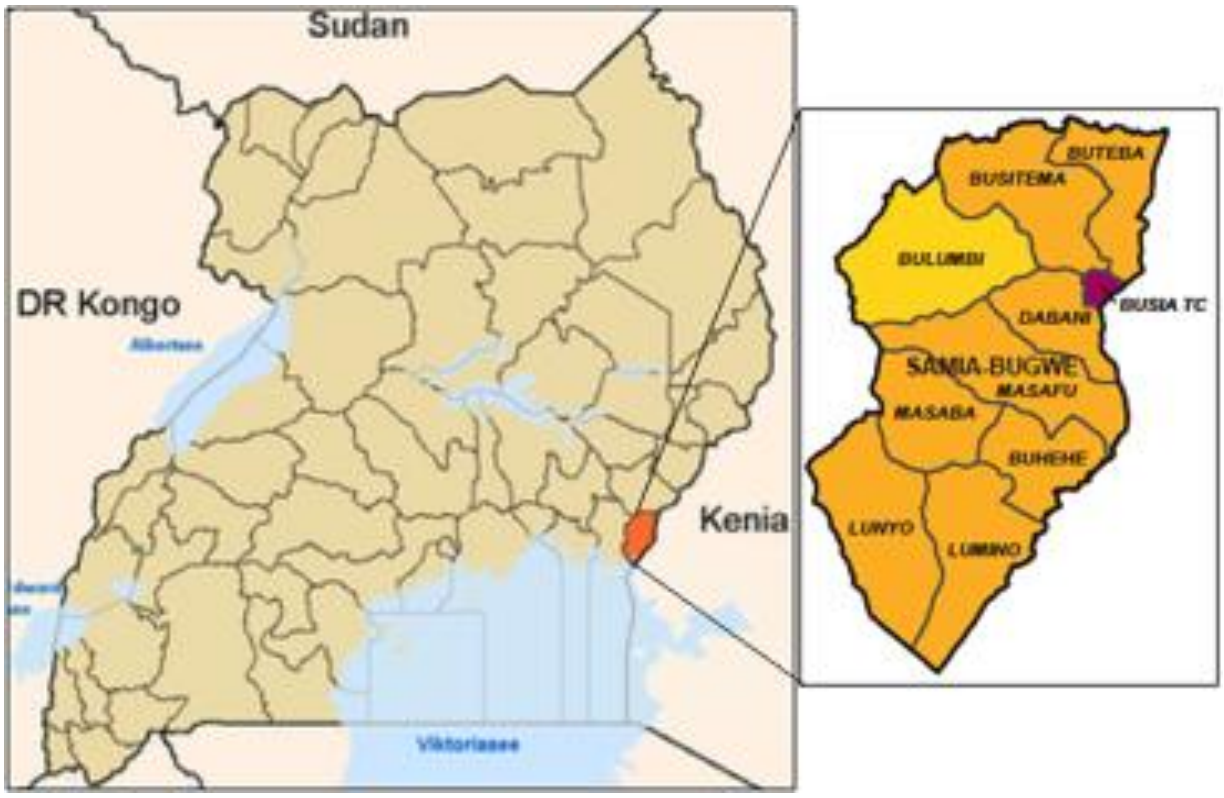

Figure 1: Map of Busia District, including the Town Centre and Sub Counties.

1.5 Need for an ESIA

Section 19 (3) of the National Environment Act CAP 153 made an Environmental Impact Assessment mandatory for all projects or policies that may, are likely to or will have significant impacts on the environment so that adverse impacts can be identified, eliminated or mitigated. The project falls under the Third Schedule of the National Environment Act. It involves major changes in land use as stated in Category 1 subsection (c). Section 20 (1) of the National Environment Act states that where a project has been determined to require an ESIA, the Developer shall, after completing the study, prepare an Environmental Impact Statement (EIS) according to the guidelines established by the Authority, and have the EIS submitted to the Authority and/or forward to any other relevant Lead Agency. The MWE procured the consultancy services of Survesis and Savimaxx Limited in undertaking ESIA and Resettlement Action Plan (RAP) for Lot 1 and Lot 2 project components.

1.6 Purpose of the ESIA

This ESIA report is to deliver the requirements of the Ministry of Water and Environment (MWE) as spelt out in the terms of references as well as the relevant policies and guidelines of the World Bank. The ESIA sets out to identify potential environmental and social impacts of the proposed Busia Water Supply and Sanitation Project.

1.7 The ESIA Process

This ESIA was carried out in line with requirements of the legal, policy and regulatory framework of Uganda as well as the World Bank (**Error! Reference source not found.**). n addition, this ESIA report was prepared with in consultation of the manual for EIA Guidelines for Water Resources Related Projects in Uganda (MWE, 2011); Environmental and Social Management Framework for the Water Management and Development Project; and the World Bank´s general Environment Health and Safety Guidelines (EHSGs), with specific reference to the EHSGs for Water and Sanitation Projects. The World Bank policy requirements, in instances that they were more comprehensive, were addressed over and above the requirements of the regulatory framework of Uganda.

In general, this ESIA study comprised:

i. Review of relevant literature and secondary baseline data on legislation, policies and regulatory frameworks; bio-physical environments; and social settings.

ii. Field studies that included flora and fauna counts and categorisation, including receptor systems baseline data. Studies were carried out on species of birds, *herptiles*, butterflies, mammals and plants. The species numbers and types were used to determine the baseline environmental quality of the project sites as far as flora and fauna are concerned. Receptor systems baseline data studied include soils, water, air quality and noise. In general, the biodiversity status of the various sites were determined and will be used as monitoring indicators for the impacts of project activities on the respective sites.

iii. An inventory of activities in the neighbourhood that are likely to be affected by the development and operation of the proposed water supply and sanitation facilities.

iv. Consultations with stakeholders, including the neighbouring local communities in the Sub Counties of Majanji, Lumino, Buhehe, Masafu, Masaba, Dabani, Buteba, Masinya and Sikuda; Busia District Local Government officials (District Environment Officer, District Engineer, Physical and Economic Planner); and lead agencies such as the Directorate of Water Resources Management (DWRM), Directorate of Environment Affairs (DEA), Directorate of Water Development (DWD).

v. The ESIA and the project feasibility study and detailed engineering designs were undertaken in parallel, so that all alternatives proposed are assessed for their environmental impacts.

vi. Prediction and analysis of environmental impacts resulting from the proposed project, and proposing appropriate mitigation measures.

vii. Development of an Environmental and Social Management Plan.

viii. Preparation of an Environmental and Social Impact Statement and presentation to NEMA for review and approval.

2 PROJECT DESCRIPTION

2.1 Water supply system components

Given a design horizon of 2040, intermediate year of 2028, and 2016 as the initial year, the Busia Water Supply and Sanitation Project will comprise of:

i. A water supply system and

ii. Sanitation management facilities (on-site and off-site).

Figure 2 below shows the location of the key project infrastructure sites, including alternate sites.

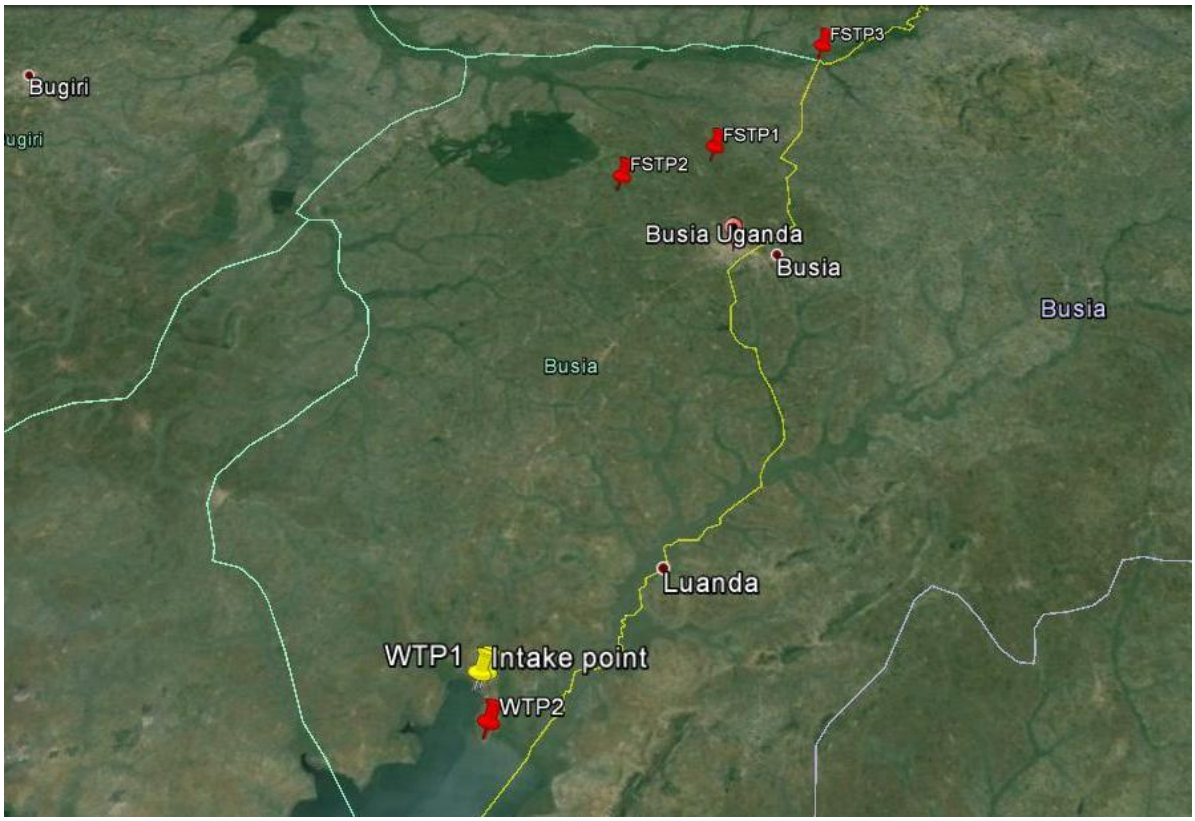

Figure 2: Location of key project infrastructure, including alternative sites.

A population of 70,482 and 97,033 capita has been designed for, respectively, in the intermediate and ultimate years within Busia Municipality. Similarly, a population of 64,837 and 89,262 has been designed for in the en-route and satellite towns.

Project maximum water demands of 6,363; 9,100 and 12,988 m^3/day were estimated for, respectively, in the initial, intermediate and ultimate years. Thus, in the design, the system was sized based on the water demand of 9,100 and 12,988 m^3/day (Fichtner and M&E, 2015c).

The water supply system will comprise the following components:

2.1.1 Lake Intake infrastructure

Based on hydrological and water quality analysis of three key surface water resources (Lake Victoria, River Sio and River Malaba) within Busia District (Fichtner and M&E, 2015a), Lake Victoria was selected as the most optimal water source for the project.

The design team have drafted two options. Water will be abstracted either directly, via a submersible pump, (Figure 3 a) or via a dry-installed self-priming pump (Figure 3 b). The intake will be located at least 300 m into the lake so as to avoid shore debris that is normally stirred up by waves, in addition to safeguarding the intake valve against low water levels that may not permit abstraction. Thus, an access bridge (pier), extending into the lake, will be constructed.

The intake works and raw water main have been sized at 12,988 m^3/day, thus will meet the maximum daily supply of the ultimate year. Additionally, it will operate for a maximum of 22 hours/day to allow for repair and maintenance works.

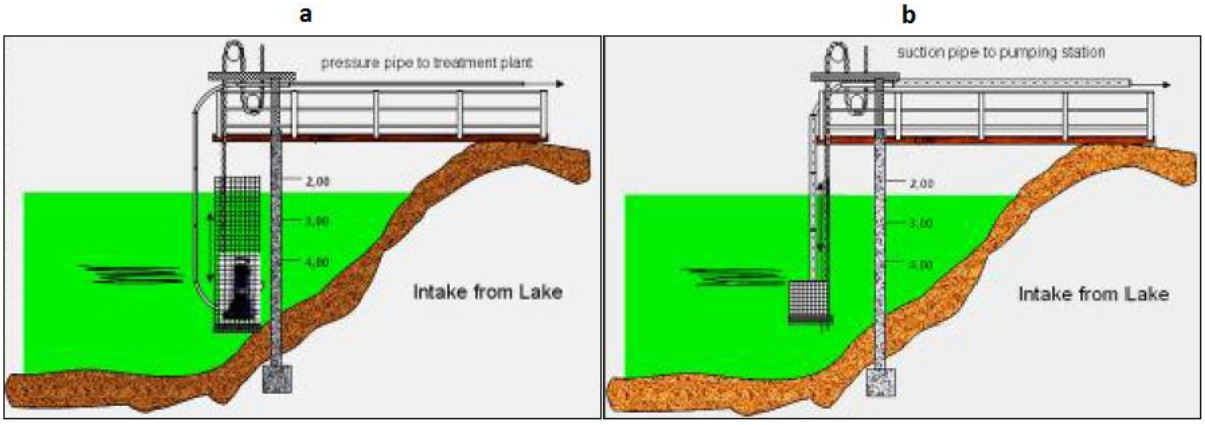

Figure 3: Proposed Intake Structures (Source: Fichtner and M&E, 2015c).

2.1.2 A water treatment plant infrastructure

The treatment works has been designed such that it consists of the following stages in a chronological order (Figure 4): aeration; pre-chlorination; coagulation/flocculation (dosing of aluminium sulphate, lime milk and polyelectrolyte); sedimentation; filtration; clear water basin; final chlorination; wash water and net water pumps.

The water treatment works, with exception of the clear water tank, has been sized at the intermediate year (9,100 m^3/day), thus a set of treatment works will have to be setup as a second phase to meet the daily supply of the ultimate year (12,988 m^3/day). However, the clear water tank has been sized at the ultimate year. Additionally, it is assumed that it will operate 22 hours/day to allow for repair and maintenance works.

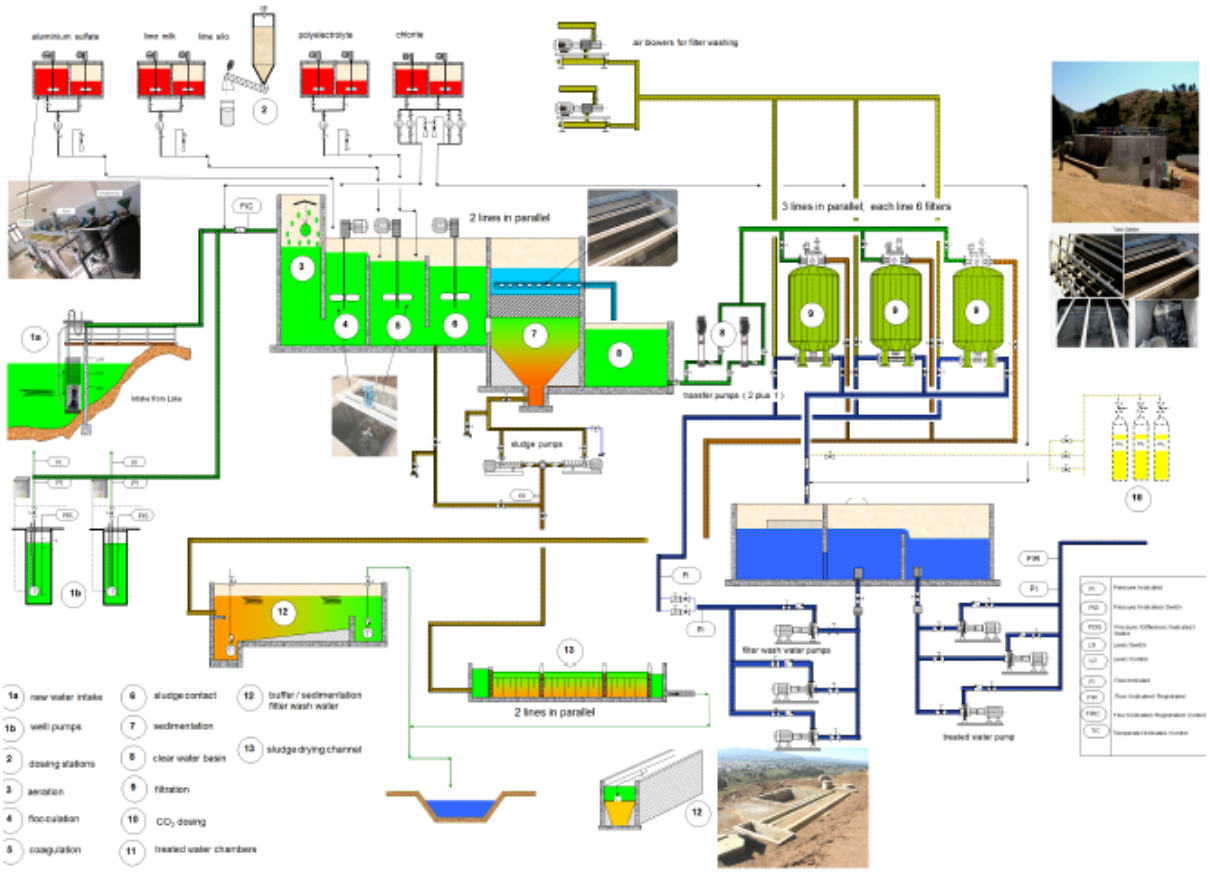

Figure 4: Schematic layout of proposed WTP infrastructure.
Source: Fichtner and M&E, 2015b

2.1.3 Treated water transmission main

The treated water main will deliver water from the water treatment plant in Majanji through the enroute towns of Lumino, Masaba, Buhehe, Masafu, Dabani to Busia Municipality. It will consist of a two stage system as illustrated below.

i. Water will be pumped from the clear water tank at the WTP in Majanji to a storage tank at Daha Village, Buhehe Sub County. This section will be 12.5 km in length and will contain the entire project´s demand with the exception of Majanji town. Majanji town will have an independent system tapping off from the clear water tank. Additionally, tap offs on this pipeline will be made for the towns of Lumino, Masaba and Buhehe.

ii. In the second stage, water will be transmitted from Buhehe storage tank to Dabani reservoir in Dabani Subcounty Headquarters. This section will be 13.422 km in length and will have the demand for Masafu town, Dabani town, Busia Municipality, and the towns of Buteba, Masinya and Sikuda. Thus, a booster station will be located at Buhehe storage tank to deliver water to Dabani Reservoir. Additionally, a tap-off along the transmission line will be provided for Masafu town.

The treated water main has been sized at the ultimate year whereas its pumps and the reservoirs to be supplied have been sized at the intermediate year, thus they will be expanded in the future to suit the ultimate year.

2.1.4 Storage reservoirs at Buhehe and Dabani

Three storage reservoirs have been designed for the project. The first reservoir already exists and will be connected directly to the clear water tank at the WTP and will supply Majanji town.

The second reservoir along the transmission line will be located at Butangasi Parish, Buhehe Sub County. It has been designed at 500 m³ in the intermediate and ultimate years. A booster station will be located next to it to augment supply to the third reservoir.

The third reservoir, main storage tank for Busia Municipality, will be located at Dabani Sub County Headquarters. It will also be used as a main distribution tank for the towns of Dabani, Buhehe, Buteba, Masinya and Sikuda. The storage capacity of this reservoir will be at 1500 and 2500 m³ in, respectively, the intermediate and ultimate year.

2.1.5 Improved distribution network

The distribution network, designed for the ultimate year, was focused on Busia Municipality (Figure 5). The design includes extensions to the peripheral areas of the Municipality and surrounding towns.

Figure 5: Layout of proposed Busia Municipality distribution network.
Source: Fichtner and M&E, 2015b.

2.2 Onsite sanitation management facilities

The project proposes to build ten 5-stance toilets in schools, of which five will be for girls and the remaining five for boys. However, the schools to be provided will be jointly selected during execution of works by the Municipal Council, the Client and Site Management.

Thirteen public toilets will also be built or rehabilitated in a number of public places, including market places, bus stops, administrative areas, hospitals and informal areas. The toilets will generally vary between 5 and 13-stances. The new and to be rehabilitated toilets will have hand-washing facilities and shower rooms for both male and women.

2.2.1 Offsite sanitation management

The offsite sanitation management (faecal sludge disposal) facility proposed for the project is a hybrid constructed wetland (hybrid of vertical flow (VF) and horizontal flow (HF) constructed wetlands, Figure 6). Sized at 3,842 m^3/annum (i.e. ultimate year faecal sludge production rate of the project area), the system consists of two VF and one HF system. Water percolates downward through the sand and gravel medium in the liquid/solid separation media where it is collected at the bottom and then channelled to the next cell (percolate treatment medium) for further treatment. The downward flow of water in VF systems allows for much more oxygen rich (aerobic) conditions.

A cesspool emptier (sludge emptying truck) will be employed in ferrying/transferring faecal sludge from the on-site sanitation facilities (latrines and septic tanks) to the FSTP, thus there will be no sewers. The cesspool emptier, assumed at 6 m^3 capacity, will be emptied in 7 minutes at the FSTP.

In general, the faecal sludge treatment plant will comprise:

i. Solid/liquid separation with planted drying beds and retention of the solids component until stabilised. The planted drying beds are designed as parallel batch operated beds with alternative operating cycles of loading and resting.

ii. Pre-treatment of the liquid portion by vertical flow constructed wetlands. The water drained out of the planted drying bed is collected and drained to vertical constructed wetlands, which are batch operated vertical planted filters, with alternating periods of activity and inactivity. The longest recommended activity/inactivity cycle is 3 weeks: 1 week of feeding before a 2 weeks resting period.

iii. Polishing treatment of the liquid portion by horizontal rock filters. In a horizontal rock filter, the wastewater travels through a submerged porous rock bed, where the biomass is attached to the rock. The bed shall be emptied every 15 years.

iv. Final treatment of the liquid portion in natural wetlands.

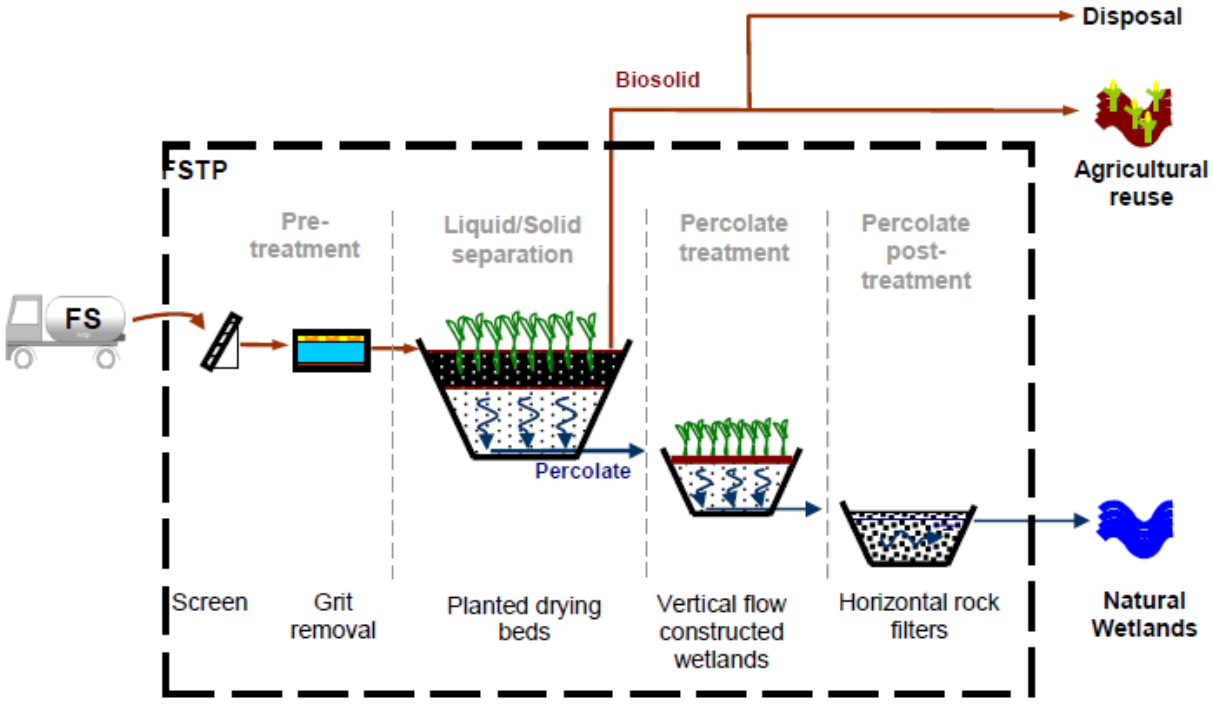

Figure 6: Schematic of the FSTP process to be adopted.

(Source: Fichtner and M & E, 2015a).

3 POLICY, LEGISLATION AND REGULATIONS

3.1 National policies and Laws on environmental and Social Impact assessment

There are several environmental and social policies and laws that will be triggered during the implementation of proposed Busia WSSP. A list below provides applicable policies, laws and guidelines: -

3.1.1 Policies

- Vision Uganda 2040
- Draft National Environment Management Policy, 2014
- National Water Policy, 1999
- National Policy for the Conservation and Management of Wetland Resources, 1995
- Uganda National Land Policy, 2013
- National Health Policy, 2010
- Uganda Wildlife Policy, 2014
- Uganda Forestry Policy, 2001
- National Gender Policy, 1997
- HIV/AIDS Policy, 1992

3.1.2 Guidelines

- EIA Guidelines, 1997
- Environmental Impact Assessment Guidelines for water resources related projects, 2011
- The Environmental Audit Guidelines for Uganda, 1999
- The Environmental Impact Assessment Public Hearing Guidelines of 1999
- The Guidelines for Occupational Safety and Health, Including HIV in the Health Services Sector 2008

3.1.3 Laws

- The 1995 Constitution of Uganda (as amended)
- The National Environment Act, Cap 153
- The Water Act, Cap 152
- The Land Act, Cap 227

- The Land Acquisition Act, Cap 226
- The National Forestry and Tree Planting Act, 2003
- The Uganda Wildlife Act Cap 200
- The Public Health Act Cap 281
- The Occupational Safety and Health Act No. 9, 2006
- The Physical Planning Act, 2010
- The Local Governments Act, Cap 243
- The Employment Act, 2006
- The Workers' Compensation Act 2000
- The Children Act Cap 59
- The Prevention of Trafficking in Persons Act, 2009
- The Penal Code Act Cap 120

3.1.4 Regulations

- The Water Resources Regulations, 1998
- Water (Waste Discharge) Regulations, 1998
- The Water Supply Regulations, 1999
- The Sewerage Regulations, 1999
- The Environment Impact Assessment Regulations, 1998
- The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000
- Environment (Waste Management) Regulations, 1999
- The National Environment (Delegation of Waste Water Discharge Functions) Instrument, 1999
- The National Environment (Standards for Discharge of Effluents into Water or on Land) Regulations, 1999
- The National Environment (Noise Standards And Control) Control of Noise Regulations, 2003
- The Employment (Employment of Children) Regulations of 2012

3.2 Key Environmental Policies, Laws and Guidelines

The water source of the Busia WSS project is Lake Victoria. The Water intake and Water Treatment Plant will be located in Namundiri 'A' Village, Majanji Parish, Majanji Sub County. As a result of the project the water quality of the lake at the intake point may deteriorate; the current volumetric potential of Lake Victoria will be lowered due to diversion / pumping of water for the purpose of this project. Since the implementation of the project will affect the Lake, the following laws will be triggered.

Law/Regulation/Guideline	**Key provisions and Relevancy**
The 1995 Constitution of Uganda (as amended)	The implementation of the project will take into consideration of the Constitution that provides for, *inter alia,* matters pertaining to land, natural resources (such as swamps, rivers and lakes) and the environment. Principle XXVII of the Constitution declares that: a) Utilization of natural resources shall be managed in such a way as to meet the development and environmental needs of the present and future generations of Uganda, particularly taking all measures to prevent or minimize damage and destruction to land, air, and water resources resulting from pollution or any other kind of natural resource degradation. b) The state shall promote sustainable development and public awareness of the need to manage natural resources and to ensure that the utilization of the natural resources of Uganda shall be managed in such a way as to meet the needs of present and future generations.
The Land Act Cap 227	The Act requires a person who owns or occupies land to manage and utilize the land in accordance with the environmental laws and other laws listed in Section 43 including the Water Act and National Environment Act.

Law/Regulation/Guideline	Key provisions and Relevancy
The National Environment Act Cap 153	The Act provides a list of projects in the third schedule for which an EIA is a requirement. It also provides for guidelines and regulations for undertaking an EIA and emphasizes public participation in the conduct of an EIA. Sections 19, 20 and 21 of the Act lay out the EIA process, and Sections 22 and 23 make it a requirement to undertake environmental audits and monitoring of on-going activities or projects under implementation.
The Environment Impact Assessment Regulations, 1998	Regulation 2 (2) provides that no developer shall implement a project for which environmental impact assessment is required under the Act and under these Regulations unless the environmental impact assessment has been concluded in accordance with these Regulations.
The EIA guidelines of 1997	The guidelines establish three major phases through which the EIA should be conducted namely; the Screening phase, the environmental impact study phase and thirdly, the decision making phase.
The Environmental Impact Assessment Guidelines for water resources related projects, 2011	The guidelines under Section 3.4.1 requires that in order to avoid excessive abstraction or pollution of the available ground water resources, an assessment be carried out for all those water use projects that are likely to impact on such groundwater resources in rural and small towns' water supply projects. ESIA for this project has been conducted based on the above provisions of the Act, the EIA regulations and the guidelines followed. NEMA will issue an EIA certificate for the Busia WSSP after reviewing and approving the ESIA.
The Water Act Cap 152	Under Section 18 (2) a person wishing to construct any works or to take and use water is required to apply to the director of the Directorate of Water Development for a permit to do so.
The Water Resources Regulations, 1998	The developer will be required, to apply for surface water and construction permits from DWRM to abstract water from Lake Victoria.
The Physical Planning Act,	The Act regulates the approval of physical development

Law/Regulation/Guideline	Key provisions and Relevancy
2010	plans and applications for development permission. Section 37 requires an applicant of a development permit to acquire environmental impact assessment certificate in accordance with the National Environment Act before he or she can be granted full approval to develop. Therefore the development of the Busia WSSP is subject to the control of Physical Planning Authority of Busia Municipal Council as mandated under S.12 of the Act.

The Water Treatment Plant (WTP) will discharge backwash water into Lake Victoria and dispose of water treatment sludge, which contains aluminium sulphate, a known toxic or hazardous waste. The faecal sludge treatment plant (FSTP) at Okame – Amogoro Village, Mawero Parish, Buteba Sub County will release sewage effluent into the Okame -Amogoro stream, which will have excessive plant nutrients like nitrates, nitrites and phosphates; organic matter high in BOD_5 and COD; and pathogens. These will degrade the water quality of the downstream aquatic environment.. The following laws and regulations will be triggered at the Water Treatment Plant.

Law/Regulation	Key provisions and Relevancy
The Constitution of Uganda 1995 (as amended)	Principle XXI requires the Government of Uganda to take all practical measures to promote a good water management system at all levels. Article 39 provides that every Ugandan has a right to a clean and healthy environment.
The Water Act Cap 152	S. 29 (1) provides that a person wishing to discharge waste may apply to the Director for a waste discharge permit in the prescribed manner. S. 31 (1) deals with prohibition of pollution to water and stipulates that a person commits an offence who; unless authorized under Part 5 of the Act, causes or allows waste to come into contact with any water, waste to be discharged directly or indirectly into water and water to be polluted.
The Water (Waste Discharge) Regulations (1998)	Regulation 4 (1) require a person who wishes to discharge effluent or waste on land or into aquatic environment to apply for a waste discharge permit.
The National Environmental	Regulation 3 and the schedule prescribe maximum

Law/Regulation	Key provisions and Relevancy
(the Standards for Discharge of Effluent into Water or on Land) Regulations of 1999	permissible standards limits for effluent or waste to be discharged into water or on land. The water treatment plant and the faecal sludge treatment plant have to comply with the standards as specified in the Schedule of the Regulations. The functions of Executive Director NEMA under the Regulations are to ensure that an operator of a plant undertakes pre-treatment of effluent before discharge into any receiving environment. The powers to enforce this Regulation is delegated to the DWD now DWRM.
The Waste Management Regulations of 1999	The Regulations require waste disposal in a way that would not contaminate water, soil, and air or impact public health. Regulation 5 requires a person who owns or controls a facility or premises, which generate waste to minimise the waste generated by adopting the following cleaner production methods and reduce toxic emissions and wastes. Regulation 14 requires any person who intends to operate a waste treatment plant or disposal site to apply to NEMA for a licence and Regulation 15 to carry out EIA before the plant is established and an operator of a waste treatment plant or disposal site to carry out an annual audit of the environmental performance of the site or plant and shall submit a report to NEMA. The Developer (MWE) will need to apply for a licence to operate the faecal sludge treatment in accordance with the Waste Management Regulations.
The Local Government Act Cap 243	Under Part 4 of the second schedule of the Act, the local government is mandated to ensure the protection of wetlands, the protection and maintenance of local water resources inter alia. The Busia District Natural Resources/Environmental Officers shall in this respect monitor the project implementation to ensure that the project meets the environmental standards.

The Busia WSSP will have impacts on wildlife. The area has hippos that have a terrestrial range of 10 km in the dense wetland surrounding Lake Victoria. The water project will cause noise, vibrations, lights and fencing which will affect free movement, feeding, mating and health of wildlife. The wildlife Act will therefore be triggered.

Law/Regulation	Key provisions and Relevancy
The Wildlife Act Cap 200	The Act provides for sustainable management of wildlife. S.15 of the Act states that any Developer desiring to undertake any project, which may have a significant effect on any wildlife species, or community, shall undertake an environmental impact assessment in accordance with the National Environmental Act. This ESIA is carried out in line with this provision. Uganda Wildlife Authority (UWA) is the institutional body whose principal function is to ensure sustainable management of wildlife resources in Uganda. It shall monitor the implementation of conservational measures of the wildlife by the water project in Busia.

The project has impacts on public health, which though have been mitigated as given in the ESMP. The FSTP will discharge effluent that contains bacteria and heavy metals, which will affect public health. The water project will cause noise, vibrations, and dust emission from excavation of foundations, trenches for transmission and distribution pipelines. These can potentially impact on public health hence triggering the following laws and regulations.

Law/Regulation	Key provisions and Relevancy
The Public Health Act Cap 281	Section 7 provides local authorities with administrative powers to take all lawful, necessary and reasonable practicable measures for preventing the occurrence of, or for dealing with any outbreak or prevalence of, any infectious, communicable or preventable disease, to safeguard and promote the public health. Busia District /Municipal Council Authority will take measures, including if necessary, proceedings at law to ensure mitigation of the project impacts on public health within their Jurisdiction.
National Environment (Noise Standards And Control) Control of Noise Regulations, 2003	Regulation 6 established permissible noise levels for a facility. Regulation 12 requires that any owner or occupier of premises whose works or activities are likely to emit noise in excess of the permissible noise levels shall apply to the Executive Director of NEMA for a license to emit noise in excess of the permissible levels. The project Developer will apply for the license from NEMA so as to comply with standards provided under the

Law/Regulation	Key provisions and Relevancy
	Regulations.

3.3 Key Social Policies, Laws and Guidelines.

The construction will require both unskilled and skilled labour. These require protection equipment (PPEs) and there are likely challenges to arise from the provision of healthcare of the workers. Accidents such as fire out breaks at the WTP, falling from heights, electrical shocks, collapse of facilities at the various project facility sites and injuries may occur during the construction, operational and decommissioning phases of the project. Such employment issues will trigger the following laws.

Law/Regulation	Key provisions and Relevancy
The Employment Act No 6, 2006	The Act makes provisions for governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management and compensation of workers. It mandates Labour Officers to regularly inspect the working conditions of workers to ascertain that the rights of workers and basic provisions are provided and workers' welfare is attended to. Further, it has provisions prohibiting forced labour, discrimination and sexual harassment at workplaces (Part II; Part IV), Providing for labour inspection by the relevant Ministry (Part III) and stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI). The Developer shall be required to treat workers with fairness and without discrimination and in addition, Busia District Labour officers shall regularly monitor the Contractor's compliance.
The Occupational Safety and Health Act, 2006	The Occupational Safety and Health Act, 2006 provides for, general duties, obligations and responsibilities of employers, rights and responsibilities of workers and general safety requirements. Section 13 (1) a stipulates that it's the responsibility of the employer to take, as far as is reasonably practical all measures for the protection of his or her workers and the general public from the dangerous aspects of the employer's undertaking at his or her own cost. The employer should ensure, as far as is reasonably practical, that the working environment is kept free from any hazard due to pollution.

	Section 19 requires an employer to provide adequate and suitable protective clothing and protective equipment to the workers of his or her undertaking. The Busia WSSP should adhere to occupational safety and health rules according to the mitigation measures suggested in this report such as workers be trained in health safety, given the PPEs and given access to a first aid kit.

The project may have risk of using children labour at construction sites and therefore the underlying provisions have to be complied with. The following laws relating to protection from child labour will be triggered.

Law/Regulation	**Key provisions and Relevancy**
The 1995 Constitution of Uganda (as amended)	Article 257 defines a child as any person below the age of 18 years. (*Also Section 2 of the Children Act Cap 59 and the Prevention of Trafficking in Persons Act 2009*) Article 34 (4) of the Constitution provides that Children are entitled to be protected from social and economic exploitation and shall not be employed in or required to perform work that is likely to be hazardous or to interfere with their education, to be harmful to their health or physical, mental, spiritual, moral and or social development.
The Employment Act 2006	Section 32 prohibits employment of a child under the age of twelve years to be employed in any business, undertaking or work place. The Act permits a child of under the age of fourteen years to be employed on condition that work is light work and carried out under supervision of an adult aged over eighteen years and does not affect the child's education. It also requires that the child is not employed in any employment or work which is injurious to his or her health, dangerous or hazardous or otherwise unsuitable and that a child does not work between the hours of 7 p.m. and 7 a.m. The person who employs such a child has to notify a labour officer in writing that the employment or work complies with the above conditions.
The Employment of Children Regulations of 2012	The Regulations also emphasize that a child employed under the age of fourteen years shall not be employed in any business undertaking or workplace, except for light work carried out under the supervision of an adult and where the

Law/Regulation	Key provisions and Relevancy
	work does not exceed fourteen hours per week. They prohibit employment of a child to do work which is injurious, dangerous, and hazardous or in the worst forms of child labour. Overtime work is prohibited for a child aged between fifteen to seventeen years and a child shall not be employed at night between the hours of 7.00 p.m. and 7.00 a.m. The Ministry of Water and Environment will work with the Ministry of Gender, Labour and Social Development to ensure prohibition of child labour by the contractors of the project.

Women and child sexual abuse by contractors is on the rise in Uganda and in undertaking the project activities. Protection ought to be given to Children and women against sexual abuse and therefore the laws below will be triggered.

Law/Regulation	Key provisions and Relevancy
The Penal Code Act Cap 120	Section 129 stipulates that any person who has sexual intercourse with a girl under the age of 18 is guilty of an offence and is liable to suffer death and also stipulates that any person who unlawfully and indecently assaults a boy under the age of 18 is guilty of felony. Section 131 prohibits procurement or attempting to procure a girl for the purpose of commercial sexual exploitation. *(Also Regulation 5 of the Employment of Children Regulations 2012)* Section 123 makes it an offence to have sexual intercourse with a woman without her consent and Section 132 prohibits procuring defilement of women and girls by threats or intimidation or false pretences or false representations or administration of drug, matter or thing with intent to stupefy or overpower.
The Prevention of Trafficking in Persons Act 2009	Section 8 prohibits recruiting a person below 16 years in any form of employment for the purposes of exploitation or introducing or matching any person to another for purposes of sexual exploitation In Implementation of the project, the Ministry of Water and Environment will work with the Ministry of Gender, Labour, and Social Development to make sure that the women and children are not sexually exploited by the contractors. Busia District Labour officers have a key role in monitoring

Law/Regulation	Key provisions and Relevancy
	compliance of the contractors.

3.4 Key International Environmental and Social Laws

The water source of the Busia WSS project is Lake Victoria, which is a trans-boundary water body that is shared by Kenya, Uganda and Tanzania. Since the water levels of the lake will be affected international law issues may arise. Uganda is a party to the Treaty for the Establishment of the East African Community 1999 which provides for the promotion of a sustainable growth and equitable development of partner States including rational utilization of the region's natural resources and protection of the environment. The EAC Protocol for Sustainable Development of Lake Victoria Basin, 2001 under Article 4 provides the principle of prior notification concerning planned measures whereby each of the Partner States shall notify other Partner States of planned activities within its territory that may have adverse effects upon those other States and the principle of Environmental Impact Assessment and Audit. Uganda is required to notify partner states of EAC through the Lake Victoria Basin Commission.

The EAC Protocol on Environment and Natural Resources Management 2006 requires the Partner States to cooperate in the management of shared water resources.

Also the Nile River Basin Cooperative Framework Agreement 2010 requires the Nile Basin States in utilizing Nile River System water resources in their territories, to take all appropriate measures to prevent the causing of significant harm to other Basin States (Article 5).

The Rio Declaration 1992 principle 17 requires that environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

The Water Management and Development Project Appraisal Document (World Bank, 2012), discloses notifications that have been made to the Partner States and the riparian countries.

The project is not anticipated to appreciably affect quality or quantity of water for other Nile riparian countries. However, in accordance with OP 7.50 in December 2011, the Nile Basin Initiative notified all riparian states (except South Sudan) on behalf of GoU. The Bank notified the Government of South Sudan on behalf of GoU. No unfavourable response to the notification was received.

3.5 Legal, policy and regulatory framework for resettlement in Uganda

The project involves construction of water supply and sanitation plants and transmission lines that require acquisition of land. This implies that the Central Government and Local Government have the responsibility to acquire land for the

construction of the different project facilities (i.e. water intake, WTP, transmission and distribution mains and FSTP) which means compensation of Project Affected Persons (PAPs). The different types of land tenure and the acquisition processes, under Uganda laws are given below.

3.5.1 Customary land

Most of the proposed land for the project in Busia is held under customary tenure. Land ownership is vested in the lineage and is allocated by a father to his sons, who in turn assign it to their wives and children for cultivation. The situation indicates that the youth and the women only have a user-right to the land and not ownership, which disadvantages a vulnerable group.

Part of the land for the water intake and Water Treatment Plant belonging to Bwiire Barrack Enos (0.558 acres), the FSTP land owned by Adome Philip (2.000 acre), the land for the Dabani Reservoir belonging to the late Musungu Birenge, (0.289 acres) are all under customary ownership. Implementation of the project on this land will trigger the laws below.

Law/Regulation	**Key provisions and Relevancy**
The 1995 Constitution	The Constitution restored recognition of the rights of those who held customary land (Article. 237 (3) (a) and (4)).
The Land Act Cap 227	Section 3 (1) of the Act explicitly recognized that customary law should regulate this form of land tenure. It states that customary land tenure shall be governed by rules generally accepted as binding by the particular community. Anyone who acquires land in that community shall also be bound by the same rules except where such rules are repugnant to natural justice, equity and good conscience. The required land therefore shall be acquired as per the customary rules in the respective areas with the involvement of Local Council 1 chairpersons to verify ownership and women and the youths' due their vulnerability.

3.5.2 Freehold land

In this project, part of land for the proposed water intake and the Water Treatment Plant in Namundiri "A" Village, Manjanji Parish, Majanji Sub County belong to Aggrey Awori (0.010 acres) with a freehold land title. Establishment of such project component on the freehold land will trigger the following laws.

Law/Regulation	**Key provisions and Relevancy**
The 1995 Constitution of	Article 237 (3) (b) provides that land in Uganda belongs to the citizens of Uganda and shall vest in them in accordance with the land tenure systems provided for in there under including

Law/Regulation	Key provisions and Relevancy
Uganda	freehold tenure
The Land Act Cap 227	Section 2 provides for the different tenures of land including freehold. According to S.3 (2), the freehold tenure may involve either a grant of land in perpetuity, or for a lesser specified time period. The Act specifies that the holder freehold land has full power of ownership of it and as such, he may use it for any lawful purpose, dispose of it by will or transact it in any other way as he or she sees fit upon negotiation with the project developer. A search has to be done with the District Land Board to certify title to the required land for the Water intake and the WTP as under the Registration of Titles Act Cap 230 S.101.

3.5.3 Public land

Part of the land for the Water Intake and the WTP (6.603 acres), land for the Majanji Reservoir (0.180 acres) and part of the transmission pipeline land (0.183 acres) in Namundiri "A" village, Majanji parish are occupied by the UPDF and registered under Uganda Land Commission. The land for Dabani Reservoir (0.537 acres) and part of the transmission pipeline land (0.103 acres) is held by Dabani Sub County in Dabani East Village. This is public land, which shall require public use by the water project. It requires the involvement into discussions by the MWE and the Ministry of Justice and constitutional affairs and Busia District Local Government. Where a government institution wants land that belongs to another government institution an application should be made to the Uganda Land Commission for change of use or shared use.

3.6 Compulsory land acquisition

Failure to reach consensus with the freehold and customary owners of land as above invokes government's compulsory land acquisition with adequate compensation. The principle of eminent domain (compulsory acquisition of land) allows Governments to lawfully acquire land for public purposes. The following laws will be triggered in circumstances of compulsory land acquisition.

Law/Regulation	Key provisions and Relevancy
The 1995 Constitution (as am ended)	Under Article 26, everyone has the right to own property either individually or in association with others. It further stipulates for compulsory acquisition where it is for public use but this should be done with by prompt payment of fair and adequate compensation prior to acquisition and with a right of access to courts of law.

Law/Regulation	Key provisions and Relevancy
The Land Act Cap 227	Section 42 provides that the Government or Local Government may acquire land in accordance with the provisions of Article 26 and 237(2) of the 1995 Constitution. Section 77 provides for the computation of compensation for the affected parties.
The Land Acquisition Act Cap 226	The Act governs compulsory acquisition of land for public purposes in addition to the Constitution of Uganda and the Land Act. S.2 (1) of the Land Acquisition Act provides that the Minister is empowered to acquire any land if he is satisfied that the land is required for "Public Purpose". Section 42 the Act makes provision for payment of compensation to any person whose interest in land is extinguished as a result. The Busia WSS project is in public interest since it is targeted at enhancing sustainable supply of clean and safe drinking water.

The procedure for compulsory acquisition of the land for the Busia WSSP is as follows:

- The Minister for Lands and Urban Development will authorize Ministry of Water and Environment to find out the suitability of land for the purpose it is being acquired. This includes surveying the land, digging or boring the land for samples, etc. If damage occurs on the land, Government compensates the land owner for the damage (Section 2 of the Land Acquisition Act);

- The Minister then makes a declaration by statutory Instrument (by law) that the land is suitable and a copy of the declaration given to the owner of the land (Section 3 of the Land Acquisition Act);

- The Assessment Officer (this is a public officer appointed by the Minister) orders the marking ,measuring of the land and a plan of the land to be made (Section 4 of the Land Acquisition Act);

- A notice of not less than 15 days is given inviting all people having interest in the land to the assessment officer on a day, time and place specified in order to determine the nature of their claims, the amount of compensation to be paid and any objections they may have to the plan for the land use(Section 5 of the Land Acquisition Act);

- The Assessment officer on the day specified hears the claims and makes an award specifying the true area of the land and the compensation which

should be paid to each person having an interest in the land (Section 6(1) of the Land Acquisition Act);

- Compensation is paid basing on the current market price of the land in the area prepared annually by the District Land Board. (Section 59(1) (e)&(f) of the Land Act);

- Any person aggrieved by the award of the Assessment Officer may appeal to the District Land Tribunal or the High court if the Value of the land exceeds 50,000,000/= (Section 76 1(b) &(c) of the Land Act) the Uganda Land Commission then pays compensation for the value of the land if no appeal is made to the Courts of law (Section 6(4) (b) of the Land Acquisition Act).

