



Republic of Uganda

Ministry of Water and Environment

INTEGRATED WATER MANAGEMENT AND DEVELOPMENT PROJECT

**ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE
PROPOSED LARGE SOLAR POWERED PIPED WATER SUPPLY AND SANITATION
SYSTEM IN NYAKABALE RURAL GROWTH CENTRE, KIRYANDONGO DISTRICT**



ENVIRONMENTAL AND SOCIAL IMPACT STATEMENT

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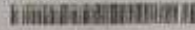
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LIST OF ACRONYMS

| | |
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| AIDS | Acquired Immune Deficiency Syndrome |
| EHS | Environment Health and Safety |
| ESIA | Environmental and Social Impact Assessment |
| ESMP | Environmental and Social Management Plan |
| FDG | Focus Group Discussions |
| GBV | Gender Based Violence |
| GRC | Grievance Redress Committee |
| GRM | Grievance Redress Mechanism |
| HC | Health Centre |
| IUCN | International Union for the Conservation of Nature |
| IWMDP | Integrated Water Management and Development Project |
| KII | Key Informant Interview |
| MBGL | meters below ground level |
| MoGLSD | Ministry of Gender, Labour and Social Development |
| MWE | Ministry of Water and Environment |
| MoH | Ministry of Health |
| NEMA | National Environment Management Authority |
| NUWS | Northern Umbrella of Water and Sanitation |
| NGOs | Non-Government Organization |
| OHS | Occupational Health and Safety |
| OPM | Office of the Prime Minister, Government of Uganda |
| PCR | Physical Cultural Resources |
| PLA | Participatory Learning & Action |
| RAP | Resettlement Action Plan |
| RGC | Rural Growth Centre |
| RWC | Refugee Welfare Council |
| SEA/SH | Sexual Exploitation and Abuse and Sexual Harassment |
| SEP | Stakeholder Engagement Plan |
| ToR | Terms of Reference |
| UNESCO | United Nations Educational, Scientific and Cultural Organization |
| UNHCR | United Nations High Commission for Refugees |
| UTM | Universal Transverse Mercator |
| VECs | Valued Environmental Components |
| WASH | Water, Sanitation and Hygiene |
| WCS | Wildlife Conservation Society |
| UCSAP | Uganda Climate Smart Agricultural Project |

EXECUTIVE SUMMARY

The Ministry of Water and Environment (MWE) together with National Water and Sewerage Corporation (NWSC) are implementing the Integrated Water Management and Development Project (IWMDP) with funding from the World Bank and Government of Uganda. The project aims at improving access to water supply and sanitation services, capacity for integrated water resources management and the operational performance of service providers. Under component 1.2 of the IWMDP, districts that host about 70% of refugees will be supported with provision of piped water supply and sanitation services. The target areas include Yumbe, Arua, Moyo (including Obongi district newly created from Moyo), Adjumani in West Nile, Lamwo in Northern and Kiryandongo in Central Uganda. In Kiryandongo district, there will be 3 large solar powered piped water supply systems and 10 public toilets to serve both refugee and host communities located in 3 Rural Growth Centres (RGCs) namely Nyakabale, Gaspa and Mutunda.

As a requirement in the National Environment Act, 2019 and the World Bank Safeguards policies, MWE contracted JBN Consults and Planners Limited to undertake the Environment and Social Impact Assessment (ESIA) for the proposed water and sanitation system in Nyakabale RGC. The ESIA studies were conducted between November and December 2021. It was aimed at preparing a framework to ensure that environmental and social impacts and risks accruing from the proposed infrastructure are identified and mitigation measures put forward. Basing on the ESIA findings, the proposed IWMDP project triggered several WB-OPs namely – Environmental Assessment (OP4.01), Natural Habitats (OP4.04), Physical Cultural Resources (OP 4.11), Involuntary Resettlement (OP4.12). This report therefore presents the findings of the ESIA exercise undertaken by the Consultant to assess the likely environmental and social impacts of the proposed project in Nyakabale RGC.