3.7 World Bank Safeguard Policies

The Busia WSS Project will be funded by the World Bank, which has environmental and social safeguard policies that are designed to avoid, mitigate, or minimize adverse environmental and social impacts of projects supported by the bank. The operational policies triggered in this project are summarized in below. Safeguards policies triggered by the project and their handling are summarized in table below.

Safeguard policies triggered by the WMD Project in Busia.

Safeguard Policies Triggered	**Reason**
Environmental Assessment OP/BP 4.01	OP 4.01 is triggered as the project may have adverse environmental and social impacts through its infrastructure building activities, particularly civil works for water supply and sanitation, water abstraction, establishment of faecal treatment plant and be affected by discharge from the wastewater into the Okame - Amogoro stream and wetlands around Lake Victoria. In general, the project falls under Category B of the World Bank´s classification of projects requiring an EIA given that its potential adverse environmental and social impacts will be site specific, few if any are irreversible, and in most cases mitigation measures can be readily designed. Additionally, the World Bank Environment Health and Safety Guidelines (EHSGs), with specific reference to the EHSGs for water and sanitation projects, applies to the project.
Natural Habitats OP/BP 4.04	OP 4.04 is triggered due to potential loss or degradation of natural habitats including, riparian and wetland habitats, through project planning, physical activities or use of water resources. Project includes activities in ecologically sensitive areas such as wetlands around Lake Victoria.
Physical Cultural Resources OP/BP 4.11	So far in this ESIA no PCRs like graves, shrines have been found above ground in the project area. However, with excavations chance finds of archaeological / paleontological value may be found. Hence there is a possibility this safeguard may be trigged by the project.
Involuntary Resettlement OP/BP 4.12	OP 4.12 is triggered due to land acquisition at the water intake and WTP: freehold land belonging to Aggrey Awori (0.010 acres) and customary land belonging to Bwiire Barrack Enos (0.558 acres). At the FSTP, land belonging Adome Philip (2.000 acres) will be acquired, while land belonging to the family of the late Musungu Birenge (0.289

Safeguard Policies Triggered	Reason
	acres) at the water reservoir will be acquired. Compliance will be ensured through the RPF and RAP which are prepared separately. OP 4.12 requires compensation at replacement cost as minimum.
Projects on International Waterways OP/BP 7.50	OP 7.50 is triggered since the project encompasses international waters including the River Nile and Lake Victoria. Compliance has been ensured through the issuance of a Notification to the Riparian by the Nile Basin Initiative and the World Bank (see the Project Appraisal Document, WB, 2012).
World Bank Policy on Access to Information (July 1, 2010)	This policy will be triggered since there is need for policy on disclosure of information to all the stakeholders. Compliance has be ensured by discussing the information to all the stakeholders such as district technocrats, Municipal and Local council leaders, and communities among others during the consultation process and the information is accessible.

4 ENVIRONMENTAL AND SOCIAL BASELINE

4.1 Socio-economic Environment

4.1.1 Demographic characteristics

In 2014 Busia District had a population of 325,527 (UBOS Population Census, 2014) compared to 225,008 in 2002 (UBOS Population Census, 2002). The district population growth rate was 3.08%. The majority of the people stay in rural areas (259,569) against 55,958 in urban areas. Since the project area covers nine out of the 14 sub counties in the district, the above statistics are a true reflection of the project area. In the socio-economic survey carried out, the majority of the project affected household heads in Busia are male (See Table 6 below). Male-headed households constituted 87.5% while female household heads accounted for 12.5%. However, female headed households are more vulnerable to such projects and impact on their livelihoods and the general welfare of their household members tend to be severe compared to their male counterparts.

Table 6: Gender of the Household heads.

Gender of the PAPs	Percentage
Male	87.5
Female	12.5
Total	**100.0**

4.1.2 Ethnic composition

The socio-economic survey of PAP's show only two tribes in Busia i.e. the Basamia 96.9% and the Iteso 3.1% are affected by the project. Busia District is a multi-ethnic society with the indigenous Basamia constitute 46%, followed by Bagwe at 25%. Other tribes that co-exist include the Iteso, Basoga, Bagisu and Karamojong.

Busia being a border district (neighbouring Kenya) has a transient population. According to the 2002 Census indigenous Ugandans constituted 98 percent of the population, while 2 percent were non Ugandans. The majority of immigrants were females. Immigrations were associated to education, marriage and economic purposes.

Since only the indigenous Basamia and Iteso were the only ones affected by the project, this means they are the only ones who have access to land, crops and property in the project area. The other tribes are mainly in trade business since this is a border district.

Table 7 shows the composition of the tribes in the project area.

Table 7: Tribe of the PAPs.

Ethnicity of the PAPs	Percentage
Musamia	96.9
Iteso	3.1
Total	**100.0**

4.1.3 Age composition of the affected persons

Majority of the PAPs are aged 45 – 54 years with those above 55 years of age comprising of 31.3% respectively. PAPs aged between 35 and 44 years are only 21.9% while those aged 25 to 34 years were only 12.5%. Only one of the PAPs was aged 15-24 years. By implication, 31.3% of the PAPs in the affected area are above 55 years of age making them vulnerable to the proposed project activities. Also the one aged between 15 - 24 years is likely to be affected by the project, see Table 8.

Table 8: Age composition of the PAPs.

Age composition of the PAPs	Frequency	Percentage
15-24	1	3.1
25-34	4	12.5
35-44	7	21.9
45-54	10	31.3
55+	10	31.3
Total	32	100.0

4.1.4 Religious affiliation

The socio-economic survey established the religions of the project affected persons. It was established that majority of the PAPs were protestants (53.9%) followed by Catholic (46.1%). Moslems and other forms of religious affiliation such as the born again, SDA and traditionalists were not encountered in the survey (see Table 9 below).

Table 9: Religion of the PAPs.

Religion of the PAPs	Freq.	%
Catholic	15	46.1
Protestant	17	53.9
Muslim	0	0.0
Other	0	0.0
Total	**32**	**100**

4.1.5 Marital status

The marital status is a very useful variable in understanding the potential impact of the project on familial relationships and social capital. Majority (75%) of the HH heads that were surveyed in the project affected area are married. This means that the proposed water project will mainly affect the married people. The widowed (15.6%) are a vulnerable group and magnitude of the effect of the project on their standards of living and general welfare is likely to be high compared to the rest of the groups. Single and separated affected persons constitute 6.3% and 3.1% respectively (see Table 10).

Table 10: Marital status.

Marital status	Percentage
Single	6.3
Married	75.0
Separated	3.1
Widowed	15.6

Marital status	Percentage
Total	**100**

4.1.6 Average household size

The survey found that the average HH size of the PAPs is 4.7 people, which is lower than the national average household size of 5.081. Table 11 below shows the percentage distribution of PAPs in the affected households across the male and female genders. The majority of the project affected households had HH sizes ranging between 2 - 5 people, followed by those with a size range between 6 -10. Very few HHs had more than 11 people. The bigger the HH, the higher the vulnerability and the likelihood of being affected by the project.

Table 11: Household size.

Gender	Household size			
	1-5 people	6-10 people	Above 11 people	Total
Males (%)	34.0	35.5	5.2	74.2
Female (%)	9.0	12.0	4.3	25.8
Total (%)	**33.0**	**47.5**	**9.5**	**100**

4.1.7 Education and literacy levels

The results from the socio-economic survey indicated that majority of the PAPs in the project area had attained and completed primary education (75.0%) followed by those who had attained secondary education (9.4%) and diploma level (9.4%) Table 12 below. Those who reported to have no form of formal education were 6.3%. According to the Busia District Development Plan, there is still a high level of illiteracy and low educational attainment, which in return affects the success of development projects and innovations, because the level of labour productivity in the district is very low.

Being illiterate, unable to read and write makes the PAPs more vulnerable given that they cannot explore the economic opportunities and their participation in decision making processes at the community level is minimal. This therefore implies that also their level of participation in the proposed project will be minimal and they could only offer support services.

Table 12: Education and literacy level.

Literacy level	Freq.	%
Illiterate	2	6.3
Completed primary	24	75.0
Completed secondary	3	9.4
Diploma	3	9.4
Total	**32**	**100**

4.1.8 Existence of vulnerable groups

Vulnerable groups usually have limited production assets, which are likely to be impacted by new projects and innovations yet their level of resilience is very low. The socio-economic survey established the different vulnerable groups among the

project affected HH heads and members. The vulnerability was examined in terms of marital status, age of the HH heads, and HH with members with disability and the chronically ill. 15.6% of the PAPs were widowed, 3.1% were child headed families while 48.4% were either disabled or chronically ill – see Figure 7 for details. The proposed project should therefore put in place mechanisms to meet the needs of vulnerable groups including improving on their livelihoods.

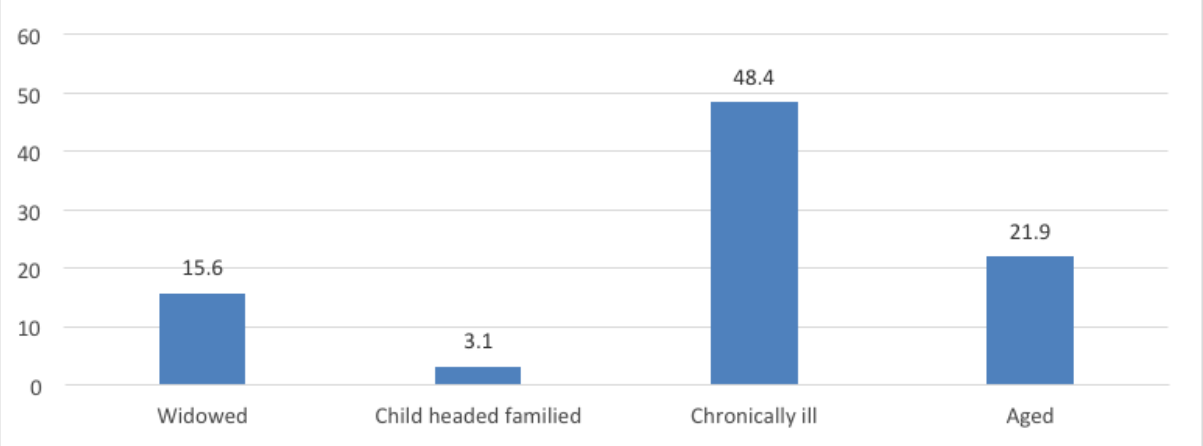

Figure 7: Existence of vulnerable groups among the PAPs.

4.2 Household Economy

The following sections present the household economy in terms of sources of livelihood. At a general level, people in the project area are living below the poverty line. The poverty condition is evidenced by low accessibility to social services, low household incomes, high unemployment levels and unskilled population due to the low levels of literacy. The sections present the socio-economic conditions of the PAPs at the different project facilities and along the proposed water project corridor among the sampled 33 of the affected households.

4.2.1 Access to income

In an effort to clearly understand access to income of the PAPs, the socio-economic survey examined the HH economy of the PAPs through establishing the different activities the PAPs are engaged in. According to Table 13 below, farming/livestock production was the main source of income and livelihood among the PAPs. It constitutes 75.0% of the major production activities among the PAPs. The other major production activities and sources of income are business/petty trade (9.4%) and civil service (9.4%). It was also established that 6.3% of the PAPs engaged in causal labour. No single affected HH head reported not to be employed in form of being a housewife, student or retired civil servant (see Table 13 below).

Table 13: Production activities

Production activities/occupation	Percentage
Farming/animal rearing	75.0
Business	9.4
Civil servant	9.4

Production activities/occupation	Percentage
Causal labour	6.3
Total	**100**

4.2.2 Type of crops grown

The socio-economic survey established that over 75.0% of the PAPs carryout crop and livestock production on the affected land for their livelihood. According to the Figure 8 below, the main food crops grown are banana (22.9%), coffee (21.7%), cassava (16.9%), groundnuts (14.5%), maize (12.0%), beans (7.2%) and only (1.2%) reported growing fruits. Some of the affected HHs reported poor crop yields due to inadequate agriculture extension services, presence of pests and diseases, lack of rain and poor farming practices. The major cash crop grown in the project is coffee.

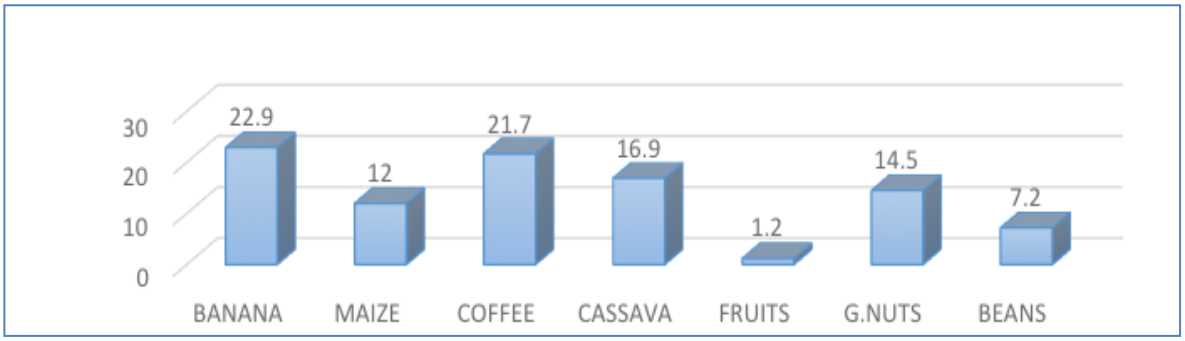

Figure 8: Crops grown by the PAPs.

4.2.3 Household earnings

Household income from farming among the PAPs is shown in Table 14. The data shows that majority of the HHs earn UGX 400,000 from farming annually. On average, the affected households earn 700,000 from farming annually. The maximum income from farming is UGX 4,000,000 while the minimum income is UGX 100,000 annually. This indicates that the affected households' earnings are low to enable them access essential necessities and basic social services.

Table 14: HH incomes from various activities.

HH income	Amount (UGX)
Average	700,000
Mode	400,000
Minimum	100,000
Maximum	4,000,000

4.2.4 Household expenditure patterns

Findings from the qualitative studies and community engagements show that household income is mainly expended on the major items including food, education expenses, medical expenses, airtime, transport, water, electricity and fuel. The implication is that the household expenditure patterns are consumptive and not investment based.

4.2.5 Access to and utilization of fuel

Among the project affected persons in Busia, it was found that the major source of fuel is firewood (81.3%), followed by using paraffin (18.7%). Interestingly no households in the affected areas reported using charcoal, solar and electricity. It was reported that firewood and paraffin are mostly used for as energy for cooking in the rural areas (see Table 15).

Table 15: Fuel used by the household.

Fuel type	Frequency	Percentage
Firewood	26	81.3
Paraffin	6	18.7
Charcoal	0	0.0
Solar	0	0.0
Electricity	0	0.0
Total	**32**	**100**

4.2.6 Ownership of communication and information technology (ICT) assets

The socio-economic survey established the different assets owned by the affected households as proxy welfare indicators. It was established that most of the affected HHs own ICT assets. For instance, Table 16, below, 96.9% of the affected HHs owned radios while 93.5% of the affected HHs own mobile phones. No affected HHs owned fixed phones. By implication, radio announcements and mobile phone messages can be used to inform communities in project affected areas about the project including inviting them for meetings and to participate in the different project activities. In addition, all the affected HH members owned at least two pairs of clothes while 77.4% of the affected HHs owned a transport equipment. According to Table 16 below, majority of the households own bicycles, very few households owned motorcycles and vehicles.

Table 16: ICT item ownership.

Do you own the ICT item below	Yes	No
Radio	96.9	3.1
Mobile phone	93.5	6.5
Fixed phone	0.0	100.0
Other items owned household members		
At least two sets of clothes	100.0	0.0
Own any transport equipment	77.4	22.6

4.2.7 Access and ownership of land

All the PAPs (100%) indicated that they have access to land and all of them farm on the affected land, while (96.3%) reside on the affected land although not as a principal residence. The project will only take small land for each land take such that the residual land is adequate for the PAPs to continue carrying out their economic activities. The maximum acres of land owned is 20 acres while the minimum acreage is 0.10.

Table 17: Average land in areas owned by the PAPs.

Ownership of land	Land area (acres)
Average	3.4200
Mode	2.00
Minimum	0.10
Maximum	20.00

4.2.8 Land tenure

Land was identified as the key asset by all the persons affected because it is a key factor of production. It is the source of food, income, and residence. It also provides space for burial grounds. Although, land holdings differ from one village to the other, the average land size per household differed according to the location of the households. In Busia, it was reported that the major land tenure in the project affected area is freehold and customary tenure system (see Table 18 below).

The socio-economic survey also found out that no one co-owned the land within the affected area. As a grievance resolution mechanism, community elders were reported to be playing important roles with regard to land disputes resolution through acting as mediators. Since land is mostly freehold, it can be used as a collateral to obtain a loan from the bank. However, those on customary land are somehow vulnerable because they cannot use it as collateral to obtain a loan from the bank for purposes of starting income generating activities. Customary land in Busia is regulated by customary norms and values and the boundaries under customary tenure are marked by trees, ridges and trenches.

Table 18: Land tenure system and ownership.

Type of land tenure	Frequency	Percentage
Customary	6	18.7
Freehold	26	81.3
Total	**32**	**100**
Status of occupancy		
Land owner	32	100.0
Licensee	0	0.0
Co-tenant	0	0.0
Total	**32**	**100**

It is therefore important that, the project implementation pays attention to the existing land tenure systems, status of occupancy as well as other crucial issues regarding land ownership and compensation procedures within the regulatory framework of Uganda. Specifically, the management and control of land in Uganda is regulated by the 1998 Land Act, which recognizes four tenure systems i.e. customary, mailo, freehold, and leasehold.

4.2.9 Evidence of ownership and encumbrances on affected land

The survey established the documentation and evidence of land ownership. Over 96.8% of affected landholdings reported to have no evidence of ownership of affected land in form of certificate of title. Only one household reported to have evidence of land ownership. In addition all the affected households said they do not

have a mortgage/lien on the owned land. It was also observed that in Busia, there were no claims on affected land (See Table 19 below). Lack of evidence of land ownership is likely to become a major deterrent during compensation. The only evidence of land ownership was in form of agreement with their parents and family members. However, this shall be mitigated by convening meetings comprising of the Local Council 1 Executive and Clan / Family members of which minutes shall be taken and signed, and will be evidence of ownership of the land due for compensation.

Table 19: Evidence of ownership.

Do you have evidence of land ownership	Frequency	Percentage
Yes	1	3.2
No	31	96.8
Total	**32**	**100**

4.2.10 Access to health

In the project affected area and like other rural communities in Uganda, the population in the proposed project area is affected by mainly malaria and stomach disorders. It was reported that 80.0% of the project affected persons are affected by malaria while 20.0% reported to be affected by stomach disorders. Ulcers is the major chronic illness suffered by affected households and it constitutes 66.7%. Other reported chronic illnesses included high blood pressure and HIV/AIDS. Very few households reported having members with disabilities. For instance according to Table 20 below, only 2 of the affected households reported having disabled people while 2 households reported having household members with crossed eyes.

Table 20: Disease prevalence.

Diseases	Frequency	Percentage
Common Diseases		
Malaria	26	80.0
Stomach disorders	6	20.0
Cough, flu	0	0.0
Headache	0	0.0
Sleeping sickness	0	0.0
Chronic illnesses		
Ulcers	6	66.7
Sickle cells	0	0.0
Cancer	0	0.0
Diabetes	0	0.0
Asthma	0	0.0
High blood pressure	1	11.1
Tuberculosis	0	0.0
HIV/AIDS	2	22.2

HIV/AIDS is also a big concern with a prevalence rate of 10% in the district. This is higher than the National prevalence rate of 6.8%. The main predisposing factors to HIV infection are mainly early, multiple and extramarital sexual relationships without the benefits of correct and consistent condom use, low awareness and poor access to condom outlets, community myths and misconceptions on HIV/AIDS issues, and

inadequate treatment of STIs. Socio-economic factors such as poverty, migrant labour, commercial sex work, the low status of women, including over dependency on men, idleness, illiteracy and low formal education, stigma, discrimination, and substance abuse, especially alcoholism, have a big bearing to HIV infection.

Busia District has unique features that have fuelled the epidemic. The business opportunities available along the Uganda – Kenya border was identified as one of the major factors presenting challenges to the health workers to control HIV transmission. Busia Municipal Council is also a hub for the long distance travellers, particularly truck drivers (hauliers) who stop over in town on their way either from or to Kenya, and the commercial sex workers, who move between Kenya and other big towns along the main route to Kampala of which Busia is inclusive.

In an effort to create community awareness about the spread and control of HIV/AIDS, the Ugandan Government together with various NGOs, both local and international, have come up with HIV/AIDS prevention and control interventions in the district. Such activities include: awareness creation through outreach programmes, drama, radio talk shows and routine counselling; condom distribution to communities and the private sector for disease prevention. This feeds into the medical services of Voluntary Counselling and Testing (VCT) and Routine Counselling and Testing (RCT).

In testing knowledge about the disease, the survey found that having unprotected sex with infected persons was reported as the major cause of HIV/AIDS in the project area (41.9%), followed by the mother to child transmission (40.5%) and sharing sharp instruments (17.6%). Majority of the PAPs said that HIV/AIDS can be avoided through safe child birth (35.9%), using condoms (34.6%) and abstaining from sex (29.5%). This is a clear indication that the PAPs are very knowledgeable about HIV/AIDS, its causes and how it can be avoided.

Table 21: Knowledge about the causes and how HIV/AIDS can be avoided.

Questions on HIV/AIDS	Frequency	Percentage
Knowledge on the causes of HIV/AIDS		
Unprotected sex with infected person	31	41.9
Mother to child transmission	30	40.5
Sharing sharp instruments	13	17.6
Infected blood transfusion	0	0.0
Other	0	0.0
Total	**74**	**100**
Knowledge on how HIV/AIDS can be avoided		
Using condoms	27	34.6
Safe child birth	28	35.9
Abstinence	23	29.5
Total	**78**	**100**

4.2.11 Access to water source

Based on the socio-economic survey, it was found out that the major source of safe water for domestic use within the affected areas was the community borehole (74.3%). 2.9% of the PAPs draw water from the river and ponds/dams which contain water that is not suitable for domestic consumption. No affected households

reported piped water as their main water source for domestic consumption (see Table 22).

Table 22: Major source of water for domestic use.

Water source	Frequency	Percentage
River	4	11.4
Community borehole	26	74.3
Protected spring	4	11.4
Ponds/dams	1	2.9
Total	**35**	**100.0**

4.2.12 Banking services

The socio-economic survey established that majority of the affected HH do not have bank accounts which is a sign of poor saving culture. It was established that (83.7%) of the affected HH do not have bank accounts, only (18.3%) reported to have accounts in commercial banks. The project teams should encourage the PAPs to open up bank accounts where their compensation will be deposited. This could also be a safeguard to prudently invest the compensation money (see Table 23 below)

Table 23: Access to banking service.

Do you have a bank account		**%**
Yes	6	18.7
No	26	81.3
Total	**32**	**100**

4.3 Physical Environment

4.3.1 Climate of Busia

The rainfall pattern in Busia District is typically bimodal, with the first rainy season extending from March to May and a longer rainy season from August to November, see Figure 9. The annual rainfall varies from a minimum of 1,080 mm to a maximum of 1,940 mm, with a mean of 1,514 mm (Busia District Report, 2009). It can be seen from Figure 9 that potential evapotranspiration varies between a maximum of 150 and a minimum of 115 mm/month.

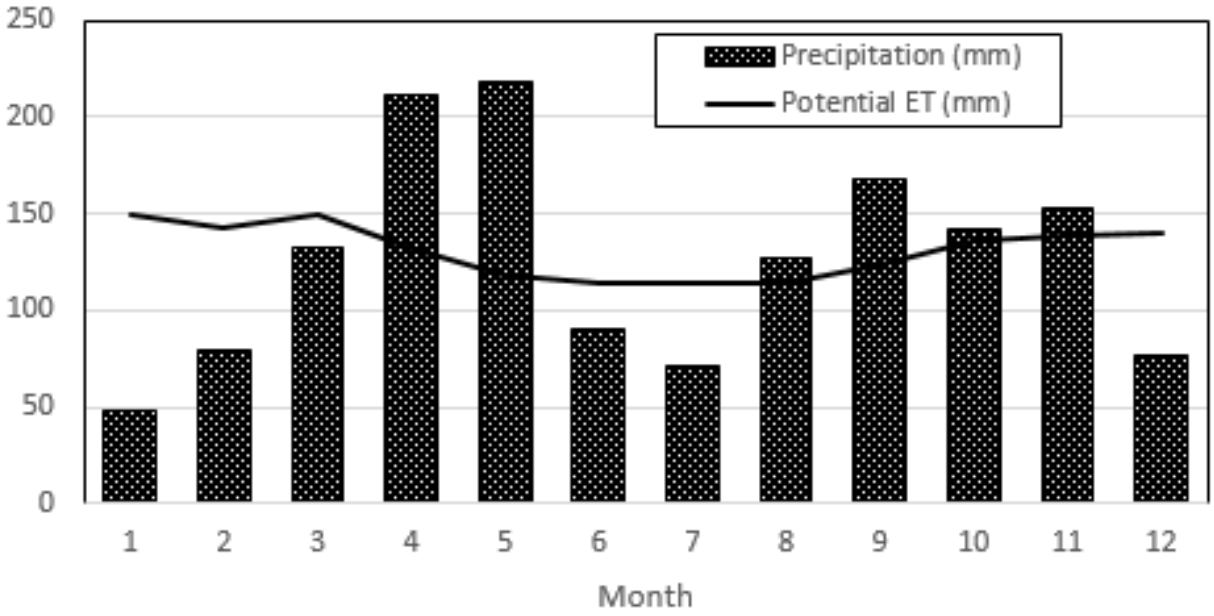

Figure 9: Mean monthly rainfall and potential ET in the project area.

4.3.2 Topography of Busia

Busia District is a flat to mild sloping landscape with undulating plain topography. With only a few hills in some places, the highest altitude is noticed at Nebolola hills, Lumino Sub County, at about 1,193 m AMSL. Meanwhile the lowest altitude is in the valley of River Malaba at 1,000 m AMSL (Busia District Report, 2009).

4.3.3 Geology and soils of Busia

Busia District is underlain by one major type of rock system: Pre-Cambrian rocks. This rock system is a basement that is rather complex and includes a variety of granites, gneisses, quartzite and small areas of other kinds of strong folded metamorphic rocks. The District is also characterized by the main out-crop of the Lunyo granite (NEMA, 2004).

Most soils in Busia District can be categorized as *petric plinthosols*, see Figure 10. *Plinthosols* are internationally referred to as 'Groundwater Laterite Soils'. They are iron-rich mixture of clay mineral soils that are primarily found in the wet tropics and formed from basic rock as a result of accumulation of iron under hydromorphic conditions. The impenetrability of the hardened layer as well as the fluctuating water table that produces it restricts its use to grazing or forestry (Britannica online).

The second largest soil group in Busia District can be categorized as *lixic ferralsols* and are defined by a fine-textured subsurface layer of low silt to clay ratio. They are formed on geologically old parent materials in humid tropical climates and occur on old but stable land surfaces. Thus, they are strongly weathered soils with low activity clays and low amounts of mineral nutrients. This makes the soils to have a low fertility and not suitable for agriculture, unless lime and fertilizer is added.

The third and smallest soil group in Busia District are *gleysols*. These are wetland based soils that, unless drained, are saturated with groundwater for long enough periods. They are found in depressions and low landscape positions with shallow groundwater. Are greyish/blueish in colour inside the soil horizons due to anoxic

conditions but turn brownish/yellowish/reddish in colour at surfaces of soil particles as the iron in the soil gets oxidized. They are generally fertile soils with high content of organic matter.

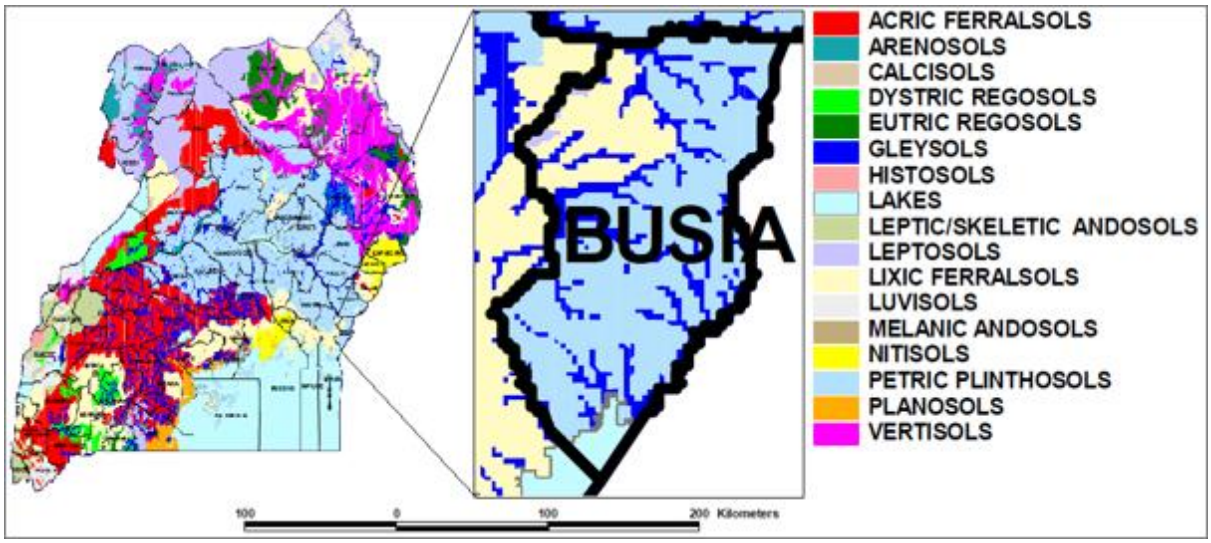

Figure 10: Soil map of Busia District (source: NARO, Undated)

4.3.4 Hydrology of the region of Busia

Busia region is characterised by two distinct drainage basins, namely: Lake Victoria and Lake Kyoga drainage basins (Figure 11). The Lake Victoria drainage system flows southwards and consists of rivers such as Sio, Nasigombe, Nalioba, Namagenge, Nalwire and Namatu draining into Lake Victoria.

The Kyoga drainage system flows northwards and consists of rivers such as Malaba, Kibimba and Lumboka draining into Lake Kyoga. Most streams are tributaries of River Malaba, including Solo, Okame - Abochet, Nakola, Tira and Osapiri (NEMA, 2004).

Busia District is equally endowed with wetlands covering up to 174.08 km^2 of land. The Lake Victoria wetland system covers an area of 76.96 km^2 mean while the Lake Kyoga system covers an area of 97.12 km^2. The major wetlands in the district comprise the Lumboka, Malaba, Lake Victoria and Sio wetland systems.

In a study undertaken for the Busia District Water Supply and Sanitation Project, groundwater was realized as a potentially viable option (Fichtner and M & E, 2015a). About 30% of the existing boreholes in and around the town area had yields above 5 m^3/h. This is in line with a study that was undertaken in 2010 by the Monitoring and Assessment Division of the DWRM during a National Water Resources Study (Nsubuga et al., 2014). The Lake Victoria and Lake Kyoga basins are among the top three drainage basins with the highest amounts of exploitable groundwater resource. This groundwater potential could partly be owed to the climate, topography, soils and geological formation of the region. The relatively high rains coupled with the relatively flat terrain and wetland systems gives ample time for groundwater recharge.

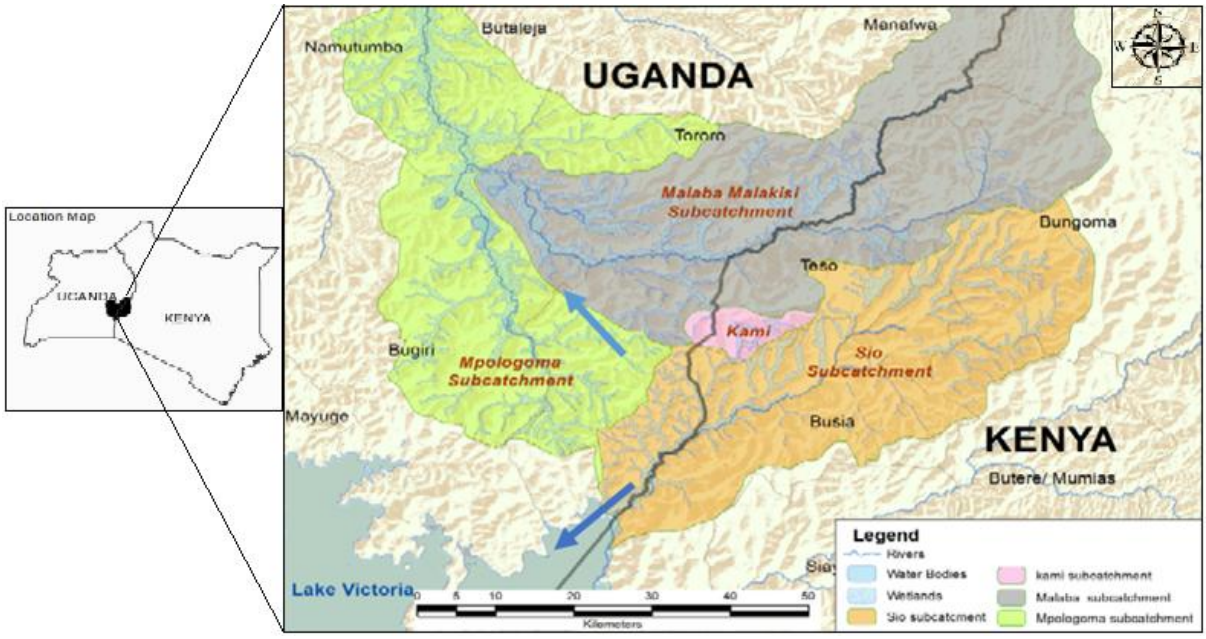

Figure 11: Lake Victoria and Kyoga drainage basins within the region of Busia.

(Source: NBI, 2012).

4.3.5 Analysis of Lake Victoria water level variability

Based on lake Victoria water level records as provided by the DWRM, the "Agreed Curve" for Lake Victoria (J. V Sutcliffe et al., 2007) and subsequent analysis in WETSPRO (Willems, 2008) and ECQ (Willems, 1998) hydrological assessment tools, the frequency of occurrence of various extreme water levels (low and high) with respect to the gauge level at Jinja pier was assessed (Figure 12 and Figure 13).

Low lake water levels may lead to water shortage that could negatively affect water availability for the project. However, the lowest water level so far registered at Jinja pier is 10.33 m. This corresponds to a return period of about 250 years, Figure 12. Thus, to ensure a continual water supply for the project, the intake level should preferably be located below this observed minimal low water level.

High water levels could lead to flood conditions that may interfere with the operation of the WTP facility given that it will be constructed on to the lake shore. The highest water level so far registered at Jinja pier is 13.35 m. This corresponds to a return period of 10 years (Figure 13). Thus, the design team must ensure that the WTP facility is protected from floods by moving it to higher grounds or raising its foundation while taking the pier level at Jinja as reference.

With respect to sustainable environmental flows and requirements of other water users downstream of Lake Victoria, the project will abstract, at maximal, 13,637 m^3/day (0.16 m^3/s). This is about 0.04% of the minimal observed (381.88 m^3/s) Lake Victoria outflow. Thus, the effect of water withdrawal for the project will not be significant on other water users.

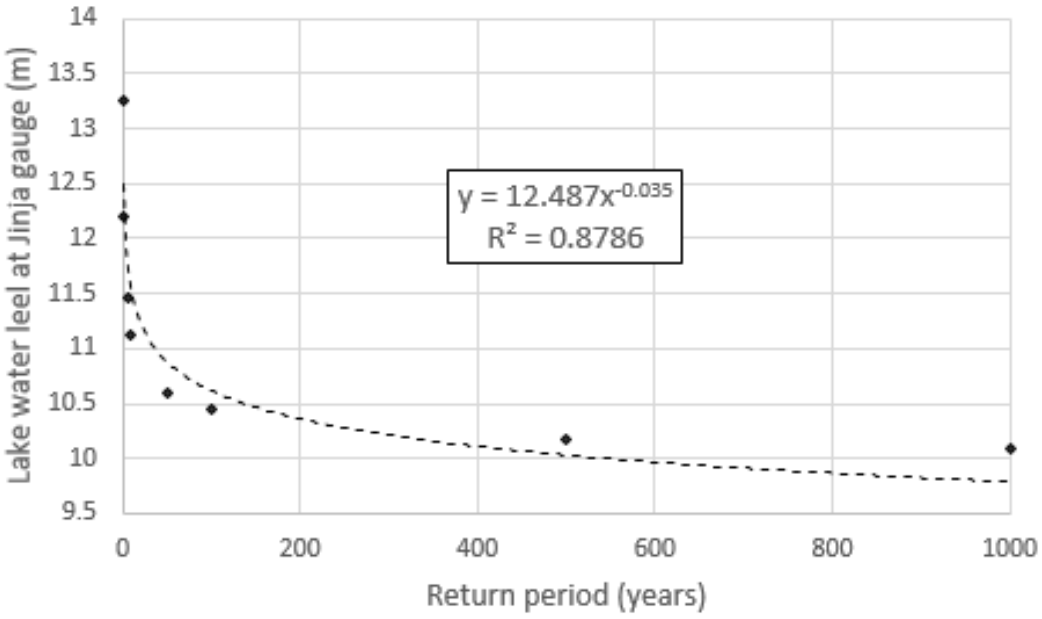

Figure 12: Frequency of occurrence of low water levels at Lake Victoria.

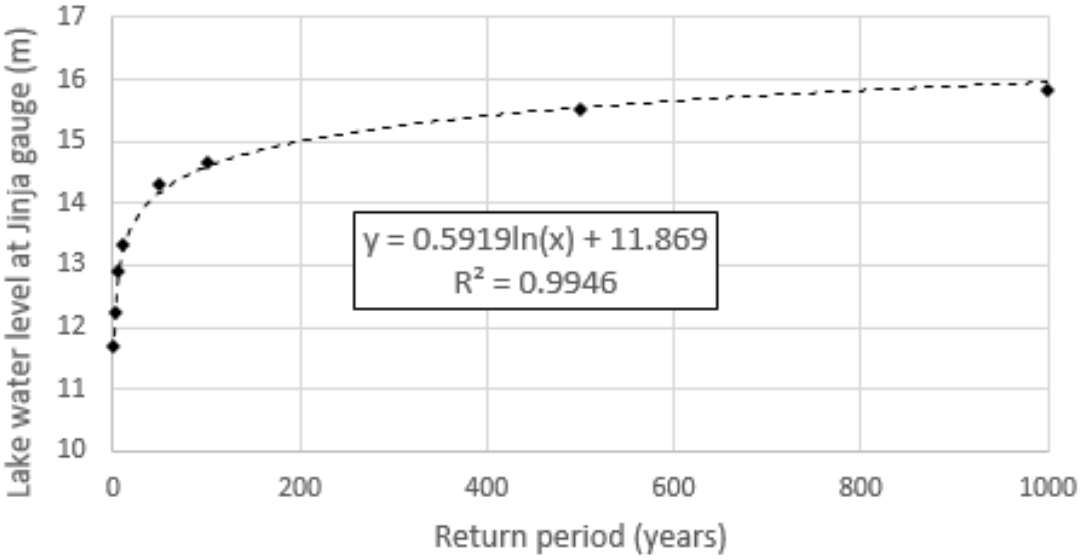

Figure 13: Frequency of occurrence of high water level at Lake Victoria.

4.3.6 Lake Victoria water quality analysis

Based on water sample picked at the intake site, Lake Victoria, Majanji Sub County, and sub sequent analysis (see Appendix 2) at the National Water and Sewerage Corporation, Central Laboratory, Bugolobi, Kampala, the following conclusion can be drawn:

The Lake Victoria water is not suitable for direct consumption due to high levels of Total Suspended Solids (TSS), bacterial faecal coliform, water turbidity and apparent colour as per the Uganda Drinking Water Standard acceptable levels. However, all the other water quality parameters, including pH, conductivity, BOD, nutrients, etc. are within acceptable limits. The values of TSS, faecal coliform bacteria, turbidity and apparent colour were, respectively, 37 mg/L, 20 CFU/100 mL, 16.4 NTU and 173 PtCo

as compared to the acceptable National Standard at, respectively, 0 mg/L, 0 CFU/100 mL, 10 NTU and 15 PtCo.

However, based on the design and operating principle of the WTP to be set-up (refer to Fichtner and M&E, 2015a; Fichtner and M&E, 2015c), the above mentioned water quality issues at Lake Victoria will be transformed to acceptable levels (potable water) as long as the facility is well constructed and operated.

4.4 Biological Environment

The role of flora and fauna investigations in Environmental Impact Assessment (EIA) is to provide sufficient data to allow a complete identification, prediction and evaluation of potential impacts of proposed developments on the habitat of plants and animals and the environment in general. This is to ensure that that potential impacts, where identified, are avoided or reduced if at all possible.

The status of vegetation, mammals, *herptiles*, birds and butterflies, including their habitats were studied for each of the Busia Water Supply and Sanitation Project facility sites. These findings, discussed in the subsequent sub-sections, were incorporated in the Project Impacts and Environmental Management and Monitoring Plan.

4.4.1 Vegetation

In general, the surveyed nine sites had 117 plant species recorded from 96 genera and 41 families. The plant species recorded were representative of four plant life forms, with respective individual species for each category as follows in a descending order of dominance: shrubs (46); herbs (32); trees (20); grasses (14); and five species for climbers. The plants occurred in different habitat types such as bushy vegetation, fallow lands, scrubland and the *Cyperus-Vossia-Phragmites* dominated marshes close to the Lake.

There were no species of conservation concern as per the IUCN Red List. However, two invasive plant species were recorded, namely: *Senna spectabilis* and *Lantana camara*. The invasive plants displace native species through altered recruitments in natural ecosystems, and their spread is often triggered by disturbances in the ecological systems.

4.4.2 Butterflies

A total of 29 species grouped into 16 genera were identified. These were distributed among the 160 total specimens collected. The butterflies were further grouped into four families: 7 were *Lycaenidae*; 66 *Pieridae*; 61 *Nymphilidae*; and 26 *Papilionidae*. The 29 species identified in the project key facility sites represent about 2.3% of Ugandan known butterfly species. From all the sites surveyed, the intake and WTP sites at Majanji Sub County had the highest abundance and diversity of butterflies. On the other hand, the reservoir site at Dabani Sub County Headquarters had the least abundance. This low abundance could be attributed to anthropogenic activities that has greatly altered their habitat, hence reduction in their biodiversity. However, there were no species of conservation concern as per the IUCN Red List.

4.4.3 Herpetofauna

Fifty-one amphibian individuals belonging to five species (i.e. *Amietophrynus kisolensis, Amietophrynus maculatus*, *Amietophrynus garmani*, *Ptychadena mascareniensis* and *Ptychadena anchietae*), two families and two genera were recorded. However, the amphibians were recorded in only four of the eight surveyed sites i.e. the water intake, water treatment plant, faecal sludge treatment plant and alternative faecal sludge treatment plant. There was no significant difference in terms of species richness and abundance among these four sites as all sites had almost the same number of individuals. This is so because all the four sites are found in aquatic habitats though disturbed but provide relatively ideal habitats for amphibians, yet the other sites, especially the water reservoir sites, are found in human habitats that are severely altered with little vegetation cover for amphibians.

A total of six reptilian species (i.e. *Agama agama, Lygodactylus gutturalis, agama lionotus, Philothamnus battersbyi, Trachylepsis straita and Varanus niloticus*) belonging to five families and five genera were also recorded in six of the eight sites visited i.e. the water treatment plant, faecal sludge treatment plant, alternative faecal sludge treatment plant and the water reservoir sites. These sites were found within human settlements, farmland, abandoned structures and rocks that are suitable *refugia* for reptile survival. However, the abundance was low. This could be partly attributed to human disturbance through vegetation clearing during farming, construction and also partly due to man's negative attitude towards the reptiles.

None of the amphibian and reptiles recorded is of conservation concern with regard to IUCN Red List of threatened species. This is because the *herpetiles* recorded, though low in the project area, are abundant and wide spread in the immediate surroundings. In fact, the five and six amphibian and reptilian species recorded are far low when compared against the 98 and 150 amphibian and reptile species found in Uganda. Furthermore, the *herpetofauna* of the project area is very low when compared to the 25 and 58 amphibian and reptile species of Kakagame Forest reserve, a tropical forest found in Kenya and neighbours Uganda in the East. This low *herpetofauna* diversity of the project area can be attributed to the fact that most of the land within Busia project area is under farmland or any other intense human activity that does not allow high abundance of *herpetiles*.

4.4.4 Avifauna

A total of 319 individuals belonging to 41 species were recorded. However, this species record is far low when compared against Uganda's 1,007 bird species. Furthermore, a value of 41 avian species is still low when compared to the 367 bird species found in Kakagame Forest reserve, Kenya. This disparity can be attributed to the fact that most of the project sites are found in altered habitats with intense human activities such as farming and settlements.

Comparison with the IUCN Red List of threatened species indicates that none of the birds recorded is of conservation concern.

4.4.5 Mammals

Twelve mammal species were recorded in the project area. These included one shrew species (African Giant Shrew), one species of hedgehog (Four-toed Hedgehog), six rodent species (Hinde's Rock Rat, African Grass Rat, East African

Mole Rat, Striped Grass Mouse, Pygmy Mouse, and Natal Multimammate Mouse), three bat species (Angolan Free-tailed Bat, Common Slit-faced Bat, and Banana Bat) and one species of a large sized mammal (Hippopotamus).

The Intake, WTP and Majanji reservoir recorded the highest number of species (nine each), while FSTP option two, Dabani and Masaba reservoir recorded the lowest number of species (five each). FSTP option one recorded six mammal species. One threatened species (the Hippopotamus) was recorded at the Intake and WTP sites.

The Intake and WTP lie in the Lake Victoria basin and it's known to be rich in biodiversity although natural habitats are increasingly under threat from human settlements. The low species counts at the reservoir and FSTP sites can be attributed to increased farming activities in that the original habitats have been greatly modified.

Hippopotamus inhabits River Sio on the Uganda – Kenya border and can graze up to 10 Km from their territories. Thus, they utilize the Intake and WTP project area as part of their grazing ground.

The unthreatened species found at the sites belong to genus *Crocidura,* order Rodentia, Bat families and are known to inhabit all vegetation types at all altitudes and have a diverse diet including animal foods, roots, fruits and seeds. Their habitats overlap those occupied by human beings and are therefore very adaptable species, thus their presence in the project area.

When mammal species richness in the project area is compared to that in the closest protected areas of Mount Elgon and Kidepo, it is comparatively low as over 50 mammal species are found in the protected areas compared to 12 in the project area. Uganda is reported to have 330 mammal species; the project area therefore has low species richness due to the degraded nature of the habitats that support species that are adaptable to modified habitats.

4.4.6 Conclusion

The vicinity of the WTP is forage area for the IUCN red listed Hippopotamus. However, the impacts of the project on its forage ground are readily foreseeable and can be mitigated as discussed in Appendix 5. There are no IUCN red listed flora in the project area. However, there are two natural habitats.

i. The Lake Victoria water body at the intake site; and
ii. The permanent wetland system at the vicinity of the WTP site.

As a minimum, the World Bank operational policy, OP 4.04 – Natural Habitats, requires that natural habitats be protected and maintained. The WTP site is not in but at the vicinity of a wetland system. Furthermore, the site is already converted given that it contains an abandoned intake works and crops, in addition to being bordered by an army barracks, a police barracks, a docking facility for boats, a fish factory and a communal fish cleaning and storage facility (Plate 1 to Plate 4).

The intake works will be setup at least 300 m in the lake. The intake main (piping) has been designed in a way that it will access the lake through the already converted route to the docking site. Thus, no intake works will pass through the wetland. However, apart from location, intake velocity is a primary factor that affects the

impingement of fish and other aquatic biota (EPA, 2000; EPRI, 2000). For most locations, a design intake velocity requirement should restrict the through-screen velocity to 0.15 m/s. Nonetheless, intake structures located at least 50 meters from the littoral zone of a lake or reservoir is not subject to a velocity standard.

In general, most of the project footprint is on land. We do not expect fish to be impacted because there is already a water intake works in the project area. There was no reported fish kills due to water abstraction. However, fish and other biota will only be impacted only and only if the project discharges WTP effluents directly into source water. Nonetheless, these have been addressed in the ESMP.

Plate 1: Crops at the WTP site.

Plate 2: An abandoned intake works at the vicinity of the WTP site.

Plate 3: A fish factory at the vicinity of the WTP site.

Plate 4: Abandoned structures at the vicinity of the WTP site.

4.5 Description of Project Sites

4.5.1 Raw water intake site

The intake facility will be installed in Lake Victoria at Namundiri "A" Village, Majanji Sub County (Plate 5 and Plate 6). The installation point is government owned, thus a permit will have to be acquired from the Directorate of Water Resource Management of the MWE.

Soils are mainly brown lateritic gravel, with brown chalky material in some areas. The consistency of soils being medium dense. Bathymetric surveys indicate that the slope from the lake shore to the intake point is at an average of 0.0133 (1.3%). Key land use activities at the shore comprise subsistence farming (*Mangifera indica, Zea mays*

and *Phaseolus vulgaris*) and settlements (military barracks and Majanji Police station), a beach, a fish factory, and a community fish handling facility (cleaning, sorting and storage).A road exists for accessing the shoreline but a pier bridge will have to be constructed to access the intake point.

There are up to 22 (twenty-two) plant species, with wetland vegetation (*Cyperus papyrifera*) being dominant and forming a continuous dense network along the shoreline. Other biodiversity comprise 8 (eight) butterfly species (*Danaus chryssipus, Catopsilia florella, Belanois creaona, Eurema brigitta, Eurema hecabe, Colias electro pseudo heacte, Colotis auregineus and Cochrysops hippochrates*). Four amphibian species (*Amietophrynus kisoloensis, Amietophrynus garmani*, *Ptychadena mascareniensis and Ptychadena anchietae*). 19 (nineteen) bird species (*Moticilla agiump, Ardea melanocephala, Milvus migrans, Ploceus cucullatus, Ardeoli ibis, Ploceus pachyrhynchus, etc.*) and 9 (nine) mammalian species (*Crocidura olivieri, Atelerix albiventris, Aethomys hindei, Tachyoryctes splendens, Lemniscomys striatus, Mops condylurus, Nycteris thebaica, Pipistrellus nanus,* and *Hippopotamus amphibius*) were also identified at the site. All the above mentioned flora and fauna with the exception of the mammalian *Hippopotamus amphibious* are not of conservation concern given that they are not Red Listed as vulnerable as per the IUCN nomenclature. Additionally, no reptiles were seen at the site during the time of visit. However, residents reported that monitor lizards and crocodiles are not uncommon.

Plate 5: Proposed intake site at Lake Victoria, Majanji Parish, Majanji Sub County.

(GPS coordinate: UTM 36N 0609830 E 0028672 N, as viewed from the shore.

Plate 6: Land use at the shore of Lake Victoria.

4.5.2 Water treatment plant (WTP) site

The WTP facility will be constructed adjacent to the project's water source at Namundiri "A" Village, Majanji Sub County (Plate 7). The land at site is owned by the Uganda Peoples´ Defence Forces (6.603 acres), Bwire Barack Enos (0.558 acres), and Aggrey Awori (0.01 acres).

The site is accessible by road and consists mainly of brown lateritic gravel with no visible groundwater occurrence, in addition to being fairly steep with rock outcrops. It is characterized by a bushy vegetation and scrubland. Key land use activities in the neighbourhood comprise fishing, subsistence farming (*Zea mays* and *Manihot esculenta*) and settlements (homesteads, a fish factory and a community fish handling facility).

Key biodiversity comprise up to 24 (twenty-four) plant species (*Cyanthula spp, Laggera alata, Ocimum spp*and *Triumfetta spp, Lantana camara, Acacia hockii, and Dichrostachyus cinerea*), 21 ((twenty-one) butterfly species (*Junonia sofia, Junonia chorimene, Junonia oenone, Belanois creaona, Colias electro pseudo heacte, Colotis auregineus, Eicochrysops hippochrates, etc.*), 4 (four) amphibian species (*Amietophrynus kisoloensis*, *Amietophrynus garmani*, Ptychadena *mascareniensis*, and *Ptychadena anchietae*), and 18 (eighteen) bird species (*Moticilla agiump, Aplopelia larvata, Egretta garzetta, Streptopelia decipens, Ispidina picta, Apus cafer, Pyconotus barabatus, etc.*). 3 (three) reptilian (*Agama lionotus, Lygodactylus gutturalis,* and *Trachylepsis straita*) and 9 (nine) mammalian species (*Crocidura olivieri, Atelerix albiventris, Aethomys hindei, Tachyoryctes splendens, Lemniscomys striatus, Mops condylurus, Nycteris thebaica, Pipistrellus nanus,* and *Hippopotamus amphibius*) were also recorded. However, none of the species of flora and fauna recorded, with the exception of *Hippopotamus amphibious* is of conservation concern with respect to the IUCN Red List.

Plate 7: Proposed WTP set-up site in Majanji Parish, Majanji Sub County.

(GPS coordinate: UTM 36N 0618817 E 0028201 N), as viewed from the lake shore.

4.5.3 Reservoir sites

Reservoir Site 1

Reservoir 1 located in Namundiri "A" Village, Majanji Parish, Majanji Sub County (Plate 8) has been adapted in that it already exists and will be connected directly to the clear water tank at the WTP. The land at site is government owned (Uganda Peoples Defence Forces), in addition to being accessible by road.

Soils consists of brown lateritic gravel with no visible elevated groundwater. The site is generally flat with fallow/grazing land that transcends into bushy vegetation. Key land use activities in the neighbourhood comprise livestock grazing and settlements, including homesteads and a community fish handling facility (cleaning, sorting and storage).

There are 18 (eighteen) plant species (*Panicum spp, Hyparrhenia, Cycodon dactylon*, *Lantana camara, Ocimum gratissimum*, *Solanum incanum*, Aspilia spp, etc.), 25 (twenty-five) butterfly species (*Graphium Colonna, Danaus chryssipus, Colias electro pseudo heacte, Belanois aurota, Belanois rubrosignata, Eicochrysops hippochrates, etc.*), 4 (four) reptilian species (Agama *agama*, *Agama lionotus*, *Lygodactylus gutturalis*, and *Trachylepsis straita*), 5 (five) bird species (African fire finch, African pied wagtail, Black-kite, Cattle egret and Mourning dove), and 9 (nine) mammalian species (*Atelerix albiventris, Aethomys hindei, Arvicanthis niloticus, Tachyoryctes splendens, Mus minutoides, Mastomys natalensis*). No amphibians were seen at the site perhaps due to the built-up environment. Additionally, none of the species of flora and fauna recorded is of conservation concern with regard to the IUCN Red List.

Plate 8: Reservoir 1 at Majanji Parish, Majanji Sub County.

(GPS coordinate: UTM 36N 0609923 E 0029247 N); to be adapted to the Busia Water Supply Project.

Reservoir Site 2

Reservoir 2, to be located at Daha Village, Buhehe Sub County (Plate 9), will be constructed on 0.289 acres of land that is privately owned by the family of the late Busungu Birenge. The site is generally flat and is accessible by road. It is characterised by brown laterite soils with no visible elevated groundwater. The site is currently being utilized for crop farming. Key land use activities in the neighbourhood comprise crop farming (*Zea mays, Sorghum bicolor, Manihot esculenta,* and *Phaseolus vulgalis*) and settlements (homesteads).

Key biodiversity comprise 8 (eight) plant species (*Cycodon dactylon, Bidens pilosa, Panicum maximum, etc.*), 7 (seven) butterfly species (*Junonia chorimene, Junonia oenone, Ypthima albida, Graphium antheus, Catopsilia florella, etc.*), 1 (one) reptiles species (*Lygodactylus gutturalis*), 5 (five) bird species (African fire finch, African pied wagtail, Blue-napped mouse bird, Lemon dove, and Mourning dove), and 5 (five) mammalian species (*Arvicanthis niloticus, Tachyoryctes splendens, Mus minutoides, Mastomys natalensis, and Pipistrellus nanus*). No amphibians were recorded and none of the species of flora and fauna recorded is of conservation concern with regard to the IUCN Red List.

Plate 9: Proposed site for reservoir 2 and the booster station.

Daha Village, Buhasaba Parish, Buhehe Sub County (GPS coordinate: UTM 36N 0612546 E 00406655 N).

Reservoir Site 3

Reservoir 3, to be located in Dabani East Village, Dabani Sub County, will be constructed on 0.537 acres of government owned land (Dabani Sub County Headquarters). The site, generally flat, is characterised by brown laterite soils with no visible elevated groundwater and is accessible by road. It is characterized by fallow land that transcends into bushy vegetation. Key land use in the surrounding comprise crop farming (*Ipomoea batatas* and *Zea mays* interspersed with trees of Eucalyptus *grandis* and *Grevillea robusta*) and settlements (home steads).

Site biodiversity comprise plant species of *Flueggea* spp, *Tithonia diversifolia* and grasses of *Cynodon dactylon, Brachiaria b*rizantha and *Panicum maximum*. Other biodiversity comprise 3 (three) butterfly species (*Junonia chorimene, Junonia oenone and Eicochrysops hippochrates*), 4 (four) reptilian species (*Agama agama*, *Agama lionotus*, *Lygodactylus gutturalis*, and *Trachylepsis straita*), 5 (five) bird species (African pied wagtail, Black-kite, Lemon dove, Lizard buzzard, and Mourning dove), and 5 (five) mammalian species (*Pipistrellus nanus, Mastomys natalensis, Mus minutoides, Tachyoryctes splendens* and *Arvicanthis niloticus*). No amphibians were seen and none of the species of flora and fauna recorded is of conservation concern with regard to the IUCN Red List.

Plate 10: Proposed site for reservoir 3.

Location: Dabani Sub County Headquarters (GPS coordinate: UTM 36N 0618235 E 0049811 N).

4.5.4 Water transmission and distribution mains

The pipe system to be employed is subdivided into raw water mains, treated water transmission mains and distribution mains.

The raw water mains, connecting the intake system to the WTP, will be extended 300 m into the Lake Victoria. The treated water transmission main will be laid along road reserves (government land), specifically on the road connecting Busia Town to Majanji Sub County. However, the land belonging to the UPDF at the water intake, WTP and Dabani Sub County (see Plate 10 for details) will be acquired. Soils along these road reserves are typically laterite and gleysols, with gleysols being in wetland areas. Key land use activities along the road reserves is crop farming, bushland and a few buildings (kiosks). Occurrence of elevated groundwater levels can be seen in the wetland areas and at points where streams flow close to the road or where they cross roads.

The distribution networks will also be laid along road reserves within Busia Municipality and the various informal settlements to be supplied with water. The soils are equally laterite and gleysols. Key land use activities along the road reserves comprise settlements and cropland.

The World Bank Operational Policy, OP 4.01 Environmental Assessment and OP 4.04: Natural Habitats will be triggered at wetland localities and points that streams/water bodies have to be crossed. Since the water mains will be laid on road reserves (government owned), therefore resettlement/compensation policies/frameworks will not be triggered.

4.5.5 Faecal sludge treatment plant (FSTP) site

The FSTP site, located at Okame-Amagoro Village, Mawero Parish, Buteba Sub County (Plate 11), is on 2.0 acres of land privately owned by Adome Philip. The site, accessible by road, has a mild gentle terrain that is drained by Okame-Amagoro stream and consists mainly of loam clay soils of loose – stiff consistency. There are no signs of elevated groundwater, in addition to being characterized by bushy vegetation. There are no nearby settlements though animal grazing is practiced at the vicinity.

The site is dominated by the plant species of *Tithonia diversifolia*, *Acanthus pubescens, Ocimum gratissimum, Leonitis nepetifolia,* and palm trees. However, none of these species is of conservation concern with regard to the IUCN Red List.

Plate 11: Proposed FSTP site.

Location: Okame-Amagoro Village, Mawero Parish, Buteba Sub County (GPS coordinate: UTM 36N 0624057 E 0056320 N).

5 PUBLIC CONSULTATION AND DISCLOSURE

5.1 Rationale

It is a prerequisite, for all category B World Bank funded projects, that project affected groups be consulted (refer to the World Bank Policy, OP/BP 4.01 – Environmental Assessment).It is also mandatory that individuals, groups and entities with a stake in any proposed project not only be informed but equally consulted for their views as regards likely impacts and any other concerns pertaining to the proposed project. At the same time, Ugandan laws and regulations also emphasise stakeholder participation in development projects (refer to: The National Environmental Act, CAP 153).

Standard methods, qualitative and quantitative, for rapid collection of public information were employed. These included but not limited to the following: interviews; in-depth interviews; and Focus Group Discussions. Questionnaires guided the consultations.

The agenda of the consultations varied depending on the purpose of the meeting. Nonetheless, the agenda included: opening prayer, self-introduction, communication from the Environmentalists (both from the MWE and the consultants), consultants' dissemination of the purpose of the meeting, consultations and discussions, and closing remarks by the chair. The district level consultation meetings were conducted in English and the community level meetings were conducted in English with a local language translation. Details of Public Consultations are given in Appendix 4. Table 24 below shows a summary of Stakeholders concerns.

Table 24: Summary of Stakeholders Concerns.

No.	Stakeholder Concerns
1	Resettlement, loss of land and livelihood
2	Influx of immigrate labour
3	Increased risks of spread of HIV/AIDS and other STIs
4	Child abuse and early age pregnancies
5	Child Labour
6	Increased risks of accidents
7	Occupational health and safety

5.2 Stakeholder Analysis

Stakeholders are defined as individuals, groups and entities that are affected by a development activity either directly or indirectly or those that may exert either positive or negative influence on the project. Those that are directly affected are known as primary stakeholders whilst those that are affected indirectly are known as secondary stakeholders. Stakeholders in any project will include individuals, various social groups, formal and informal agencies in the public, private and voluntary sector that includes NGOs/CBOs.

The categories of stakeholders that were identified include technocrats at the district, Local Council Authorities at the different levels and residents within the vicinity of the proposed site. At the district headquarters, the technocrats that were

consulted included the CAO, ACAO, District Planners, District Environmental Officer, District Water Engineer and District Community Development Officer.

The Sub County officials – LCIII Chairpersons, Sub County Chiefs and Community Development Officers of Lumino, Buhehe, Majanji, Dabani, Buteba and Busia Municipality were consulted. At local level, the L.C. 1 Chair Persons of Majanji, Namawumbi B, Tiira, Osapiri, Okamye communities as well as residents within the Project Impacted Area (PIA) were consulted (Plate 12 to Plate 15).

5.3 Stakeholders' views and concerns about the proposed project

Most of the stakeholders at various levels generally knew about the project and nearly all of them felt that, the water supply project was a good intervention in their area. The District, Municipality and Sub-county local governments had been consulted at almost all the stages of the project development. Findings from the community meetings and focus group discussions established that project affected communities had accepted the project although they were not so sure of the demarcation of the road reserves where the main pipes would pass and whether their private land would not be affected. Most of the meetings held endorsed the project. To those who welcomed the project it was perceived as a source of clean and safe water, as a source of employment and an opportunity to improve the social services like the road network for easy access, improvement of health and the elimination of water borne diseases. Below are some of their sentiments: -

"*Currently only 30% of the municipal population* access water and the project will increase it to 70%... and the project will reduce the water related borne diseases." **Municipal Council meeting.**

"*… We want employment opportunities for our people, so that they can easily support the project….*"**Local Leader, Majanji meeting.**

''The project should also start engaging the people early enough together with the local government officials concerned so that, people get prepared to receive the project in their respective communities because in a way, this will help to reduce on the compensation if we work together,'' **Local Leaders meeting at Majanji**.

Plate 12: Interviewing the Ag. Town Clerk Busia Municipal Council.

Plate 13: Meeting civic leaders at the proposed Majanji intake site.

Plate 14: FGD Women at the proposed Majanji intake site.

Plate 15: Meeting the community at the proposed FSTP site.

5.4 Community Resistance

Only in Dabani Sub-county did the leadership have some concerns over the site of the water reservoir. The site has been reserved for a proposed Sub-county office block.

> *"The project wants the Sub-county headquarter land. So far we have not been consulted. Nor has the project had the audacity to write to us officially informing us about the project and the request for land to build the water reservoir? All we see are Surveyors with Total Stations, Sociologists with questionnaires, Ecologists with binoculars and Busia Municipal Council officials trespassing on the Sub-county land saying they want land for a water reservoir without notifying us the local leaders. This is Sub-county land, we as leaders shall be held accountable by the people who elected us, if only to find we gave away their land to build a water reservoir without their permission. After all who told you we need water in Dabani Sub-county?"* retaliated the LC III Chairperson of Dabani Sub-county.

In Namawumbi B Village, Busia Parish, Dabani Sub County, the community out rightly objected the construction of the faecal sludge treatment plant in their village. The resident community complained, *"Of all developments in the world you have decided to bring us faeces!?"*The community told the ESIA Team that they would not have the faecal sludge treatment plant in their midst, because they already have running battles with a tannery, which releases woeful effluents into River Solo, which flows through their village. *"We no longer use the river for drinking water, our goats and cows die when they drink the water, all our food crops dry when we use the water for irrigation and our bicycles rusted when we washed them with river water contaminated with tannery effluents,"* complained one resident at a community meeting was attended by over sixty people at Elim Namawumbi Primary School in Namawumbi (B) Village, Busia Parish, Dabani Sub-county. The community through their LC III Chairman proposed another site for the faecal sludge treatment plant. The ESIA Team was taken to the proposed site which is located in Syamutumba East Village, Busia Parish, Dabani Sub-county at co-ordinates 36N 06178799; 0053113, Altitude 1156 m. The site is located at the confluence of river Solo and Namawumbi. This site is fallow land, with few people and bushy.

In Namawumbi B, Busia Parish in Dabani Sub County the community resisted the establishment of the faecal sludge Plant in the area. From the meeting it was established that the community was not willing to have the faecal sludge in their community, citing the negative effects of bad smell, the sewage ponds being dangerous to their children, hindering development to the area, the area being highly populated and the fact they are dealing with bad effects from the tannery plant in the area which has polluted River Solo which can no longer support life, the water from the river cannot be used for home consumption, the river no longer supports plant life through irrigation nor fit for the animals to drink.

This is what they had to say:

> *"Animals have died and our skin peels offs when we come in contact with this water from River Solo; and when it comes to 6 pm, you may fail to eat food because of the smell that comes from the tannery. They brought the tannery from Jinja. It has affected us so much. You cannot wash you bicycle in that*

river, it will rust immediately. You cannot plant crops along that river they will not grow. The population is high here, we were 300 households by then but now we are over 1000 households. My fear goes to the children. There is a lagoon in Kenya that has been a cause of death to many people, they have been drowning. Therefore, with that I appeal to you to take the faecal sludge/sewer system away from here."**Namawumbi Community meeting.**

"All this land around here (Referring to area around the faecal sludge area) is sliced into plots and they belong to people. This place is highly populated, so it would not be a good site for the faecal sludge. There are very small plots of land in that so called "large undeveloped pieces of land"

The distance from town here is too short and that project will hinder development of the project". (**Community meeting at Namawumbi).**

*"The Alternative site is Syumutumba. The area is not populated and there is a stream that pours in river Solo, why not use that land?" (**Community meeting in Namawumbi B).***

As highlighted from the quotations above, the faecal sludge become a very contentious issue. The project was forced to acquire an alternative land for the FSTP (section 6.1.2). and therefore the need to engage the community again before the land is acquired. The consultants attempted to respond to their concerns although further sensitisation and explanation by the Ministry, District and Municipal team need to address the issue collectively.

5.5 Pollution

River Solo has been particularly polluted through the disposal of waste such as untreated sludge directly into the river by the tannery plant. Community members at the proposed sewage site complained about the bad smell that shall come out of the faecal sludge treatment plant. They anticipate that there will be excessive smell and diseases in the area which points to the need for sensitization.

*"…Kampala has more cholera more than Busia, do you want us to get Cholera, because of the faecal sludge in the area" **(Namawumbi B Meeting).***

The community anticipated excessive dust and noise from the trucks, which are likely to disturb the tranquillity of their neighbourhood.

In addition the LC 1 Chair Okame Village also cautioned about polluting the area because when heavy trucks start to construct and eventual use of the garbage plant there will be a lot of dust, smell and noise.

*"The smell, the dust and noise during construction will affect us, we may not be able to eat food, and our primary school will be affected by noise and dust". **LC1 Chairman Okame**.*

The conclusion was reached that the Contractor will put silencers and engineering devices to control the noise in the area. Sprinkling water will help control dust during construction; road humps will be constructed to reduce the speed of trucks before the project commences to reduce on the risk of accidents.

5.6 Traffic and other minor accidents

The residents of the area anticipated that traffic accidents are likely to escalate during construction phase. This is because heavy truck drivers tend to be very fast while ferrying heavy construction materials and also raise dust. This traffic may particularly pose a risk to the children and other residents from the community who are not used to heavy traffic volumes. Therefore, any kind of reckless driving may spark off accidents.

As a mitigation measure, some stakeholders contended that drivers should be cautioned about over speeding. This being a rural area they should be extra careful and recommend that there should be community sensitization about the on-going project so that precaution is taken.

5.7 Increase of diseases and promiscuity

The stakeholders raised concern about the likely escalation of HIV/AIDS and STDs in the PIA and during the construction of the Busia Water Supply. They noted that the project workers who are usually unaccompanied youth and men will come to their area to work and might exploit the women and girls in the community due to high poverty levels in the PIA; the women are girls often give in get money from the men.

> *"We might have an increase of the HIV infection in the area because of influx of people coming with the Contractor. There is need to sensitize communities about HIV,"* **Municipal Environmental Officer**.

Based on this it was agreed that communities and all the people working on the project be cautioned to be sensitive on the issues concerning HIV & AIDS and promiscuity. The workers should follow their ethical code of conduct, while the Contractor should work together with the local authority should sensitize people in the project area about HIV/AIDS and STDs and should offer basic HIV/AIDS prevention services like condom distribution and treatment of STI infections to the workers.

5.8 Physical cultural sites

From the field visits and the stakeholder engagements held in the different project sites no graves or cultural or archaeological sites were seen during the detailed ESIA field trip or reported by the different stakeholders. However, the Contractor should take precautionary measures during excavations just in case there are chance finds. The Chance Finds procedure is elaborated in Chapter 9 below.

5.9 Conclusion

The community and the key stakeholders have expressed support for the project since they expect it to accrue benefits such as provision of reliable safe and clean water supply in Busia Municipal Council and parts of other benefiting sub counties of Majanji, Lumino, Buhehe, Buteba and Dabani. The project will also promote development and employment creation for the community members during construction and access to safe and clean water. Despite the anticipated benefits, the project will have some negative social and economic impacts.

It is recommended that the Contractor implements all the mitigation measures suggested in the ESIA report. To ensure that the project is managed perfectly to a logical conclusion, the Contractor should make the necessary budgetary provisions to ensure that mitigation commitments in the ESIA as well as in the RAP and monitoring programs stated herein are effectively implemented. In addition, public consultation and sensitization should continue during the disclosure period, in order to capture any other issues that could have been left out during the consultation exercise.

It is further recommended that the WMD Project writes to the PIA institutions formally to request for land for the project infrastructure.

5.10 Disclosure of the ESIA

According to Ugandan laws and funding guidelines of the World Bank it is a requirement for projects of this type to be publically disclosed. This is to allow stakeholders to have an input in the implementation of the project. This creates transparency and accountability for implementing stakeholders. The ESIA and RAP team's consultation with the communities and key stakeholders were part of the disclosure process. The ESIA report will be submitted to NEMA for review. In turn NEMA will deposit it in public places like the district, municipality, public libraries, and invite the public to make comments. The comments will be corrected and analysed by NEMA. If the comments are very serious NEMA will call a public hearing. The views of the public will be received and passed on the Client to incorporate in the final ESIA. Once the final ESIA has incorporated the views of the public it will become a legal instrument when the ESIA certificate is issued.

As part of The World Bank Policy on Disclosure of Information, the ESIA report will be put on its Web site info shop for thirty days for the public to make comments. Comments received will be incorporated into the final ESIA, before the project can be cleared for the next implementation phase.

6 ANALYSIS OF ALTERNATIVES

6.1 Siting and Design Alternatives

6.1.1 WTP siting and design alternatives

Alternative Site 1 – selected site

The location of this site is given in Plate 7 and its detailed description is given in Section 4.5.2. The site is suitable for a WTP design given that the fairly steep terrain will avail gravity flow between treatment system components, thus minimizing operational energy cost. 6.602 acres (92%) of the 7.17 acres required is government owned (Ministry of Defence), thus easier to negotiate for.

Alternative Site 2 – rejected site

Alternative site 2, Plate 16, is located in the same Parish and Sub County as alternate site 1. It is accessible by road and is privately, thus will have to be bought. It consists of brown lateritic gravel with no elevated groundwater. The site is characterized by low-lying grass. Main land use activities in the neighbourhood comprise bushland, crop farming, and settlements, including homesteads, a beach and a fish factory. The generally flat terrain implies extra energy will be required in moving water between treatment system components.

Plate 16: Proposed alternate WTP set-up site 2.

Majanji Parish, Majanji Sub County (GPS coordinate: UTM 36N 0618817 E 0028201 N), as viewed from the lake shore.

None of the species of flora and fauna recorded, except *H. amphibious* (hippopotamus), is of conservation concern in that they are of Least Concern category with respect to the IUCN Red List.

In general, the decision for selection of the preferred site was based on anticipated cost of acquisition (short term) and higher cost of operation (long term) in favour of Site 1, at the UPDF Barracks.

6.1.2 FSTP siting and design alternatives

Alternative site 1 – selected

The location of this site is given in Plate 11 and its detailed description is given in Section 4.5.5. No elevated groundwater, has clay soils which make effluent penetration difficult, thus minimal risk of groundwater contamination; 100% private land, thus must be bought. The site has a natural wetland bordering the stream, which would be used in the tertiary treatment of the effluent from the FSTP. The area is sparely populated. The nearest residents are 900m away. The recommended nearest distance for houses should be 700m. In general, the site is suited for the FSTP and there was no compliant from residents. Hence the site was chosen as the best alternative for the location of FSTP.

Alternative site 2 – rejected

The location of this site is given in Plate 17 below. The site consists of a mix of inorganic lean clay soils and fat clay soils of loose - very stiff consistency. The site, privately owned and accessible by road, is generally moderate in slope that gently extends towards a valley bottom. Crop farming is practiced as key land use at the vicinity, with scattered settlements at least 300 m away from the site.

Solo River, at the valley bottom drains the site. Occurrence of elevated groundwater can be seen as one approaches the valley bottom, thus increased risk of groundwater contamination. No natural wetland bordering the river and the FSTP site, thus direct discharge of effluent leading to increased phosphorous loads in the receiving water.

The site is characterized by a bushy vegetation dominated by *Tithonia diversifolia, Acanthus pubescens, Ocimum gratissimum, Leonitis nepetifolia and Afromomum anguistifolium*, with some *Acacia polycantha* trees. However, none of the species of flora and fauna recorded is of conservation concern with regard to the IUCN Red List.

A key challenge is that the neighbouring communities have rejected the FSTP in their village (see Section 5.4 for details). Therefore, this site was not selected.

Plate 17: Proposed alternate site 2 for the FSTP.

Namawumbi Village (B), Busia Parish, Dabani Sub County at GPS coordinate: UTM 36N 0619220 E 0053204 N.

Alternative site 3 – rejected

The site, accessible by road, is shown in Plate 18 below. It consists of a mix of inorganic lean clay soils and fat clay soils of loose - very stiff consistency. The site, privately owned, is generally mild in slope that gently extends towards a valley bottom that is drained by Okame -Abochet River. Crop farming is practiced as a key land use, with *Zea mays* (maize), *Brassica oleracea* (cabbages) and *Solanum lycopersicum* (tomatoes) as key crops. The nearest settlement is about 500 m off the site. Occurrence of elevated groundwater can be seen as one approaches the valley bottom, thus increased risk of groundwater contamination. No natural wetland bordering the river to be utilized for effluent discharge, thus direct discharge of phosphorous into receiving water will occur.

It is also characterized by weedy species of *Cycodon dactylon, Brachiaria brizantha, Cymbopogon nardus, Panicum* maximum and enclaves of the shrubby *Tithonia diversifolia*. Howeer, none of the species of flora and fauna recorded is of conservation concern with regard to the IUCN Red List.

In general, the FSTP alternate Site 1 is the most optimal for the project with respect to social and environmental considerations. Therefore, this site was not selected.

Plate 18: Proposed alternate site 3 for the FSTP.

Okame-Abochet Village, Abochet Parish, Buteba Sub County (GPS coordinate: UTM 36N 0624251 E 0057521 N).

6.1.3 WTP technology selection alternatives

The type of treatment operation performed at a drinking WTP and treatment chemicals used depend largely on the contaminants present in the source water (EPA, 2011a). An analysis of the source water (Lake Victoria) quality indicate elevated levels of total suspended solids (TSS), faecal coliforms, turbidity, and apparent colour with respect to the Uganda Drinking Water Standard (see Section 4.3.6 for details).

To transform the source water to a potable form, the key processes of coagulation/flocculation, sedimentation, filtration, and disinfection will have to be employed. Below is an analysis of the key technologies that could be adopted in the key processes of coagulation/flocculation, filtration and disinfection.

Coagulation/flocculation

Coagulants and flocculants that are added to raw water include metal salts (e.g. aluminium sulphate/chloride and ferrous sulphate/chloride) and polyelectrolytes. Below is an analysis of available options. Aluminium sulphate is the preferred option.

Table 25: Technology analysis of coagulants/flocculants.

	Aluminium/Ferrous sulphate/chloride	**Polyelectrolytes**
Pros	Offer the lowest price per unit weight and are widely available, thus most commonly used; insoluble at normal drinking water treatment operating conditions, thus very little metal is carried into finished product; generally settles readily;	Effective over a wider pH range than inorganic coagulants; can be applied at lower doses; produce smaller volumes of more concentrated, rapidly settling floc; floc formed from use of a properly selected polymer will be more resistant to shear, resulting in less

		carryover and a cleaner effluent;
Cons	Require corrosion-resistant storage and feed equipment; may alter the pH of water since they consume alkalinity, thus need for liming; sludge exhibits poor compaction traits, ranging from 0.5 to 2 percent solids (ASCE/AWWA, 1997), thus difficult to dewater; sludge is biologically inert (inorganic) with little organic content and have little value as a fertilizer/soil conditioner; large volumes of settled floc must be disposed of in an environmentally acceptable manner.	Several times more expensive in price per unit weight than inorganic coagulants; selection of the proper polymer for the application requires considerable jar testing under simulated plant conditions, followed by pilot or plant-scale trials; All polymers must be approved for potable water use by regulatory agencies.

Filtration

After solids settling, the source water passes through filters to remove finer particles and metals. Various types of filter media may be used by WTPs, including permeable fabric and porous beds (EPA, 2011a; EPA, 1995). Table 26 below is an analysis of the types of filters used by WTPs. In general, the multimedia filter should be considered as a first option with the rapid sand filter as a second and last option given their suitability as summarized in Table 26.

For the project, the selected option is rapid sand filtration.

Table 26: Technology analysis of filter types.

Filter type	Characteristic	Pros/cons
Slow sand filter	Consists of a bed of fine sand above a gravel layer and underdrain system; used for low-flow rates.	Not suitable for high turbidity source waters; trap microorganisms that break down algae, bacteria, and other organic matter. The source water for the project contains up to 16.4 NTU of turbidity. This is above the Uganda Drinking Water Standard of 10 NTU. The use of slow sand filters in the project will imply increase in dosing levels of alum so as to alleviate turbidity, with cost implications.
Rapid sand filter	Consists of a bed of sand above several layers of gravel in varying sizes.	Gravity filtration is the most widely used form of water filtration in many countries. However, in rapid gravity filtration the particulate impurities are removed in or on the media, thus causing the filter to clog after a period. Clogged filters are cleaned by backwashing.
Pressure filter	Similar to rapid sand filters but the operation is housed within a cylindrical tank and the water passes through the filter while under pressure generated by a pump rather than by gravity.	Pressure filters have been found to offer lower installation and operation costs in small filtration plants. However, they are generally somewhat less reliable than gravity filters. Their use is mainly confined to the treatment of water for industrial purposes.
Diatomaceous	Consists of a layer of	Most suitable for low turbidity and low

Filter type	Characteristic	Pros/cons
earth filter	diatomaceous earth above a septum or filter element.	bacterial count source water; Coagulants and filter aids are required for effective virus removal. The source water for the project contains up to 16.4 NTU and 20 CFU of, respectively, turbidity and bacterial faecal coliforms. These are above the Uganda Drinking Water Standards of, respectively, 10 NTU and 0 CFU. The use of diatomaceous earth filter in the project will imply increase in dosing levels of alum and chlorine, with cost implications.
Multimedia filter	Consists of layers of various sizes of gravel, high-density garnet, sand, and anthracite coal.	Enhances the removal of tastes, odours, and organic substances. Thus, lowering the amount of alum to be employed. However, frequent backwashing may be required to remove clogs.
Membrane filters	Include ultrafilters and microfilters; use pressure as the driving force.	Designed to remove particulates smaller than 10 micrometers; WTPs using membrane separation are typically smaller plants (serving less than 50,000 people) (EPA, 2011a), thus cannot be employed in the project with an ultimate year population of 186,295.

Disinfection

Historically, chlorine was the disinfectant used, but more recently other chemicals such as chlorine dioxide, chloramines, and ozone have been used to purify water. Non-chemical methods of disinfection include heat and radiation (e.g. ultraviolet light (UV)). Table 27 below is an analysis of the key options that could be employed in the project. The application of UV disinfection for source water treatment is limited because turbidity and suspended solids that can render it ineffective (EPA, 1999c). Thus, UV has not been analysed for the project.

As can be seen from Table 27, ozone, the most efficient disinfectant, is not a persistent disinfectant, thus unsafe water consumption can occur in case of recontamination along transmission/distribution lines and reservoirs. It is also difficult to fulfil the legal limit for the formation of bromate during the process of ozonation, thus most WTPs tend not to employ ozonation. Chlorine and chloramines are more effective in secondary disinfection in comparison to chlorine dioxide (Less persistent chemical). Thus, chlorine dioxide may not be suitable for the project given the extent of piping systems. Lastly, though the combined residual from chloramines lasts longer than chlorine residuals, chloramines are not as effective as other germicidal agents.

In general, chlorine is the key form of disinfectant employed in Uganda. This is similar to the US, a developed country, with up to 80% of WTPs employing free chlorine (EPA, 2011a).

Table 27: Technology analysis of disinfection types.

Criteria	Disinfectant			
	Chlorine	**Chloramines**	**Chlorine dioxide**	**Ozone**
Persistency	Persistent chemical (used locally and for transport across long distances to the final consumers).	Persistent chemical (used locally and for transport across long distances).	Less persistent chemical (used locally and for transport across long distances).	Non persistent chemical (used locally at production plants).
Oxidant demand rate	Chloramine > Chlorine > Chlorine dioxide > Ozone			
Disinfection efficiency	Ozone > Chlorine dioxide> Chlorine > Chloramine NB: efficiency order can be changed by local conditions e.g. disinfectant consumption rate, biofilm protection, etc.			
Disinfection by-products	More than 500 by-products identified that are formed by reaction with organic matter; most products are halogenated (Cl, Br, I) organics; most relevant organic halogenated by-products are Trihalomethanes, Haloacetic acids, Haloacetonitriles, Haloketones, and Haloaldehydes; Trihalomethanes are regulated in Europe; Both Trihalomethanes and Haloacetic Acids are regulated in the US.	Nearly no halogenated organic by-products formed; negligible reaction with organic matter, except halogen transfer to nitrogen amines; some halogenated organic by-products formed with trace of chlorine or chlorine in excess; Ammonia is formed if used in excess, thus nitrite formed from bacterial oxidation of ammonia.	Nearly no halogenated organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated organic by-products formed with excess of chlorine used or chlorine formed in-situ.	Nearly no halogenated organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated by-products formed with excess of chlorine used or chlorine formed in-situ; main halogen by-product is bromate; it's difficult to fulfil the legal limit for its formation, thus many WTPs have replaced the ozonation step.

6.1.4 FSTP technology selection alternatives

A number of domestic wastewater treatment technologies exist. These technologies tend to employ a combination of physical and biological techniques, in addition to being tailored to small or large scale Person Equivalent (PE). Given that the project is targeted to a municipality (i.e. medium to large PE) in a developing country, a number of low cost treatment techniques could be employed, including activated sludge system, waste stabilization ponds, aerated lagoon system, and constructed wetlands.

Reliable energy supply is a challenge in developing countries, Uganda inclusive, thus energy intensive wastewater treatment systems (see Table 28) such as activated sludge and aerated lagoons may not be sustainably operated. Waste stabilization ponds and constructed wetlands could be opted for given that they are low energy based systems.

Both waste stabilization ponds and constructed wetlands are simple to operate and have low maintenance cost, thus tailored to developing countries. However, constructed wetlands are poor in removing phosphorus, unless special materials are incorporated in the substrate. On the other hand, waste stabilization ponds encourage leaching (groundwater contamination in zones with elevated water level) and are not all that good in removing suspended solids and phosphorous.

In general, waste stabilization ponds may not be the best option for the project given the elevated groundwater level at the various alternate sites (see Section 4.5.5). Constructed wetlands, vertical flow (VF) systems in particular, can be constructed with impervious materials, the challenge is that they are poor in removing phosphorous, thus they need to discharge into a natural wetland system prior to effluents accessing any receiving water body.

Table 28: Technology analysis of applicable FSTP types.

Criteria		**Activated sludge system**	**Waste stabilization ponds**	**Aerated lagoon system**	**Constructed wetlands (hybrid system)**
Plant performance	BOD removal	Good (70 – 90%)	Good (up to 95%)	Good (80 to 90%)	Good (up to 80%)
	FC removal	Fair	Good	Good	Good
	SS removal	Good (90%)	Fair	Fair	Good (up to 90 - 95%)
	Helminth removal	Poor	Good	Fair	Good
	Virus removal	Poor	Good	Good	Good
	Total N removal	Good (70 – 80%)	Good (up to 80%)	Fair	Good (up to 80%)
	Total P removal	Good (80%)	Fair (up to 50%)	Poor	Poor
	Prevention of groundwater leaching	Good	Poor	Good	Good in VF systems; poor in HF systems
Economic factors	Simple and cheap construction	Poor	Good	Fair	Fair in VF systems; good in HF systems
	Simple operation	Poor	Good	Poor	Good
	Land requirement	Good	Poor	Fair	Poor
	Maintenance costs	Poor	Good	Poor	Good
	Energy demand	Poor	Good	Poor	Good
	Sludge removal costs	Fair	Good	Fair	Fair

Adapted from Arthur 1983, EPA 2002, Korkusuz 2004, IUPWARE 2012, and Youbin undated.

6.2 The "No Project" Alternative Project Justification

6.2.1 Key benefits of the "No Project" option

i. The water resource potential of the proposed water supply source, Lake Victoria, would remain unchanged as water will not be extracted.

ii. Short-term impacts such as noise, dust generation, vibrations, etc., emanating from construction activities would be avoided.

iii. The loss of the relatively small amounts of agricultural land to the construction of water treatment works, faecal sludge treatment works, and storage reservoirs would be avoided.

iv. Temporary inconveniences emanating from construction activities within urban areas such as temporary road closure for pipeline crossings, would be avoided.

v. The limited odour nuisance associated with well managed Faecal Sludge Treatment Plants would be avoided.

vi. The health risks associated with handling of harmful water treatment chemicals would be avoided.

vii. The associated dangers of releasing of wastewater directly into receiving water in case of treatment system failures would be avoided.

6.2.2 Key benefits of improved water supply if project is implemented

- Easy access to potable water within homesteads at various levels – stand posts, yard taps and house connections;
- Reduction in incidences of diarrheal and other water borne diseases; this leads to reduction in mortality and morbidity, especially of children;
- Improvement in hygiene and sanitation from increased use of hand washing, personal hygiene and environmental sanitation;
- Reduction in hours spent searching for and fetching water from distant sources which would significantly increase the time allowed for other activities; this is expected to lead to better livelihood for women and the girl child, who are traditionally, responsible for fetching water;
- Reduction in domestic violence and abuse of women as people in the homestead compete for the little potable water;
- Reduction incidences of promiscuity which are often carried out in the guise of fetching water, some involving children; this leads to incidences of child abuse, domestic violence and early pregnancies;
- Possibility of improving the quality of life in the poor neighbourhoods of the town where the most vulnerable people live; these areas include Custom

Road "A" Village, Central Ward and Eastern Division. The project will offer pro-poor preferential tariffs to these communities;

- Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
- Higher quality hotels, restaurants and entertainment places since the developers can erect and maintain high quality toilets;
- Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transfers to the community;
- Increased revenue to the local authority and the country in general through the collection of taxes.

6.2.3 Key benefits of improved sanitation facilities if project is implemented

- Reduced incidences of diarrheal and other water borne diseases; this leads directly to lower rates of mortality and morbidity, especially of children;
- Greater school attendance by the girl children since they are more comfortable with cleaner and safer toilets; this leads to increased gender awareness and improvement;
- Reduced costs for collection and disposal of faecal and other matter from homesteads; this leads to improved environmental sanitation and its attendant benefits;
- Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
- Higher quality hotels, restaurants and entertainment places since the developers can erect and maintain high quality toilets;
- Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transfers to the community;
- Increased revenue to the local authority and the country in general through the collection of taxes.

6.2.4 Conclusion on the 'No Project' option

Busia Municipality and en-route growth centre residents are in urgent need of a sustainable water supply and sanitation facilities. The existing piped water supply system is operating below demand. The current sanitation systems are unreliable, in sorry state and sub-standard. If this is allowed to continue, not only will the residents be exposed to public health risks but development opportunities will continue to be stifled and curtailed.

This certainly will have local, national and regional implications given that it's the largest and most utilized transit town in connecting Uganda and some regions of

Rwanda, South Sudan and D.R. Congo to the coast in Kenya. Secondary implications include continuing trends of water-related diseases, no direct or indirect employment opportunities associated with the project, and continuing degradation of the environment and water resources due to unplanned disposal of faecal sludge.

In general, the minor benefits of the No-Project option are far outweighed by the benefits to be attained on implementing the Busia Water Supply and Sanitation Project.

7 ANALYSIS OF THE POTENTIAL IMPACTS OF THE PROJECT

7.1 Social and Environmental Characteristics of Project Infrastructure

7.1.1 Social characteristics of project infrastructure

In all the project impacted areas, there will be increased number of people in the area consisting of workers and service providers, with some being new to the project area. These workers and service providers will typically range at 15 to 100 people at each project infrastructure site during the construction phase. Similarly, 50 to 100 workers and service providers are anticipated in the entirety of Busia at the operational phase. These people will bring increased incomes to the community, and there will be interactions with the locals. Consequences of social interactions will include labour relations; sale of products to the plant staff; social conflicts over any number of issues; intermarriages and similar relationships (which could lead to HIV/AIDS infections, pregnancies, etc.); increases in the prices of some items due to the increased purchasing power of the plant staff and increased opportunities for the locals for self-advancement. Business opportunities include improvement in hotels and lodging facilities, restaurants and bars for the benefit of the plant staff.

Some of the people will be permanently located in the PIAs while a few will be short-term maintenance or delivery staff. Details of these analyses are given in subsequent sections of this Chapter.

7.1.2 Social and environmental characteristics of the intake works

The livelihood of the ecosystem in the lake at the intake works site (Figure 3) will be temporarily interrupted and the environ supporting them transformed. However, flora and fauna will readapt once construction works are accomplished.

There will be increased noise to communities and settlements from the dry-installed pump, Figure 3 b, given that it will be stationed above the lake water surface as compared to the submerged pump. Thus, noise pollution to settlements.

7.1.3 Social and environmental characteristics of the WTP infrastructure

A key social issue will be noise generation from pumping stations that could be a nuisance to nearby settlements given that they will operate 22 hours a day.

Environmental issues at the WTP are related to the treatment chemicals/methods being employed as discussed below.

Environmental characteristics of chlorination

Chlorine has been proposed as the disinfectant for the project, with a two stage application (i.e. primary and secondary). Primary disinfection will occur prior to sedimentation. Although no residuals are generated during this treatment step, the disinfectant used or disinfection by-products may be present in the WTP residual waste streams (e.g. filter backwash water) (EPA, 2011a).

Secondary disinfection will occur at the end of source water treatment (at the finished drinking water clear tank). This disinfection step is used to maintain a

disinfectant residual in the finished drinking water to prevent regrowth of microorganisms. The secondary disinfection process does not result in residuals generation; however, water from the clear well may be used to backwash filters. As a result, disinfectant added to the finished drinking water may become part of the filter backwash (EPA, 2011a).