By description, the project will be located in Nyakabale RGC (Kiigya and Mboira parishes) in Kigumba Sub County and Mboira Sub County respectively, Kiryandongo District. It will cover a core beneficiary area of 10 villages. By design, it will have 2 water sources (2 boreholes DWD 77383 with 10.0m³/hr yield; and DWD 77382 with 34.0m³/hr yield). It will have other components namely - a submersible pump and pump house, transmission mains, a storage reservoir with 300m³ capacity (cold pressed steel tank elevated on steel tower), distribution network (14,110m in length; 200 start-up domestic connections including yard taps; 35 new public stand points, PSPs), intensification lines and a DOSATRON online proportional chemical dozer. The project will construct gender disaggregated VIP Latrines at Kifuruta primary school and Kigumba Health Centre III as well as waterborne public toilets in Nyakabale and Katamarwa trading centres. The electricity supply at the water sources will comprise of multi crystalline PV solar panels rated at 280pW 24 Volts DC cells with a control unit and other system support structures. There is also hydroelectricity in the Project Area which will be tapped into as backup to power up the electric components of the system. The Northern Umbrella of Water and Sanitation (NUWS) is proposed to operate and manage the water supply system. The project has a Capital Investment Cost Estimate of US\$ 4,141,351,640 (Exclusive VAT and Contingency). The ESIA team assessed the baseline conditions in all the site locations, engaged stakeholders and identified impacts and risks, as well as alternatives to the design and ESMP.

The Physical Environment baseline conditions show that the project area lies in Kamudini catchment in the Upper Nile Water Management Zone. It's generally a plateau land with an average elevation of 1,295 meters above sea level. It has a bi-modal rainfall pattern with an annual long-term average rainfall of 1200mm. The area is divided into three major climatic zones of high, medium and low rainfall. The drainage system consists of extensive wetlands, predominantly Nyama which drains south eastwards towards the Victoria Nile, the largest surface water source in the district.

The soils are mainly sandy loam soils, a number of rocky/stony patches, with observable Laterite rock outcrops while some areas are loose due to modification by agricultural activities hence susceptible to erosion. The hydrogeology is characterised by crystalline bedrocks of the Precambrian era containing water in fractures and fissures. The aquifer is constituted of weathered Precambrian formation (regolith) the potential of which is greatly enhanced by the under laying fractured crystalline bedrock of the same age. The average annual rainfall of the area is approximately 1,400 mm per annum, approximately 10% of which recharges the aquifers annually. The groundwater flows in the same manner as surface water, westerly towards Victoria Nile. The air quality baseline measurements for Particulate matter, NO₂, SO₂, CO and VOCs were within the required limits. Noise levels were above the maximum permissible noise limits for Nyakabale P/S and Kifuruta P/S and this was mainly attributed to the vibrant human activity in the area.

The Biological Environment studies undertaken at the borehole site, reservoir and water supply network corridors (covering about 1.69km² of the project area of influence) indicate that there are 157 plant species distributed among 37 families in the project area. Fourteen (14) of the encountered species were identified as invasive. Out of the 157 plant species encountered, none of the species is listed on the IUCN Red list of Uganda of 2016. There are 13 butterfly species of least concern representing 6 families and 2 dragon fly species of least concern. Nine (9) species of amphibians, listed as species of least concern (1 toad and 8 frogs - all representing 5 families and 5 genera). Six (6) reptile species, listed as species of least concern, were recorded during the survey. Three (3) species were lizards and three (3) species were snakes. Thirty-six (36) species of birds were positively identified, representing 26 families and 33 genera. The bird species were listed as species of least concern except for the Rufous Sparrow *Passer cordofanicus* whose conservation has been assessed as a regional responsibility (R-RR). One mammal species, listed as species of least concern, the Vervet monkey *Chlorocebus pygerythrus* was reported in the project area.