Chlorine is toxic to plant and animal life; the gas form has a density greater than air, thus gas leaks accumulate and present significant safety concerns. Properly engineered gas handling systems, adequate training and refresher training, or switching to a non-gaseous chlorine form like calcium hypochlorite reduce safety concerns. To humans, chlorine is an irritant to the eyes, nasal passages and respiratory system. Chlorine gas must be carefully handled because it may cause acute health effects and can be fatal at concentrations as low as 1,000 ppm (SDWF, Undated).

Furthermore, the use of chlorine for disinfection of drinking water produces small quantities of halogenated methane compounds (e.g., trihalomethane). The halogenated methane compounds, known as disinfection by-products, are suspected to be carcinogens (Chlorine Chemistry Council, 2003). EPA limits the amount of total trihalomethanes in drinking water to 0.08 mg/L (EPA, 2008b). Free chlorine in backwash water is directly toxic to aquatic organisms and can react with naturally occurring organic compounds in receiving waters to form toxic compounds such as trihalomethanes.

Chlorine dioxide, formed when chlorine (gaseous or liquid form) is mixed with sodium chlorite, has been used in some drinking water systems where an elevated pH (>7) of the processed water has reduced the effectiveness of chlorine (EPA, 2011a). As with chlorine, WTPs must safely handle chlorine dioxide. It must be generated when needed because it cannot be safely stored due to its explosive characteristics. Its reaction by-products or waste materials can be toxic, such as chlorite (ClO_2, MCL 1.0 mg/L) and chlorate (Cl_2O_2) ions (EPA, 2008b). On the positive side, chlorine dioxide does not dissociate or disproportionate under normal drinking water treatment conditions, is a strong oxidant, and does not form halogenated disinfection by-products.

Chloramines (or combined residual chlorine), formed when chlorine reacts with ammonia, have been demonstrated as disinfectants, but are not as effective as other germicidal agents (EPA, 2011a). The combined residual from chloramines lasts longer than chlorine residuals and can remain chemically stable in water from hours to days. Backwash water from chloramines is highly toxic to fish and other organisms which live in water. However, these substances are not found to be bio-accumulative (transfer up the food chain) (Environment Canada, 2002).

The potential negative impacts of chlorine and its by-products in its various forms are well studied and mitigation measures to ensure chances of harming people and the environment are minimised, are readily available. Chlorine in its various forms is the most widely used disinfectant in the water treatment plants in Uganda. Its impacts would include corroding storage areas and it escaping into the atmosphere to deplete the ozone layer. However, the community would benefit from treated water which is safe to drink at all consumer points, which is the essential positive impact of the project.

Options to replace chlorine are generally more costly and require higher technologies for their application. None is able to give a residual disinfection capacity up to the consumers. These alternatives include ozone.

Environmental characteristics of alum and lime sludge

Aluminium sulphate, a coagulant that is irritating to skin, eyes, nose and mouth by contact (EPA, 2002) will be employed at the operational phase to remove turbidity. The coagulant sludge will consist of solids removed from the coagulated water, mainly hydroxide precipitates from the coagulant and material in the raw water (clay and sand, colloidal matter, microorganisms including algae and planktons, and other organic and inorganic matter present in the raw water) (EPA, 2011a).

Alum sludge contains a high moisture content (97 to 99.5%) and a low solids content. It generally settles readily but does not dewater easily. It is a most difficult sludge to treat because of several peculiar properties. Although alum sludge has high 5-day biochemical oxygen demand (BOD_5) and chemical oxygen demand (COD), it usually does not undergo active decomposition or promote anaerobiasis. It is reported to have a total solids (TS) content of 1,000 to 17,000 mg/L (AWWA, 1969a), of which 75 to 95% is total suspended solids (TSS) and 20 to 35% is volatile solids (VS). The pH value ranges between 5 and 7 (Reh, 1978). The BOD_5 of alum sludge ranges from 30 to 150 mg/L. The COD values are high, ranging from 500 to 15,000 mg/L (AWWA, 1969a).

Table 29 below shows typical and average chemical coagulation sludge volume generation rates with respect to average water treatment flow and water treatment design flow. Given an ultimate year WTP design capacity of 13,637 m^3/day (3.64 MGD), the coagulant sludge production rate for the project will typically vary between 0.18 to 67.38 m^3/day with an average of 20.06 m^3/day (i.e. 48 – 17,800 GPD with an average of 5,300 GPD).

Table 29: Typical chemical coagulation sludge volumes.

Average Water Treatment Plant Flow (MGD)	Water Treatment Plant Design Flow (MGD)	Typical Sludge Volume Range (GPD)	Average Sludge Volume (GPD)
0.23	0.7	7 – 2,600	770
0.7	1.8	18 – 6,700	2,000
2.1	4.8	48 – 17,800	5,300
5	11	110 – 40,900	12,100
8.8	18	180 – 66,800	19,800
13	26	260 – 96,600	28,600
27	51	510 – 189,400	56,200
120	210	2,100 – 779,900	231,300
270	430	4,300 – 1,596,900	473,500

Key: MGD = Million gallons per day; GPD = Gallons per day.

Source: EPA, 1993 as cited by EPA, 2011a.

Lime sludge will be generated as a result of softening using lime (CaO) or lime/soda ash (Na_2CO_3). As with coagulant sludge, lime sludge is removed from the water stream in the settling basin underdrain and in filter backwash wastewater. Sludge

from the softening of surface water is a highly variable material. It consists mainly of calcium carbonate (85 to 95% total solids); magnesium hydroxide, aluminium, and other metals; clay and silt particles; minor amounts of unreacted lime; and inorganic and organic matter (EPA, 2011a). The volume of sludge produced from lime or lime-soda softening plants ranges from 0.3 to 6% of the water softened (AWWA, 1969b).

The sludge will generally contain 85 to 95% solids, will be white in colour, with no odour, and low in BOD_5 and COD (EPA, 2011a). It is usually stable, dense, and inert. It dewaters readily, depending on the ratio of calcium (Ca) to magnesium (Mg) and on the amount of gelatinous solids present in the sludge.

In general, if discharged into water, the suspensions and dissolved solids in the sludge of alum and lime may:

i. Settle to form bottom deposits in the receiving water, creating anaerobic conditions because of the oxygen demand exerted by microbial decomposition. Decomposition consumes oxygen and reduces the amount available for aquatic animals. Severe reductions in dissolved oxygen concentrations can lead to fish kills. Even moderate decreases in dissolved oxygen concentrations can adversely affect waterbodies through decreases in biodiversity (EPA, 2011a);

ii. increase turbidity in receiving waters, thus reducing light penetration through the water column, thereby limiting the growth of rooted aquatic vegetation that serves as a critical habitat for fish, shellfish, and other aquatic organisms;

iii. Provide a medium for the transport of other adsorbed pollutants, including nutrients, pathogens, metals, and toxic organic compounds, which accumulate in settled deposits. These settled suspended solids and other associated pollutants often have extended interaction with the water column through cycles of deposition, resuspension, and re-deposition. Metals are potentially toxic to phytoplankton and zooplankton and to higher aquatic plant and animal species, including fish. They have the potential for bioaccumulation and bio-magnification in aquatic food chains. Aluminium in particular is toxic in the aquatic environment to several fresh-water species of fish, invertebrates, bacteria, and algae at pH conditions less than 6 (EPA, ASCE, AWWA, 1996).

iv. Clog fish gills as a result of suspended solids. In severe situations, clogging of fish gills can result in asphyxiation; in less severe situations, it can result in an increase in susceptibility to infection;

v. Contaminate receiving waters that serve as source waters for public and industrial water supplies;

vi. Alter the chemistry of natural waters to a degree that adversely affects indigenous aquatic biota, especially in the immediate vicinity of the effluent discharge.

The use of aluminium sulphate in the water treatment plants in Uganda is widespread and it is the coagulant of choice in most cases. NWSC is experimenting with other chemical coagulants, which have a smaller environmental footprint.

However, these are still in the experimental stages and could be adopted in the near future as a replacement of aluminium sulphate. These polymers are usually proprietary and must be sourced from specific vendors, who protect the technologies behind them, rendering them more expensive than aluminium sulphate.

The more common polymers include:

- Cationic emulsions;
- Cationic powders;
- Anionic emulsions and
- Anionic powders.

Certain organic particulate emulsions are also used, though with only special situations such as emergencies, due to their cost.

For the WMDP, the designers have prescribed aluminium sulphate as the coagulant and even with its negative impacts; it remains a most positive coagulant due to its widespread use in the country and therefore availability. The technologies for handling, applying it to water and disposing of sludge are all well known in the country. It remains the coagulant of choice.

7.1.4 Social and environmental characteristics of transmission infrastructure

Raw water transmission infrastructure
The raw water transmission main, including the pier bridge, will modify the current habitat for aquatic flora and fauna along its route and the immediate environs. Thus, it can act as an obstacle to the free passage/movement of fauna and at the same time as a habitat to clinging flora and fauna.

The pier and the intake works will create an obstacle to the shipping in the area, especially the small fishing boats that often navigate at night. These fishing boats might crash into the pier unknowingly and this may lead to injuries or even fatalities. The pier should therefore be lit and in the case of power failure, the side reflectors will be adequate to warn fishing boats of potential dangers. As the pier remains in place longer, the local fishing community will get familiar with the obstacle; however, chances are there that new boats in the area will not be aware of its presence in the water. Adequate warning signage and reflectors will be erected nearby.

The pier can be used as a diving platform by children and even adults. Because it is constructed of metals which might be slippery when wet, the pier structure is not suited for this purpose since accidents can occur. Access to the pier will therefore be restricted by a manned or locked gate, with signage forbidding entry to unauthorised persons. The structure will also be surrounded with barbed wire to discourage people from mounting it from the lake.

In case of accidents, the operators of the plant will ensure that trained personnel are always available to assist victims through first aid and evacuation to nearby health

units. All staff who work in the plant will be provided with life jackets and will be trained in first aid and rescue. A first aid kit will be provided at the water works.

Locals who are experienced swimmers will be drafted and given employment in the plant to support in inspecting the undersea structures and participate in emergencies. This is to ensure that they buy into the project and become part of it.

The local beach management unit located at Majanji is an important stakeholder and will assist in sensitising the community on the scope of the project and its benefits as well as impacts that may affect them. There will be routine community meetings and the plant operator will seek to be represented in the BMU of Majanji.

Treated water transmission

The distribution pipes will transmit safe water and its associated benefits much closer to the beneficiaries who include residents of Busia Municipality, particularly the urban poor and settlements along Busia - Majanji road. Thus, improving on public health and sanitation.

Most of the treated water transmission mains and all of the distribution pipes will be buried underground. Thus, minimal disturbances to the habitat of flora and fauna, except during maintenance works as minor excavations will be carried out. The main social issue will be during the construction period when most impacts will be experienced. The social impacts are of a limited nature, are short term, are readily foreseeable and are avoidable or mitigated in accordance with the ESMP.

To enhance the social benefits of the transmission mains, communities along the route will be provided with water supply services at various levels – house connections, yard taps and kiosks. Sensitisation of the community will also be done to ensure that they improve their hygiene and sanitation situation at the household and community levels.

7.1.5 Social and environmental characteristics of reservoir infrastructure

Social characteristics

The reservoirs in general are located on levelled ground (refer to section 4.5.3). Apart from the splashing of water as it falls into the tanks, and some limited vibration, the reservoirs are not intrusive. There will be some lighting in the structure (though this is not essential); a fence and gate will be erected to deter unauthorised entry and vandalism of project infrastructure.

Maintenance teams will visit the sites occasionally and a guard will routinely monitor the tanks but will not be stationed on the site. These increased human presence in the area will have some social consequences as already discussed in Section 7.1.1.

The tanks are built of robust materials and should last a long time until they are decommissioned and dismantled. Though exceptionally rare, a tank could collapse and present a flood situation to the low lying areas surrounding it. To ensure this possibility of rupture of the tank does not harm the community, drainage channels will be constructed downhill to harmlessly take the water to nearby streams. These channels will be located on land acquired by the project and will be cleaned and maintained by the plant staff.

To enhance community acceptance and ownership, local guards may be drafted in to carry out maintenance of the drains and for guard duties.

Environmental characteristics
Though disturbances will occur to flora and fauna at reservoir sites during the construction phase, mainly due to vegetation clearing and minor excavations, plants and animals will thrive again at the operational phase.

7.1.6 Social and environmental characteristics of the FSTP infrastructure

Environmental characteristics of generated nutrients
Overall, the hybrid-constructed wetlands to be employed in the project (i.e. two vertical flow and one horizontal flow system, Figure 6) are effective for the treatment of wastewater containing nitrogen (ammonia and nitrate), organics, and suspended solids (Vymazal, 2010). However, phosphorus removal is low (Vymazal, 2007). Removal of phosphorus occurs via ligand exchange reactions (phosphate displaces water and hydroxyls on the surface of aluminium, calcium and iron hydrous oxides), but is typically low unless special materials (e.g. granular slag) are incorporated in the substrate (Vymazal, 2010). For example, Korkusuz, (2004), experimented on the treatment of domestic wastewater in a cell of a vertical flow (VF) constructed wetland with wasted granular slag and gravel as media. He obtained, respectively, for both materials the removal of suspended solids (SS) 64% and 62%, COD 49% and 40%, NH_4^+-N 88% and 58%, total nitrogen (TN) 41% and 44%, total phosphorus (TP) 63% and 9%, PO_4^{3-}-P 60% and 4%.

Given that up to two vertical flow systems, with gravel as media, will be employed in the project, the removal of SS, COD, NH_4^+-N and TN can be achieved at nearly 100%. Meanwhile the removal of TP and PO_4^{3-}P will typically be attained at, respectively, 18 and 8%. Which is rather poor.

Removal of phosphorus is equally limited in horizontal flow (HF) systems due to the fact that the media used (gravel, crushed stones, etc.) is usually low in Fe, Al or Ca to facilitate precipitation and/or sorption of phosphorus. This means that, without granular slag in the media of the VF cells, phosphorous loads will be continuously released in the FSTP effluent.

Phosphorus is typically scarce in water under natural conditions (MPCA, 2007), thus limiting primary productivity in freshwater ecosystems (EPA, 2011a). In such aquatic ecosystems, an increase in ambient phosphorus concentration due to wastewater discharges above naturally occurring levels results in the excessive growth of algae and other phytoplankton, with the development of eutrophic conditions as the consequence. In turn, eutrophic conditions can cause disruption of natural aquatic ecosystem structure and loss of biodiversity. Water bodies having total phosphorus concentrations less than 0.01 mg/L are nutrient-poor and will not support large quantities of algae and aquatic plants. At the other extreme, total phosphorus levels of 0.1 mg/L or more categorize water bodies as highly eutrophic, with high nutrient and algae levels (MPCA, 2007).

In Uganda, faecal sludge typically contains between 150 – 450 mg of total phosphorous per litre of sewage (NWSC, 2008). Given that the designed FSTP will employ sand, gravel and crushed stones as media, the removal of total

phosphorous will typically be at 18%. Thus, up to 123 – 369 mg of total phosphorous per litre of effluent will be discharged.

The Design Team estimates indicate that up to 3,842,000 litres of faecal sludge will be generated annually at the ultimate year (2040) (Fichtner and M&E, 2015b). This corresponds to an annual production rate of 5763 x 10^5 – 17289 x 10^5 mg of total phosphorous. Thus, 472566 x 10^3 – 1417698 x 10^3 mg of total phosphorous will be released annually in the effluent.

Nonetheless, as discussed above, granular slag media in a single cell of a VF system can obtain up to 63% total phosphorus removal. Thus, if the two VF systems in the project are all fitted with granular slag, then nearly 100% phosphorus removal can be achieved. This will attain the permissible discharge regulation of 10mg/l for Total Phosphorous and 5mg/l for phosphate Ugandan Regulation and IFC standard (Appendix 6 and 7).

Traditionally, Uganda has been relying on natural wetlands in tertiary polishing of sewage effluents. However, this is no longer possible because of the encroachment on natural wetlands, saturation of wetland substrate and climate change, which has reduced water flow in wetlands. Constructed wetlands were first experimented two decades ago in Uganda. In the last decade, proto types have been used in small experimental trials. However, the hybrid-constructed wetland designed for the Busia project will be a pilot full-scale constructed wetland system in Uganda.

Social characteristics of generated odour

The FSTP to be employed in the project, Figure 6, consists of up to two vertical flow (VF) cells that will be installed prior to the horizontal flow (HF) cell. Wastewater will flow vertically downwards in the VF systems through sand and gravel filters, with solids being retained above the filter horizons. Thus, anaerobic biogenic transformation of organic matter and nutrients that generate odour will occur deeper in the treatment profile. This therefore limits the release of generated odour to the atmosphere, thus minimizing the attraction and influence of flies and vermin.

However, to optimally manage odour at the lowest possible cost, a minimum distance must be set between the FSTP facility and the nearest occupied building. The modified Warren Spring formulae may be employed.

$$R_{urban} = \frac{1}{4}(2.2 \times OE)^{0.6}$$

Where R_c = maximum complaints radius, m, to within a factor of 2; OE = odour emission rate, ou/s. A typical high odour emission rate in wastewater plants is about 710 ou/s/m^2 (UKWIRL, 2001). This corresponds to a maximum complaints radius of 20.61 m per m^2 of the FSTP facility. Similarly, a typical low odour emission rate in wastewater plants is about 0.3 ou/s/m^2. This corresponds to a minimum complaints radius of 0.2 m per m^2 of the FSTP facility. In general, an average complaints radius of 10.4 m per m^2 of the FSTP facility could be considered for the project.

A well-managed odour and vermin control system will enhance acceptance by the community while these nuisances may lead to rejection of the FSTP by the community. Efforts will be expended to sensitise the community on the benefits of the FSTP and its benefits to the community. The benefits include reduction of solid

waste; emptying of their pit latrines and septic tanks; provision of manure from the composting of waste; and generation of biogas.

Most communities do not have large quantities of solid waste to dispose of but cumulatively, even the little that they produce can become a nuisance if not disposed of properly; thus a FSTP in the area would provide a disposal route, which the community can take advantage of. Their pit latrines are emptied occasionally; it is suggested that the impacted communities are given preferential tariffs when they bring in their pit latrine sludge for disposal at the plant. The compost sale should also be at a lower tariff. This will encourage the community to accept the project in their neighbourhood.

The FSTP is expected to generate significant quantities of biogas. The biogas could be sold to the local community to reduce high dependence on wood fuel and charcoal for cooking and heating. To enhance acceptance of biogas use to the community, a demonstration unit could be set up at the FSTP housing unit nearby. Sale of biogas in cylinders or through pipelines should be built into the project, and should benefit the community in the impacted area (at preferential tariffs) and schools and hospitals in the area.

The operator shall engage an independent person to routinely audit the operations of the plant with a view to keep the community engaged, informed and to have the operations at a high level of efficiency.

A community complaints procedure will be set up, requiring quick actions to control vermin outbreaks or flooding of the FSTP. Members of the community will be drafted in to a community association, which will be responsible for oversight of the operations of the FSTP and generation of benefits such as compost and biogas.

7.1.7 Social impacts of potential tariff changes

The majority of the households in the project area prefer to pay for water delivered from yard taps and the revenue accruing to the system is substantial and adequate to cover the full costs of operation, maintenance and eventual expansion. This leaves only a minority to be in a position to meet the full costs of higher service levels.

There is no obscurity in the implications of water services planning in such communities. It is complex. Professionals in water services planning should be aware of the problematic outcomes of having systems that operate only sub-optimally. This is especially because policy decisions regarding all service levels should be addressed adequately and at the same time. Where decisions regarding one service type mismatch the intentions of another, eruptive results are bound to increase the chance of systems failure. The reasons for this are very clear. Public taps and private connections in localized system draw water from the same sources, have no divergent quality differences and yet provide unequal convenience. To accord with economic principles of equity therefore, the marginal cost of production should be equated with the marginal revenue (benefits) of the system.

In type community such as those in the project town, where private connections may eventually turn out to be competitive sellers of water with public taps, the

financial viability of (and not the economic viability) of the system is greatly threatened. Therefore policies regarding tariff, billing, collection, connection and sale of water should all be addressed exhaustively.

It is understandable that economies of scale accrue to the system with higher private connections since they use large volumes of water and the marginal cost of production in the entire system tends to decrease. However, it is important to realize that when households with private connections turn out to sale water to other households that would have bought from public taps, the revenues of the system will certainly decline. Households with private connections will definitely have this initiative if they are charged a much lower rate per cubic meter than at the stand post. It would even be higher if they are charged fixed monthly rates. In either case, the marginal cost of the water they sell is lower than the marginal revenue (benefit) to them. These households would then continue to inflict "a double-edge sword" effect to the system. The cost of producing much water at the aggregate level by the system will rise and at the sometime revenues accruing to it are reduced (these are tapped by the selling households which eventually pay only little for the amount they would use at their household).

It is difficult to estimate the number of households that will sale water once connected in the project, but the existence of households that sale water from private connections such as yard taps in town today it is definite evidence that more private connections will emerge when the water system improves its efficiency. It is therefore necessary to address this problem right from the beginning by:-

- Ensure adherence to the principles of charging according to the marginal cost of production.
- strict requirements of metering and restrain from flat monthly rates;
- strict management procedures of timely billing and collection;
- strict measures of disconnecting defaulters and recovery of money owed;
- sensitization of communities about the dangers of exposing the system to failure through unscrupulous water selling households and colluding with similar management staff;
- ensure continued operation of all outlets as planned/installed. If some outlets fall out of use due to some technical (or other) reason, the people initially served will be exposed to the complexity of the type community mentioned earlier and the overall effect to the system will be discouraging.

The above suggestions are all aimed at attaining a solution where households should pay for all the water they use. It is important to note that emergence of households that benefit from the systems, in money terms, will bring about a rush for house-connections. Since this increases the volume of water to be produced, the technical capacity of the systems may be overblown.

It is also easy to see how a laxity in addressing key policy issues at the public taps will undermine the sustainability of the system. If stand post water is provided freely (as a social service), the majority of households will collect their water from this service type. The system will have to draw on operations funds from the few private connections and soon the low-level equilibrium trap will be hit. The result will be a need for subsidy from either the Town authorities or the Government or close the systems.

Similarly, very low tariffs at the stand-posts on the basis that they are low service levels will result in continued water vending. Vendors will find it easy to collect water from stand-posts at lower prices and sell to willing households at higher prices (as is the case today with point sources) in most towns country wide. The effect of this is manifested in households spending highly for water yet aggregate revenues to the system are at comparatively low levels. Another effect is that once vendors find this business lucrative, they will tend to dominate the queues at the stand-posts hence create crowding. In the case of Kumi, and Ngora, there is already an organized water vendors' network in the towns taking advantage of the water supply systems inefficiency for a prolonged period.

Effects of charging flat monthly rates for use of public taps are also numerous. First of all, it is difficult to establish a realistic rate reflective of every household's consumption. In the case that a common rate is adopted, some households will certainly be paying less than they consume while others pay more than they consume. The latter is however thought to consist of a minority since each user household will have an incentive to use as much water as possible (even for low value uses). In fact the cost of using water above the quantities for which the tariffs were based is nil hence uses such as watering gardens will arise.

Providing fewer outlets has diverse effects. Among these are: overcrowding (queuing), increase in time for collecting water, emergence of water vendors - who will in-turn want to dominate the public taps. Households with private connections will also start selling water to their neighbourhood.

The biggest percentage (70.1%) of all the households covered during the study pay for the water they use.

n our analysis of preferred location for public taps, a distance of 100 meters was the mean desired distance. Currently household walk up to a mean distance of 0.59km and 0.67km in the dry and wet season respectively, to collect water.

In order to minimize the chances of system failure, it is important to address policy issues aimed at reducing the above effects:

- All public taps should be metered so that it is easy for the collecting agency (Private operator) to account for the water sold.

- Households should be charged according to the amount of water consumed. Various approaches can be applied in volume metric charging. First the user household can pay on the per-jerry can basis.

- All public taps should adopt a similar charging mechanism. It is possible that if different towns are allowed to decide their modes of charging, some will prefer to charge flat monthly rates while others would devise other ways of collecting the money. This is mainly because the social setting of these towns is different. The effect of this is that public taps for which payment is fixed will attract many users as compared to those for which water is metered by the jerry can. Not only will this cause enforcement complexities on the part of the revenue collecting agency (private operator), but will also encourage sale of water from fixed monthly paying households to the neighbourhoods.

- It has been argued over time that water vendors should not be prohibited from using public taps. It is logical to argue this way since vendors provide an essential service but the effects of allowing vendors the freedom to sell water is often felt soon or later. Vendors have the capability and incentive to sabotage a public water system. They may continuously act in such a manner as to seek to destroy/vandalize public taps of their target markets. It is however useful to decide on formalizing any person's interest to sale water in a specific area. In this way such a person will be treated and subjected to respective conditions set for such a connection fees, the cost of a meter, hook-up cost and above all the tariff. His connection will operate side by side with the existing public taps and house connections.

7.2 Environmental Assessment of Project Localities

7.2.1 Environmental Assessment of the intake Locality during construction

A detailed baseline description of the intake locality is given in Section 4.5.1. A pier bridge extending at least 300 m into the lake, including intake facilities (valve(s), pump(s) and pipes), will be erected during the construction phase. These will comprise columns to support these structures. In general, the normal life cycle of aquatic flora and fauna will be disrupted within these localities during construction. However, the environmental impacts of the construction phase are readily foreseeable, of limited extent and of a short duration. Mitigation measures are well within the ability of contractors to implement, as stated in the ESMP.

A key social impact is created by the increased number of people flocking to the area as workers and as jobseekers. Refer to Section 7.1.6 for a discussion of the potential impacts of increased number of people in the project area.

7.2.2 Environmental assessment of the WTP locality during construction

A detailed baseline description of the WTP site is given in Section 4.5.2. At the construction phase, ground levelling and soil excavations will expose soils to erosion depending on site terrain and intensity of erosion agents (wind and surface water runoff). This can lead to direct siltation of the water source. However, the environmental impacts of the construction phase are readily foreseeable, of limited extent and of a short duration. Mitigation measures are well within the ability of the contractors to implement, as stated in the ESMP.

The site of the WTP is in a sparsely populated area and there are no people living in the immediate project area, though a few are impacted – especially those whose land will be partly taken by the WTP.

A social impact is created by the increased number of people flocking to the area as workers and as jobseekers. Refer to Section 7.1.6 for a discussion of the potential impacts of increased number of people in the project area.

7.2.3 Environmental Assessment of the FSTP Locality

A detailed baseline description of the FSTP site is given in Section 4.5.5. The gentle slope forming a valley that is drained by Okame - Amagoro stream at the FSTP site can be adapted in enhancing gravity flow between treatment compartments.

A key challenge, however, is that the site does not have a natural wetland system between the proposed treatment plant locality and the receiving stream. This implies that phosphorous loadings will be directly discharged into Okame - Amagoro stream given that the FSTP to be employed is rather poor in assimilating phosphorous (refer to Section 7.1.6). Furthermore, the locality can pose a serious threat of water and aquatic pollution in case of system performance breakdown as there is no natural wetland to assimilate pollutant loads.

7.3 Environmental Assessment of Support Facilities

7.3.1 Environmental assessment of the FSTP service area

The FSTP service area of the project is principally Busia Municipality. The wastewater to be collected from latrines will not only comprise organic materials but equally inorganic matter given that some homesteads tend to dump domestic solid wastes into pit latrines. FSTPs principally employ microbes to break down organic materials, thus any inorganic matter will not be treated. The inorganic matter must be removed from the FSTP once it is deemed safe to handle and disposed of into landfills. It is not useful for any agricultural purpose. In general, community education and sensitization is crucial to ensuring optimal utilization of the FSTP.

Collection and safe disposal of excreta will give a major boost to household hygiene and sanitation and reduce the incidence of diseases which are spread by flies and poor hygiene practices.

To enhance the social and environmental impacts of the wastewater collection system, it is important to carryout community sensitisation and to give reasonable tariffs on the basis of economies of scale. As more households join the system, there should be a concomitant tariff rebate given to the community. Social responsibility actions such as drama and sports activities should be organised to increase knowledge of the systems and attract new users. Ultimately, service levels may improve from pit latrines to septic tanks, or even to a small bore sewerage system, depending on the number of people included in the system.

7.4 Environmental assessment of the FSTP effluent disposal route

The leachate from the FSTP will be channelled through a drain into the nearby Okame - Amagoro stream. A detailed description of the impacts of the FSTP

leachate on the receiving water body is given in Section 7.1.6. The communities along the route and those using the water from the stream will occasionally be exposed to nutrients, pathogen and odour nuisances. While the receiving water body is not potable at present, the incremental pollution from the leachate will only aggravate the problem. It is therefore important that the communities will be provided with water at household, or kiosk or yard tap level of service. Furthermore, they should be sensitised not to directly consume the water in Okame - Amagoro stream.

The natural environment is quite effective in reducing BOD_5 and pathogens in the water through natural die off. The Streeter-Phelps equation will be used in monitoring the dissolved oxygen deficit along the stream using data that will be obtained from actual measurements. It is not possible to model the dissolved oxygen sag curve without actual input data[1].

Data and observations by Water Quality staff of NWSC indicate that the high dissolved oxygen concentrations in natural waters in most Ugandan rivers will ensure that the degradation of wastewater in the river will be rapid. However, a strict monitoring program will be instituted to ensure that the stream is not damaged beyond what is acceptable in the NEMA Regulations.

7.4.1 Assessment of infrastructure necessary for operating the FSTP

Given that cesspools will be employed in ferrying faecal sludge to the FSTP site, access roads are inevitable. The FSTP site, refer to Section 4.5.5, has an access road that is routinely maintained by Busia District Works Department.

The challenge perhaps is that the road is murram based, thus could lead to increased dust generation to settlements and communities along the route. Most of the roads in the Municipality are earth roads and are maintained and improved by the Municipal Council, whose budget is not linked to the project. The project can however intervene with the drivers delivering faecal sludge to be careful not to spill the contents of their trucks carelessly and to be careful not to injure pedestrians and other road users.

The infrastructure necessary for operating the FSTP will be located at the plant site. An office will be available at the central office; however, a guard will be stationed at the plant to deter unauthorised entry and to maintain a log of the faecal sludge deliveries and exit of compost manure and biogas. These infrastructure will have an insignificant environmental footprint.

7.5 Environmental Assessment of Project Area Informal Settlements

There are no informal settlements (communities that live in slums) at the localities that water and sanitation infrastructural facilities will be constructed. However, informal settlements will benefit from the project given that water distribution mains, including water kiosks, are to be extended into these settlements. These informal settlements are located in Custom Road "A" Village, Central Ward and Eastern Division within Busia Municipality.

[1]The Streeter-Phelps equation is accessed through the link Streeter-Phelps.

The informal settlements will also benefit from the collection and disposal of faecal sludge from their pit latrines and from hygiene and sanitation sensitisation that the WMD Project will conduct, as well as from drama and sporting events organised to highlight public health and hygiene. They will also get a preferential pro-poor tariff for their yard taps and kiosks selling water and sewerage services.

To enhance these positive impacts on the urban poor, targeted messages will be developed into information, education and communication (IEC) materials while a number of the men and women will be offered employment opportunities during the construction and operation phases of the project.

7.6 Impact Assessment

One of the key components of an EIA is to identify impacts, for the various project phases, on physical/chemical, biological and socio-economic environments. Impacts, positive and negative, have been identified for the project with respect to construction and operational phases.

To harmonize positions of the multidisciplinary team on the assignment and reduce subjectivity in evaluating the significance levels of the identified potential environment impacts of the project, there was need to use a method that is flexible, transparent and most importantly free from subjectivity. In this light, Rapid Impact Assessment Matrix (RIAM) developed originally by Pastakia (1998) for EIA was suitably chosen Table 30.

Table 30: Impact Ranking according to the Rapid Impact Assessment Matrix

No.	Impact Rank	Rank	Description of the Rank
1	+5	Major positive change/impact	A 'major change' will occur at a point when the condition extends to a regional/national boundary and is of major importance. Such a change would also be permanent, irreversible, though it could be non-cumulative.
2	+4	Significant positive change/impact	The lower limits of 'significant change' can be taken, as the point when a condition is outside local boundaries but is of major importance, yet is temporary, reversible and non-cumulative.
3	+3	Moderate positive change/impact	A condition of moderate change will lie between the limits of 'change' and 'significant change'.
4	+2	Positive change/impact	A condition of 'change' will occur up to a condition of local importance with significant magnitude, which is permanent, irreversible and cumulative.
5	+1	Slightly positive change/impact	A condition that is local in importance and a slight change from the status quo yet is permanent, irreversible and cumulative, represents the upper limit of the 'slight change' condition.
6	0	No change/status quo	Conditions that have neither importance nor magnitude will score a zero, and can be banded together. Any condition in this band is either of no importance, or represents the status quo, or a no change situation.
7	-1	Slightly negative change/impact	A condition that is local in importance, and a slight change from the status quo, yet is permanent,

No.	Impact Rank	Rank	Description of the Rank
			irreversible and cumulative, represents the upper limit of the 'slight change' condition.
8	-2	Negative change/impact	A condition of 'change' will occur up to a condition of local importance with significant magnitude that is permanent, irreversible and cumulative.
9	-3	Moderate negative Change/impact	A condition of moderate change will lie between the limits of change' and 'significant change'.
10	-4	Significant negative change/impact	The lower limits of 'significant change' can be taken, as the point when a condition is outside local boundaries but is of major importance, yet is temporary, reversible and non-cumulative.
11	-5	Major negative change/impact	A 'major change' will occur at a point when the condition extends to a regional/national boundary and is of major importance. Such a change would also be permanent, irreversible, though it could be non-cumulative.

7.7 Analysis of Significant Positive Impacts

7.7.1 Improved Public Health, Hygiene and Household Health Status

Based on socioeconomic surveys carried out by the ESIA team and prior studies undertaken by Fichtner Water & Transportation and M & E Associates Limited (refer to Fichtner and M & E, 2015a), it can be stated that the sanitation management facilities within Busia Town are rather rudimentary and largely depend on the level of service of water supply.

The population is served by onsite sanitation facilities (pit latrines and waterborne toilets that are connected to septic tanks). Furthermore, there is no excreta disposal system in that households and institutions simply abandon filled-up pit latrines as new ones are built. This is a key challenge in the core of the Town as land for new developments is always a challenge.

Most public sanitary facilities are not in good shape and inadequate to cope with the number of users, including vendors/traders, nearby local communities and visitors. The available number of toilet/latrine stances in schools are inadequate to serve needs and most schools do not have hand washing facilities. Toilet/latrine stances at key health facilities such as Dabani Hospital and Busia Health Centre Grade IV are in bad shape, inadequate and some have no hand washing facilities. Pits are supposed to be emptied and the sludge disposed of by suction trucks from Tororo Municipality given that it has a disposal facility. However, the truck owners generally charge exorbitant rates.

In general, toilet facilities that require stable water supply are in poor state in most institutions and public places. Pit latrines and septic based systems face the key challenge of faecal sludge disposal especially when they are filled up.

The proposed water and sanitation project will improve on the health and hygiene of the targeted population through the provision of a safe and reliable water supply, including human waste management facilities, thus reducing the risk of water contamination and the spread of pathogens that cause waterborne diseases. Up to

100% of the ultimate year population in Busia Municipality has been designed for with respect to safe water supply. A 79% coverage will be attained through the new water scheme, with the current groundwater based scheme being utilized as a supplement. Thus, it is anticipated that 100% reduction in water borne diseases can be achieved through continual community education and sensitization on the value of safe water. Furthermore, the FSTP, to be treating up to 3,842 m^3 of faecal sludge per annum (i.e. 100% of the ultimate year faecal sludge production in Busia Municipality), will ensure timely and safe disposal of human waste given that it will be located in the project area. Thus, it is anticipated that 100% improvement in household sanitation can be achieved through continual community education and sensitization on the value of hygiene.

The benefits that will accrue from improved public health, hygiene and household health status, will be immense in magnitude, permanent (as long as the project is sustainably managed) and cumulative in benefit, thus a significant (+4) positive change.

Enhancement measures

An awareness campaign on issues of public health, hygiene and sanitation are very critical. Hence sensitization is important. Hand washing should be encouraged. Body bathing, cleaning of clothes, utensils and dwelling areas, particularly toilets, will improve the public health of the project area. The sorting of solid waste at source and handling it over to waste collection providers for disposal at the municipality disposal sites will improve public health.

7.7.2 Improved living standard/well-being

The living standard and well-being of en-route communities and Busia Municipality residents, the key beneficiaries of the WMD project, will be improved during the operational phase of the project.

At a population of 55,958 as per the 2014 National Census and taking an annual growth rate of 3.08% that was realized between the year 2002 and 2014 (UBOS, 2014), Busia Municipality is expected to have a population of 85,567 and 123,140 by, respectively, the intermediate (2028) and ultimate year (2040). A population of 70,482 and 97,033 has been designed for, respectively, in the intermediate and ultimate year. This means that 82.4 and 78.8% of the people of Busia Municipality will be supplied with sustainable safe water within easy reach in, respectively, the intermediate and ultimate year. However, a coverage of 100% can be achieved with the current groundwater based supply scheme acting as a supplement.

This will be a great achievement as compared to the current water supply scheme that achieved a coverage of 48% in the year 2010 (refer to MWE, 2010). Furthermore, the project will eliminate the reliance on the current system that is rather intermittent, rationed and unreliable (refer to Fichtner and M & E, 2015a).

Settlements around the water intake and along transmission lines will equally be supplied with safe and readily available potable water. This will tremendously lower the reliance on the unsafe water sources such as springs, streams, rivers, wells and wetlands. Thus, improving on health and reducing water borne related disease like typhoid fever and cholera. There will be reduced conflicts with hippos and other

wild animals, and reduced exploitation of women and the girl child, who currently fetch water from Lake Victoria, since water will be brought to their doorstep.

The benefits that will be attained from improved living standards and well-being, will be immense in magnitude, permanent (as long as the project is sustainably managed) and cumulative in benefit, thus a significant (+4) positive change.

Enhancement measures
The operator of the project should supply water and sanitation services to the population at affordable tariffs for them to realise the benefits of the project, thus ensuring its sustainability. This will include on-time billing and keeping users up to date on the status and functionality of the various project facilities.

Operation and maintenance of the facilities should be done in a professional manner to ensure sustainability of the services.

7.8 Analysis of Direct and Indirect Positive Impacts

7.8.1 Reduction of domestic violence

Statistics from the health facilities indicate that at least three women are reported to be battered by their husbands in different communities of Busia District every week (many more might not be reported). The interview with a Medical Officer at Dabani Health Facility in Busia, indicated that at least one woman is admitted daily to the hospital having sustained injuries as a result of being battered by her spouse. It was found that in some instances, women have been beaten to coma by their partners. Domestic violence cases are often reported to police (41%), Child disappearance (cases of missing children) are also very common (32%), followed by Child neglect (19%) and Child desertion (8%).

In the African culture it is the duty of women and children to collect water. Lack of water in the house may lead to domestic violence where the husband beats up the wife or children. Whenever women and children go to collect water a suspicious husband or father may think the wife or children have been involved in promiscuity. This is particular if women or children spend unaccountable time at the water source. This may lead to domestic violence against the women or children. The project will bring water near to the household where a suspicious husband/father may be able to monitor the movement of his wife or children since it will be a short distance from home.

In general, the impact reduction of domestic violence, though localized and reversible, will be moderate in magnitude, permanent (as long as the project is sustainably manged) and cumulative in benefit, thus a positive (+2) change.

Enhancement measures
The project should take water to every homestead in the project area. In informal settlements, public tap should be located within 100 m from the homestead.

7.8.2 Improved gender awareness

Women, as a norm in most African culture, take lead roles in domestic activities, including water and sanitation programmes within homesteads. As of 2010, 88% of

the people of Busia were served by point water sources (MWE, 2010). This figure must have increased given the fact that no piped water system has been built/improved on within Busia since the year 2000 and the population is growing at about 3.08% per annum (UBOS, 2014). The project will avail, at the operational phase, user friendly (tap water systems) as compared to most of the current water sources (wells, streams, springs, hand pumped boreholes, etc.) that are rather far from homes and water cannot be easily collected.

Thus, if water quality, water availability and wastewater disposal improve, households will spend much less time and money on fetching water, storing it, purifying (boiling) it and disposing of wastewater. Women will spend shorter time in domestic chores and the time saved can be used productively in economic terms (e.g. through work which generates income). School girls will have the opportunity to concentrate on school programmes, rather than spend so much time fetching water. Moreover, fetching water is known as a soft path into juvenile delinquency as both boys and girls take that as a chance to conduct many activities outside the view of their parents.

Bringing water close to the communities is foreseen to uplift the women and the girl child status in the various communities.

In general, the benefits that will accrue from improved gender aspects, though localized, will be immense in magnitude, permanent (as long as the water facilities are sustainably managed) and cumulative in benefit, thus a moderate (+3) positive change.

Enhancement measures

The District Planning, Community Development and Water Management Teams should plan and budget for the extension and construction of tap water kiosks closer to informal settlements, especially where communities cannot individually afford tap water connections into homesteads. The District Community Development Team should also sensitize communities of the importance of having safe water, its ease of access and the liberty it gives women and children to have time for other productive activities.

7.8.3 Employment

Employment opportunities will be available in a number of disciplines during the construction and operational phases. Not only will the skilled people be employed but also equally unskilled personnel will have opportunities. Additionally, local communities and the entire Ugandan economy will benefit. Temporary jobs will be created during the construction phase and permanent jobs when the water supply and wastewater disposal installations start operating.

The building of installations creates new jobs or secures existing jobs within construction companies who will be awarded contracts. The operation of the supply and treatment installations will also secure existing jobs and create new ones. At a staff ratio of 6 per 1,000 connections (NWSC, 2010), the NWSC, the foreseen operator, will be able to employ between 15 to 25 people at the commencement of operations given the number of households that was at 13.683 in the year 2014 (refer to UBOS, 2014). Furthermore, up to 15 to 100 people will be temporarily

employed, either directly or indirectly, per project site during the construction phase as discussed in Section 7.1.1.

In general, the benefit of employment, though partly permanent and reversible, will be regional in context, moderate in magnitude and cumulative in benefit, thus a moderate (+3) positive change.

Enhancement measures
The communities showed enthusiasm with regard to job prospects during the meetings with the ESIA team at the various project component facilities. To manage conflicts and negative politics that could arise, especially during the construction phase, the contractors should give priority for employment to the local people within the project localities depending on their skills and training. Women should be given preferential opportunities and employees should be issued appointment letters with clearly spelt out and understandable terms of employment. The contractor must also ensure that workers are paid on time. Vulnerable groups like the youth and disabled should be given priority.

7.8.4 Incomes and market for produce and products

Incomes and market for products is foreseen to accrue at all the phases of the project. At the construction phase, local communities will generate income from the sale of food and sundries to construction workers. These will be provided by farmers and local entrepreneurs. Construction materials such as cement, iron bars, timber/wood, aggregates, sand, electro-mechanical equipment and pipes will be required, thus suppliers will earn an income.

To operate and maintain the project facilities, the supply of materials and services will be required. Chemical companies, security services, and training providers will be required.

In general, the benefits that will be attained from incomes and market for products, will be regional in context, moderate in magnitude, permanent and cumulative in benefit, thus a moderate (+3) positive change.

Enhancement measures
The Management Team of the various project phases should give priority to the local suppliers and service providers.

7.8.5 Economy

Benefits to the Ugandan economy are foreseen to accrue during the construction and operational phases. Income will be generated through tax remittances such as Value Added Tax (VAT), With Holding Tax (WHT), Pay as You Earn (PAYE), Local Taxes, etc. The income generated will not only go the National Treasury, but equally to the District Treasury, thus directly benefiting Pallisa District residents.

In general, the economic benefits to be attained, though minor in magnitude, will be national in scope, permanent and cumulative in benefit, thus a moderate (+3) positive change.

Enhancement measures
During the construction phase, all contractors and sub-contractors should be registered tax payers with the Uganda Revenue Authority (URA) and should pay applicable taxes and remittances in a timely manner.

The client should ensure that engineering designs, architectural drawings and site layout plans for the various project facilities be submitted to the Physical Planning Committee of Pallisa District Local Government for review and approval. NWSC, the foreseen operator of key project facilities, should obtain operational licenses from Pallisa District Local Government once the facilities are ready for commissioning.

The Central Government through URA should ensure that project facilities operator makes timely submissions and routinely update their tax bases.

7.8.6 Skills and technology transfer

Skills and technology transfer is foreseen to take place in all phases of the project, though most importantly at the construction phase. The construction supervision will be carried out by an association of a local and a foreign company. Furthermore, it is anticipated that construction works will be sub-contracted to local companies. This will avail an opportunity for skills and knowledge transfer into the Ugandan economy.

The operational phase will equally offer skills build-up, particularly for students through internships, with respect to the operation, management and maintenance of the various water supply and sanitation facilities.

In general, the benefits that will be attained from skills and technology transfer, though localized, will be regional in context, moderate in magnitude, permanent to a large extent and cumulative in benefit, thus a positive (+2) change.

Enhancement measures
The terms of agreement as per the contract given to the construction supervision team should emphasis knowledge transfer and the Client (MWE) should monitor and ensure that the objective is met.

7.8.7 Land and property compensation

It is envisaged that there will be private land acquisition for the construction of the WTP at Namundiri "A" Village (Majanji Sub County), a reservoir at Daha Village (Buhehe Sub County) and the FSTP at Okame - Amagoro Village (Buteba Sub County). The other project facilities will be located on Government owned land, thus compensation will not be required but rather transfer of ownership.

There will be loss of land in those sites to be acquired but the owners will be adequately compensated as per the World Bank Policy on Involuntary Resettlement and Uganda Laws on land and property acquisition. The essence of resettlement is that the affected persons are left better off as compared to their current status. A Resettlement Action Plan has been drafted, for the project, and will be implemented by the Client.

In general, the benefits that will accrue from land and property compensation, though localized and temporary, will be moderate in magnitude and cumulative in benefit, thus a positive (+2) change.

Enhancement measures
A Resettlement Action Plan has been undertaken concurrently with this ESIA. It identified Project Affected Persons (PAPs). The Wold Bank Guidelines on Involuntary Resettlement and Ugandan laws on Compensation and Land Acquisition should be adhered to so that livelihoods are restored and improved by the project.

7.9 Analysis of Significant Construction Phase Negative Impacts

Based on a RIAM analysis of the anticipated negative impacts, there will be no significant (-4 or -5) negative impacts at the construction phase given that they are all short-term (temporary), readily foreseeable and mostly noncumulative. All the construction phase impacts, as discussed in subsequent Sections, are -1 to -3 in the environmental score, meaning that they are not significant.

7.10 Analysis of Construction Phase Direct and Indirect Negative Impacts

7.10.1 Loss of land and damage to property

PAPs, as summarized in Appendix 3, will have to involuntarily give-up their properties for the benefit of the project. These properties include land, perennial crops and trees.

Most of the land to be acquired for the project is government owned, with the exception of 0.568, 2.0 and 0.289 acres at the WTP, FSTP and Reservoir 2 respectively (refer to Section 4.5). This gives a total of 2.857 acres. The private land at the WTP and Reservoir 2 are utilized occasionally for subsistence farming, while the 2.0 acres at the FSTP site is used for grazing cattle. Furthermore, land owners will be adequately compensated as per the World Bank policy on involuntary resettlement and Ugandan laws on compulsory land acquisition.

In general, the impact of agriculture land loss, though permanent in effect, will be localized, minor in magnitude and is reversible, thus a slight negative (-1) change.

Mitigation measures
The land to be permanently acquired for the project should be compensated for as per Ugandan laws on Compensation and Land Acquisition; those who will be temporarily affected, such as temporary excavations for water pipe laying, should be compensated for any damages; the RAP study/report that has been undertaken for the project should be utilized as a guide during the compensation exercise.

7.10.2 Conflicts due to influx of immigrant labour

The project will attract immigrant labour into the project area. Like any other project with mass recruitments, the behaviour of workers on and off the site, such as the use of abusive and vulgar language, destruction to property, lack of respect to the locals and engagement in sexual relations with underage girls and married women are bound to happen. Thus, a potential source of conflict.

The impact of conflicts as a result of influx of immigrant labour, though localized, temporary, reversible and noncumulative, can be in immense in magnitude, thus a negative (-2) change.

Mitigation measures

Contractors should develop guidelines for behavioural conduct, including penalties. Workers must be sensitized on proper social behaviour and conduct with regard to community norms prior to starting work; workers should be sensitized to avoid engaging in sexual relations with underage girls and married women; in case of misunderstandings between workers and the local community, local leadership should always be sought as a first priority in solving these issues; similarly, in liaison with local leaders, contractors should prepare local communities – psychologically and otherwise – for the newcomers; efforts be focused on instilling attitudes of tolerance, support and understanding towards the newcomers in the local communities.

7.10.3 Child abuse and early age pregnancies

Given that workers will have higher disposable income earned from being employed on the project, temptations to engage in sexual acts with underage children, particularly the gild child, can occur. This may result in early pregnancies. One of the major consequences arising from this would be an increase in number of girl children dropping out of school. This may psychologically disorient the life of the child and her family.

Furthermore, given that the project employees shall be recruited from many parts of the country and from different cultural and sexual backgrounds, it is possible that some of them introduce foreign sexual behaviours in the project area such as having sex with young boys. This is child molestation.

The impact of child abuse and early age pregnancies, though immense in magnitude, will be localized, temporary, is reversible and will not be cumulative, thus a negative (-2) change.

Mitigation measures

Employers at both the construction and operation phase should have a strict employment code of conduct. At the induction of employees the employer should emphasise that molestation of children especially the girl child is punishable by taking the culprit to court. An employer who tries to shield or cover up for the employee caught in the act will equally be prosecuted, according to the penal code.

7.10.4 Child Labour

It is generally anticipated that local labour will be employed especially for casual activities. This anticipation is very high on the side of community leaders and members in the project areas. However, although this is a good gesture that is likely to improve household income, if not properly managed and coordinated could potentially result into recruitment of children to provide labour on the project. Child labour is condemned by all international conventions including those of the International Labour Organization (ILO) and the United Nations (UN) as well as the Ugandan laws.

The impact of child labour, though moderate in magnitude, will be localized, temporary, is reversible and noncumulative, thus a negative (-2) change.

Mitigation measures
During construction and within the operational phase, the project implementation team should put a mechanism in place to identify the presence of all persons under the age of 18 and ensure that they are not employed on the project.

7.10.5 Increase in HIV/AIDS and STDs during the construction phase

Like any other project with mass recruitments, influx of immigrant labour at the construction phase is bound to occur. Most often these workers will not come with their families and some may be single. This will encourage the formation of new social networks with the resident community, increasing the risk of prostitution and the spread of HIV/AIDS and STDs. Currently, HIV/AIDS prevalence rate in Busia stands at 10%. This is higher than the National prevalence rate of 6.8% (refer to Table 20).

In general, the impact of increase in HIV/AIDS and STDs, though cumulative, will be largely localized/regional in context, moderate in magnitude, temporary and is reversible, thus a moderate (-3) negative change.

Mitigation measures
Sensitize workers on proper social behaviour and conduct with regard to community systems, HIV/AIDS and other sexually transmitted diseases. HIV/AIDS policies be developed at workplace. Free HIV/AIDS testing, counselling and condom distribution be encouraged for both workers and local community.

The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. Social bonds are not readily controlled and the permanence of HIV/AIDS transmission makes this particular impact of social bonding both negative and also positive. Social bonds leading to lasting marriages and children occur in such situations; early pregnancies and sexual exploitation can also occur. It is therefore important to tackle the issue of social bonding with firmness and fairness, forbidding power relationships, which lead to exploitation of mostly women and children, while encouraging relationships that may lead to permanent situations.

7.10.6 Loss of vegetation cover

Vegetation clearance and removal will take place at the WTP, transmission mains and FSTP sites. The removal of trees will be minimal (only done when necessary) but will contribute to increase of carbon dioxide in the atmosphere (trees fix carbon dioxide from the atmosphere). All these will contribute to the greenhouse effect that causes global warming, thus climate change. The reservoir sites and pipeline routes are mainly covered by short grass that will rejuvenate on complication of construction works.

In general, the impact of vegetation clearance at the WTP and FSTP sites, though permanent (at points that infrastructures will be erected), will be localized, minor in magnitude, is reversible and noncumulative, thus a slight (-1) negative change.

Mitigation measures
Limit clearance of vegetation to only localities required for development; if possible, avoid cutting of trees; landscape with grass & trees, with local plant species as the preferred biodiversity on completion of construction works.

7.10.7 Loss of fauna

Vegetation clearance and excavations at the various construction sites may lead to the destruction of habitat for fauna. This will not only disrupt the natural lifecycle of various fauna but permanently destroy/alter their habitats, especially at the WTP and FSTP sites. This impact is however of a limited extent given the small sizes of the plots.

H. amphibious (hippopotamus), an IUCN Red Listed animal, inhabits River Sio on the Uganda – Kenya border. Hippos can cover up to 10 km as grazing ground, thus utilizes part of the WTP periphery as feeding ground. The WTP will generate noise in addition to security lights that drive away most wild animals. However, there is no other direct impact on the hippos from the project, except maybe the increased presence of human beings in and around the pier, sometimes at night.

Furthermore, the constructed wetlands to be built at the FSTP site will not only alter the current fauna habitat but create a new one (wetland based). This will also introduce new flora and fauna at the site.

In general, the impact of fauna loss (hippopotamus) at the WTP site, though localized, reversible and noncumulative, will be immense in magnitude and permanent, thus a negative (-2) impact.

Mitigation measures
UWA should be consulted prior to commencement of any works at the WTP site with regard to protection of the habitat of *H. amphibious*. A Wildlife Management Plan (Appendix 5) has been prepared for the project. It should be implemented by the Contractor during construction and the operator during the operation phase of the project.

Clearance of fauna habitat (vegetation and soils) should be limited only to localities required for development; adhere to construction schedule so that work is completed on time; compensatory re-vegetation should be done once construction work is complete as part of landscaping and greening of the area so as to replicate the environment that was habited prior to construction works.

7.10.8 Erosion and loss of top soil

The loss of top soil due to erosion of graded/levelled and excavated soil will take place at various sites depending on site slope and the extent of soil disturbance. These soils will be carried by runoff water and wind.

Minor excavation works will take place at the reservoir sites; soils excavated along pipe routes will be used for backfilling. Thus, minimal loss of top soil at these localities. However, extensive site levelling and excavation works will take place at the WTP and FSTP sites given the requirements of the structures to be built.

In general, the impact of loss of top soil, though moderate in magnitude and irreversible, will be localized, temporary and noncumulative, thus a negative (-2) change.

Mitigation measures
Limit clearance of vegetation to localities required for development; sites should be hoarded off before excavations and soil barriers erected; topsoil should be removed prior to carrying out excavations and saved for later rehabilitation work such as gardening of site; excess soil which will not be used for construction works shall be removed from the site in a timely manner and deposited at an approved site; abandoned quarries be used for the disposal of excessive quantities of excavated soil material; areas adjacent to the construction site should not be disturbed and care taken to minimise the area of impairment caused by on-site storage of construction materials and equipment; adhere to construction schedule so that work is completed on time.

7.10.9 Noise and vibration from vehicles

Noise and vibration will occur both on and off site. This will emanate from movement of trucks, excavation works, usage of equipment (compactors, generators, etc.), etc.

The impact of noise and vibrations, though moderate in magnitude, will be localized, temporary, reversible and noncumulative, thus a negative (-2) change.

Mitigation measures
Sites must be hoarded to curb noise impacts to neighbouring communities; features to reduce noise generation and vibrations be fitted to motorized equipment; workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate; workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs; movement of haulage vehicles be limited to day time since the noise impact will be less felt.

7.10.10 Dust generation

Construction dust can lead to lung and sight related health risks. Dust will be generated during excavation works, movement of haulage trucks, grading and levelling of ground surfaces, operation of stone crushers, etc. Acute Respiratory Infections, being the second leading cause of morbidity among all age groups in Busia (Busia District Abstract, 2009), could thus increase.

In general, the impact of dust emissions, though moderate in magnitude, will be localized, temporary, reversible and is noncumulative, thus a Negative (-2) change.

Mitigation measures
Construction sites shall be hoarded off to restrict dust to within site boundaries; sprinkle water on vehicle pathways; PPE like dust masks shall be availed to workers whenever needed; loose materials like sand that are susceptible to dust generation during haulage be covered with tarpaulin; limit vehicle speed on murram roads.

7.10.11 Exhaust emissions from vehicles

Exhaust emissions from vehicles and machinery (e.g. generators) are expected to occur particularly at the construction phase. This will consist mainly of poorly burnt fuels and oils, including nitrogen oxides, carbon oxides, hydrocarbons, particulate matter, etc.

Nitrogen oxides react with ammonia, moisture and other compounds to form nitric acid vapour and related particles. Small particles can penetrate lung tissue, thus worsening of respiratory diseases. Carbon monoxide is highly toxic and the most common type of fatal air poisoning in many countries (Omaye, 2002). Acute Respiratory Infections, being the second leading cause of morbidity among all age groups in Busia (Busia District Abstract, 2009), could thus increase.

Carbon dioxide is a greenhouse gas. It traps solar radiation being emitted from the earth, thus causing a rise in the earths' temperature, which leads to global warming. The warming of the earth results in the changing of weather patterns leading to climate change.

In general, the impact of exhaust emissions, though important to local/immediate surrounding and moderate in magnitude, will be temporary, is reversible and noncumulative, thus a moderate (-3) negative change.

Mitigation measures

Timely automobile maintenance be carried out to limit carbon emissions; workers operating/working near stationary emission emitting equipment/machinery (e.g. generators, excavators, etc.) be availed PPE (e.g. nose muffs); do not burn cleared vegetation.

7.10.12 Occupational health and safety at construction

Construction employees meet many occupational hazards at the workplace. Examples include repetitive stress injury, cumulative trauma, musculoskeletal disorders, etc. These are generally caused by work conditions that result from using the body in a repetitious way and end up causing injury or traumatizing the body. At times the work environment is poor. For example, low and high illumination; poor ventilation or windy conditions; noisy conditions; high or low humidity; poor working environmental conditions, etc. These usually may lead to accidents at the work place and/or low performance. The result is unhealthy workforce.

The impact of occupational hazards, though immense in magnitude, will be localized, temporary, it is reversible and noncumulative, thus a negative (-2) change.

Mitigation measures

Prepare and approve occupational safety and health plan for all sites; the Contractor shall provide safety guidelines to all operations prior to start of work; wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff; establish emergency entrances, exits and amenities; ensure access to first aid kits; ensure safe working heights through provision of work platforms, scaffolds and adequate supervision by ensuring regular inspection of formwork, false work and temporary supports before loading or pouring concrete; secure site boundaries with fences or hoardings as

appropriate; install caution signage around the site to discourage the public from being close to the site, for example, "falling debris", "keep off the site" etc. . The Client through the contracted Construction Supervisor (the Design Engineer) will continually monitor Contractors´ compliance with Health and Safety measures.

7.10.13 Solid waste generation

Solid wastes, if not well managed, can lead to health and safety issues, including accidents, bad odour, harbouring of vectors, parasites and other dangerous animals. The wastes to be generated at the construction phase include food remains, polythene bags, plastic bottles, papers, wrappings for components to be installed, excavated soil and left overs of construction materials (timber, aggregates, sand, bricks/blocks, steel bar cuttings, glasses, cement, etc.), etc.

In general, the impact of solid wastes, though moderate in magnitude, will be localized, temporary, is reversible and noncumulative, thus a negative (-2) change.

Mitigation measures

Prepare site waste management plan prior to commencement of work, including appropriate waste storage areas, collection & disposal schedule; wastes be appropriately segregated into metallic, plastic, glass & biodegradable; waste bins be provided at appropriate points; re-usable wastes be sold or given away to interested parties; excavation material be used for site levelling/backfilling; wastes be disposed at only NEMA approved sites.

7.10.14 Human waste generation

Poor management of human waste at construction sites can lead to health issues (e.g. cholera outbreaks), bad odour, environmental degradation (eutrophication), water contamination, etc. Up to 50 or more workers will be employed at the WTP and FSTP sites. Sanitary wastes will be an issue given that management facilities are currently non-existent.

The impact of poor human waste management at the various construction sites, though it can be immense in magnitude, will be localized, temporary, is reversible and noncumulative, thus a negative (-2) change.

Mitigation measures

Prepare site human waste management plan prior to commencement of work; put in place mobile toilets for use by workers; workers be made aware of available sanitary facilities & their location; regularly inspect sites to identify sanitation non-conformances and ensure timely redress; construct water borne/mobile toilets instead of pit latrines; toilets be periodically emptied by licensed cesspool providers to designated facilities.

7.10.15 Raw material extraction

Construction raw materials such as aggregates and sand will have to be sourced locally or within the region. Mining activities lead to a number of impacts, including impacts on air quality, hydrology and water quality, ecology and biodiversity, social concerns, health and safety concerns, and resource issues.

In general, the impacts of raw material extraction for the project, though it can be irreversible, will be largely localized, moderate in magnitude, temporary and noncumulative, thus a negative (-2) change.

Mitigation measures
Raw material extraction be carried out at NEMA approved sites; NEMA approved site management plan be prepared by contractors for each raw material extraction site; cover extracted loose raw materials with tarpaulin during transportation; do not overload vehicles to avoid accidents.

7.10.16 Accidents

Accidents, minor, severe, major or fatal, can occur on or off site during the construction phase. These may emanate from traffic accidents, falling from heights, electrical shocks and electrocution, cuts, falling objects, bursting vessels, slipping or tripping, burns, entanglements, lifting and manual handling back injury, etc.

The impact of accidents, though it can be immense in magnitude and irreversible (e.g. if fatal), will be localized, temporary and noncumulative, thus a moderate (-3) negative change.

Mitigation measures
In addition to the mitigation measures listed occupational health and safety (see above), the following should be adhered to:

Prepare & approve site accident management plans; only trained and & experienced personnel be allowed to operate accident prone/high risk equipment and machinery; ensure good housekeeping and proper induction courses for employees; develop and distribute guidelines for working at heights, confined places, etc.; ensure proper wiring and installation to prevent electrical shocks; equipment be installed and operated properly to avoid bursting and explosions; employers should have an accident reporting and investigation mechanism.

7.11 Analysis of Significant Operation Phase Negative Impacts

7.11.1 Degradation of source water quality

The WTP will be constructed adjacent to the water source for the project (Lake Victoria). The WTP will employ alum and lime in its treatment processes. Thus, the sludge will have to be disposed. Additionally, backwash (filter cleaning) wastewater will have to be disposed. The impacts resulting from the disposal of these WTP residuals in to source water have been elaborated in Section 7.1.3.

The WTP is designed to treat backwash effluent, separate and thicken the water treatment sludge and return clarified backwash water into Lake Victoria. However, the clarified backwash water will continuously release residues of aluminium sulphate, suspended solids, chlorine and nutrients. Over the long term, these residues will form a sludge on the lake bottom but this is expected to be of minor significance owing to the large dilution effect of the lake.

In general, the impact of WTP residuals, if discharged into source water, though localized and temporary, will be limited because of the dilution factor and non-

cumulative in effect, thus a negative (-2) negative impact. There are no vulnerable aquatic species in the lake or in the wetland because of the dilution factor of Lake Victoria (the second largest fresh water lake in the world). It is anticipated aquatic biodiversity will not be affected.

Mitigation measures

Management of alum & lime sludge

Do not discharge any sludge into Lake Victoria or any nearby water body. Adopt mechanisms that lead to:

- Pollution prevention & waste reduction (resource recovery) at the WTP as a first priority; followed by
- residuals treatment and
- Safe disposal of wastes as a last option.

Adopt the following pollution prevention & waste reduction mechanisms: -

Optimize intake location to lower turbidity & suspended loads by siting and installing intake infrastructure at a deeper and clearer point of the lake profile; optimize solids settling using the pH in clarifiers and sedimentation tanks to reduce coagulant chemicals (alum coagulation has a minimum solubility at pH 6 (Tchobanoglous, et al., 2003). Thus, adjusting of pH (i.e. above 6) to keep optimal coagulation conditions might help to reduce waste products but still effectively treat the source water); reduce softening chemicals by monitoring source water hardness (WTPs remove calcium hardness to a level that meets the requirements of the customer. By monitoring the calcium content of the influent, WTPs might reduce the amount of chemicals needed to precipitate the required fraction of calcium hardness, thus resulting in a minimized amount of residuals requiring additional treatment or disposal); recycle/reuse sludge where applicable.

Adopt the following residuals treatment mechanism:

- Utilize drying beds in separating solids and liquid at the WTP facility.

Adopt the following safe disposal mechanisms:

- Contract a NEMA approved WTP residual handler to collect hazardous solid wastes for safe disposal; or
- Landfill solid wastes but not close to any surface or groundwater (residuals from WTPs are typically not hazardous (EPA, 2011a), thus can be landfilled). Those wastes that can be taken to the FSTP should be handled separately and transported to the FSTP.

Management of backwash water

Do not discharge backwash water into Lake Victoria or any nearby water body prior to de-chlorination; adopt mechanisms that lead to:

- Pollution prevention & waste reduction (resource recovery) at the WTP as a first priority; followed by

- Backwash water treatment; and

Adopt the following pollution prevention & waste reduction mechanisms:

- Optimize the filter media by employing filter medium that ensure longer filter run times, thus infrequent backwashing while maintaining or improving on the finished water quality;

- Return backwash water to the head of the source water treatment plant for reuse.

Adopt the following backwash water treatment mechanism:

- Dechlorinate the free or total combined chlorine residual remaining after disinfection through the addition of sulfur chemicals such as sulfur dioxide, sodium sulfite, sodium bisulfite, sodium metabisulfite, and sodium thiosulfate (NB: do not overdose with sulphite). Too much sulfite can result in sulfate formation, which suppresses oxygen content and lowers the pH of the treatment residuals (EPA, 2000b).

7.11.2 Degradation of FSTP effluent disposal route

The FSTP that has been designed for the project is not effective in removing phosphorus (refer to Section 7.1.6). Increase in ambient phosphorus concentration above naturally occurring levels results in excessive growth of algae and other phytoplankton, thus development of eutrophic conditions.

The receiving water body, Okame – Amagoro stream, is also being used by downstream communities (households) for domestic activities, including domestic cleaning and watering animals. This could create resentment and ultimately rejection of the facility by the community.

In general, the impact of degradation of FSTP effluent disposal route, though temporary and reversible, will affect areas immediately outside the local condition, will be slight in magnitude and cumulative in effect. Using granular slag as a substrate in the constructed wetland will remove phosphate from the effluent and the discharge of effluent into a natural wetland will further polish the effluent as recommended in the mitigations below. The impact is classified as negative (-2) impact because the volume of effluent into the receiving environment will below.

Mitigation measures

- Employ media such granular slag to enhance phosphorous removal within the FSTP constructed wetlands (refer to Section 7.1.6). If media that enhance phosphorous removal will not be employed then do not directly release the FSTP effluent into the receiving water prior to channelling through a natural/created wetland. Wetlands are known to remove phosphates from effluents through sedimentation, flocculation, absorption, co-precipitation, cation and anion exchange, complexation, precipitation, oxidation/reduction, microbiological activity and plant uptake (Brezonik, 1993 and Matagi *et al* 1998).

- ;
- Prepare and approve an operation & maintenance manual for the FSTP;
- Ensure continual training and skills build-up of the FSTP staff with respect to sustainable operation of the FSTP.
- Ensure that affected communities are availed safe and sustainable water supply for domestic consumption through the project. This supply could be through household connections, yard taps or water kiosks. These communities should also be sensitized and educated on the benefits of safe water within easy reach.

7.12 Analysis of Operational Phase Negative Direct and Indirect Impacts

7.12.1 Sediment swirl up and transport

If installed too close to the lake bed, sediment swirl up and transport could occur through the intake valve of the intake facility. This could lead to increased turbidity at the intake locality, thus affecting the flora and fauna. Sediment transport through the intake main will lead to increased sedimentation sludge at the WTP, thus increased cost for sludge management.

The impact of sediment swirl up and transport, though moderate in magnitude, will be localized, temporary, is reversible and noncumulative, thus a negative (-2) change.

Mitigation measures

The intake facility, including the suction valve, should be properly sited through sound bathymetric surveys so that the minimal distance, as per water pump manufacturer´s manual, during low water levels is kept between the intake valve and the lake bed; the maximal intake valve height, with respect to the pier gauge in Jinja, should be kept at 10.33 m (refer to Section 4.3.5); install the intake facility in such a way that the intake valve can be varied with respect to the lake bed (i.e. dynamic intake valve).

7.12.2 Odour nuisance

Odour (bad smell) will be generated at the FSTP. This can be carried by wind to nearby settlements, thus unpleasant breathing environments..

In general, the impact of odour nuisance, though localized, can be immense magnitude, will be permanent, irreversible and cumulative, thus a negative (-2) negative change.

Mitigation measures

As discussed in Section 6.1.2, a minimum distance of about 740 m should be maintained between the FSTP facilities and the nearest inhabited building. Nonetheless, the nearest settlement is about 900 m from the FSTP site.

Frequently monitor the performance of the FSTP to ensure that clogging is remedied as soon as possible; keep the immediate surrounding of the FSTP tidy with short grass and enforce proper internal solid waste handling and disposal.

Outbreaks of pollution due to system failure should be remedied immediately and the community informed if there will be a prolonged delay in repairs.

7.12.3 Occupational health and safety at operation

Chlorine, a toxic chemical, will be employed as the disinfectant during the operational phase of the WTP. Chlorine gas has a density greater than air, thus gas leaks accumulate and present significant safety concerns to persons handling it. A thorough discussion on the effects of chlorine has been elaborated in Section 7.1.3.

In general, the impact of chlorine occupational hazards, though localized and temporary, can be immense in magnitude, irreversible and cumulative to some extent (e.g. id fatalities occur), thus a moderate (-3) negative change.

Mitigation measures

Written safe work practices be compiled for the WTP site to prevent chlorine leaks and spills and promote safety of all site personnel and visitors.

The safe work practices should form the basis of on-site training for all plant operatives and supervisory personnel in exposure control, first aid, PPE, and emergency response. The training should be documented and upgraded during the operation phase.

Current material safety data sheets, warning signs and other proprietary chlorine wall charts should be visible for use by site personnel and visitors.

Written operating procedures should be followed by operators. The procedures should address the appropriate steps for evacuating and filling chlorine containers.

Operators should wear appropriate PPE consisting of rubber gloves, apron and face shield or goggles, when changing cylinders.

Site specific inspection and maintenance schedule should be created for all chlorine storage and handling equipment and associated safety equipment. Equipment and chlorine containers should be regularly monitored for leaks using ammonia leak detection kits. Line repair kits should be available. Site operatives should never repair a chlorine leak alone; there must always be backup. Leaks should be repaired using site specific emergency response procedures.

7.12.4 Solid waste generation

The wastes that will be generated at the operational phase include food remains, polythene bags, plastic bottles, papers, containers for treatment chemicals (alum, lime, chlorine, etc.), wrappings for spare parts, etc. Wrappings/cylinders for treatment chemicals can be hazardous to humans and the environment if not safely disposed.

In general, the impact of solid wastes, though localized, temporary and largely reversible, can be immense in magnitude and cumulative in effect, thus a moderate (-3) negative change.

Mitigation measures
Prepare operational site waste management plan for the FSTP & WTP facilities, including appropriate waste storage areas, collection & disposal schedules; wastes be appropriately separated into metallic, plastic, glass & biodegradable; waste bins be provided at appropriate points; re-usable wastes be sold or given away to interested parties; hazardous/toxic wastes (e.g. chlorine and alum containers be returned to supplier or given to a NEMA approved waste handler; other wastes be disposed of at only NEMA approved sites.

7.12.5 Bio-solid generation

Bio solid (manure) will be generated at the FSTP after thickening of faecal sludge. Though its removal will be carried out occasionally (i.e. once every 3 – 5 years), there is need to safely depose it. Faecal sludge manure tends to harbour pathogens, particularly eggs of worms /helminths, and if not safely disposed/reused can lead to heath issues.

In general, the impact of bio solids, though localized, temporary and reversible, will be immense in magnitude and cumulative in effect, thus a moderate (-3) negative change.

Mitigation measures
Landfill bio solids at a NEMA approved site. In case reuse is required, then dose manure with lime to kill pathogens prior to supply of manure to farmers. Make farmers aware of the risks of poor handling of bio solids. Hand washing with soap be encouraged after handling. Protective gears such as hand clove, boots, overalls and nose and mouth muffs be encouraged.

7.12.6 Pressure on existing utilities

Stable and sustainable electrical power supply will be required to optimally achieve demand target for the project. Utility consumption such as water pumping, lighting systems, WTP onsite laboratory operations, office work (computers for management and billing of water consumption), etc., will need sufficient and reliable power supply.

The Ugandan national power grid is already faced with a high consumer base that it can only sustains through power rationing (load shedding). The intake facility and booster stations will operate 22 hours a day and the WTP at 24 hours a day. Thus, increased pressure on the already overloaded National Grid line is foreseen.

The impact of increased pressure on existing utilities, though temporary and reversible, will regional in context, moderate in magnitude and cumulative, thus a moderate (-3) negative change.

Mitigation measures
Install standby generators at within the WTP site; options to use solar energy for lighting should be employed as this reduces demand on the national grid.

7.12.7 Accidents

A pier bridge will be constructed up to 300 m into the lake. This will be utilized in accessing the intake facility during the operational phase. Local communities, fishermen and visitors normally use the locality that the pier will be built as navigation route. Thus, accidents (such boat collisions with the pier) can occur that could be minor, severe or even fatal.

Major chlorine gas leaks at the WTP can occur that could lead to injury or even death if not safely remedied on time.

Drowning of domestic animals and visitors, children in particular, can occur at the FSTP site if proper measures are not undertaken.

The impact of accidents, though localized and temporary, can be immense in magnitude, irreversible (e.g. if fatal) and cumulative in effect, thus a Moderate negative (-3) change.

Mitigation measures

At the intake

The pier bridge, at the minimum, should be constructed with lighting systems that can enable navigators, fishermen and local community to clearly see it at night; install warning signs with reflective material when illuminated so that boats/ships coming close to it can easily see it; given that the pier bridge will be long (at least 300 m into the lake), passage ways could be incorporated underneath it so that small boats do not have to go round it.

At the WTP

In the event of a major chlorine gas leak:

- Utilize an approved contingency plan for the site as guide.
- The WTP Operator will contact the nearest Fire Department and remain on the scene.
- Shut down the water treatment process until the chlorine leak has been repaired.
- Do not attempt repair until the Fire Department & a qualified repairer are onsite.

At the FSTP

Fence off the FSTP site; do not allow animals to graze within the site; do not allow children to play within the site or any persons to move within the site without the guidance of a staff member.

7.13 Analysis of Immediate, Long-Term and Cumulative Impacts

7.13.1 Immediate, long-term and cumulative positive impacts

Table 31 below is a summary of the characteristics of the positive impacts identified and analysed in Sections 7.7 and 7.8. it can be seen that the benefits of *improved public health, hygiene and household health status*; *improved living standard/well-being*; *employment*; *incomes and market for produce and products*; and *skills and technology transfer* have all the characteristics of being immediate, long-term (permanent) and cumulative in benefit. The benefits accruing from *improved gender awareness* and the *economy* will be long-term and cumulative but not immediate. On the other hand, the benefit of *Land/property compensation* will be immediate but temporary and non-cumulative.

Table 31: Immediate, long-term and cumulative positive impacts.

Positive Impact	Immediate	Long-term	Cumulative
Improved Public Health, Hygiene and Household Health Status	√	√	√
Improved living standard/well-being	√	√	√
Reduction of domestic violence	√	√	√
Improved gender awareness	**x**	√	√
Employment	√	√	√
Incomes and market for produce and products	√	√	√
Economy	**x**	√	√
Skills and Technology Transfer	√	√	√
Land/property compensation	√	**x**	**x**

Key: √ = applicable; **x** = not applicable.

7.13.2 Construction phase immediate, long-term and cumulative negative impacts

Table 32 below is a summary of the characteristics of construction phase negative impacts as identified and analysed in Section 7.10. It can be seen that all impacts will be immediate. However, the impact of *loss of land and damage to property* will be long-term (permanent) given that land portions will have to be permanently acquired for the benefit of the project. Furthermore, the impact of *increase in HIV/AIDS and STDs*, if not curtailed, can be cumulative.

Table 32: Immediate, long-term and cumulative construction negative impacts.

Negative Impact	Immediate	Long term	Cumulative
Loss of land and damage to property	√	√	**x**
Conflicts due to influx of immigrant labour	√	**x**	**x**
Child abuse and early age pregnancies	√	**x**	**x**
Child labour	√	**x**	**x**
Increase in HIV/AIDS and STDs	√	**x**	√
Loss of vegetation cover	√	**x**	**x**
Loss of fauna	√	**x**	**x**
Erosion and loss of top soil	√	**x**	**x**

Negative Impact	Immediate	Long term	Cumulative
Noise and vibration from vehicles	√	**x**	**x**
Dust generation	√	**x**	**x**
Exhaust emissions from vehicles	√	**x**	**x**
Occupational health and safety	√	**x**	**x**
Solid waste generation	√	**x**	**x**
Human waste generation	√	**x**	**x**
Raw material extraction	√	**x**	**x**
Accidents	√	**x**	**x**

Key: √ = applicable; **x** = not applicable.

7.13.3 Operation phase immediate, long-term and cumulative negative impacts

Table 33 below is a summary of the characteristics of operation phase negative impacts as identified and analysed in Sections 7.11 and 7.12. It can be seen that all impacts will be immediate. Additionally, the impacts of *degradation of source water*, *degradation of FSTP effluent disposal route* and *odour generation* will also be long-term (permanent) and cumulative in effect. However, the impacts of *occupational health and safety*, *solid waste generation*, *pressure on existing utilities* and *accidents* will not be long-term though they could be cumulative. Lastly, the impact of *sediment swirl up and transport* will not be long-term nor cumulative.

Table 33: Immediate, long-term and cumulative operation negative impacts.

Negative Impact	Immediate	Long-term	Cumulative
Degradation of source water	√	√	√
Degradation of FSTP effluent disposal route	√	√	√
Sediment swirl up and transport	√	**x**	**x**
Odour generation	√	√	√
Occupational health and safety	√	**x**	√
Solid waste generation	√	**x**	√
Bio solid generation	**x**	**x**	√
Pressure on existing utilities	√	**x**	√
Accidents	√	**x**	√

Key: √= applicable; **x** = not applicable.

7.14 Environmental and Social Analysis of Irreversible Impacts

As discussed in Sections 7.10, 7.11 and 7.12, some of the project´s construction and operational activities can lead to severe injury or even fatalities of humans, flora or fauna, including the habitat that supports them, thus irreversible. The impacts of erosion and loss of top soil, degradation of source water during operation, prolonged exposure to high noise levels, exhaust emissions, occupational health and safety, and accidents can lead to severe injury or fatalities.

8 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

8.1 Introduction

This Environmental and Social Management Plan (ESMP) is aimed at ensuring that the proposed Busia Water Supply and Sanitation Project is established in compliance with applicable legal frameworks, standards and industrial best practices. The ESMP (see Table 34 at the end of this Chapter) lists the requirements to ensure effective mitigation of impacts for all proposed project developmental and operational activities. For each project activity, the following information is analysed:

i. Likely impacts, including indicators;

ii. A description of the mitigation measures that should be undertaken;

iii. Frequency of monitoring;

iv. The responsible party;

v. Relevant policies, legislation and regulatory framework; and

vi. Cost of mitigation and enhancement where applicable.

8.2 Proposed Work Programs, Timing and Budget Estimates

See the ESMP in Table 34 and Table 35, next page.

Table 34: Environmental and Social Management Plan

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
PRE-CONSTRUCTION/CONSTRUCTION PHASE										
1	**Land Use**	Loss of land and damage to property	Slight negative change (-1)	• Use the RAP report as a guide to determining affected persons; • Compensate for land as per Ugandan laws on Land Acquisition; • Those who will be temporarily affected should be compensated for any damages.	• Records of clearly identified PAPs, including vulnerable individuals; • records of sensitization of PAPs on WB & National policies & laws related to involuntary resettlement; • records of targeted training of PAPs with respect to financial management, health, wealth creation & any other necessary knowledge and skills; • records of letters of agreement & payment details between PAPs & the Client; • Records of any complaints & doubts from	Quarterly	WB OP 4.12: Involuntary Resettlement; The Land Act, Cap 227; The Land Use Policy 2004; The Land Policy, 2011.	UGX 300,149,617. The cost of RAP	MWE	WB; MGLSD; NEMA; District Community Development Department.

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
					PAPs.					
2	**Population and Settlement**	Conflicts due to influx of immigrant labour	Negative change (-2)	• Sensitize workers on community based social behaviour and conduct; • sensitize workers to not engage in sexual relations with underage girls and married women; • local leadership should always be sought as a first priority in solving issues; • prepare both local communities psychologically and the new comers; • Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrates by the local communities	• Records of training/sensitizations offered to workers/local communities with regard social issues; • MGLSD approved community action plan, including conflict management at construction site; • number of cases of community fears/complaints handled in relation to cases reported; • The nature of link/relationship between contractors & local government & community leaders.	Quarterly	The Constitution of the Republic of Uganda, 1995.	UGX 10,000,000	Contractors	MWE; MGLSD; District Community Development Department.
3		Child abuse and early age	Negative change	• Develop a strict employment code of conduct to	• MGLSD approved code of conduct for	Quarterly	The Constitution of the	UGX 10,000,000	Contractors	MWE; MGLSD; District

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
		pregnancies	(-2)	protect the girl child; • Sensitize employees on dangers of molestation of children, especially the girl child.	protection of the girl child at site; • number of cases of child abuse lawfully handled in relation to cases reported; • Complaints from communities.		Republic of Uganda, 1995.			Community Development Department.
4		Child Labour	Negative change (-2)	• Develop a site recruitment plan/code with respect to child labour; • Ensure that the HR office monitors the workforce with respect to child labour.	• MGLSD approved employee recruitment code at site; • Trained & approved HR officer at contractor´s office; • Complaints from communities.	Quarterly	The Constitution of the Republic of Uganda, 1995.	UGX 5,000,000	Contractors	MWE; MGLSD; District Community Development Department.
5		Increase In HIV/AIDS & STDs	Moderate negative change (-3)	• Develop sustainable & proactive HIV/AIDS policies at workplace; • Sensitize workers on HIV/AIDS and other sexually transmitted diseases; • Provide free HIV/AIDS testing, counselling and	• MoH & MGLSD approved on site HIV/AIDS management plan; • records of sensitization programmes on HIV/AIDS; • Complaints from local community on social/sexual behaviour of	Quarterly	The Public Health Act, Cap 281.	UGX 10,000,000	Contractors	MWE; MoH; MGLSD; District Health Inspectors; Community Development Officers

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				condom distribution to workers and local community.	workers.					
6		Occupational health and safety	Negative change (-2)	• Prepare and approve occupational safety and health plan for all sites; • provide safety guidelines to all operations prior to start of work; • wear appropriate PPE; • establish emergency entrances, exits and amenities; • ensure access to first aid kits; • secure site boundaries with fences or hoardings as appropriate; • Install caution signage.	• MoH & MGLSD approved occupational safety and health plan at sites; • records of health & safety cases at work place; • Firefighting equipment in place; • Site hoarding & caution signage in place.	Daily	The Occupational Safety and Health Act, 2006.	UGX 10,000,000	Contractors	MWE; MoH; MGLSD; District Health Inspectors.
7	**Flora and Fauna**	Loss of vegetation cover	Slight negative change (-1)	• Limit vegetation clearance to only localities required for development; • if possible, avoid	• Extent of site clearance; • extent of landscaping; • Number of trees	Immediate (before works) and during the	WB OP: 4.36 Forests; The National Forestry and Tree	UGX 20,000,000	Contractors	MWE; NEMA; District Environment Office.

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				cutting of trees; • Landscape with local plant species on completion of construction works.	planted.	construction phase	planting Act; The National Environment Act Cap 153.			
8		Loss of fauna	negative change (-2)	• Consult UWA prior to commencement of works at the WTP site with regard to protection of habitat of Hippos; • UWA approved Hippo habitat management plan be developed by the Client (Appendix 5); • secure site boundaries with fences & lights be maintained throughout the night at the WTP site to keep away any H. amphibious that might encroach; • Clearance of fauna habitat be limited only to	• Letter of approval from UWA as regards development of the WTP site; • UWA approved Hippo habitat management plan; • extent of site clearance; • Extent of landscaping on works completion.	Immediate (before works) and during the construction phase	WB OP: 4.04 Natural Habitats; The National Environment Act Cap 153.	UGX 5,000,000	Contractors; MWE.	NEMA; UWA; District Environment Office.

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				localities required for development; • adhere to construction schedule so that work is completed on time; • Compensatory vegetation be planted once construction work is complete.						
9	**Soil**	Erosion and Loss of top soil	Negative change (-2)	• sites be hoarded off prior to excavations and soil barriers erected; • topsoil be removed prior to excavation works & saved for site rehabilitation; • excess soil be removed in a timely manner and deposited at an approved site; • Adhere to construction schedule so that work is completed on time.	• Area of site hoarded off; • any gullies of soil erosion; • soil erosion checks in place; • covered stockpiles of loose soil; • Signs of siltation of nearby water bodies (Lake Victoria, rivers, streams, etc.).	Weekly during the construction phase	The National Environment Act Cap 153.	UGX 10,000,000	Contractors	MWE; NEMA; District Environment Office.
10	**Air Quality**	Noise and vibrations	Negative	• Sites be hoarded	• Site hoarding in	Daily during	The National	UGX 10,000,000	Contractors	MWE; NEMA;

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
		from vehicles	change (-2)	to curb noise transmission; • Silencers be fitted on motorized equipment; • Provide workers with ear muffs; • Movement of haulage vehicles be limited to day time.	place; • silencers installed in noise emitting machines; • earmuffs used by workers on site; • Record of complaints from recipients; • Record of noise levels.	construction works	Environment (Noise Standards and Control) Regulations, 2003			District Environment Office.
11		Dust generation	Negative change (-2)	• Site be hoarded off to restrict dust to within site boundaries; • sprinkle water on vehicle pathways; • provide dust masks to workers; • materials susceptible to dust generation during haulage be covered with tarpaulin; • Limit vehicle speed on unsurfaced tracks.	• Complaints from the local community; • visible dust emissions; • frequency of water sprinkling on dusty areas; • PPEs used; • Tarpaulins on tracks carrying loose soils.	Daily during construction works	The National Environment Act Cap 153; The Public Health Act, Cap 281; The Occupational Safety and Health Act, 2006	UGX 10,000,000	Contractors	MWE; MoH; NEMA; District Environment Office; District Health Inspectors.
12		Exhaust emission from	Moderate negativ	• Timely automobile maintenance to limit carbon	• Records of automobile maintenance;	Daily during constructi	The National Environmen	UGX 10,000,000	Contractors	MWE; MoH; NEMA; District

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
		vehicles	e change (-3)	emissions; • workers working near stationary emission emitting equipment be availed nose/mouth muffs); • Do not burn cleared vegetation.	• visible gaseous emission from vehicles, equipment & machinery; • Records of complaints from onsite workers & neighbouring communities.	on works	t Act Cap 153; The Public Health Act, Cap 281			Environment Office; District Health Inspectors.
13	**Land Use**	Raw material extraction	Negative change (-2)	• Extract from NEMA approved sites; • NEMA approved site management plan be prepared; • cover extracted loose materials with tarpaulin during transportation; • Do not overload vehicles to avoid accidents.	• NEMA approval letter & site management plan for each raw material extraction site; • Complaints from communities.	biannual	The National Environment Act Cap 153.	UGX 5,000,000	Contractors	MWE; NEMA; District Environment Office.
14	**Population and Settlement**	Solid waste generation at construction	Negative change (-2)	• Prepare site waste management plan; • wastes be appropriately segregated; • waste bins be provided at appropriate	• NEMA approved waste management plan at site; • clearly labelled waste management facilities; • signs of	Daily during construction works	The National Environment (Waste Management) Regulations, 1999; The Public Health Act,	UGX 5,000,000	Contractors	MWE; NEMA; District Environment Office; District Health Office.

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				points; • re-usable wastes be sold or given away to interested parties; • Wastes be disposed at only NEMA approved sites.	indiscriminate littering; • frequency of waste collection and disposal; • availability of approved waste disposal site; • Complaints from communities.		Cap 281.			
15		Human waste generation	Negative change (-2)	• Prepare site human waste management plan; • workers be made aware of available sanitary facilities; • regularly inspect sites to identify sanitation non-conformances and ensure timely re-address; • construct water borne/mobile toilets; • Toilets be periodically emptied by licensed cesspool.	• NEMA approved site human waste management plan; • Status of sanitary facilities at site (e.g. cleanliness, flies infestation, hand cleaning facilities, etc.; • Complaints from local communities.	Daily during construction works	The National Environment (Waste Management) Regulations, 1999; The Public Health Act, Cap 281.	UGX 5,000,000	Contractors	MWE; NEMA; District Environment Office; District Health Office.
16		Accidents	Moderate	In addition to the mitigation measures	• MGLSD approved	Daily during	The Occupation	UGX 10,000,000	Contractors	MWE; MGLSD

No	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
			negative change (-3)	listed under impact **No. 6** above, the following should be adhered to: • Prepare & approve site accident management plans; • only trained and & experienced personnel be allowed to operate risk prone equipment/machinery; • ensure good housekeeping and proper induction courses for employees; • Equipment be installed and operated properly to avoid bursting and explosions.	accident management plan; • number of accidents reported; • skill/training credentials of workers operating or working at accident prone sites; • presence of PPEs; • Category of insured workers.	construction works	al Safety and Health Act, 2006			

Table 35: ESMP for the operational phase of the project in Busia.

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
OPERATIONAL PHASE										

17	**Water Resources**	Degradation of source water during operation	negative change (-2)	**<u>Management of alum & lime sludge</u>**
				• Do not discharge any sludge into Lake Victoria or any nearby water body;
				• adopt mechanisms that lead to:
				  • Pollution prevention & waste reduction (resource recovery) at the WTP as a first priority; followed by
				  • residuals treatment; and
				  • Safe disposal of wastes as a last option.
				<u>Management of backwash water</u>
				• Do not discharge backwash water into Lake Victoria or any water body prior to de-
					• Educational training & experience of the management team;
					• methods being employed, including their efficiencies & drawbacks, in pollution prevention & waste reduction;
					• fraction of total residuals being recycled;
					• availability of onsite waste treatment mechanisms;
					• availability of NEMA approved waste disposal site(s); or
					• Availability of a NEMA approved WTP waste handler;
					• Complaints from communities.
						Daily during operation	WB OP: 7.50 Projects on International Waterways; The Water Act Cap 152, The Water (Waste Discharge) Regulations, Statutory Instrument 152-4	UGX 20,000,000	Operator	MWE (DWRM); NEMA.

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions

				chlorination;
				• adopt mechanisms that lead to:
				  • Chlorine use reduction & waste reduction (resource recovery) at the WTP as a first priority; followed by
				  • backwash water treatment; and
				• Safe disposal of backwash water (e.g. through recycling or de-chlorination).						

18		Degradation of FSTP effluent disposal route	negative change (-2)	• Employ media that enhance phosphorous removal within the FSTP; or • channel FSTP effluent through a natural wetland prior to release into receiving water; • prepare and approve an	• Educational training & experience of the management team; • phosphorous (P) content of the FSTP effluent with respect to the maximal acceptable for direct discharge in freshwater systems	Daily during operation	WB OP: 7.50 Projects on International Waterways; The Water Act Cap 152, The Water (Waste Discharge) Regulations, Statutory Instrument 152-4	UGX 0	Operator	MWE (DWRM); NEMA.

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				operation & maintenance guide for the FSTP; • ensure continual training and skills build-up of the FSTP staff; • The project should extend piped water to the communities at the vicinity of the FSTP, including sensitization on the dangers of consuming polluted water.	within the tropics; • P content in the receiving water with respect to the maximal acceptable in freshwater systems within the tropics; • presence of a natural wetland between the FSTP & the receiving water/possibility to create one; • presence of P removing materials within the constructed wetlands; • piped safe water extended to communities close to the FSTP site; • Complaints from downstream users.					
19		Sediment swirl up and transport	Negative change (-2)	• Site intake locality based on bathymetric surveys so that the minimal distance, as per water pump manufacturer´s manual, during low water levels is	• Minimal actual height, with respect to lake bed, that can be attained by the valve in comparison to manufacture´s recommendation; • Maximal actual	Monthly during operation	WB OP: 7.50 Projects on International Waterways; The Water Act Cap 152, Water Resources Regulations, Statutory	UGX 5,000,000	Operator	MWE; NEMA.