The Socio-Economic baseline conditions indicate that the area Kigumba Sub county in which Nyakabale RGC is located has a total population of 43,940 people (22,197 males; 21,743 females) living in 8,411 households. The area has an average household size of 5.2 which is slightly higher than the country's average household size of 4.7. 75.1% of the population are dependent on subsistence farming as their major occupation. The dominant crops grown include root tubers (cassava, sweet potatoes), cereals (maize, rice, sorghum), tobacco, coffee and plantains, while the animals reared for income majorly include local chicken and livestock (cattle, goats, sheep, piggery). It was noted that water scarcity is rampant and directly linked to incidence and prevalence of water related diseases. Between 2015 – 2021, there were 365,549 reported cases

(OPD) for diseases and illness related to Cough or Cold, Malaria, Diarrhoea, Intestinal worms, Gastrointestinal Disorders, Pneumonia, STIs, GBV related injuries, Typhoid, Stomach Aches, HIV/AIDs, Covid19 (DHO/HMIS2, 2015-2021). However, the burden of water related diseases is likely to reduce due to provision, access and utilization of safe and clean water.

Secondary data from MWE / Water Atlas 2016 showed that access to safe water in Kiryandongo district stands at 71%, with rural access at 77% and urban access at 48%. Within Kigumba SC, there are 284 domestic water points which serve about 47,414 people. By type of technology, 58% of household population are served by deep boreholes, 40% by shallow wells, 2% by protected springs and none by rain water harvest. From a gender perspective, women and children take a heavy burden of full-filling productive roles at household and community level, and this mainly involves collection of water, and other related tasks such as collecting firewood for cooking, washing utensils among other domestic chores. This exposes them to extreme vulnerability.

Further still, in order to obtain timely baseline data, the ESIA team conducted a socioeconomic survey. Findings of the survey indicate that 22.5% of the households (HHs) walk a distance of more than 500 meters; 22.5% move 300-500 meters; 42.7% move 100-300 meters; 12.3% move Less than 100 meters. In terms of time for water collection, 42.3% of the households collect in morning hours of between 7.00am and 10.00am; 29.1% collect between 10.00am-2.00pm; 19.4% between 2.00pm-7.00pm; 9.3% between 5.00am-7.00am. About 40.5% households spend at least 1 hour waiting at a water source point; 44.1% spend less than 30 minutes; 6.2% spend 2 hours and 9.4% spend 30 mins - 1 hour. In many of the health facilities, there is no water within all treatment wards and in waiting areas. This implies a lower status of WHO minimum standards for water, sanitation and hygiene services in health facilities. Much as the World Bank has supported some education facilities with rain water harvesting tanks, in most of the schools there is no reliable source of water, no menstrual health facilities such as private rooms, sanitary pads, disposal pits, etc. Additionally, much as latrine coverage is low, the uptake of water borne toilets and septic tanks will increase upon completion of piped water supply. It's also anticipated that there will be an increase deliberate emptying of faecal sludge into storm drainage and swamps and this will consequently cause environmental and health-related problems. The operation and maintenance of the solar piped water system may invoke local governments and refugee administration units to enforce and/or pass new laws and regulations regarding eligibility of connections, operation and maintenance.

Potential Impacts were identified as well. The positive impacts of the project include -a) improving the living standards and the wellbeing of the residents of Nyakabale RGC through increased provision of safe water within an easy reach of the household and boosting the pipe water supply; b) creation of employment opportunities (both direct and indirect) for local people especially youth and women; c) reduced incidences of diseases; d) reduced domestic violence; e) improved education outcomes; f) improved on-site supply of water in health care facilities (WinHCF); g) benefits to the local economy and transfer of skills and technology among others. The identified negative impacts were categorized into those affecting the physical, biological and human environments. The major impacts included social misdemeanour and conflicts due to influx of immigrant labour, gender-based violence, contraction and spread of COVID 19, occupational health and safety risks and depletion of ground water resources. The identified moderate impacts

included soil erosion, loss of fauna habitat, destruction of vegetation, solid waste generation, reduced traffic safety, loss of land, child labour and destruction of physical cultural resources. While, the minor impacts included land use cover change, noise and vibrations, and air pollution.