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				kept between the intake valve and the lake bed; • the maximal intake valve height, with respect to the pier gauge in Jinja, should be kept at 10.33 m; • Install a dynamic intake valve.	height, with respect to Jinja pier gauge, that can be attained by the intake valve; • signs of increased turbidity and sediment loads at the intake valve locality; • Increased sediment load in raw water feed to the WTP as compared to water in undisturbed localities but close to the intake.		Instrument 152-1.			
20	**Air Quality**	Odour generation	Moderate negative change (-3)	• Maintain a minimum distance of about 740 m between the FSTP facilities and the nearest inhabited building; • frequently monitor performance of the FSTP to ensure that clogging is remedied as soon as possible; • Keep the immediate surrounding of the FSTP tidy.	• The distance between the FSTP & the nearest occupied building; • complaints from communities; • The level of tidiness and availability of solid waste management facilities onsite.	Daily	The National Environment Act Cap 153.		Operator	MWE; NEMA.
21	**Population**	Occupationa	Moderate	• Prepare safe work	• Approved onsite	Monthly	The	UGX	Operator	MWE; MoH;

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
	and Settlement	l health and safety	negative change (-3)	practices for the WTP to prevent chlorine leaks and spills and promote safety of all site personnel and visitors; • train plant operators and supervisory personnel in exposure control, first aid, PPE, and emergency response; • prepare material safety data sheets, warning signs and other proprietary chlorine wall charts; • Regularly monitor equipment and chlorine containers for leaks.	standard operating procedures for storage and handling of chlorine; • approved site specific inspection and maintenance plan; • documented safe work practices; • evidence of continual staff training; • availability of PPE; • records of repairs and maintenance works; • records of periodic drills performed by site personnel to test readiness of warning instrumentation; • Records of occupational safety hazards.		Occupational Safety and Health Act, 2006.	10,000,000		MGLSD; District Health Inspectors.
22		Solid waste generation at operation	Moderate negative change (-3)	• Prepare operational site waste management plan for the FSTP & WTP facilities; • Segregate wastes	• NEMA approved waste management plan at site; • clearly labelled onsite waste management	Daily	The National Environment (Waste Management) Regulations, 1999; The Public Health	UGX 5,000,000	Operator	MWE; NEMA; District Environment Office; District Health

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				into metallic, plastic, glass & biodegradable; • waste bins be provided at appropriate points; • hazardous/toxic wastes (e.g. chlorine and alum containers be returned to supplier or given to a NEMA approved waste handler; • Other wastes be disposed at NEMA approved sites.	facilities; • signs of indiscriminate littering at site & surroundings; • frequency of waste collection and disposal; • availability of approved waste disposal site; • Complaints from communities.		Act, Cap 281.			Office.
23		Bio solid generation	Moderate negative change (-3)	• Landfill bio solids at a NEMA approved site. • Dose manure with lime to kill pathogens prior to supply of manure to farmers. • Make farmers aware of the risks of poor handling of bio solids. • Hand washing with soap be	• NEMA approved bio solid land filling site • Bio solid stabilised and hygenized at the FSTP site • Farmers aware of risks of reuse of bio solids • Hand washing with soap being practiced • Protective gears being used.	Quarterly	The National Environment (Waste Management) Regulations, 1999; The Public Health Act, Cap 281.	UGX 5,000,000	Operator	MWE; NEMA; District Environment Office; District Health Office.

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				encouraged after handling. • Protective gears such as hand cloves, boots, overalls and nose and mouth muffs be encouraged.						
24		Pressure on existing utilities	Moderate negative change (-3)	• Install a standby generator at a safe location within the WTP site; • Options to use solar energy for lighting should be.	• Frequency of load shedding; • Energy options in place.	Biannual		UGX 25,000,000	Operator	MWE
25		Accidents	Moderate negative change (-3)	**<u>At the intake</u>** • Prepare site accident management plan; • provide lighting systems on pier bridge; • install warning signs with reflective material when illuminated; • Fence off the pier bridge to prevent children accessing it for diving into the lake.	**<u>At the intake</u>** • Approved site accident management plan; • lighting systems on the pier bridge; • clearly marked and visible warning signs; • records of accidents; • Complaints from communities & navigators. **<u>At the WTP</u>** • Approved major chlorine gas leak contingency plan;	Daily	The Occupational Safety and Health Act, 2006	UGX 5,000,000	Operator	MWE

#	Environmental or social factor	Impact	Rank	Mitigation measures	Monitoring Indicators	Frequency of monitoring	Relevant policies, legislation & regulatory framework	Estimated cost of mitigation & enhancement (UGX)	Responsibility	Monitoring Institutions
				At the WTP In the event of a major chlorine gas leak: • Utilize an approved contingency plan for the site as guide; • contact the nearest Fire Department; • Shut down the water treatment process until the chlorine leak has been repaired. **At the FSTP** • Fence off the FSTP site; • do not graze within the site; • children should not play within the site; • Visitors be guided by a staff member.	• availability of chlorine leak repair kit; • Qualification & experience of the WTP management team; • Records of major gas leaks & how successfully handled. **At the FSTP** • FSTP site fenced; • Records of reported incidents of animal or human droning; • signs of domestic animals accessing the FSTP facility; • Children & visitors accessing the FSTP facility without authorisation/guidance.					

8.3 Handling of Chemicals and Other Potentially Harmful Materials

Chlorine, a harmful and toxic chemical, will be employed at the WTP during project operation. Thus, it must be safely handled to prevent any accidents, including health and safety issues. A full analysis of the harmful chemicals which are specific to the project (chlorine, aluminium sulphate, polyelectrolytes and lime) is given in Sections 7.1.3. Here we analyse the handling aspects of these chemicals.

8.3.1 Design and management of chlorination storage and dosing areas

The following special storage and handling features should be utilized and maintained during the WTP operation.

i. Storage and equipment rooms be equipped with doors, opening outward to the outdoors complete with panic hardware;
ii. Viewing window into chlorine storage and equipment rooms for operator security;
iii. Visual and audible emergency alarms at the chlorine room entrance;
iv. Exhaust fans with a typical rating to air changeover every minute;
v. A chlorine gas leak detector to generate alarms and attendant ammonia bottle to help locate a leak;
vi. A drench shower located where it is easily accessible in case of emergency, with single turn (butterfly valve) water tap;
vii. An emergency kit to repair leaking containers.

For systems that use gas chlorination:

i. Install alarm and safety systems, including automatic shutoff valves, that are automatically activated when a chlorine release is detected;
ii. Install containment and scrubber systems to capture and neutralize chlorine should a leak occur;
iii. Use corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease;
iv. Store chlorine away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures.

8.3.2 Handling of chlorine during operation

Chlorine reacts violently with hydrogen, acetylene gases and solvents creating heat (EPA, 2011b). The reaction of chlorine with ammonia can create explosive compounds and gases that are toxic to breathe. Chlorine also reacts with metals. In the presence of water, chlorine can create a highly corrosive and dangerous acid mist. Therefore:

i. Prepare and approve standard operating procedures for its storage and handling.
ii. Never store chlorine gas and ammonia in the same building or area.
iii. Keep chlorine isolated and in different rooms from the chemicals that it reacts with.

iv. Chlorine storage areas, storage containers and process equipment and lines should be properly labelled and appropriate hazard warning should be posted in accordance with site specific operating procedures.

v. Gas containers should be stored in separate or divided rooms separately from flammable materials and other chemicals such as ammonia and sulphur dioxide, if used elsewhere in the installation.

vi. Containers should be stored and used above ground level and always in a vertical position.

vii. Chlorine gas containers should be stored in marked areas shielded from external heat sources.

viii. The protective hood should be kept secure on all unused containers and should only be taken off only when the container is being used. All containers in use should be secured in position by chains or other methods as appropriate. Gas containers should only be lifted with suitably rated and tested equipment and never by their protective hoods.

ix. Empty cylinders should be clearly marked and segregated from unused cylinders.

8.3.3 Storage and handling of Alum during operation

i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.

ii. Alum is readily soluble but the solution is corrosive to aluminium, steel and concrete so tanks of these materials need protective linings.

iii. Though a weak acid, avoid all unnecessary contact with it, as a matter of good working practice. Wear rubber or PVC boots, apron and overclothing as necessary depending on the condition of handling. The occupational exposure limit is 2 mg per cubic metre for an 8-hour reference period.

iv. Apply cold water to affected skin and eye areas. Move to fresh air, loosen clothing and seek medical attention in case of inhalation. Immediate medical attention should be sought for a person who has ingested the chemical and vomiting should not be encouraged.

8.3.4 Storage and handling of lime during operation

i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.

ii. Ensure that bulk supplies of lime are pneumatically transferred to storage silos to prevent lime dust.

iii. Delivery and use of bags of slaked lime can give rise to severe dust problems if care is not taken. The occupational exposure standard is 5 mg per cubic metre for an 8-hour reference period. Ensure that workers wear protective gears.

iv. Enclose slurry storage tanks to avoid dust.

v. The pump and feed lines should be emptied of all lime by rodding if necessary and flushed with clean water. This should be done when the lime dosing plant is taken out of use, say when a change of duty pump is made.

8.3.5 Storage and handling of polyelectrolytes during operation

i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.

ii. Polyelectrolytes are not acutely toxic but care should be taken to avoid swallowing, contact with the eyes or prolonged contact with the skin. Always consult the Safety Data Sheetfor the product in use for details of any health hazards involved.

iii. Polyelectrolyte powder, dropped on a wet floor turns into a tough slippery jelly which is dangerous and difficult to clean up. Powder, if spilled, should be collected as dry material as far as possible before the area is washed liberally with (if possible) warm water.

iv. Some polyelectrolytes may contain a small proportion of acrylamide for which the occupational exposure limit is 0.3 mg per cubic metre for an 8 - hour reference period.

8.4 Stakeholders to Be Involved In the Implementation of Each Action

The management and supervision of the ESMP is strictly the responsibility of the Ministry of Water and Environment as the Developer. During construction, the Contractor will be responsible for the day-to-day implementation of the ESMP. During the operation phase, the National Water and Sewerage Corporation (NWSC), who will take over management of the project, will be responsible for the implementation of the ESMP. The Developer, the Contractor and the Operator should employ an Environmentalist with relevant academic qualification and work experience. At the local level Busia District Local Government and Busia Municipal Council will be responsible for the day-to-day monitoring of the ESMP in their areas of jurisdiction.

At the National level, two institutions i.e. the National Environment Management Authority (NEMA) and the Department of Occupational Safety and Health (DOSH) of the Ministry of Gender, Labour and Social Development will be involved. The role of NEMA is to monitor the project as per the Environment Act Cap 135 Section 7 and to approve external environmental compliance audits as per the Environmental Audit Regulations (1999).The role of DOSH is to issue permits and periodically inspect the project site. DOSH will issue workplace Certificates every six months it the project meets working conditions as set out in the Occupational Safety and Health Act 2006. The District and municipal councils will approve construction and occupancy permits in their area of jurisdiction.

As a means of impartiality, local NGO's or CBOs will be involved in the implementation of ESMP. Their role is to be neutral observers. They should have experience in environmental management and skills in conflict resolution.

8.5 Staffing and Training Requirements

The following personnel are proposed for each ESMP implementing stakeholder: -

8.5.1 Ministry of Water and Environment (Project Support Unit)

- Water Engineer
- Sociologist

- Environmental Health Officer

8.5.2 Contractor(s)

- Site Engineer
- Site Supervisor
- Site Foreman
- Contractor's Environmental Officer

8.5.3 District Level

- District Environmental Officer
- District Water Officer
- District Engineer
- District Community Development Officer

8.5.4 Municipal Council

- Municipal Environmental Officer
- Municipal Water Officer
- Municipal Engineer
- Municipal Community Development Officer

8.5.5 NEMA

- Environmental Audit Officer

8.5.6 DOSH

- Occupational Health and Safety Officer

8.5.7 NWSC

- Environmentalist

8.5.8 NGO or CBO

- Representative with skills in environmental management and conflict resolution

8.5.9 Directorate of Museums and Monuments

- One Archaeologist

It is the onus of each ESMP implementing stakeholder to ensure that all its personnel to be involved in implementation of this ESMP are adequately qualified and were

appointed based on their qualification and suitability for their respective roles. Therefore there is no training provided for them under this ESMP.

8.6 Client Assistance in Coordinating the ESIA with Relevant Agencies

The WMD Project, through Component 3 – Strengthening Institutions for Effective Project Implementation; under Sub-component 3.3: Implementation, management and monitoring for results (MWE/DWD) has provided US $ 0.56 million to DWD. DWD through the Water Services Liaison Division (WSLD) will be responsible for implementing sub-component 2.2 (Water and Sanitation Project in small towns) and will assign adequate staff to implement, manage and monitor these tasks; and ensure that the incremental costs associated with project implementation are fully funded throughout the project duration. DWD will work closely with Water Sector Development Facility WSDFs who will support the day-to-day implementation and liaise with local governments in which the sub-projects are housed. These costs will be funded through a combination of project and in kind or cash contributions including core staff costs (existing and or new, full time or contract), consumables, logistics, fuel and communications.

Key agencies the project will have to interact in order to implement the ESIA and ESMP are National Environment Management Authority for environmental audit compliance certificates, the Department of Safety and Health for Certificate to Register a Work Place and the Municipal Council to provide construction permits.

8.7 Stakeholder Consultations Concerning the Shared Use of Water Resources and Their Associated Catchments

In this respect, MWE is currently broadening its Sector Wide Approach (SWAp) to include a comprehensive and coherent program of support for water resources, water supply and the environment across agencies. The Project will be aligned with the SWAp to strengthen the capacity for IWRM in the agencies implementing the project, including: DWRM – establishing functional WMZs; DWD – improving sustainability of urban water supply and sanitation in fast growing towns; DEA – enhancing environmental services in order to ensure sustainability. The Project will also closely coordinate with the Government and development partner members of the Working Group (WESWG), which is responsible for making important sector planning and budget decisions, vetting new project proposals, and advocating for policy and institutional reforms under the Joint Water and Environment Sector Support Program (JWESSP). The Bank will work with the WESWG members to harmonize approaches and coordinate activities, with a view to further integrating the WMDP within the JWESSP at mid-term. For example, WESWG and its structures will provide oversight of the project to improve alignment with the SWAP.

8.8 Stakeholder Engagement Plan

The World Bank's OP 4.01 requires the stakeholders and communities be informed of the ESIA implementation process. All stakeholders need to be kept informed during project implementation so as to accord the necessary support and advice. This consultation and public participation will be on-going process that will continue throughout the implementation of the ESIA. This will ensure that all affected individuals and households are well informed and adequately involved in the entire implementation of the ESIA process.

Key stakeholders identified include but not limited to: -

- Local Council and Community Members in Busia Municipality, Majanji, Buhehe, Dabani and Buteba Sub Counties;
- Busia District Local Government;
- Busia Municipal Council:
- National Environment Management Authority;
- National Water and Sewerage Corporation; and
- NGO's operating within Busia District among others.

All the relevant stakeholders should be kept informed and up to date on issues pertaining to the project activities especially those, which affect them or where they have influence. Information sharing and disclosure can be done in the following ways:

- Public meetings with local communities should be held to engage them to get their views how the project is impacting them. This strategy is central to the successful management of risks and impacts on communities affected by the project in addition to adding value to the acceptance of the project. To ensure this, regular public meetings will be organized paying special attention to vulnerable groups like the disabled, elderly, children especially the girl child and women. Their views should be considered in future plans.
- The project will continue interact with National and Local Regulatory Authorities will conduct regular meetings with both national and local authorities to ensure that they are all always kept well informed. Some information to some of the central agencies can be channelled through submission of monitoring reports.
- As a means of preventing conflict of interest Environmental Non-government Organization (NGOs) or Community Based Organizations CBOs should be involved in the monitoring of the ESMP.
- Consultation method whether by surveys, meetings, focus group discussions or key informant interviews should be documented and records kept. Among the things that should be documented include date and location of the consultation meetings, list of attendees, their affiliation and contact address. Proper minutes with action plans and follow up should be record.

A stakeholder engagement plan whose purpose is to have an open productive working relationships, based on principles of transparency, accountability, accuracy, trust, respect and mutual interests with affected communities and other stakeholders should be developed by Ministry of Water and Environment and NWSC.

A sample stakeholder engagement plan (Table 36) has been developed to ensure the full involvement of stakeholders.

Table 36: Stakeholder Engagement Plan.

Target Group	Tasks/Methods	Frequency	Responsibility	Project Phase
Project Affected Persons	• Compensation; • Working Group Meetings; • Regular household visits	When required and in accordance with the law.	MWE/DWD/Contractor	Construction phase
Directly and Indirectly affected Persons.	• Sensitisation local communities on health, safety, cultural and environmental issues related to the project • Health promotion and awareness programmes on HIV/AIDS.	When required and in accordance with the law.	MWE/DWD/Contractor/NWSC	All phases
Local and central government agencies	• Provision of regular updates and submission of monitoring reports to relevant agencies as required. • Payment of attention to the licences required for the project • Internal Environmental Audit • External Environmental Audit	Quarterly Quarterly Every six months Annual	MWE/DWD/Contractor/NWSC MWE/DWD/Contractor/NWSC MWE/DWD/Contractor MWE/DWD/Contractor/NWSC	All phases All phases Construction Phase All phases
Community Consultation	• Continuous consultations with the community members. • Use Grievance Redress Mechanism to settle complaints	As required	MWE/DWD/Contractor/NWSC	All phases
NGO Organisations	• Provide regular updates on the key project information	As required	MWE/DWD/Contractor/NWSC	All phases
Vulnerable groups	• Identify support that may be required to ensure vulnerable people can access project benefits	As required	MWE/DWD/Contractor/NWSC	All phases

8.9 Monitoring and Evaluation

During construction, monitoring will be the responsibility of WMD Project Support Unit. NEMA and DOSH will periodically monitor the project as per their constitutional, legal and regulatory mandate.

The major activities to be carried out during monitoring will include site inspection, review of grievances logged by stakeholders, and discussions with PAPs, construction workers and the local community who live near the project facilities in order to get neighbourhood issues. The Local Councils (LC 1) of each project site, particularly the Chairman of the Environmental committee, should be involved during each site inspection. Community grievances should be discussed and solved at this level. It is recommended that the Project Support Unit should monitor the project every month by making a site inspection.

As part of the evaluation strategy, two types of environmental audits are recommended i.e. internal and external audits. The Contractor with the supervision of the Project Support Unit should carryout quarterly internal environmental audits while an external annual environmental audit should be carried out by a NEMA registered and certified Environmental Auditor. During the operational phase environmental audits will be commissioned by NWSC the Operator. This should be in accordance with the Environmental Audit Regulations 2006.

During the construction phase, the Construction Supervision Team (the Design Consultants) will compile concise monthly monitoring reports. At the end of each quarter, the Contractor will write an Internal Quarterly Environmental Audit Report.The Project Support Unit will review the reports and approve them. The Project Support Unit on behalf of MWE as the Developer should commission the annual external environmental audit report. It will be submitted to NEMA for a Compliance Certificate. During the operational phase, the NWSC should submit annual environmental audit reports to NEMA for approval.

8.10 Measures for Emergency Response to Accidental Events

The Developer/Contractor/Operator should each prepare an Emergency Response and Preparedness Plan (EPRP). The EPRPs should preferably be prepared prior to start of construction works and updated according at the operational phase. The EPRP should assess the risks and impacts from project activities and set out the methods for dealing with emergencies arising during the construction or operation phases. Particularly attention should be paid to those potential effects on the workers, neighbouring and wider communities. The EPRP will also set out the means by which these measures will be communicated to affected communities in a culturally appropriate manner.

The EPRP should have Best Practices, which include working with local and national agencies like the fire brigade, police, hospitals, counter terrorism units etc. The following are key emergencies, which the project should be prepared to handle: -

- Fire
- Electricity shocks and electrocution

- Bomb threat
- Civil disturbance
- Hostage
- Terrorist incident
- Death of a worker on the project site
- Suicide
- Shooting or stabbing
- Disasters e.g. landslides, earth quake, lightening, collapse of excavation walls
- Large-scale hazardous material spill
- Mass casualties
- Health epidemics
- Rapture or leak of equipment
- Flooding

8.11 Catchment Management Plan

This component of the ESIA is handled under a separate consultancy.

9 A CHANCE FINDS PROCEDURE

9.1 INTRODUCTION

The project will involve excavations. There is a likelihood of discovering chance finds during excavation, which may be of archaeological and/or paleontological importance. This will trigger the World Bank Safeguard Policy on Physical Cultural Resources, OP 4.11, and the Uganda Historical Monument Act, 1967. The implementation of chance find procedure (CFP) should be a responsibility of the contractor.

9.1.1 Purpose of the CFP

This CFP will serve the following purposes: -

- Translate commitments in the ESIA into implementation procedures that will protect physical cultural resources during construction of the project;
- Serves as a key tool the contractor can utilise to manage and monitor preservation of resources of cultural heritage significance and
- Provide transparency to stakeholders that commitments made in the ESIA in regard to preservation of finds of heritage value are actually being fulfilled.

This CFP provides: -

- Responsibilities for implementation of the procedure;
- Impact management measures to be implemented;
- Verification, and
- Records and reporting requirements.

9.1.2 The Objective of CFP

Through its Contractor, MWE seeks to ensure that impacts on cultural heritage resources are minimized as far as possible. Thus the overall objective of this CFP is to describe an approach and procedures to be undertaken by the contractor with regard to protection of chance finds encountered during project implementation.

9.1.3 Scope of CFP

This CFP sets out requirements for management of cultural heritage resources during project implementation. The focus of the procedure is primarily mitigation during earthworks at the project site. It is expected that earthworks will be undertaken at following sites, at which chance finds may be encountered.

- Wastewater/ sewage and sludge management facilities;
- Water pipelines and sewers;
- Borrow sites where gravel may be obtained (if any).

9.1.4 Definition of "Cultural Heritage"

For purposes of this CFP, cultural heritage includes:

i) Archaeological deposits and remains;

ii) Historical monuments, sites and buildings;

iii) Places of worship;

iv) Cemeteries and graveyards; and,

v) Places associated with folklore, mythology (and traditions) and the location of historical and cultural festivals, events and rituals.

9.1.5 Commitments

This CFP is developed based on target areas and commitments given in Table 35 below:

Table 35: Target areas and commitments Target area Commitment

No	Target area	Commitment
1	Unidentified archaeological features	This CFP will be implemented to fulfil requirements of Uganda's Historical Monuments Act, 1967.
2	Early earthworks involving excavations (see Sec 1.4 above)	A specialist archaeologist from the *Department of Museums and Monuments* in the *Ministry of Tourism, Trade & Industry* (MTTI) will be on site at the stage of commencing civil works entailing excavations and on call to come to site to investigate, inspect and retrieve any chance finds encountered. Retrieved chance finds will be submitted to the National Museum.

9.1.6 Relationship to Other Project Documents

This CFP should be implemented in conjunction with: -

- Contractor's environment & social management plan;
- Project overall ESMP that specified project-wide requirements for environmental and social management;
- The ESIA report for this project and
- Resettlement Action Plan (RAP) that covers the framework and procedures to be followed during land acquisition for construction of the project.

9.1.7 Uganda's Historical Monuments Act, 1967

This CFP is to be executed in compliance with Uganda's Historical Monuments Act, 1967. In this Act, sub-section 12(1) requires that any portable object discovered in the course of an excavation is surrendered to the Minister who shall deposit it in the Museum. Management of archaeological chance finds is a responsibility of the Department of Museums and Monuments in the Ministry of Tourism, Trade & Industry.

9.2 CHANCE FINDS MANAGEMENT PROCEDURE

9.2.1 Personnel and Responsibilities

This procedure is based on three recommendations below: -

i) The Contractor will have a Socio-Environmental Officer (SEO) on the site during project construction. The contractor's SEO will closely work with the developer's socio-environmental staff to ensure compliance with national and financier's requirements as well as implementation of this chance finds procedure.

ii) During ground opening and excavations, the developer will facilitate an Archaeologist from the Department of Museums and Monuments in MTTI to be on site and ensure that any chance finds encountered are managed according to requirements of The Historical Monuments Act, 1967.

iii) All construction staff involved in earthworks should be trained in basis skills of recognising suspected chance finds and the procedure of notifying the SEO and Archeologist.

Specific roles of persons to be involved in implementation of this procedure are outlined below.

9.2.2 Role of the contractor's Socio-Environmental Officer

The SEO is required to: -

i) Communicate contents and requirements of this plan to contractor;

ii) Sensitise workers to ensure that all are aware of their responsibilities in regard to protection chance finds;

iii) Inform the Archaeologist of any chance finds encountered on site;

iv) Coordinate inspection and monitoring by the MTTI Archaeologist. The SEO should keep in close contact with the archaeologist throughout the construction period;

v) Implement measures recommended by the archaeologist for management of "chance finds" encountered;

vi) Conduct cultural heritage tool box talks to construction personnel as advised by the Archaeologist; and

vii) Maintain records (daily logs) related to archaeological finds during construction.

9.2.3 Role of the MTTI archaeologist

An archaeologist contracted (on a non-permanent basis) from the department responsible for museums and monuments in MTTI will have the following roles: -

i) Archaeological monitoring of all earthworks;

ii) Advice/ guidance to the contractor with respect to halting construction activities if earthworks encounter chance finds;

iii) Conducting preliminary assessment of all previously unidentified archaeological features encountered and submission of these to the National Museum;

iv) Provision of advice on the significance and management of unidentified archaeological features encountered;

v) Processing/ excavation of any unidentified subsurface archaeological features encountered in accordance with standard procedures recommended by the Department of Museums and Monuments;

vi) Maintain watching briefs during opening up site or deep excavations at any location during construction, with clear procedures for protection and documentation of any "chance finds" encountered;

vii) Maintain monitoring records of all unidentified archaeological features encountered;

viii) Develop a set of points to be discussed in "Tool Box" sessions to create awareness among construction crews on "chance finds"/ archaeological features. Note that as part of their sensitization, workers will be required to cease work if they encounter archaeological features and report to Contractor's SEO, who will notify the Archaeologist; and

ix) Write a report for the developer upon completion of construction. This report will be submitted to the Supervising Consultant, Contractor, Developer and Department of Museums and Monuments. The report will summarise findings of archaeological monitoring, describing any features encountered and their preservation significance.

The archaeologist will also undertake "Watching briefs" as the primary element of management and protection of cultural heritage during project construction. Watching briefs will consist of passive visual investigation during ground breaking at excavation sites.

Objectives of the "watching briefs" should be to: -

- Record subsurface archaeological features discovered during earth-moving activities;
- Provide advice to the contractor on significance of subsurface archaeological features discovered; and
- Provide advice to the contractor on areas where ground disturbing activities may continue or where necessary need to be "worked around" or stopped.

NWSC (2016).

The following will be implemented during the "watching brief": -

- Prior to commencing any construction activities, the contractor will give a brief to the archaeologist about site(s) they plan to excavate;
- The archaeologist will conduct a walkover to identify site's archaeological sensitivity through characteristics such as soil type, topography, etc. and
- The archaeologist will witness/ observe site clearance, soil stripping and excavations for presence of subsurface archaeological features.

9.2.4 Role of the Contractor

The Contractor will be required to: -

i) Heed advice from the Archaeologist in respect to halting earthworks when chance finds are encountered; and

ii) Provide cultural heritage tool box talks to construction crews as advised by the Archaeologist.

9.2.5 General rule when Chance Finds are encountered

Upon identification of suspected archaeological remains, the location must not be disturbed until it is inspected by the archaeologist from MTTI.

9.2.6 Procedures

In the event that genuine archaeological remains are encountered, the procedures to be adopted are described in the sections below.

9.2.7 Human remains

If encountered during earthworks, human remains must be handled with dignity and respect. If identified before disturbing the ground, such a location should be staked or flagged off to prevent additional disturbance. However, for uncemented graveyards, it may not always be possible to identify, distinguish and protect a burial ground from construction activities and therefore the following procedures will be followed if suspected human remains are found: -

i) Work will immediately cease in affected location and contact the contractor's SEO who will notify the MTTI Archaeologist;

ii) If the affected location is likely to be disturbed by other workers on site, an employee will be assigned to stand watch until the archaeologist arrives;

iii) Any exposed bones will be covered with plastic sheeting but not backfilled, until the archaeologist arrives to inspect the chance finds;

iv) If excavated fill has been loaded into a truck, it will be emptied at a suitable location for inspection by the archaeologist; and

v) The contractor will resume work once the archaeologist's inspection is completed and an instruction to recommence works issued.

9.2.8 Artefact scatters

The following procedures will be adopted when unanticipated artifact scatters are encountered:

i) The contractor will immediately stop work at the location where finds are encountered and contact the SEO who will notify MTTI Archaeologist;

ii) The affected location will be staked or flagged off to prevent further disturbances;

iii) If excavated fill has been loaded into a truck, it will be emptied at a nearby secure location for inspection by the archaeological consultant; and

iv) The contractor will resume work only after the archaeologist has completed a site inspection and given the go-ahead for works to resume.

9.2.9 Isolated artefact finds

Due to their shape and colour, which often contrasts with the surrounding soil, artifacts are easy to identify by non-archaeologists during earthworks or other activities on site.

Should an isolated artifact be observed, the following procedures will be adopted: -

i) If the artifact is in imminent danger of being destroyed or damaged, it will be collected and its location marked with a flag;

ii) Whenever possible, the artifact will be left on the ground where it was found;

iii) The SEO will be notified that the location requires an archaeological inspection;

iv) The SEO will notify the archaeologist of the chance find;

v) The SEO will ensure that other workers near the location are aware of the need to avoid disturbing the area until inspected by the archaeologist; and

vi) The archaeological consultant will inspect the affected location, after which the SEO will be advised that construction works can proceed.

9.2.10 Historical remains

All types of historic archaeological materials are subsumed within this category, including isolated historical artifacts. When historic remains or suspected historic archaeological remains are encountered the following procedures will be adopted:

i) SEO will order cessation of work will and notify the archaeologist;

ii) The affected location will be staked or flagged off to prevent further disturbances;

iii) The archaeologist will determine if the materials encountered are of real historic significance; and

iv) The contractor will resume work only after the archaeologist issues instruction for the works to resume.

If isolated historic or suspected historic archaeological artifacts are observed, the following procedures will be followed:

i) If the artifact is in imminent danger of being damaged, it will be collected by the SOE and put in a bag (e.g. a Ziploc bag), along with any fragments thereof;

ii) If detached fragments are found, a label must be included with the date of the find and its position;

iii) Its depth and location must be marked with a stake or flag,

iv) Otherwise, whenever possible, the artifact mbe left on the ground at the location where it was found; and

v) The SEO will notify the archaeologist, who will determine if an inspection is required. If no follow-up inspection is necessary, the archeologist will advise the SEO that construction can continue.

9.3 TRAINING

General awareness training will be provided by an archaeologist from MTTI to all construction crews and the contractor's SEO. The training will incorporate information on cultural heritage, its significance, protection status of previously unidentified subsurface archaeological features in the area and construction activities that may destroy them.

This awareness will be maintained through tool-box talks that should be regularly conducted with all construction crews.

9.4 MONITORING

Monitoring will be done by the contractor's SEO with the principal objective being to provide assurance that:

- Project construction is compliant with this procedure; and
- Evidence is collected to demonstrate that commitments related to cultural heritage protection are being effectively met.

Key performance indicators below will be utilised in the monitoring

9.4.1 Key Performance Indicators

The contractor's SEO will undertake monitoring of chance finds management based on KIPs in Table 36.

Table 36: Monitoring criteria

No	KIP/ measure	Rationale	Performance target	Monitoring frequency
1	Conduct cultural heritage awareness training	Ensures workers are aware ofcultural heritage in the area and the possibility of sub- surface resources to be encountered.	90%	Every 3 months
2	Number of "chance finds" damaged by construction activities	Monitors effectiveness managing chance finds	Zero	Monthly

9.4.2 Action Tracking

All non-compliance with this procedure shall be followed up and corrective action taken. The contractor's SEO is expected to maintain an actions tracking system as part of archaeological monitoring. Cultural heritage management action tracking including close out of actions (solutions and preventive actions taken) will be reported quarterly by the contractor to the project developer.

9.5 REPORTING AND RECORD KEEPING

Records in sections below will be kept by indicated personnel.

9.5.1 Archaeologist

The archaeologist will report the following to the Contractor's Socio-Environmental Officer:

- Daily log of activities on a weekly basis;
- Results of any assessments of "chance finds" as soon as the assessment is completed and
- A detailed report of field activities, findings and conclusions following a period of major earthworks.

9.5.2 Contractor's Socio-Environmental Officer

The Contractor's SEO will report the following to Frontier's Socio-Environment Manager.

- Awareness records on cultural heritage resource among workers on a weekly basis;
- Bi-weekly report summarizing cultural heritage management activities;
- Action tracking system on a weekly basis; and
- Performance against key indicators (KPI).

10 GRIEVANCE REDRESS MECHANISM

10.1 Introduction

Regardless of its scale, construction projects normally have disputes and grievances. These are likely to come from complaints about dust, flooding, blasting (noise, vibration, evacuation), lost access, dangers to life, damage caused to public roads from heavy machinery, deteriorating water quality and quantity, damage to property and crops, soil erosion and disruption of social cultural setting of the community. Timely redress of such grievances is vital for satisfactory construction implementation and resettlement in order for the project to be completed on schedule. There is need to ensure that procedures are in place to allow affected people to lodge a complaint or a claim without cost and with the assurance of a timely and satisfactory resolution of that complaint or claim.

In addition, the project may have to make special accommodations for women and members of vulnerable groups particularly the girl child to ensure that they have equal access to grievance redress procedures. Such accommodations may include employment of women or members of vulnerable groups to facilitate the grievance redress process or to ensure that group representing the interests of women and other vulnerable groups take part in the process.

10.2 Grievance Redress Committee (GRC)

In order to handle grievances at the project site, a Grievance Redress Committee (GRC) is proposed. It will be responsible for receiving and logging complaints and resolving disputes. The GRC will work with the MWE to resolve each grievance or dispute to ensure that redress actions are implemented. If affected persons are not satisfied the grievance redress structures, they will be entitled to seek redress through either the District Land Tribunals or Ugandan Courts of Law. It is important that the GRC be set up as soon as construction starts. Disputes can arise from construction activities and it is therefore important that the mediation mechanisms be available to cater for claim, disputes and grievances at the early stage.

10.3 Proposed Mechanisms of Grievance and Appeals

In this regard, grievances are best redressed through Project Support Team for matters of coordination but actual resolutions undertaken by local government staff, political leadership or reputable leaders as identified by the communities; our observations revealed that most community members rely on their political and technical leaders. As first step MWE should appoint a Grievances Redress Co-ordinator within among the existing staff. This should be a preferably a Sociologist with the adequate experience in handling conflicts.

10.3.1 Reconciliatory Procedure

This is an informal mechanism that will be applied to reach a resolution whenever minor contradictions and disagreements that may occur. It will include an oral or written appeal to the Reconciliatory Committee based conflict resolution structure constituting of the Contractor/Operator Representative, LC I Chairman, LC I Women Secretary, LC I Disabled Persons Secretary and LC I Secretary for Defence**.** This approach is a mutual coordination mechanism to guarantee that mutual interests are served and disputes and contradictions are solved.

10.3.2 Written Complaints to MWE

When the complainant is dissatisfied and feels that a member of the Reconciliatory Committee has infringed upon his legal rights and interests or is dissatisfied with the decision made he or she can write to the MWE to lodge a written complaint. If the complainant cannot write the Grievances Redress Co-ordinator is required to write the person's complaint. This complaint should be addressed within two weeks of receipt.

10.3.3 Grievance Redress Procedure

The Grievance Redress Committee will receive a written grievance or complaint. Preferably these should be those, which the Reconciliatory Committee has failed to handle. This Committee will dispense grievances/complaints as described below.

10.3.4 Legal Redress

If the complainant feels dissatisfied with the administrative arbitration decision by the Grievance Redress Committee (GRC), the complainant will then seek legal redress in courts of law. If the complainant is not satisfied with the decision made above, he or she may lodge an appeal to the civil court.

10.4 Proposed Process of Grievance Management

The ESMP recommends the following process, which should be adopted by the project support team: -

10.4.1 Lodging Complaint

The Grievance Management Coordinator/Officer will receive complaint from the PAP in the local language and complete a Grievance Form, which will be signed by the leader of the Local Grievance Management Committee and the PAP/complainant. This will then be lodged in the Grievance Log/Register provided by the Grievance Management Coordinator/Officer.

10.4.2 Determining Corrective Action

If in their judgment, the grievance can be solved at this stage and the Grievance Management Coordinator/Officer and a representative of an NGO/CBO will determine a corrective action in consultation with the aggrieved person. A description of the action; the time frame in which the action is to take place; and the party responsible for implementing the action will be recorded in the grievance database.

Grievances will be resolved and status reported back to complainants within 30 days. If more time is required this will be communicated clearly and in advance to the aggrieved person. For cases that are not resolved within the stipulated time, detailed investigations will be undertaken and results discussed in the monthly meetings with affected persons. In some instances, it may be appropriate to appoint independent third parties to undertake the investigations.

10.4.3 Meeting the Complainant

The proposed corrective action and the timeframe in which it is to be implemented will be discussed with the complainant within 30 days of receipt of the grievance.

Written agreement to proceed with the corrective action will be sought from the complainant (e.g. by use of an appropriate consent form). If no agreement is reached, the above step will be re-visited.

10.4.4 Implementation of Corrective Action

The Project or its Contractors/Operators within the agreed timeframe will undertake agreed corrective actions. The date of the completed action will be recorded in the grievance database.

10.4.5 Verification of Corrective Action

To verify satisfaction, the aggrieved person will be approached by the Grievance Officer to verify that the corrective action has been implemented. A signature of the complainant will be obtained and recorded in the log and/or on the consent form. If the complainant is not satisfied with the outcome of the corrective action additional steps may be undertaken to reach agreement between the parties. If additional corrective action is not possible alternative avenues maybe pursued.

10.4.6 Action by local leaders and contractors

If the Grievance Co-ordinator and NGO/CBO representative cannot solve the grievance, it will be referred to relevant parties such as local leaders, District Officers, NEMA, Valuer and MWE, for consultation and relevant feedback provided.

10.4.7 Action by Grievance Redress Committee

If the complainant remains dissatisfied and a satisfactory resolution cannot be reached, the complaint will be handled by the Grievance Redress Committee. A dedicated Grievance Committee will be established to assess grievances that arise from disputes. This will include the following members: -

- MWE Chair,
- WMDP Project Coordinator,
- Resettlement Officer/Social Scientist Secretary,
- Project's Environmental Focal Point,
- The Chair of the local community (LC I Chairman),
- A member of a recognized non-government organization,
- A Community Leader.

This committee must have a quorum of at least two thirds persons. Decisions will be reached by simple majority. The Grievance Committee should be constituted for as long as no more grievances are lodged. Once the Grievance Committee has determined its approach to the lodged grievance, this will be communicated to the GO, who will communicate this to the complainant. If satisfied, the complainant signs to acknowledge that the issue has been resolved satisfactorily. If the complainant is not satisfied however, the complainant notes the outstanding issues,

which may be re-lodged with the Grievance Committee or the complainant may proceed with judicial proceedings.

The effectiveness of the GRM will be evaluated during the periodical performance reporting and as part of the Environmental Audits.

The GRM should be assessed on the following parameters: -

- Number of complaints:
- Grievance issues by type and how they were resolved:
- Total received, total justified,
- Total resolved at various levels including the type of agreement reached,
- Total referred to legal system/courts of law, including clarification on who initiated (local leaders, PAP or MWE) the referral and subject matter.

10.5 Proposed Terms of Reference for Grievance Management Coordinator/Officer

In line with MWE's resettlement policy framework, projects need to adopt appropriate measures that minimise the risks relating to constructing the water supply and sanitation project. Based on consultations with stakeholders in both districts, effective management of grievances strongly enhances the performance of projects through elimination of construction delays, proper expectation management and increasing community support for the project the current situation suggests that community members incur high transaction costs to ensure that their grievances are handled. Therefore, MWE will seek the services of a grievance management coordinator to support the existing framework in documenting, analysing and engaging stakeholders on how to manage project related grievances as a way of minimising to delays in works related to unresolved grievances. The roles and responsibilities of the grievance management coordinator will include: -

- to coordinate the work of the Grievance Committee, including calling and chairing scheduled meetings;
- help train Community and Local Government staff engaged in grievance management for land and crops;
- provide advice and assistance to such persons;
- monitor progress of grievances;
- inform Members of outcome of vote on whether or not to proceed to grievance;
- act as primary Association contact with lawyers and liaise with legal counsel regarding on going grievance issues;

- And report on informal disputes and grievances to MWE Project Implementation Unit on a regular basis.

Training and Qualifications: Minimum of a relevant university degree with 5 years' experience in grievance handling in rural communities with solid working knowledge of environment, resettlement and compensation issues in Uganda.

11 WATER SOURCE PROTECTION AND CATCHMENT MANAGEMENT PLAN

The water catchment area and the water point source for the project are highly degraded. The main drivers of this degradation is population growth, poor agricultural practices, rapid urbanization, climate change, anthropogenic activities like pollution caused by solid waste, wastewater, open defecation and deforestation caused by land convention for agriculture and energy needs from fuelwood. To address these modern day ills, there is an urgent to have water source protection measures and a catchment wide management plan for the project. Under a separate component of this project "Investment in Integrated Water Resources Development and Management Component," a water source protection was given. The threats caused by anthropogenic activities, the hazards they are likely to cause and control measures are herewith outlined in Table 11.1. Additionally, catchment management plan was given and is outlined in Table 10.2.

Table 11.1– Water Source Protection Measures at Water Source

Water source protection challenge/ need	Underlying cause	Control measure
Sustaining water quality at abstraction point	Loss/ degradation of wetland belt (due to agricultural encroachment) thus undermining capacity to filter sedimentation and or stabilize the lake shore bank.	Enforce wetland policy to protect or regulate wetland and lake use.
		Enforce environmental regulations (lake shore and wetlands).
		Promote wise use practices of wetland resources.
		Demarcate and protect wetland/ lake shore protection zone.
	Use agro pesticides that find their way into water at abstraction point	Improve capacity for safe handling and disposal of agro- pesticides
		Promote soils erosion control measures so as to reduce surface runoff
		Construct diversion trenches to trap and divert storm water or soil wash from uptake point
	Soil erosion/ surface erosion from gardens and along the access road resulting in sedimentation/ silting and pollution.	Promote soils erosion control measures to reduce surface run off

Water source protection challenge/ need	Underlying cause	Control measure
	Poor human and livestock waste disposal leading to contamination of water at the abstraction point	Restrict human and livestock access to abstraction and water treatment point
		Ensure safe disposal of human waste (e.g. use of pit latrines)
	Market adjacent to the proposed abstraction point	Relocate the market to safe location where effect of market on water can be minimal/ avoided.
	Sand mining/ extraction within upstream wetlands	Halt/ stop rock/ sand mining or extraction activities.
Sustaining water quantity	Poor agricultural land uses in the catchment that affect hydrological system (underground water) e.g., through increased surface runoff, exposing high water table	Promote Sustainable land management/ agricultural practices in the catchment
		Regulate wetland use upstream (agriculture +sand mining)
	Declining tree/ vegetation cover that affect hydrological system (underground water)	Increase tree cover through appropriate afforestation or agroforestry practices with appropriate tree species.
		Maintain vegetation around Majanji abstraction point.
Maintenance of water supply infrastructure	Insecurity water supply infrastructure due to vandalism and thefts	Fence/ provide protection of supply infrastructure.
		Develop and apply conflict mitigation/ management strategies.
Ensuring adequate and equitable access to piped water	Population growth or concentration along supply routes resulting into increasing water demand	Promote alternative water supply/ water harvesting/ water storage technologies.
	Conflicts related to access to piped water among current and potential water users	Engage Stakeholders in designing and monitoring the water supply system.
		Develop and apply conflict mitigation/ management strategies.
Sustaining livelihoods	Declining soil fertility and over-all land productivity	Promote sustainable land management practices (soil fertility management, control of soil loss, etc.)
		Promote technologies for enhancing land productivity (e.g. improved varieties of crops, disease and pest control, etc.)
	Conflicting or competing land (e.g., cultivate wetland edge) and water uses	Zoning protection areas of the wetland, lake and infrastructure

Water source protection challenge/ need	Underlying cause	Control measure
	(e.g., fishing near/ around the abstraction point)	Empowering stakeholders to plan for and manage their water sources (provision of incentives for protecting water source e.g., fishing gear that enables fishing activity in deep waters)
		Increase awareness on the relationship between land/ water use and water quality and water availability at Majanji

Table 11.2 – Water Source Protection Measures at Sub-Catchment level

Threat	Hazard	Control measure
Ineffectiveness of sub-catchment management and water source protection	The water sources are contaminated, treatment costs increase and safe water availability is not granted	Multi-level institutional capacity building and trainings
		Supply water within the water source sub-catchment to ease cooperation of population (e.g. install Public Stand Post near WTP).
measures		Inform water users about why water costs are going up and link to their own polluting activities that are contributing to the problem.
		Implement a water quality monitoring programme.
Natural vegetation removal (clear- cutting) for cultivation, timber and charcoal production	Vegetation removal affects the water quality and quantity by modifying the chemical composition and by altering the water flow dynamics in the sub-catchment	Reforestation with native species and water friendly trees
		Educational programs: promote use of solar power, biogas, eco-stoves, solar cookers, high efficiency stoves, gasifier stoves to reduce deforestation.
		Tree plantation for commercial use (timber and biomass production).
Burning of vegetation	Burning of vegetation affects the water quality and quantity by modifying the chemical composition and by altering the water flow dynamics in the sub-catchment	Fire management and protection procedures. Bushfire management policy
		Regular sub-catchment patrols
		Educational programs
		Habitat change monitoring
		Establishment of river bank protection zones (30 m) and lake shore protection zone (200 m)

Threat	Hazard	Control measure
Natural habitat fragmentation	Habitat fragmentation reduces livelihoods available and drives the exploitation in the sub-catchment, in the wetlands and around river banks	Land use management and planning / Establishment of forested areas, control activities near and inside them.
		Demarcate wetlands, enforce policy to protect / regulate wetland and lake use.
		Promote good practices for sustainable use of wetland resources.
		Wildlife corridors to conserve biodiversity.
Land degradation from wrong agricultural practices	Land degradation reduces agricultural yield available and drives the exploitation in the sub-catchment and around river banks	Agricultural counselling/advisors to promote contour bunds, strip cropping, crop rotation etc. for raising infiltration rates
		Agro-forest (production of trees and of non-tree crops or animals on the same piece of land).
		Establishment of river bank protection zones (30 m) and lake shore protection zone (200 m)
		Promote small irrigation schemes away from water sources
Soil erosion from wrong agricultural practices	Soil erosion modifies the soil fertility and reduces the land productivity; the runoff affects the water quality of the receiving rivers and streams	Reforestation with native species and plantation of (native) fast growing herbs and shrubs
		Agricultural counselling/ advisors to avoid that soil is left bare, to promote crop rotation and erosion control measures.
		Use of riverine vegetation strips to slow runoff and prevent nutrient and sediment load.
Pollution from agricultural activity	Fertilizers and chemicals used in agriculture can contaminate the water resources thereby modifying the water quality and posing risks for human health	Promote organic agriculture - starting from pilot farms. Agricultural counselling/advisors
		Control and regulate use of fertilizers and pesticides.
		Use of riverine vegetation strips to slow runoff and prevent nutrient and sediment load.
Increase of the pressures on the natural resources to obtain livelihoods	Contamination of the water source in densely populated areas	Establishment of sustainable agricultural practices (support of NAADS), support basic education attainment and incentivize access to credit (SACCOS) to differentiate income in rural areas

Threat	Hazard	Control measure
Overgrazing from livestock	Soil erosion and WS contamination with faeces	Agricultural counselling/advisors
		Temporary fencing of pastures
		Building of alternative watering systems for livestock away from water sources / Fence off access to rivers and lakes / Construction of storage facilities for livestock
Pollution from anthropic	Chemical and microbiological pollutants	Chemical and biological monitoring of the WS
activities	can contaminate the WS	Law enforcement on discharge limits from industries/ Regulation of extraction activities/ Ban on fish poisoning / Regulate fish cage farming/ Provide waste and wastewater treatment at the fish landing site
		Construction and management of faecal sludge treatment plant for Busia TC and Majanji town before disposal, thus reducing the contamination of soils and groundwater
		Improvement of solid waste collection and transportation in the sub-catchment area, especially urban areas (Busia TC) and in Majanji town (with particular attention to waste produced in the market)
		Construction and management of sanitary landfill for solid waste disposal (especially for Busia TC and Majianji)
		Awareness campaigns against waste dumping.
		Penalise residents for dumping waste in ditches and rivers.
		Improvement of drainage system to reduce runoff sediment transport in the sub- catchment area and implement treatment before discharge especially in urban areas and in road drainages that drain into the lake
		Awareness campaign against open defecation and improvement of private sanitation facilities in the sub- catchment area

Threat	Hazard	Control measure
Poor sanitation	Microbiological contamination of the WS spreading of infectious diseases	Construction of lined public latrines to reduce contamination of groundwater in the sub-catchment area
		Improvement of sludge collection and disposal.
		Construction of sewer system and wastewater treatment plant in urban areas (Busia TC) and in Majanji town.

12 CONCLUSIONS AND RECOMMENDATIONS

12.1 Conclusions

The project will supply up to 82.4 and 78.8% of the people of Busia Municipality in, respectively, the intermediate and ultimate years with sustainable and safe water within easy reach. Furthermore, the project will eliminate the reliance on the current piped water system, built in the period 1999 – 2000, that is intermittent, rationed and unreliable (refer to Fichtner and M&E, 2015a).

With respect to sustainable environmental flows and requirements of other water users downstream of Lake Victoria, the project will abstract, at the maximum, 13,637 m^3/day (0.16 m^3/s). This is about 0.04% of the minimal observed (381.88 m^3/s) Lake Victoria outflow. Furthermore, the minimal observed Lake Victoria outflow has a return period of about 300 years. Thus, the effect of water withdrawal for the project on other water users is insignificant.

Most of the land to be acquired for the project is government owned, with the exception of the privately owned 0.568, 2.0 and 0.289 acres at, respectively, the WTP, FSTP and Reservoir 2 sites. Furthermore, only portions of the private land will be acquired with the owners being left with enough land to carry on. Thus, resettlement is not necessary but rather compensation will be undertaken as costed in the RAP report for the project. The World Bank Operational Policies, Indigenous Peoples OP/BP 4.10 and Projects in Disputed Areas OP/BP 7.60, are not triggered given that there are no indigenous peoples or disputed areas within the project domain.

The implementation of the ESMP for the project will cost UGX 500.2 million in total, including the cost of RAP that has been valued at UGX 300.2 million. In general, the construction phase is at UGX 435.2 million and the operation phase at UGX 65 million.

12.2 Recommendations

The WTP site, including the periphery, is a forage ground for the near threated Hippopotamus. The Contractor/Operator should implement the Wildlife Management Plan (Appendix 5) in conjunction with Uganda Wildlife Authority. This should be carried prior to start of construction works.

The FSTP site at Okame - Amagoro Village, Mawero Parish, Buteba Sub County has no natural wetland for discharging its effluent, thus direct discharge of phosphorous loads into the receiving stream will occur given that only sand and gravel is to be utilized in the designed FSTP. Increased phosphorous loads in receiving water leads to eutrophication. To overcome this, the Design Team should preferably change the media of the constructed wetlands in the FSTP with phosphorus removing materials such as granular slag. Furthermore, the project should extend piped water to the communities at the vicinity of the FSTP, including sensitization on the dangers of consuming polluted water. This water extension could be in the form of household connection, yard taps or communal kiosks.

Protection of the source and catchment area for the project's water supply is indispensable in order to meet the project objectives, namely: provision of sufficient water and sanitation services of good quality to the Municipality. It is necessary to

protect the lake and its catchment from pollution and to maintain a high retention potential of precipitation in the upper catchment. In general, the formation of a Catchment Protection Unit (CPU), one of the activities under Component 1.2 of the WMDP be fast tracked with the aim of protecting the catchment area of Lake Victoria and other rivers and streams in the region.

During the ESIA study, consultations were conducted with relevant stakeholders. The Developer should liaise with them to ensure effective implementation of the proposed mitigation measures for the anticipated negative impacts. An Environmental and Social Management Plan (ESMP) has been developed for the Client, Contractor(s) and Operator to implement. Environmental concerns will be addressed through this plan so that environmental laws and policies will be complied with through the existing institutional frame works. However, strict control and supervision of the Contractor will ensure compliance with required mitigation measures.

The Environmental Practitioners are of the view that the project should be implemented "as is" provided that the suggested mitigation measures are put in place.

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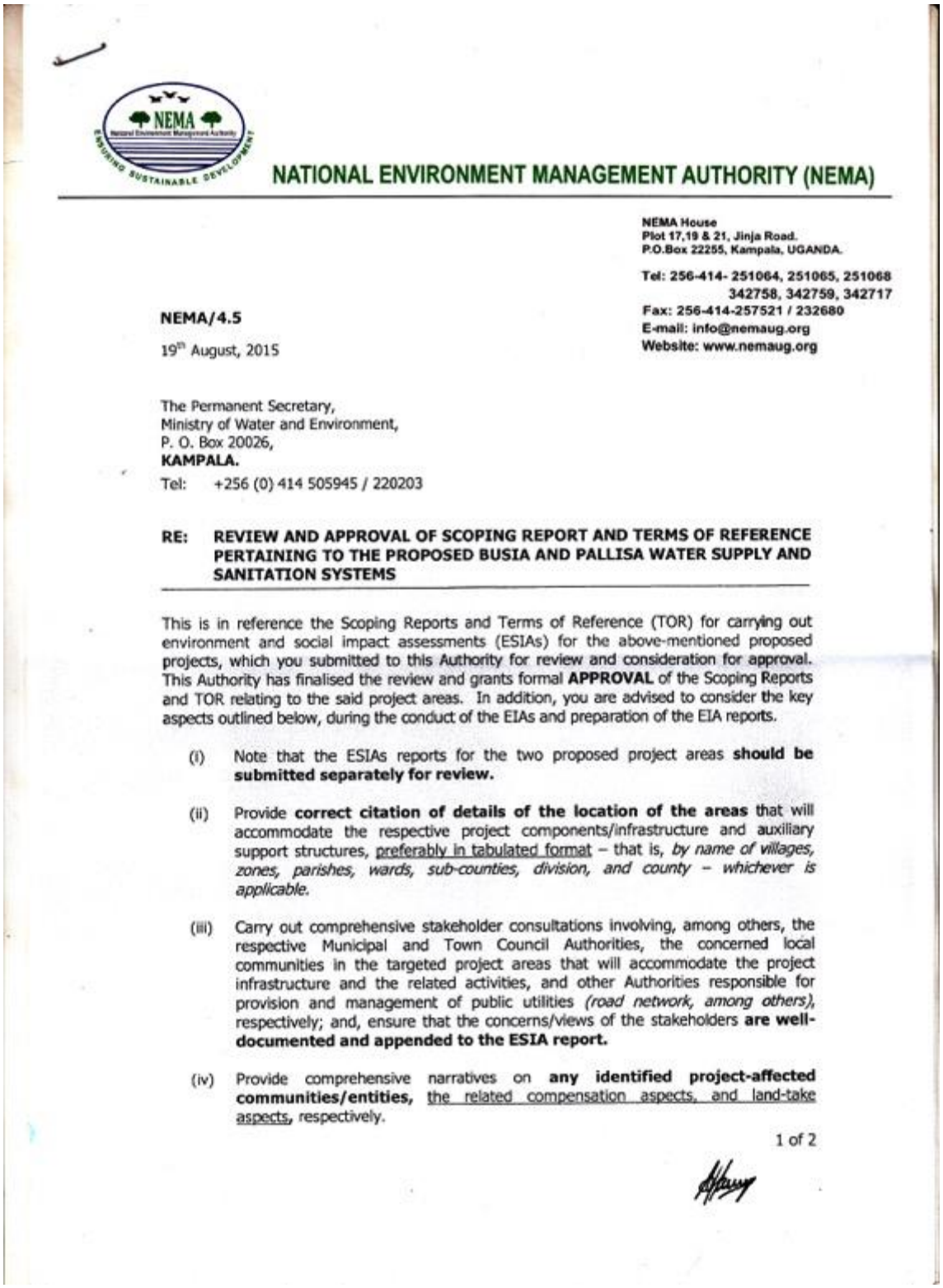
APPENDIX 1: NEMA APPROVAL OF TOR



NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

NEMA House
Plot 17,19 & 21, Jinja Road.
P.O.Box 22255, Kampala, UGANDA.

Tel: 256-414- 251064, 251065, 251068
342758, 342759, 342717
Fax: 256-414-257521 / 232680
E-mail: info@nemaug.org
Website: www.nemaug.org

NEMA/4.5

19th August, 2015

The Permanent Secretary,
Ministry of Water and Environment,
P. O. Box 20026,
KAMPALA.
Tel: +256 (0) 414 505945 / 220203

RE: REVIEW AND APPROVAL OF SCOPING REPORT AND TERMS OF REFERENCE PERTAINING TO THE PROPOSED BUSIA AND PALLISA WATER SUPPLY AND SANITATION SYSTEMS

This is in reference the Scoping Reports and Terms of Reference (TOR) for carrying out environment and social impact assessments (ESIAs) for the above-mentioned proposed projects, which you submitted to this Authority for review and consideration for approval. This Authority has finalised the review and grants formal **APPROVAL** of the Scoping Reports and TOR relating to the said project areas. In addition, you are advised to consider the key aspects outlined below, during the conduct of the EIAs and preparation of the EIA reports.

(i) Note that the ESIAs reports for the two proposed project areas **should be submitted separately for review.**

(ii) Provide **correct citation of details of the location of the areas** that will accommodate the respective project components/infrastructure and auxiliary support structures, preferably in tabulated format – that is, *by name of villages, zones, parishes, wards, sub-counties, division, and county – whichever is applicable.*

(iii) Carry out comprehensive stakeholder consultations involving, among others, the respective Municipal and Town Council Authorities, the concerned local communities in the targeted project areas that will accommodate the project infrastructure and the related activities, and other Authorities responsible for provision and management of public utilities *(road network, among others),* respectively; and, ensure that the concerns/views of the stakeholders **are well-documented and appended to the ESIA report.**

(iv) Provide comprehensive narratives on **any identified project-affected communities/entities,** the related compensation aspects, and land-take aspects, respectively.

1 of 2

(v) Provide comprehensive **baseline information and data** relating particularly to the proposed project areas that will accommodate the project components and characteristics of the immediate environs, other existing facilities, regulated sensitive and fragile areas, settlements, as well as the **water source (river or lake).**

(vi) Include in the ESIA reports **coloured location / google maps** *(preferably covering A-4 or A-3 paper size)* that are clear, well-labelled and legible and showing the project areas, a set of **GPS coordinates and coloured photographs** showing the current state of some of the critical section of each project area, respectively.

(vii) Provide comprehensive narratives on all the **proposed project components, activities,** and the size of the workforce.

(viii) Provide comprehensive **analyses of alternatives/options,** in terms of the project design, type technology, alignment of infrastructure, and other aspects.

(ix) Provide **detailed evaluation of the potential environmental impacts and risks** associated with the proposed project components and activities.

(x) Include in each of the ESIA reports **comprehensive mitigation and environmental management and monitoring plans,** respectively *(preferably in table matrix format),* that relate to the identified potential environmental impacts.

(xi) Consider other any critical environmental aspects/concerns not been foreseen during the preparation of the TOR, and **include evaluations of such concerns** in the respective ESIA reports.

(xii) Indicate the **total project (investment) cost** covering all the project components and activities.

This is, therefore, to recommend that you proceed with carrying out the ESIAs for the proposed projects. We look forward to receipt of two sets of copies of comprehensive environmental and social impact statements, for our further action.

Margaret Aanyu
FOR: EXECUTIVE DIRECTOR

c.c The Director,
Directorate of Water Resources Management,
ENTEBBE.

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APPENDIX 2: LAKE VICTORIA WATER QUALITY REPORT

NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY - BUGOLOBI
P.O.BOX 7053 KAMPALA
E-mail: waterquality@nwsc.co.ug

CERTIFICATE OF ANALYSIS

CLIENT: SAVIMAXX LTD
Address: P.O.Box 25250
Tel: 0712654651
Email: savimaxxcompanylimited@gmail.com
Date Sample Received: 23-June-2015

Ref No: LS090/INV/2015/568
Sampled by: Client
Type of container: Plastic
Sample Source: Surface Water
Date of Report: 30-June-2015

Table of Analytical Results

Parameters	Units	Busia water intake (Lake Majanji)	*National Standards for potable water. (un-treated water)*
WS Sample Nr	--	**K2502/2015/C/B**	
pH	--	7.27	*6.5 – 8.5*
Electrical Conductivity (EC)	µS/cm	97	*2500*
Total Dissolved Solids (TDS)	mg/L	62	*1200*
Total Suspended Solids (TSS)	mg/L	37	*0*
Colour: Apparent	PtCo	173	*15*
Turbidity	NTU	16.4	*10.0*
Alkalinity: total as $CaCO_3$	mg/L	72	*500*
Hardness:Total	mg/L	52	*500*
Magnesium: as Mg^{2+}	mg/L	4.8	*50*
Flouride: F	mg/L	0.06	*1.5*

NATIONAL WATER AND SEWERAGE CORPORATION
EXTERNAL SERVICES
P. O. Box 7053, Kampala, Uganda
Tel: +256 414 315 111/107
Email: external.services@nwsc.co.ug

Table of Analytical Results

Chloride- Cl^-	mg/L	3	*500*
Nitrate – N	mg/L	0.03	*5.0*
Sulphate: SO_4^{2-}	mg/L	4	*200*
Calcium: Ca^{2+}	mg/L	12.8	*75*
Ammonia-N	mg/L	3	*1.0*
Bio-Chemical Oxygen Demand (BOD)	mg/L	3.54	*Not specified*
Chemical Oxygen Demand (COD)	mg/L	63	*Not specified*
Total Phosphorus (TP)	mg/L	0.11	*Not specified*
Total Nitrogen (TN)	mg/L	9.2	*Not specified*
Ortho Phosphate	mg/L	0.42	*5.0*
Fat oil and Grease	mg/L	0.73	*Not specified*
Bacteriological: Faecal Coliforms	CFU/100mL	**20**	*0*

Remarks

The sample showed good physio-chemical characteristics with the exception of colour, TSS and turbidity. However, the bacteriological characteristics didn't comply with the National standard for untreated potable water.

ANALYSED BY: Robinah Muheirwe and Hawa Nakitende

AUTHORISED BY: ..... **MANAGER, Central Laboratory Services**

APPROVED BY: ..... **SENIOR MANAGER, Water Quality Management Department**

NB: The NWSC certificate of analysis by no means constitutes a permit to any person or company undertaking to conduct business.

NATIONAL WATER AND SEWERAGE CORPORATION EXTERNAL SERVICES

hake vitchi + mganji

APPENDIX 3: PROJECT AFFECTED PERSONS

S. No.	Name of Claimant	Village	Land to be acquired (Acres)	Crops to be compensated
Intake/Water Treatment Plant and Reservoir 1				
1	UGANDA PEOPLES DEFNCE FORCES	NAMUNDIRI - A	6.603	Mango
2	BWIRE BARACK ENOS	NAMUNDIRI - A	0.558	Cassava
3	AGGREY AWORI	NAMUNDIRI - A	0.01	
4	UGANDA PEOPLES DEFENCE FORCES	NAMUNDIRI - A	0.18	
5	UGANDA PEOPLES DEFENCE FORCES	NAMUNDIRI - A	0.183	
Transmission Main 1				
6	ANYANGO SUZAN	BULWANDE		Nsambya; Lira tree
7	BAHATI WANYAMA	BULWANDE		Nsambya
8	AUMA LUKA	BULWANDE		Acacia tree; Nsambya
9	WANDERA PATRICK	BULWANDE		Gravelia
10	XAVIER WANYAMA	BULWANDE		Eucalyptus trees
11	OUNDO STEVEN	BULWANDE		Acacia
12	WANYAMA MARGRET	BULWANDE		Jambula
13	OJIAMBO DOUGLAS	BULWANDE		Mango; Gum tree hedge
14	OGINGA BENEDICT	BULWANDE		Eucalyptus trees
15	OGENGA MILTON	MAHOMBI		Acacia
16	BWIRE JAMES	MAHOMBI		Umbrella tree; Nsambya
17	JOHN ORODI	MAHOMBI		Banan clumps; Nsambya
18	OUMA JANE	MAHOMBI		Acacia; Nsambya
19	KWOBA SAMSON	MAHOMBI		Nsambya
20	OSINYA CHRISTINE	MAHOMBI		Nsambya
21	ONYANGO ALEX	MAHOMBI		Banana clumps; Nsambya
22	OMONDI LONIC	BUKEMU		Nsambya

S. No.	Name of Claimant	Village	Land to be acquired (Acres)	Crops to be compensated
23	NGWENO JACKSON	BUKEMU		Tamarine
24	WABWIRE JOHN ONYANGO	BUHENYE - B		Lira tree; Nsambya
25	SOMBI SAM	BUHENYE - B		Nsambya
26	NAJABI BWIRE	BUHENYE - B		Nsambya
27	OJIAMBO JOHN	BUHENYE - B		Nsambya
28	OKUKU PATRICK	BUHENYE - B		Lira trees
29	TO BE IDENTIFIED	BUHENYE - B		Acacia; Nsambya
30	NAFULA SCOVIA	BUHENYE - B		Acacia; Nsambya
31	WERE AIDAH	BUHENYE - B		Nsambya
32	ODWOR WILBER	BUHENYE - B		Pawpaw; Acacia; Nsambya
33	MAKOHA GRACE	BUHENYE - A		Nsambya; Mutuba
34	OUNDO SILAS	BUHENYE - A		Mango; Nsambya; Mvule
32	WANDERA VICENT	BUHENYE - A		Eucalyptus tree
33	BARASA AGUNDA RANDARI	BUMALA		Musizi; Mvule; Lira tree; Nkoba tree
34	LUHONI ANDREW ONYACHI	BUMALA		Acacia
35	OUMA ODIMBE	BUMALA		Mvule
36	WANDERA MOSES	BUMALA		Mvule; Lira tree; Acacia
37	ONYANGO SIKALA JUSTIN	BUMALA		Lira tree; Umbrella tree
38	WANGIRA EKAKA	LUMINO - I		Gravelia; Eucalyptus; Nsambya
39	MESSAGE PENTACOSTAL CHURCH	LUMINO - I		Mvule; Musizi; Umbrella tree; Chi apple; Lira
40	WANDERA ORTON	LUMINO - I		Sembula
41	GLORY PALACE NUR & PRI	LUMINO - I		Nsambya; Gum Tree hedge
42	MAJONI OBAYI	LUMINO - I		Mango
43	SYAMBI NGWENO	LUMINO - I		Mutoma (Mutumba)
44	ONGWEN OKUMU/NGWEN	LUMINO - II		Mvule
47	OUMA TAME	LUMINO - II		Mango
48	OKOCHI MOTOHA	LUMINO - II		Mutumba

S. No.	Name of Claimant	Village	Land to be acquired (Acres)	Crops to be compensated
49	OYULA SEDURAK	LUMINO - II		Mango
50	AJAMBO MARY	LUSISIRA		LIRA
51	MUKHULA OCHIMI	LUSISIRA		Musizi
52	OKOCHI ISAAC	LUSISIRA		Mutumba
53	NAMISI SIMON MASA	LUSISIRA		Nsambya; Birowa
54	OPONDO JANET	LUSISIRA		Mutumba; Gum tree hedge; Mvule; Lira
55	MASIGA ROMAN	LUSISIRA		Mutumba
56	NAFULA BEATRICE	LUSISIRA		Acacia
57	KITIMBO JAMES	LUSISIRA		Mango
58	WAFULA CHARLES VINCENT	LUSISIRA		Mvule; Nsambya
59	MANGENI PETER	LUSISIRA		Mango
60	OMUMENYA	LUSISIRA		Nsambya
61	NAMUSYA	LUSISIRA		Mango
62	NYENGENYA CHARLES	LUSISIRA		Mango; Banana
63	JUMA JOSEPH	LUSISIRA		NSAMBYA
64	NEKESA JESICA	LUSISIRA		Lira tree; Acacia
65	LEONIDA MAKOHA WANDERA	MUNDAYA		Mugavu; Mutumba
66	OSOSO HENRY	MUNDAYA		Gum tree hedge; Lira
67	JAMES OUMA WANYAMA	MUNDAYA		Musizi
68	OGUTU AFANDE	HUTALE		Mvule
69	WANYAMA RONALD	SIGALAME - B		Acacia; Gum tree hedge
70	BUTANGASI PRI. SCH	SIGALAME - B		Gum tree hedge; Barbed wire
71	OSORE FRED	BUSEKIRA		Pine
72	ST. ELIZERBETH SSS	BUSEKIRA		Mutumba
73	ACENO DOREEN	BUSEKIRA		Nsambya
74	CHARLES JUMA	BUSEKIRA		Acacia
75	WANGIRA	BUSEKIRA		Compound tree

S. No.	Name of Claimant	Village	Land to be acquired (Acres)	Crops to be compensated
Reservoir 2 and Booster Station				
76	LATE MUSUNGU BIRENGE	DAHA	0.289	
Transmission Main 2				
77	BWIRE MICHAEL	LWANGOSIA		Mutumba
78	NERIMA CAROLINE	LWANGOSIA		Mutumba
79	EGESA ROBERT WANYAMA	LWANGOSIA		Mutumba
80	EGESA MUSAWO RICHARD	LWANGOSIA		Umbrella tree
81	ODUBAKA BWIRE	LWANGOSIA		Nsambya
82	BALUUTI SULAIMAN	LWANGOSIA		Nsambya
83	WANDERA KILEMBE	LWANGOSIA		Gum tree
84	AUMA TEOPISTA BWIRE	LWANGOSIA		Lira tree; Eucalyptus tree; Gravelia; Mutumba; Banana clumps; Mugavu
85	PIUS	LWANGOSIA		Banana clumps; Mutumba
86	BWIRE MUSA	LWANGOSIA		Umbrella tree
87	MUGENI SIMON KWOBA	LWANGOSIA		Mugavu; Acacia; Gum trees hedge
88	RICHARD OGUTI	LWANGOSIA		Lira trees; Teak trees
89	BWIRE STANSLOUS	LWANGOSIA		Gum trees
90	GEOFREY WANDERA	LWANGOSIA		Gum trees; Nongo; Mvule
91		LWANGOSIA		Pine
92	OUMA SILVER OMONI	LWANGOSIA		Lira tree; Mvule; Mango
93	WERE FRANCIS (LATE)	LWANGOSIA		Mango
94	BWIRE MICHAEL (LATE)	LWANGOSIA		Gravelia; Lira tree
95	JESICA NABWIRE BWIRE	LWANGOSIA		Nsambya; Lira tree
96	MUSUNGU PAUL	LWANGOSIA		Mutumba
97	GIRABA GODFREY	LWANGOSIA		Mutumba
98	PIUS OSATO	LWANGOSIA		Pine trees
99	OUNDA JAMES	BUWAMBO		Mvule tree
100	TAMBITI FLORENCE	BUWAMBO		Eucalyptus

S. No.	Name of Claimant	Village	Land to be acquired (Acres)	Crops to be compensated
101	BETTY TAMBITI	BUWAMBO		Eucalyptus; Lira
102	OUMA LAUBEN NAMBOKWE	SIKOBWE		Eucalyptus; Mvule; Mutumba; Nsambya
103	MASAFU SUB COUNTY	BUWANDA		Musisi; Avocado; Mango
104	MASAFU PRI. SCHOOL	BUWANDA		Mvule; Tamarine; Gum tree; Mango; Acacia
105	MASAFU POLICE STATION	BUWANDA		Banana clumps
106	MASAFU HOSPITAL	BUWANDA		Nsambya; Jacaranda
107	MASAFU MASJID	MIRRA		Mango
108	ABUDALAH WAFULA	MIRRA		Banana clumps
109	TABBU PATRICK	MIRRA		Banana clumps
110	JOHN BARASA	MIRRA		Pines
111	ADAM MAYENDE	MIRRA		Nsambya
112	BWIRE CUMULA	BUSABALE - S		Jambula; Gravelia; Mango
113	BWIRE CUMULA	BUSABALE - S		Mutuba; Mango
114	WABWIRE FRANCIS	BUSABALE - S		Gravelia; Cypress; Acacia; Teak; Banana
115	MAGENI RONALD	BUSABALE - S		Banana clumps; Guava
116	GUSINO PETER	BUSABALE - S		Mango
117	WERE STEVEN	BUSABALE - S		Nsambya
118	BUSABALE GINNERY	BUSABALE - S		Chain link fence
119	WILLIAM OGUTU	BUSABALE - N		Mugavu; Umbrella tree; Mvule
120	OUMA RISMAS	BUSABALE -N		Mvule
121	DABAN GIRLS SS	BUSABALE -N		Lira trees; Jacaranda; Eucalyptus; Mugavu; Kabakanjagala
122	DABAN HOSPITAL	BUSABALE -N		Chain-link fence on metal posts; Gum trees
123	LATE POTELI WANDERA	DABAN WEST		Jackfruit; Acacia; Avocado; Mango
124	OPIO BLASIO	DABAN WEST		Gravelia; Umbrella tree; Kifabakazi; Banana

S. No.	Name of Claimant	Village	Land to be acquired (Acres)	Crops to be compensated
125	ODONGO KENETH	DABAN WEST		Jackfruit; Musizi
126	OJAMBO NORMAN	DABAN WEST		Eucalyptus; teak
127	NAMULUNDU WILBER	DABAN WEST		Mango
128	PASTOR ANDREW	DABAN WEST		Mango; Banana Stem
129	NAMUSYA	DABAN WEST		Mutumba
130	Mrs. BAKER WANDERA	DABAN EAST		Jackfruit; Mango; Musizi
131	NGOLOBI PAUL	DABAN EAST		Musisa; Umbrella; Compound tree
132	MALEKISUWA WABWIRE	DABAN EAST		Musisa; Cypress; Nsambya
133	EGESA DAVID	DABAN EAST		Mango; Gravelia
134	MAKULO SAMUEL	DABAN EAST		Gravelia; Umbrella
135	BUDECHO PRI. SCH	DABAN EAST		Pine; Acacia
136	OJAMBO SEDRACK	DABAN EAST		Umbrella trees; gravelia; Eucalyptus
137	WANYAMA NICHOLAS	DABAN EAST		Musizi
138	JUMA HAJUSU	DABAN EAST		Musizi
139	ALEKI JACOB	DABAN EAST		Mugavu; Banana
140	PAFURA PAUL	DABAN EAST		Banana clupms
Reservoir 3				
141	DABAN SUB COUNTY	DABAN EAST	0.537	Gravelia
142	DABAN SUB COUNTY	DABAN EAST	0.103	
Transmission Main 3				
143	ACHODE SAMUEL	BUWUMA		Pine trees; Cypress; Mvule
144	MUWANGUZI DAVID	BUWUMA		Banana clumps; Pine
145	CHRISTOPHER WERE (LATE)	BUWUMA		Lira
146	TOM OKUMU	BUWUMA		Mango

S. No.	Name of Claimant	Village	Land to be acquired (Acres)	Crops to be compensated
147	WERE CHRISTOPHER (LATE)	BUWUMA		Nsambya
148	OUMA	BUWUMA		Mutuba
149	ONYANGO GEOFREY	BUWUMA		Banana clumps; Kifabakazi
150	PHILMON WANGIRA	BUWUMA		Banana clumps
151	OUNDO SATURDAY	BUWUMA		Pine; Chi-apple hedge; Eucalyptus
152	OKUMU OMBITO	BUWUMA		Avacado
153	AJAMBO BEATRICE	BUSIWONDO		Acacia; Avocado
Faecal Sludge Treatment Plant				
154	ADOME PHILLIP	OKAME-AMAGORO	2	

APPENDIX 4: MINUTES OF STAKEHOLDERS MEETINGS

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH THE LOCAL LEADERS/OPINION LEADERS OF MAJANJI SUB COUNTY TUESDAY 16TH JUNE 2015 2:45 PM AT MAJANJI COMMUNITY HALL.

AGENDA:

1. Introduction
2. Presentation by the MWE representative
3. Presentation by the project Manager.
4. Reactions.
5. Closing remarks

VENUE: Majanji Community Hall

TIME: 2:45 PM.

ATTENDEES:

Attendance list attached

Table 37: Minutes of the meeting held at Majanji, Busia District.

Min. No	Item/ Description	Action by	Date
1.	The LCIII chairperson of Majanji Sub County introduced the team of Consultants to the local leaders.	LCIII Chairperson	
2.	**Presentation by the Environmentalist / MWE.** In her presentation, the Ministry of Environment and Water representative informed the leaders that the Ministry of Water and Environment had secured a loan from the World Bank to implement a water management and development project in eight towns in Uganda including Busia, Ngora-Kumi, Pallisa, Rukungiri, Katwe-Kabatoro, and Koboko Town council. She informed them that, the project shall benefit the small towns and that Majanji town is one of the towns to be will benefit from the project. She called for their cooperation in the implementation of the project.	Teddy Gwoyazika	
3.	**Presentation by the Project Manager**: Mr. Samuel Vivian Matagi informed the leaders that the Consultants are from Survesis and Savimaxx who were given a contract by the MWE to conduct an Environmental and Social Impact assessment of key activities and the Resettlement Action Plan for this Water Supply project. He informed them that the project targets Busia Municipality Council because the Municipality population has increased since 1995 when the water sources were constructed. He	Mr. Samuel Vivian Matagi	

Min. No	Item/ Description	Action by	Date
	elaborated to them that there will be 4 reservoirs/tanks along this route i.e at Majanji, Butangasi, Dabani and at the Busia Municipal Council. All these reservoirs will feed the towns along the way from the Water Treatment to Busia Municipal Council. He further informed them that there is a team of the RAP specialist that will come later and will sensitize them on the compensation, survey and valuation issues that may affect the project. He called on the sociologist to talk to the leaders on the various issues that call for their input.		
4	**Question and Answer Session**. The Sociologists informed the local leaders that as they are the leaders their views are very important for a successful implementation of the project regarding the negative and positive effects of the project and how they can be dealt with. She requested him to provide all their opinions and concerns so that they can be integrated into the ESIA report. **Qn. What is your opinion about the proposed project?** **Reverend:** thank you for the work that is being done , thank you for revisiting the plan for Majanji to be provided with water (Earlier on the towns along the route had not been given a provision to get water). We want employment opportunities for our people, so that they can easily support the project. The communities should be sensitized. **LCIII Chairperson:** For us as the sub county we need safe and clean water. Currently all the water source that we have are salty. All the borehole that we have and all those that have been sunk are salty.it is very hard to use the lake water , it is too dirty and has a high prevalence of diseases like cholera, bilharzia etc. We in Majanji have the source of this water and therefore before it goes to Busia we need to have our share. And we are happy that we have been considered as beneficiaries. However we need to sensitize people about the sanitation and hygiene and also how to protect the environment like not to cultivate along the shores so that water remains clean. **Qn. Is there any negative impact that you envisage to arise from the project?** **Response**: some people have gardens in this piece of land that is going to be development I request that their crops are compensated. The good thing however is that, people are very willing to surrender their land to project as long as they are compensated.	Esther Nassonko Kavuma Religious leader Political Leader Elder Leader	

Min. No	Item/ Description	Action by	Date
	Qn. What do you propose as the appropriate mitigation measures for the identified negative impacts? **Response**: We have already started engaging the community members and we are continuing to sensitize them about the project. The project should also start engaging the people early enough together with the local government officials concerned so that, people get prepared to receive the project in their respective communities because in a way, this will help to reduce on the compensation. There is need to sensitize the community not to steal the construction materials.		
5	In his closing remarks, the team leader thanked the chairman for his time and contributions he made which he said were very important in informing the development of the ESAI report. He encouraged them to continue sensitizing the communities about the project activities and that RAP team will give them more information about compensation. The chairman also thanked the team for coming and for their efforts they have made to consult the people on issues regarding the project.	Mr. Samuel Vivian Matagi LCIII Chairperson Majanji Sub County	

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 16/06/15 Time Town Majanji Town

Sub County Majanji Parish Majanji Village Majanji

Local leaders/Opinion leaders of Majanji S/C. (Intake & WTP)

No	Name	Designation	E-Mail	Phone No.	Signature
01	BWIRE BENSON PAMBA	C/P S/C MAJANJI		0782468270	
02	BOSSEY STEPHEN	POLICE OFFICER		0704929277	
03	OUNDO PAUL MARKING	C/P LC1 MAANWA'B		0750879770	
04	JULIUS WANDERA	CHAIRMAN NRM MAJANJI S/COUNTY	0778776644	0752943055	
05	REV. YOWERI WAFUTHO	REVEREND/PRIEST		0774918106	
06	OPIO Manasi	C/P L.C1		0753069549	
07	OSUA Sam	Defence Sec.		0772903495	
08	Egessa Herbert	Defence Sec.		0784004066	
09	Auma Caroline	VICI Person		0785425982	
10	Esther N. Kavuma	Sociologist		0772426834	
11	S. V. Matagi	Environmentalist	savimaxx.comp@yahoo.com	0772 654651	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH Mr. Wanyama LCIII Chairperson Buhehe Sub County on the 16th June 2015, BUSIA DISTRICT

AGENDA

1. Self-introductions
2. Presentation by the project manager
3. Presentation from the sociologist
4. Reaction and Feedback from the Sub County Chief
5. Closing remarks

VENUE: Buhehe Sub County headquarters.

TIME: 5.00 PM

ATTENDEES

Find the attendance list attached

Table 38: Minutes of meeting at Buhehe Sub County, Busia District.

Min. No	Item/Description	Action	Date
1.	**Introduction.** The consultancy Team introduced themselves to the chairman and he chairman did the same.	All participants	
2.	**Presentation by the Project Manager.** Mr. Matagi Samuel the Team leader of the Consultancy team gave the background of the project. He informed the LCIII chairperson that the Ministry of Water and Environment had secured a loan from the World Bank to implement a water management and development project in eight towns in Uganda including Busia, Kumi-Nyero- Ngora, Pallisa, Rukungiri, Katwe- Kabatoro and Koboko Town council. He informed him that, the project is being implemented in phases by different consultants. The first phase of the project was conducted by design engineers who developed the technical designs and the general lay out. Within this phase, the consultants identified the suitable locations for the intake, the treatment plant, the reservoir and the sewage plant and that, these designs were produced and also shared with the relevant town council and district authorities and in this case it had shared with Busia district and Busia municipality. He noted that, the second phase of project implementation entails conducting detailed Environment and Social Impact Assessment activities related to the project and developing a Resettlement Action Plan which had be given to Savimaxx and Survesis. He further informed him that right now they had come to handle a detailed	Team leader	

Min. No	Item/Description	Action	Date
	Environment and Social Impact Assessment		
3.	**Presentation by the Sociologist:** The Sociologist summarized the project design which included the use of the road reserve for the pipelines and distribution water points within the rural growth centres of which Buhehe town is one of them. She requested that the Chairman give his opinion, fears and concerns about the project.		
4.	**Opinion, issues and concerns:** The chairman appreciated and welcomed the project because it will help more people to have access to clean and safe water. The chairman guaranteed his support to the project. However his concerns were that;, 1. The community needs to be clear about the road reserve. This could be done through sensitization. He also recommended that both the leaders and the community need to be sensitized. 2. That will the people along the pipeline be able to benefit, in terms of access to clean and safe water 3. There is need to employ community members especially during the construction of the pipelines.	LCIII Chairperson	
5.	**Closing Remarks** In his closing remarks, Mr Matagi thanked the LCIII chairperson, Buhehe sub County for his time and contributions he made which he said were very important in informing the development of the ESAI report. He further advised the chairperson as a leader to do a lot of sensitization to the community about the project so that the project is not halted and to keep the conflicts minimal in case they arise. The chairman also thanked the team for coming and for the efforts made to consult the people on issues regarding the project.	Team Leader and the LCIII chairperson.	

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 16/6/2015 Time Town Lumino S/County – Busia Water Supply

Sub County Lumino Parish Lumino Village Lumino

No	Name	Designation	E-Mail	Phone No.	Signature
01	EBU J. MIKE	S/C CHIEF Lumino S/county	ebujohn@gmail	0772325703	
02	Bwire James Nagaf	Lic Off C/C Lumino S/C	N/A	0782659973	
03	Wanyama charles	LCII CIP Buhehe S/C	N/A	0782584673	
04	Esther N. Kavuma	Social Expert		0772426834	
05	S.V. Nadagi	Project Manager Environmentalist	Savimaxx company ltd egmail.	0712 654651	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH THE NAMAWUMBI B VILLAGE/ COMMUNITY MEETING AT ELIM NAMAWUMBI PRIMARY SCHOOL ON THE 18TH JUNE 2015 AT 9.30 AM

AGENDA:

1. **Introduction of the Consultancy Team**
2. **Presentation by Environmentalist from the Ministry Of Water and Environment**
3. **Presentation by the Project Manager**
4. **Reactions**
5. **Answering The Question**
6. **Closing remarks**

VENUE: Elim Namawumbi Primary School

TIME: 9:30 am

ATTENDEES

Attendance list attached

Table 39: Minutes of the meeting held at Namawumbi Village, Busia District.

No.	Item/ Description	Action	Date
1	The Consultancy Team was introduced to the Community meeting.	Chairman LC1 Namawumbi B	
2.	**Presentation by the Environmentalist / MWE.** Ms Teddy Gwoyazika the Ministry of Water and Environment official introduced the consultants from Survesis and Savimaxx limited who had been contracted by the MWE to conduct the ESIA and RAP on the proposed water project. She mentioned that, the government of Uganda through the MWE had secured a loan to implement a water project which was going to supply water to Busia Municipal Council. She further informed the community that there are different components on the project which included Solid Waste Plant, Intake, Water Treatment Plant, Reservoirs and Faecal sludge which was proposed to be put in Namawumbi B. She further informed the community that the first phase of project implementation had been completed and also the technical designs had already been produced and shared with the Municipal Council and the district. At this point she requested the Team Leader/Project Manager for the ESIA team to talk to the community members.	MWE Official	
3.	**Presentation by the Team Leader/ Project Manager.** Mr. Matagi Samuel, the Team leader for the ESIA team AP first introduced himself and the sociologist as consultants from Survesis and Savimaxx who were given a contract by the MWE to conduct an environmental and Social Impact	Mr. Samuel Matagi, The Team Leader	

No.	Item/ Description	Action	Date
	assessment of key activities in the project and the Resettlement Action Plan (RAP).He went further to elaborate about the project and emphasized that the project has about four components, these include; water supply to Busia Municipal Council, Solid waste management, improving the drainage system and faecal sludge. He informed the community that the government realized that some towns have not been able to grow because they lack services like water, and that Busia is one of the towns under the project. Others towns included Rukungiri, Katwe-Kabatoro, Koboko, Kumi, Nyero – Ngora and Pallisa. The government has borrowed money to set up the water system in these towns. He mentioned that Busia mainly uses, boreholes, springs, shadouffs yet it has grown to the Municipality status yet this water is no longer safe because of the increased population which has tended to contaminate the water and diseases like cholera, bilharzia etc. are very common now. He further informed the community that water source was identified at Majanji at lake Victoria after a thorough check of all the water sources like River Malaba and the water was found not suitable. He clarified that although the government got money from the World bank but that money is usually for Consultation and construction but the money for compensation is from the central and local governments, and the land provided by the local government. The sites for the project were identified which included the intake and water Treatment plant, garbage collection centre, reservoirs and the faecal sludge sited in this area near the bridge on river Solo. Through his elaborate presentation, Samuel informed the community members that the Reserve tanks have been sighted in different area along the route from Majanji so that the towns along the route will access water from the project. As a result some Sub counties will provide land for the reserve tanks (that is for the public/ government land), and in case of private land being affected an agreement will be reached and the affected person will be compensated, a case in point is the reservoir at Butangasi. Mr. Matagi clarified that although the land for the faecal sludge has been sited/proposed but has not yet been acquired.		
4.	Reaction The presentation steered up so many question and below are the questions and comments from the community. Mangeni: 1. Why do you have to put a faecal sludge in our area yet, this is not Busia Municipality? 2. Busia is developing very fast, and the lagoon maybe transferred elsewhere won't it be double work?		

No.	Item/ Description	Action	Date
	Malaba Tyson: 1. Have they surveyed and confirmed that this is the place for the faecal sludge? 2. Are they going to pay for the area? 3. Sensitize the community about the effects of the activity like smell. Godfrey Birungi: Kampala has more cholera more than Busia, do you want us to get Cholera (because of the faecal sludge in the area). Rev Ben Kyangulo: Animals have died and our skin peels offs when we come in contact with this water from River Solo; and when it comes to 6 pm, you may fail to eat food because of the smell that comes from the Tannery. They brought the Tannery from Jinja. It has affected us so much. You cannot wash you bicycle in that river, it will rust immediately. You cannot plant crops along that river they will not grow. The population is high here, we were 300 households by then but now we are over 1000 households. My fear goes to the children. There is a lagoon in Kenya that has been a cause of many people, they have been drowning. Therefore, with that I appeal to you to take the faecal sludge/sewer system away from here. Head Teacher Elim Namawumbi Primary School; Have you come here to ask us whether we agree or not? What is the distance of the faecal sludge from the people? Robert Mubiisi: This is one of the most populated areas in Busia and there are other areas with less population and with more permanent streams that can be used for this purpose, why can't you explore those other areas? How can you bring the sewer system near the school, it is very dangerous to the children. Children can drown in the lagoon as by their nature they are very inquisitive they can easily play near the lagoon and they drown who will be responsible for that. Rev Ben: The Alternative site is Syumutumba. The area is not populated and there is a stream that pours in river Solo. Mr. Idi Abubakar (LCIII Chairperson). 1. All this land around here (Referring to area around the faecal sludge area) is sliced into plots and they belong to people. This place is highly populated, so it would not be a good site for the faecal sludge. There are very small plots of land in that so called "large undeveloped piece of land" 2. The distance from town here is too short and that project will hinder development of the project. 3. The value of land will go down and the people will move away. 4. The government has a poor compensation policy, i.e.		

No.	Item/ Description	Action	Date
	it pays little money or no compensation at all. The projects should always consult the different stakeholders.		
5	The consultants answered the questions that were asked by the community and referred others to another for a.		
6.	. Closing Remarks The meeting ended unceremoniously as the community did not at all welcome the project in their area. The community members refused to sign the attendance form in fear that their signing on that attendance sheet may mean that they accepted the project in the area. It was agreed that the consultancy team pay a visit to the alternative site proposed by the community (the site was visited)		

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH MEN OF OSIPIRI, TIIRI, OKAME AND OMANYE VILLAGES OBUYETI PARISH, BUTEBA SUB COUNTY, BUSIA DISTRICT AT THE SOLID WASTE SITE ON THE 17TH JUNE 2015 AT 11.20 AM

Agenda

1. Introduction
2. and Presentation from the Consultant
3. Opinions, Issues and concerns
4. Mitigation
5. Cooperate social responsibility
6. Closure

VENUE: Proposed Site for Solid Waste.

TIME: 11.20 AM

ATTENDEES

Find the attendance list attached

Table 40: Minutes of the meeting held at Buteba Sub County, Busia District.

Min No.	Item/ Description	Action by	Date
1.	**Introductions.** All the participants and the consultancy team introduced themselves.	**All participants**	
2.	**Presentation by the Sociologists.** The Sociologist welcomed the men participants for the meeting and informed the residents that, there is an upcoming water supply project that is going to be implemented by the Ministry of water and environment with financials support from the World Bank. She further informed them that the first phase was conducted by the design engineers who identified suitable sites for the intake, the treatment plant and the water reservoir, the faecal site and solid waste management. In the second phase, two things are going to be done namely; developing the Resettlement Action Plan (RAP) and the Environmental and Social Impact Assessment Report (ESIA). She informed them that, as a sociologist, she is the one concerned with all the social issues related to the project She further informed them that, this water project as mentioned earlier has different aspects which include taking piped water to Busia Municipality from Majanji from Lake Victoria, have a faecal sludge, working on drainage of the municipality and solid waste. She told them that the Municipal Could had already secure the solid waste management site in	**Esther Kavuma**	

Min No.	Item/ Description	Action by	Date
	their area (the community were aware of site).She further informed them that at this particular site the factory /structure is going to be constructed where garbage will be sorted and one of the things to be got from it will be manure and the Busia community will be able access it through buying it and being used to increase agricultural yields. The Sociologist further informed the participants that, the main aim for this meeting is to consult them about their perceived social and environmental issues, what they think can be done to mitigate those concerns and based on their opinions to develop the ESIA report for the project. Being the community at the solid waste site, she encouraged them give the information/issues that they had which they think should be integrated into the project implementation.		
3.	**Opinions, Issues and Concerns.** Through the meeting it was established that the community mainly engages in agriculture and grow crops like maize, cassava, ground nuts. The community were aware that the land belonged to the Municipality but were not happy about the place being a solid waste management site. Earlier the Council had dumped waste in that place and the experience was not good. There was uncontrollable smell and one time they buried someone in a shallow pit where even the legs were left out. Although the community were happy about the project concerning creating employment opportunities for the community especially for the women, the community had other issues which were presented in form of questions, and below are the questions: 1. Will the liquid discharge from solid waste be channelled into their homes and gardens or channelled in the designated area? 2. Won't the garbage affect us especially the children? We may get cholera, malaria, how shall we be helped? 3. What shall we do, the smell shall be too much and will affect us and may not be even to eat our food? 4. We have a school just at the fence of this site (Nursery to Primary Five), our children will be affected. What are we going to do, shall we have to shift the school? 5. We have restaurants in this township, because of the smell from the solid waste we might lose our business. 6. Shall we be able to get water because we are also water stressed like in the Municipal Council? 7. When will the project start? If it takes a longer time to start, more people will settle around the site. The Municipality has to put its infrastructure like the solid waste site within its boundaries, so that they do not affect other areas especially projects that affect other areas negatively.		

Min No.	Item/ Description	Action by	Date
4.	**Mitigation:** The community recommended that there is need to come up with a strategy to stop the smell.		
5.	**Cooperate social responsibility:** Through the discussion the participants requested that; • The community should be offered employment opportunities in the plant. • The project should open the road from should be Okame village to Buteba sub county headquarters. • The water should be extended to Buteba Sub County. • Extending electricity to this community. • Repairing of the borehole which is not currently functioning.		
6.	**Closure.** The consultant thanked the participants who attended the discussion and requested them to be positive towards the project.	**Consultancy Term Leader**	

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 17/06/2015 Time 9:07AM Town BUSIA Municipal ①

Sub County Buteba Parish Obujeti Village Osiira, Tiira, Okame (Interviewing Batch)

FGD MEN (Solid waste site)

No	Name	Designation	E-Mail	Phone No.	Signature
	S. J. Matovu	Consultant	Savimaxcompany Ltd. Kampala	0712 654651	
	RICHARD ONYANGO			0783044651	
	EKATAM JAMES			0773208518	
	OMUKABA FRANCIS				
	SANDE PATRICK				
	Etyang Matias				
	SAMANYA DAVID				
	Wamboga Sanhalo				
	Okopio Samuel			0776184926	
	PAMDEN AUGUSTINE				
	FRED OPERENG			0783577720	
	ONGANGO MICHAEL			0729009841	
	BIMIRE JOHN	ABOCHET	OMANYE	0774181523	
	OBARA STPHNE	ABOCHET	OKAME	0772553862	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH MR. EBU MIKE COUNTY CHIEF LUMINO SUB COUNTY ON THE 16TH JUNE 2015

AGENDA

1. Presentation by the project manager
2. Presentation from the sociologist
3. Reaction and Feedback from the Sub County Chief
4. Closing remarks

VENUE: Lumino Sub county Headquarters.

TIME: 4.11 PM.

ATTENDEES:

Attendance list attached

Table 41: Meeting with stakeholders in Lumino Sub County, Busia District.

Min. No	Item / Description	Action By	Date
1.	**Presentation by the Project Manager:** Mr. Matagi Samuel introduced himself and team. He further gave the background of the project. He informed the sub county chief that , the Ministry of Water and Environment had secured a loan from the World Bank to implement a water management and development project in eight towns in Uganda including Busia, Ngora-Kumi, Pallisa, Rukungiri, Katwe- Kabatoro and Koboko Town council. He informed him that, the project shall be implemented in phases by different consultants. The first phase of the project was conducted by design Engineers who developed the technical designs and the general lay out. Within this phase, the consultants identified the suitable locations for the intake, the treatment plant, the reservoir, solid waste site and the faecal sludge plant and that, these designs were produced and also shared with the relevant town councils and district authorities and in this case it had been shared with Busia district and Busia Municipality Council. He noted that, the second phase of project implementation entails conducting detailed Environment and Social Impact Assessment activities related to the project and developing a Resettlement Action Plan which had be given to Savimaxx and Survesis .He further informed him that this particular team are handling the detailed Environment and Social Impact Assessment and in a few days the RAP team would be in the project area. The Team leader called on the Sociologist to a have a discussion with the sub County chief.	**Mr. Samuel Vivian Matagi**	

Min. No	Item / Description	Action By	Date
2.	**Presentation by the Sociologist**. The Sociologist informed the sub County Chief that the pipeline will mainly follow the road reserve and it is likely that not so many will be affected. She informed him that distribution water points will be put with in the rural growth centres. From that background She requested that sub county chief to give his opinion, fears and concerns about the project.	**Esther Kavuma**	
3.	**Reaction and Feedback from the Sub County Chief** **Opinion:** He appreciated and welcomed the project since it will help more people to have access to safe and clean water. The chief reported that they have a few boreholes which are not salty, and the demand for water is too high in the sub county. Out of the 37 villages in the sub county only 15 boreholes are functional and are being shared among all these villages. The water vendors' literary take over the boreholes and it is hard for other users to access water from the boreholes especially in town. The chief informed the team that the council had passed a resolution to sink a borehole for every village but there is lack of funds to implement the resolution. **Issues/ Concern** *1.* The chief informed the meeting that his main concern would have been compensation but since the road reserve was going to be used, the community has to be sensitized about that; what constitutes off a road reserve etc. *2.* The chief also had issues on how affordable the water will be to the community. He requested that the water should be priced in relation what the communities can afford. *3.* He further showed concern over the burst of the water pipes and the need to train local people to maintain them	**Sub County Chief**	
4	**Closing Remarks** In his closing remarks, Mr. Matagi thanked the sub county chief for his time and contributions he made which he said were very important in informing the development of the ESIA report especially that there is limited likeness of having compensation issues since the road reserve will be used by the project. The chief also thanked the team for coming and for their efforts they have made to consult the people on issues regarding the project.	**Mr. Samuel Vivian Matagi**	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH KAYIIRA MAHMOOD, SUB COUNTY CHIEF DABANI SUB COUNTY WEDNESDAY 17TH JUNE 2015 FOR A RESERVOIR AT DABANI SUB COUNTY HEADQUARTERS.

AGENDA

1. **Introduction**
2. **Presentation by the project Manager.**
3. **Reactions from the Sub county Chief.**
4. **Closing remarks**

VENUE: Dabani Sub County Headquarters

TIME: 3.00 PM.

ATTENDEES:

Attendance list attached

Table 42: Meeting with stakeholders in Dabani Sub County, Busia District.

Min. No	Item/ Description	Action by	Date
1.	Presentation by the Project Manager: In his presentation, Mr. Samuel Matagi the Team leader for the Consultancy Team informed the Sub county Chief that, the Ministry of Water and Environment had secured a loan from the World Bank to implement a water management and development project in eight towns in Uganda including Busia, Ngora-Kumi, Pallisa, Rukungiri, Katwe- Kabatoro and Koboko Town council. He informed him that, the project shall be implemented in phases by different consultants. The first phase of the project was conducted by design Engineers who developed the technical designs and the general lay out of the project. Within this phase he elaborated that the consultant identified the suitable locations for the intake, the treatment plant, the reservoirs, solid waste management site and the faecal sludge site and that, these designs were produced and also shared with the relevant Town Councils and District authorities, of which Busia Municipal Council and District has been benefited and the information has been shared. He noted that, the second phase of project implementation entails conducting detailed Environment and Social Impact Assessment activities related to the project and developing a Resettlement Action Plan which were going to be carried out by consultants from Survessis and Savimaxx limited who were	Mr. Samuel Vivian Matagi	

Min. No	Item/ Description	Action by	Date
	contracted by the MWE to undertake this assignment. He informed him that a site for a reservoir had been identified at the Dabani sub county headquarters and from the information from the District and Municipality an acre has to be offered for this government project.		
2.	Reaction from the Sub County Chief The Chief appreciated the project as it would make more people access clean and safe water. The Sub County chief informed the Consultancy team that he had got some information from the Municipality about the land take for the reservoir but the request was made orally not formally. However before the oral request from Busia Municipality that same piece of land had been offered to Child fund by the sub county Council for the construction of the Resource centre. He further informed the team that he made an initiative to go to the Municipality Council to request them make a formal request for the land, but the Municipal Council wrote to the District requesting for the land and the District has never formally communicated to the Sub County. However to some of the Sub County staff, this was not taken well as it was perceived as the Municipal Council project as the municipality is the target beneficiary. Tub county officials feel left out as they were not consulted on sub County land take reserved for the reservoir and its eventual take by the project. He advised the team to talk to the LCIII chairperson and hear him out on the project.	Sub County Chief	
3	In his closing remarks, the team leader thanked the sub county chief for his time and contributions he made which he said were very important in informing the development of the ESIA report especially regarding the existing communication gap between the local government levels.	Mr. Samuel Vivian Matagi	

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 17/6/2015 Time Town Busia Water Supply

Sub County Dabani Parish Dabani Village Dabani

No	Name	Designation	E-Mail	Phone No.	Signature
01	Kayira Muhamud	Sec Chief Dabani	kayiramu@gmail.com	0774 439010	
02	Esther N. Kavuma	Sociologist			
03	S. U. Matazi	Env. [illegible]	Savimaxcompany limited@gmail.com	077-6[illegible]	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH THE Mr. BWIRE BENSON LCIII chairperson, Majanji Sub County TUESDAY 16th JUNE 2015 at 2 PM

AGENDA:

1. **Presentation by the MWE official**
2. **Presentation by the Consultant**
3. **Question and answer session**
4. **Closing remarks**

VENUE: Majanji Sub County Offices

TIME: 4.00 PM.

ATTENDEES:

Attendance list attached

Table 43: Minutes of meeting with stakeholders in Majanji Sub County.

Min. No.	Item/Description	Action by	Date
1	Presentation by the Environmentalist/MWE 1. Introduction and Presentation by the Environmentalist / MWE. In her presentation, Teddy informed the LCIII Chairperson that, the Ministry of Water and Environment had secured a loan from the World Bank to implement a water management and development project in eight towns in Uganda including Busia, Ngora-Kumi, Pallisa, Rukungiri, Katwe- Kabatoro and Koboko Town council. She informed him that, the project shall be implemented in phases by different consultants. The first phase of the project was conducted by design engineers who developed the technical designs and the general lay out. Within this phase, the consultants identified the suitable locations for the intake, the treatment plant, the reservoir and the sewage plant and that, these designs were produced and also shared with the relevant town council and district authorities in that are concerned of which even Busia has been shared with this information. She noted that, the second phase of project implementation entails conducting detailed Environment and Social Impact Assessment activities related to the project and developing a Resettlement Action Plan. At this point, he introduced Mr. Matagi Samuel Vivian, the project manager and environmentalist and Esther Kavuma, the sociologist as consultants from Survessis and Savimaxx limited who were contracted by the MWE to undertake this assignment.	MWE Official	

2	Presentation by the Project Manager. The ESIA and RAP Consultant Representative Mr. Samuel Vivian Matagi informed the chairman that consultants from Survesis and Savimaxx were given a contract by the MWE to conduct an environmental and Social Impact assessment of key activities in the project. He explained that the earlier pre-feasibility and feasibility and detailed engineering plans had been done by Fichtner and M & E Associates. He further mentioned that there are eight towns in this assignment i.e. Busia, Nyero, Ngora, Kumi, Pallisa in the East; Rukungiri and Katwe -Kabatoro in the West and Koboko in West Nile. He further informed the chairman that, in addition to the environmentalist and the sociologist, there was another big team of ecologists including one for butterflies, mammals, plants and frogs he had travelled with to assess the impact of the project regarding those different ecological systems in the project area. At this point he called in the Sociologist to come and interview the LCIII Chairman.	Samuel Vivian Matagi	
3	Question and Answer Session/Discussion The Sociologists informed the chairman that the sub county is very key in the project and therefore his views are very important for a successful implementation of the project. She requested him to provide all his opinions and concerns so that they can be integrated into the ESIA report. The interview went as follows; Qn. What is your opinion about the proposed project? Response: For us as the sub county we need safe and clean water. Currently all the water source that we have are salty. All the borehole that we have and all those that have been sunk are salty.it is very hard to use the lake water , it is too dirty and has a high prevalence of diseases like cholera, bilharzia etc. We in Majanji are the source of this water and therefore before it goes to Busia we need to have our share. This is the hunters share. Before this water goes to Busia we should get our share. However we need to sensitize people about the sanitation and hygiene and also how to protect the environment like not to cultivate along the shores so that water remains clean. Qn. Is there any negative impact that you envisage to arise from the project? Response: some people have gardens in this piece of land that is going to be development I request that their crops are compensated. The good thing however is that, people are very willing to surrender their land to project as long as they are compensated. Qn. What do you propose as the appropriate mitigation measures for the identified negative impacts? Response: We have already started engaging the community members and we are continuing to sensitize them about the project. The project should also start engaging the people early enough together with the local government officials concerned	Esther Nassonko Kavuma	

	so that, people get prepared to receive the project in their respective communities because in a way, this will help to reduce on the compensation. There is need to sensitize the community not to steal the construction materials.		
4	Closing Remarks In his closing remarks, the team leader thanked the chairman for his time and contributions he made which he said were very important in informing the development of the ESIA report. The chairman also the team for coming and for their efforts they have made to consult the people on issues regarding the project.		

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH BUSIA DISTRICT OFFICIALS ON TUESDAY 16TH JUNE 2015 AT 9.15 AM

AGENDA

1. **Opening prayer**
2. **Self-introduction**
3. **Presentation by Environmentalist from the Ministry of Water and Environment**
4. **Presentation by the Project Manager**
5. **Reactions**
6. **Discussion**
7. **Closing remarks**

VENUE: **Busia District Headquarters.**

TIME: **9.15 am.**

ATTENDEES:

Attendance list attached.

Table 44: Minutes of meeting with stakeholders at Busia District Headquarters.

Min. No	Item Description	Action by	Date
1.	Presentation by the Environmentalist / MWE. The Ministry of Water and Environment Official Ms Teddy Harold introduced the team of consultants from Survesis and savimaxx limited who had been contracted by the MWE to conduct the ESIA on the proposed water project. She further informed the district officials that, the first phase of project implementation had been completed and that, the technical designs had already been produced and shared with both the Municipal council and the district. At this point she asked the lead EIA Consultant to make his presentation to the district staff.	MWE Official	
2.	Presentation by the Project Manager. Mr. Matagi Samuel the ESIA and RAP Consultant representative informed the District officials that the project is to expand the water distribution in the district. He further informed them that Survesis and Savimaxx were given a contract by the MWE to conduct an environmental and Social Impact assessment of key activities in the project and the RAP. He mentioned that, his team had conducted a reconnaissance in which they visited all the proposed sites for the project and that, this was now a follow up visit in which actual data collection is going to be conducted. Apart from consultations with different stake holders,	Samuel Vivian Matagi	

Min. No	Item Description	Action by	Date
	a team of ecologists and a hydrologist were already on ground doing ecological surveys on plants, frogs, mammals, and butterflies and also doing water quality analysis. He informed them that, the ESIA is aimed at looking at the different impacts particularly those that are likely to arise from project activities and based on that, to design appropriate mitigation mechanisms. He further said that the government of Uganda had identified Lake Victoria as the source of safe water that can be used for the project. At this point, he called in the sociologist to have a discussion with the District Officials.		
3.	Reactions from the Deputy The Deputy Chief administrative officer thanked and welcomed the team for coming into the district and for their efforts to come and talk to the technical team of the district. He informed the team that this is not the first meeting a team on the project but has worked with other teams before. And as a result there are many issues that are attached to the project. *1.* Apart from the urban areas that it is targeting, it also targets the rural areas, and there some aspects that people in the rural areas do not easily grasp like issues of compensation, and payment for the water services. 2. There was a leader in one of the sub counties who had resisted the giveaway of the sub county land to the project (Dabani Sub County). But we worked on this and he agreed because nobody can resist a government project like that. The cause of this was for the selfish reasons, earning from the project through the sale of the land to the municipality and also thought that the community / people thought that the project was entirely for the Municipality. *3.* Other people do not know how they are going to benefit from the project.	DCAO	
4.	Question and Answer Session. Esther the Sociologist thanked the staff for attendance, their time and their contribution to the project so far. She indicated that, within the scope of the ESIA, they are going to widely consult all the different stake holders at all levels and that, the views of the district technical staff are quite critical given their level of understating of the issues related to the environment and the social aspects of people in the entire district. At this point, she asked the officials to give her a few minutes of their time to give their views and opinions on the key issues related to the project. The discussion went as follows; What are your opinions regarding the project? CDO: The communities are used to free water but with the project water is not going to be free. This process is going to be new to the people, and their therefore changing their attitude might not be easy. For example when a bore is being sunk the community contribution was only 200,000/ out of the 15 million	Esther Nassonko Kavuma CDO	

Min. No	Item Description	Action by	Date
	that cost a borehole for only the purpose of creating a sense of ownership and maintaining the facility. But here the project demands for water payment every month. This was anticipated to be very hard in the rural areas. This will call for a lot of sensitization regarding the road reserve, they have heard about it but do not understand what it is and its dimensions. Environmental Officer: The likely issues envisaged in the project are quite many and include effect of the system to the lake, land acquisition and others. Qn. Do you have any specific concerns / fears or issues that you think should be given ample considerations? CDO: There is need for people to know how much they will be getting or how the compensation process will be like how much the garden of cassava will cost and therefore the compensation values, structures, and how a person who built in the reserve will be handled. How will the people benefit from the project especially those in the rural areas? Environmental Officer: the Intake may have issues with the navigation. This is because the project is long term. We may be concerned with the transportation and fishing which may affect the intake. Related to this the officer stressed the need to push the intake pipes further from the fishing village because it might be destroyed by the fisher men. It may also be difficult to acquire the 4 acres needed for the water treatment plant in Majanji because this is an urban area, it may be hard to get all these four acres all in one place. And four acres means cutting down trees and all the other organisms in this area therefore destroying the environment. Will the tanks be tanks be washed as a way of maintaining the tanks and preventing diseases to the consumers. How will the safety of the tanks be secured especially regarding poisoning the people who use the water.	Env. Officer CDO Env. Officer	
5.	Closing Remarks In his closing remarks, Mr. Samuel Vivian Matagi, the Consultant answered some of the questions that were paused towards him especially those regarding the compensation, road reserve, sensitization issues, issues of security to the treatment plant, protection of catchment area and the technology to be used on the project. On compensation, a RAP study was underway and it would come with most of the solutions of compensation, where a reserve road starts and ends and how far people should build from the road reserve. It was noted that land compensation rates will come from the districts rates. He further called on the officials to embrace and coordinate the project and offer all the necessary support to the project. The Deputy CAO was very grateful to the team and pledged all their support.	Samuel Vivian Matagi Deputy	

Min. No	Item Description	Action by	Date
		CAO	

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 16/6/2015 Time 10. am Town BUSIA DISTRICT - BUSIA Water Supply

Sub County BUSIA DISTRICT OFFICIALS Parish Village

No	Name	Designation	E-Mail	Phone No.	Signature
01	Adeja Vincent	ACAO	vincentadeja@yahoo.com	0772592169	
02	OBINTO DAVID OTAKA	DWO	dayollo@yahoo.com	0772-693197	
03	S. V. Mata	Project manager	savimaxx Co pay limited @ gmail.com	0712 6 62651	
04	Teddy Cubaydeka	ES. O MUSE/BSWS	chandlara@yahoo.com	0789773257	
05	Esther N. Kavuma	Sociologist	sarakavuma@gmail.com	0772426824	
06	Lukyula Ernest	DCDO	ernestwafula@gmail	0772500776	
07	Erienyu Johnson	Environment officer	erienyue@gmail.com	0772890721	
8	~~MUSA AUSI~~			0755 3922~~4~~	
~~08~~	~~S.~~				

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES OF MEETING HELD WITH THE BUSIA MUNICIPAL COUNCIL OFFICIALS AT THE MUNICIPAL COUNCIL OFFICES ON MONDAY 15th JUNE 2015 AT 4.00 PM.

AGENDA:

1. **Opening the meeting by the Assistant Town Clerk**
2. **Self-Introduction**
3. **Project Background by MWE officer**
4. **Presentation by the Project Manager**
5. **Interview of Municipal Staff**
6. **Closing remarks**

VENUE: Busia Municipal Council Offices

TIME: 4.00 PM.

ATTENDEES:

Attendance list attached

Table 45: Minutes of stakeholder meeting with Municipal Council Officials.

Min. No.	Item/Description	Action by	Date
1	Presentation by the Environmentalist/MWE In her presentation, the Ministry of Water and Environment official introduced the Consultant and gave a brief of what the Consultant was going to do. She informed the Municipal Staff that, the project shall be implemented in phases by different Consultants. Design Engineers who developed the technical designs conducted the first phase of the project and the general lay out. Within this phase, the Consultants identified the suitable locations for the intake, the treatment plant, the reservoir and the sewage plant and these designs were produced and also shared with the relevant town council and district authorities in the District. This she informed the staff that the second phase of project implementation entails conducting detailed Environment and Social Impact Assessment activities related to the project and developing a Resettlement Action Plan and she introduced the Consultant responsible for a detailed EIA and RAP.	MWE Official	
2	Presentation by the Project Manager. The ESIA and RAP Consultant Representative Mr. Samuel Vivian Matagi informed the Municipal Staff that the project is to	Samuel Vivian Matagi	

Min. No.	Item/Description	Action by	Date
	expand the water distribution in the municipality and the district. He explained that the earlier pre-feasibility and feasibility and detailed engineering plans had been done by Fichtner and M & E Associates. He further mentioned that there are eight towns in this assignment i.e. Busia, Nyero, Ngora, Kumi, Pallisa in the East; Rukungiri and Katwe -Kabatoro in the West and Koboko in West Nile. He further clarified that a detailed ESIA is going to be done regarding the environment and social issues on the intake, reservoir, water treatment plant, distribution networks, solid waste and faecal sludge treatment plant. On this component there are a number of specialist; ecologists of snakes, birds, butterfly, mammals etc. At this point he called in the Sociologist to come and interview the Assistant Town Clerk and Municipal Council Staff.		
3	Question and Answer Session/Discussion Esther Nassonko Kavuma the Sociologist thanked the Municipal Staff for their attendance and informed them that, in conducting an environmental and social impact assessment, wide consultations must be undertaken with all the key stakeholders in the project and that their views are very important in the successful implementation of the project. She therefore asked them to provide all they opinion and concerns so that, they can be integrated into the ESIA report. The interview went as follows: - Qn. What is your opinion about the proposed project? Water Officer: It is a good project. Community Development Officer (CDO): It is good project because currently there are boreholes, which are few and bring little water and a number of them have broken down. the project will benefit more people and will run throughout the year. It seems the cost of water will gradually reduce in terms of cost per 20 litre jerry can. Assistant Town Clerk: Currently only 30% of the municipal population access water and the project will increase it to 70%. Environmental Officer: Communities currently draw water from unsafe sources like shadouffs, wells, boreholes, (Boreholes and shadouffs have become unsafe because of the increased population they are near pit latrines that contaminate the underground water) but the project will reduce the water related diseases. It will also serve a number of institutions like hospitals, schools and households. It will offer employment especially the casual work to the locals and most likely	Esther Nassonko Kavuma WO CDO ATC EO	

Min. No.	Item/Description	Action by	Date
	technical/skilled work is for some other people or the Contractor comes with them. the project will offer business opportunities like food vending to the local community members. I have fears especially about compensation issues. The people have been told that the pipes where the pipes will be sunk will be paid. But you are saying the pipes will be sunk in the in the road reserve which will call for no compensation. The people need to be sensitized and made aware of the road reserve and their dimensions so that the project is not resisted. The project may increase the HIV prevalence rate. This is because there may be influx of people and engage in unprotected sex. Therefore this will call for the sensitization of communities about HIV/AIDS. It is also going to bring about the sewage system which has not been in town. This will call for sensitization about these services. Busia Municipality Private Water Operator: There is need to protect the water sources so that they are not damaged or the source polluted. Pipes should go further into the water so that they can be protected. There is need to sensitize communities where the pipe network will pass through. The sub counties include Masafu, Lumino, Buhehe, Majanji, Dabani etc. so that the pipes are protected and are safe in these communities. Environmental Officer: Sometimes the lake water reduces/ goes down some 5 metres (like recently it went down 5 metre), which may affect the water intake of the project, this therefore calls for protection of the water catchment area. I envisage a threat of water contamination from cutting the pipes. Also there is need to demarcate the road reserve from the source up to the Municipality. Assistant Town Clerk: How will the new system be used with the old system? How are they going to co-exist, or the old one will be done away with? Water Officer: How will the catchment area be contained and maintained since the catchment are goes up to Kenya where we do not have control. The reservoir would go on the Sub county land, which will not be compensated. .I understand the road from Majanji to Busia is going to be worked on, I request that there is coordination with the road Contractors so that the pipes for the project are not cut. Assistant Town Clerk: The government did not take on the local	Private Water Operator EO ATC WO ATC Busia Municipal Staff	

Min. No.	Item/Description	Action by	Date
	authorities. Like the Dabani the LIII Chairperson wrote a letter refusing the project to take the land that had been offered to the project to put up a reservoir. This therefore calls for the project to involve the local leaders right from the start. There is need for coordination of all projects that is the water, roads, electricity, optical fibre etc. The issue of two water systems i.e. the old and new system. Will the old one run concurrently with the new one? Who will continue to pay for the borehole and old system especially regarding the maintenance of these water sources? This will be made worse because the private operator contract is expiring in February 2017 when the National Water and Sewerage Corporation will take over. Shall we continue with the boreholes and shadouffs? Qn. Other concerns? What are we going to do to stop water stress in the future because even after establishing this new system we will only have 70% of the municipality covered?		
4	**Closing Remarks** In his closing remarks, Mr. Samuel Vivian Matagi, the Consultant answered some of the questions that were paused towards him especially those regarding the compensation, road reserve, protection of catchment area. On compensation, a RAP study was underway and it would come with most of the solutions of compensation, where a reserve road starts and ends and how far people should build from the road reserve. It was noted that land compensation rates will come from the districts rates. However it was noted these are low because when people under declare land valves in order to payless taxes. It is these low amounts found at the district that the Chief Government Valuer uses. He then thanked the Municipal staff for attending this meeting at such a short notice and their opinions and mitigation measures will be used to improve the water system in this area and project as a whole.		

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 15/06/2015 Time 03:30 PM Town BUSIA Water supply

Sub County BUSIA MUNICIPALITY Parish Village

No	Name	Designation	E-Mail	Phone No.	Signature
1.	Samuel Yiga Matoji	Project Manager	Savimaxx@yahoo.com	0772 661065	
2	Esther N. Kawuma	Sociologist	Senkawuma@gmail.com	0772426534	
3	Ayabazayo Audrey	Ecologist	ayabazayoaudrey15@gmail.com	0776765814	
7.	Nabwire Harriet Mal	Manager Jokia	harrietnabwire@gmail.com	0782485206	
6		E.S.H			
5	Taaka Kevina	CDO	taaka.kevina@yahoo.com	0782522882	
6	Fetty Ouonyakire	E.S.O Mass/Kenya	shanclara@yahoo.com	0789773287	
7	Moya Masiga Pascal	ASE TC	Masigampe@yahoo.com	0783896175 0757575515	
8	Bwire Silvester	Water Office	Silvestabwire@yahoo.com	[illegible]	
9	Namajja Teopista	Env. O	teonamajja@gmail.com	0772600208	
10.	Joshua Maborga	Ecologist	jjmaborga@gmail.com	0714387627	
11	Alem Ogarmai	Water Engineer	aogarmai@gmail.com	0713325260	
12	LUKIEMBA SIMON	Botanist	lukiembasimon@gmail.com	0774378871	
13	Kintu James	Ecologist	jkintuelalu@gmail.com	0704655359	

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR BUSIA WATER SUPPLY PROJECT

MINUTES FOR THE FGD WITH WOMEN OF OSIPIRI, TIIRI, OKAME AND OMANYE VILLAGES OBUYETI PARISH, BUTEBA SUB COUNTY, BUSIA DISTRICT AT THE SOLID WASTE SITE ON THE 17TH JUNE 2015

AGENDA:

1. **Introduction**
2. **Presentation from the Consultant**
3. **Question and Response from the Community**
4. **Closure**

LOCATION: Proposed SITE for solid waste

ATTENDANCE:

Find attached list attached

Table 46: Minutes of stakeholder's meeting at Buteba Sub County.

Min. No.	Item / Description	Action by	Date
1.	Introductions. All the participants and the consultancy team introduced themselves.	All participants	
2.	Presentations: The Sociologist welcomed the men participants for the meeting and informed the residents that, there is an upcoming water supply project that is going to be implemented by the Ministry of water and environment with financials support from the World Bank. She further informed them that the first phase was conducted by the design engineers who identified suitable sites for the intake, the treatment plant and the water reservoir, the faecal site and solid waste management. In the second phase, two things are going to be done namely; developing the Resettlement Action Plan (RAP) and the Environmental and Social Impact Assessment Report (ESIA). She informed them that, as a sociologist, she is the one concerned with all the social issues related to the project She further informed them that, this water project as mentioned earlier has different aspects which include taking piped water to Busia Municipality from Majanji from Lake Victoria, have a faecal sludge, working on drainage of the municipality and solid waste. She told them that the Municipal Could had already secure the solid waste management site in their area (the community were aware		

Min. No.	Item / Description	Action by	Date
	of site).She further informed them that at this particular site the factory /structure is going to be constructed where garbage will be sorted and one of the things to be got from it will be manure and the Busia community will be able access it through buying it and being used to increase agricultural yields. The Sociologist further informed the participants that, the main aim for this meeting is to consult them about their perceived social and environmental issues, what they think can be done to mitigate those concerns and based on their opinions to develop the ESIA report for the project. Being the community at the solid waste site, she encouraged them give the information/issues that they had which they think should be integrated into the project implementation.		
3.	Issues and concerns: Through the meeting it was established that the community engages mainly engages in agriculture and grow crops like maize, cassava, ground nuts. The community were aware that the land belonged to the Municipality but were not happy about the place being a solid waste management site. Earlier the Council had dumped waste in that place and the experience was not good. There was uncontrollable smell and one time they buried someone in a shallow pit where even the legs were left out. Although the community were happy about the project concerning creating employment opportunities for the community especially for the women, the community had other issues which were presented in form of questions, and below are the questions: 1. Won't the garbage affect us especially the children? We may get cholera, malaria, how shall we be helped? 2. What shall we do, the smell shall be too much and will affect us and may not be even to eat our food? 3. We have a school just at the fence of this site (Nursery to Primary Five), our children will be affected. What are we going to do, shall we have to shift the school? 4. We have restaurants in this township, because of the smell from the solid waste we might lose our business. 5. Shall we be able to get water because we are also water stressed like in the Municipal Council?	All participants	
4.	Mitigation: Need to get a strategy to stop the smell.		
5.	Cooperate Social Responsibility: Through the discussion the participants requested that; • The community should be offered employment opportunities in the plant and during construction phases. • The project should open the road from Okamye village	All participants	

Min. No.	Item / Description	Action by	Date
	to Buteba sub county headquarters. • The water should be extended to Buteba Sub County for the community to benefit.		
5.	Closure: The consultant thanked the participants who attended the discussion and requested them to be positive towards the project.	Team Leader for the Consultancy.	

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 17/06/2015 Time 9.05 Town Busia Water System (Solid waste site)

Sub County Amukura Buteba Parish Obujeti Village Okame, Tira, Osapiri, ~~Ok~~ osapi Villages

No	Name	~~Designation~~ Village	E-Mail	Phone No.	Signature
	APOLOT BEATRICE	TIIRA			
	ASERUA GRACE	OMANYE			
	ALUNGAT ROSE	TIIRA			
	NAIOCHO ROSE	OSAPIR			
	AKONGO MARY	TIIRA			
	NAMU BARBARA	OMANYE			
	AJALA ESTHER	TIIRA			
	NAWIRE ANNET	TIIRA			
	APERIO ANNET	OMANYE			
	NEKESSA MARY	OSAPIR			
	ATIANG MAGRET	OMANYE			
	AKELLO CHRISTINE	OMANYE			
	CLAIRE NELMA	OMANYE			
	AKONGO JANE ROSE	OMANYE	Councillor	0779069979	

ESIA AND RAP FOR EIGHT SMALL TOWNS WATER SUPPLY AND SANITATION SYSTTEMS, MINISTRY OF WATER AND ENVIRONMENT

Date 16/6/2015 Time Town Lumino SC County – Busia Water Supply

Sub County Lumino Parish Lumino Village Lumino

No	Name	Designation	E-Mail	Phone No.	Signature
01	EBU J. MIKE	SIC CHIEF Lumino SC county	ebujohn@gmail	0722325703	
02	Bwire James Nagaf	Lic Off C/P/SIC Lumino	N/A	0782659973	
03	Wanyama charles	LCII C/P Buhehe SIC	N/A	0782584673	
04	Esther N. Kavuma	Social Safeguard		0772426834	
05	S.V. Madaj	Proj. Safeguard Environmentalist	Savimaxcompanyltd @gmail.	0772 654651	

MINUTES FOR INTRODUCTORY MEETING FOR ESIA/RAP AT BUSIA MUNICIPAL OFFICE DURING RECONNAISSANCE VISIT TO BUSIA

Held on 4th March 2015

AGENDA

1. Opening Prayer
2. Introductions
3. Remarks from the Mayor
4. Remarks from MWE/Consultant
5. Discussions
6. Closing remarks
7. Field Visit

Minutes of the Meeting

Agenda	Submissions	Action By
Min. No 1 Opening Prayer	The meeting was chaired by the town clerk and started with an opening prayer.	
Min. No 2 **Introductions**	All members present introduced themselves and their respective designations and role in the project	All members present
Min. No 3 **Remarks from the Mayor**	He once again thanked the MWE for the project given the many water problems that the district is facing and officially welcomed us to the municipality. He informed us that he was aware of the project and as a municipality; they have already started sensitizing the people about the project. He also informed us that the district has already started in engaging with the different land owners to acquire land for the project facilities.	Mugeni Micheal
Min. No 5 **Remarks from the consultant/MWE**	Thanked the officials present for welcoming us to the district. She brief informed the member present about the project and Informed the officials that the MWE was there to introduce the RAP/ESIA consultants. The reason for the ESIA was to determine the impact of the project on the environment and the community. She informed the meeting that issues of compensation in the project area will be addressed by the RAP. The findings of the ESIA and RAP team will be fed into the design phase of the project. She requested the town council to offer support in any way to the consultant in the execution of the project activities. She urged them to be patient as they will keep on receiving more consultants with regards to the project.	Trinah Kyomugisha
Min. No 6 **Discussions**	The officials at the Dabani Sub County informed us that the sub county had not received formal communication	Discussion by all

Agenda	Submissions	Action By
	about the project so intense consultations at all these levels are very necessary. Therefore, there is need for harmony between the sub counties, the district and the municipal council before other project activities commence.	
Closing remarks	The Mayor thanked all for coming for the meeting and he said they look forward to working with the consultants so as to ensure that a sufficient RAP and ESIA are carried out.	Mugeni Micheal
Field Visit	The Officials from MWE, the Mayor, a representative from JOWA ESL and the consultants then proceeded for a field visit to some of the proposed project facilities.	

SURVESIS

ATTENDANCE FOR RECONNAISSANCE VISIT AT DABANI SUB-COUNTY, BUSIA MUNICIPAL COUNCIL AND BUSIA DISTRICT

Name	Designation	Tel. NO
1) Wandera Marion	Valuer - Survesis	0777576330
2) Nabwire Harriet W	Manager Jowa RSL	0782485206
3) Teddy Owoyabika	E.S.O	0759773287
4) MOSES ANGURIA	PROJECT SOCIALIST	0782905159
5) TRINAH KYOMUGISHA	EHS	0782853020
6) Sirimbi Dauson	wesogere area Councillor	0778759004
7) ABUBAKAR IDDI	LCIII Chman	0753657479
8) Mugeni Michael		0701666125
9 WANYAMA S. OUNDO	DIST CHAIRPERSON	0782311655
10. MASINDE FRANCIS WANJALA	SEC HEALTH SERVICE BDLG	0772-87[illegible]
11. Magunga Abdul	Land Surveyor	0701313311
12) Alem Oyanmai	Water engineer	0773323260

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APPENDIX 5: WILDLIFE MANAGEMENT PLAN

1.0 INTRODUCTION

The Busia Water Supply and Sanitation Project particularly the Raw Water Intake and Water Treatment Plant lie within the shores of Lake Victoria. The aquatic and papyrus wetland ecosystem is an ecologically sensitive area that host hippopotamus. The intake and treatment plant are 10km away from River Sio on the Uganda – Kenya border the grazing range of the hippopotamus. The local inhabitants complained of Hippos invading the project area particularly at night looking for food. Therefore, the construction and operation of the intake and the plant is likely to interfere with the feeding range of the hippos, which is classified as endangered by the IUCN Red List.

1.1 Purpose of the WMP

The purpose for this Wildlife Management Plan is to ensure appropriate implementation of mitigation measures proposed in the ESIA for Busia Water Supply and Sanitation Project are adhered to.

Anthropogenic activities involved in construction and operation of water treatment works are likely to have the following key impacts on wildlife in the unprotected wildlife area: -

i. noise pollution causing animals to: -
   - Avoid areas where construction is occurring,
   - Change behaviour as noise interferes with vocalization as well as hearing (including for mating and alarm responses)

ii. light pollution from construction sites
   - interfere with visual stimuli and orientation leading to confusion
   - increase likelihood of mortality for some species which may be attracted to the lights on site,

iii. Increased traffic on roads may lead to road kills.

1.2 This WMP provides: -

- Responsibilities for implementation of the procedure;
- Impact management measures to be implemented;
- Verification and
- Records and reporting requirements.

1.3 The Objective of WMP

Through its Contractor/Operator, MWE as the Developer seeks to ensure that impacts on wildlife in unprotected areas are minimized as far as possible. Thus the overall objective of this WMP is to describe an approach and procedures to be undertaken by the Contractor/Operator with regard to management of problem wildlife animals in encountered during project implementation.

1.4 Scope of WMP

This WMP sets out requirements for management of wildlife during project implementation. The focus of the procedure is primarily mitigation during construction and operation phases of the project.

1.4 Relationship to Other Project Documents

This WMP should be implemented in conjunction with: -

- Contractor's environment & social impact assessment;
- Project overall environment & social impact plan (ESMP) that specified project wide requirements for environmental and social management;
- The ESIA report for this project and
- Resettlement Action Plan (RAP) that covers the framework and procedures to be followed during land acquisition for construction of the project.

1.5 The Uganda Wildlife Act, 1996

This WMP is to be executed in compliance with The Uganda Wildlife Act, 1996. In the Act the Hippopotamus is described as vermin, problem animal, dangerous animal and as well a protected animal.

Part IX, Management of Problem Animals of the Act gives the right to: -

- declare an animal as vermin in section 57;
- the authority to hunt a vermin section 58;
- killing a protected animal in self-defence section 59;
- ownership of a carcass section 60;
- reports of damage by protected animals section 61;
- accidental killing of a protected animal section 62;
- wounded protected animal section 63 and
- wounded dangerous animal section 63.

2.0 WILDLIFE MANAGEMENT PLAN

2.1 Formation of Local Government Wildlife Committee

The intake and water treatment plant in Manjaji Sub county lie outside a wildlife protected zone i.e. National Park, Game Reserve or Community Wildlife Protected Area. Section 12 of the Act calls for the setup of Local Government Wildlife Committees in order to manage wildlife issues like problem animals. The committee shall be formed with the approval of the District Council. Most of the committee members should come from Manjaji Sub county which is on the shores of Lake Victoria which as has a lot of hippos.

2.2 Local Government Wildlife Committee Responsibility

i. A local government council may, on such terms and conditions as it considers necessary, appoint a committee to advise the Uganda Wildlife Authority on the management and utilisation of wildlife within the local jurisdiction;

ii. A committee appointed by a district council under subsection (i) shall submit an annual report to the Uganda Wildlife Authority (UWA) board on its activities and other matters relating to wildlife management in its area;

iii. The committee should report to UWA of any problem animal for management;

iv. The committee should co-ordinate the WMP in conjunction with the with the Contractor/Operator on side and the UWA on the other side.

2.3 The responsibility of the Contractor

i) The Contractor should appoint an Environmentalist/Biodiversity Specialist (E/BS) on the site during project construction. The Contractor's E/BS will closely work with the Developer's Environmental staff/Supervising Engineer to ensure compliance with national and financier's requirements as well as implementation of this WMP.

ii) During construction, the Developer will facilitate an officer from the UWA to be on site and ensure that any problem animals encountered are managed according to requirements of the Uganda Wildlife Act, 1996.

iii) All construction staff should be on the outlook for problem animals on site.

Specific roles of persons to be involved in implementation of this procedure are outlined below.

2.4 Role of the Contractor's Environmentalist/Biodiversity Specialist (E/BS)

The E/BS is required to: -

i) Communicate contents and requirements of this plan to Contractor/Staff;

ii) Sensitise workers to ensure that all are aware of their responsibilities in regard to problem animals;

iii) Inform UWA and the Local Government Wildlife Committee of problem animals encountered on site;

iv) Coordinate inspection and monitoring problem animals with UWA. The E/BS should keep in close contact with UWA;

v) Implement measures recommended by UWA for management of "problem animals" encountered;

vii) Maintain records (monthly logs) related to problem animals during construction.

2.5 Role of Uganda Wildlife Authority

i) Uganda Wildlife Authority should appoint a focal Officer who will co-ordinate with the Developer MWE/Contractor/Operator/Local Wildlife Committee on problem animals;

ii) Uganda Wildlife Authority will provide the Officer with financial, transport logistics, communication equipment, trapping equipment, tranquilisers, fire arms and any protective gear needed to manage problem animals.

iii) Uganda Wildlife Authority will provide the Officer with adequate trained personal to assist the Officer in the management of problem animals.

2.6 The Role of a Wildlife Officer from UWA

A Wildlife Officer seconded to the project by UWA will have the following roles: -

i) Visit the project site before the commencement of the project and get acquitted with the area, landscape, vegetation and terrain;

ii) Interact and interview the local residents and members of the Local Wildlife Committee to get the extent of problem animals in the project area;

iii) Design a rapid response plan to manage problem animals;

iv) Manage problem animals once s/he is called;

vii) Maintain monitoring records of made to the project site;

ix) Write a report for the Developer/Contractor/Operator upon each visit made to the project site.

3.0 WILDLIFE MANAGEMENT PROCEDURE

In the event that genuine problem animals are encountered, the procedures to be adopted are described in the sections below.

3.1 Identification/Detection of a wildlife problem animal

A problem animal is one which is likely to cause damage to property, attack, injure or kill persons and domestic animals.

A wildlife animal that attacks or charges a person/domestic animal is problem animal. Therefore, it is the duty of everybody (staff, local residents, E/BS, Wildlife Committee) in the project area to report the problem animal, before it does damage or causes fatality.

3.2 General rule when a problem animal is encountered

Upon identification of suspected problem animal, the affected person, either Staff and/or local resident must stand still. In case a problem animal charges the person must run for safety. In case of an attack the affected person must defend oneself with any possible means at their disposal. An alarm should be made when it is necessary.

3.3 Reporting a problem animal

Anybody who encounters a problem animal should report it to the Contractor Environmentalist/Biodiversity Specialist, the Local Government Wildlife Committee and UWA.

The hot telephones of the above persons should be available to all local residents and staff. Immediate contact should be made once a problem animal is encountered.

3.4 Managing a problem animal by a UWA Officer or an authorised hunter.

Once a telephone call is made that a problem animal has been encountered, the focal person i.e. a UWA Officer or an authorised hunter should rapidly mobilise and rush to the project scene were the problem has been encountered.

The Officer/Hunter should make a rapid assessment if the problem animal should be either captured and relocated or it should be shoot on site.

4.0 TRAINING

General awareness training will be provided by A UWA Official to all construction crews, local residents and the Operator's Staff. The training will incorporate information on problem animal behaviour, ecology and biology.

This awareness will be maintained through tool-box talks that should be regularly conducted with all stakeholders.

5.0 MONITORING

Monitoring will be done by the Contractor's E/BS, Wildlife Local Government Committee with the principal objective being to provide assurance that: -

- Project construction is compliant with this procedure and
- Evidence is collected to demonstrate that commitments related to problem animal are being effectively met.

5.1 Action Tracking

All non-compliance with this procedure shall be followed up and corrective action taken. The Contractor's E/BS is expected to maintain an actions tracking system as part of problem animal monitoring. Problem animal management action tracking including close out of actions (solutions and preventive actions taken) will be reported quarterly by the Contractor to the Project Developer.

6.0 REPORTING AND RECORD KEEPING

Records in sections below will be kept by indicated personnel.

6.1 Contractor's Environmentalist/Biodiversity Specialist

The Contractor's E/BS will report the following to Contractor Manager and UWA.

- Awareness records on problem animals among workers on a monthly basis;
- Quarterly report summarizing problem animal management activities and
- Action tracking system on a quarterly basis.

6.2 UWA Official

The UWA Wildlife Official will report the following to UWA, the Contractor/Operator and Local Government Wildlife Committee: -

- Reconnaissance survey report at the commencement of the project;
- Periodic results of any inspection made to the project area;
- A detailed report of field activities undertaken once called upon to manage problem animals.

6.3 Local Government Wildlife Committee

According to The Uganda Wildlife Act, 1996, The Local Government Committee is supposed to submit an annual report to the Uganda Wildlife Authority (UWA) board on its activities and other matters relating to wildlife management in its area of jurisdiction.

APPENDIX 6: MAXIMUM PERMISSIBLE LIMITS FOR EFFLUENT DISCHARGE

Maximum permissible limits for effluent discharge (Source: National Environment Regulations for Discharge of Effluents into Water or Land (Uganda Parliament, 1999) and (World Bank Group, 2007). The most stringent of the two standards are recommended for this project

No	Parameter	Unit	Uganda National Environment Regulations for Discharge of Effluents into Water or Land, 1999	World Bank Indicative values for treated sanitary waste water value
1	1,1,1, trichloroethane	mg/l	3	
2	1,1,2.dichloroethyelene	mg/l	0.2	
3	1,1,2 Trichloroethne		1.06	
4	1,2-Dichloroethane	mg/l	0.04	
5	1,3-Dicloropropene	mg/l	0.2	
6	Aluminum	mg/l	0.5	
7	Ammonia Nitrogen	mg/l	10	
8	Arsenic	mg/l	0.2	
9	Barium	mg/l	10	
10	Benzene	mg/l	0.2	
11	BOD5	mg/l	50	30
12	Boron	mg/l	5	
13	Cadmium	mg/l	0.1	
14	Calcium	mg/l	100	
15	Chloride	mg/l	500	
16	Chlorine	mg/l	1	
17	Chromium (total)	mg/l	1	
18	Chromium (VI)	mg/l	0.05	
19	Cirrus-1,2 dichloroethylene	mg/l		
20	Cobalt	mg/l		
21	COD		100	125
22	Clifform Organisms		10000 counts / 100ml	400
23	Color	TCU	300	
24	Copper	mg/l	1	
25	Cyanide	mg/l	0.1	
26	Detergents	mg/l	10	
27	Dichloromethane	mg/l	0.2	
28	Iron	mg/l	10	
29	Lead	mg/l	0.1	
30	Magnesium	mg/l	100	
31	Manganese	mg/l	1	
32	Mercury	mg/l	0.01	
33	Nickel	mg/l	1	

34	Nitrite - N	mg/l	20	
35	Nitrogen total	mg/l	10	10
36	Oil and grease	mg/l	10	10
37	pH		6.0-8.0	6-9
38	Phenols	mg/l	0.2	
39	Phosphate (total)	mg/l	10	2
40	Phosphate (soluble)	mg/l	5	
41	Selenium	mg/l	1	
42	Silver	mg/l	0.5	
43	Sulfate	mg/l	500	
44	Sulfide	mg/l	1	
45	TDS	mg/l	1200	50
46	Temperature	°C	20-35	
47	Tetra Cholera ethylene	mg/l	0.1	
48	Tetrachloromethananc	mg/l	0.02	
49	Tin	mg/l	5	
50	Total Suspended solids	mg/l	100	
51	Tricholoroethylene	mg/l	0.3	
52	Turbidity	NTU	300	
53	Zinc	mg/l	5	

Appendix 7 IFC Wastewater and Ambient Water Quality Guidelines

Table 1.3.1 Indicative Values for Treated Sanitary Sewage Discharges[a]		
Pollutants	**Units**	**Guideline Value**
pH	pH	6 – 9
BOD	mg/l	30
COD	mg/l	125
Total nitrogen	mg/l	10
Total phosphorus	mg/l	2
Oil and grease	mg/l	10
Total suspended solids	mg/l	50
Total coliform bacteria	MPN[b] / 100 ml	400[a]
Notes: [a] Not applicable to centralized, municipal, wastewater treatment systems which are included in EHS Guidelines for Water and Sanitation. [b] MPN = Most Probable Number		