The ESIA also conducted an Analysis of Alternatives. The identification, consideration and analysis of alternatives is a very essential component of an ESIA. Different project alternatives were considered with the primary objective of determining the best economic, environmental and social option. The alternatives analysed included the Do-Nothing Option. With the “No Project” alternative, the existing poor water supply and sanitation in the area would continue to exist. The No Project Alternative would avoid the negative impacts aforementioned but also is the least preferred from the socio-economic perspective because the population would not get the much-needed potable water supply and sanitation services. In the long term, the no-project scenario would be detrimental as the majority of the population in Nyakabale RGC would continue using unsafe water, consequently putting them at high risk of contracting and spreading waterborne related diseases. This would also have local, national and regional implications given that the project area is a major refugee and IDP hosting district in the country. The perceived project benefits outweigh the perceived negative impacts. Therefore, the analysis of alternatives focussed on project sites and technology. Different alternative water sources including surface water from the Victoria Nile were considered, different water treatment methods and alternative sanitation systems. With the pros and cons of each analysed to inform the selection process, options were considered based on the environmental and social acceptance, the cost and the skills requirement for operation and maintenance of the technology.

In terms of Stakeholder Consultation and Information Disclosure, relevant and adequate project information were provided to stakeholders to enable them to understand the project risks, impacts and opportunities so as to allow them to participate in the project and offer comments. The methods of consultation such as interviews, in-depth interviews and Focus Group Discussions and questionnaires were used to consult the following stakeholders: - The district technocrats consulted included; Chief Administrative Officer (CAO), District Planners, District Education Officer, District Environmental Officer, District Water Officer and the District Community Development Officer. Subcounty technical officers and political leaders were also consulted for both Kigumba and Mboira (new subcounty). At local level, the LC. 1 Chair persons of Apodorwa, Kikunya, Nyakabale, Magamaga, Lavor-Ogor, Nyakatiti, Kifuruta I & II, Kyakwakunguru, Karikove and Kikoba communities as well as residents within the project impacted areas were consulted. The consulted stakeholders at all levels endorsed the project. They perceive the project as a source of employment, an opportunity to improve access to safe and clean water, improvement in hygiene and sanitation particularly in Nyakabale RGC, improvement of health and the elimination of water borne diseases, increased revenues and incomes. However, they noted that the project might displace people from their land without adequate compensation and, insecurity might result because of influx of migrant workers. The views of the stakeholders were collected and considered during identification of project impacts and development of mitigation measures. Details of impacts and the mitigation measures including the stakeholder attendance are in Section 8 and Annex 4 respectively.

Furthermore, an Environment and Social impact analysis was conducted to elaborate the measures to be implemented in order to mitigate or optimize the project's identified potential impacts. For each measure, responsibilities and costs are provided. An Environmental and social management and monitoring plan (ESMP) was prepared in order to ensure that mitigation measures are effectively implemented. It considered key monitoring indicators which include (but not limited to) - Vegetation loss and remedial restoration measures instituted; Noise, and air pollution control measures in place and how they operate; Erosion control measures; Control measures for traffic accidents; OHS measures for workers; Public health observance; Solid waste management measures; Employment opportunities; Gender Based Violence; Sexual Exploitation and Abuse (SEA) and Defilement; Violence Against Children (Child Labour); Control of Spread of COVID 19; and HIV/AIDS interventions and related sexual behaviours among workers Labour recruitment and GBV aspects.

In conclusion, the proposed development of a water supply system and sanitation facilities in Nyakabale RGC, Kiryandongo District will improve the capacity to deliver effective Water, Sanitation and Hygiene services to the refugee and host communities of the district. The benefits to the local economy will be in addition to reduced morbidity, increased enrolment of children in educational institutions, increased productivity of households and reduced incidences of domestic violence. The positive outcomes of implementing the project will infer positive change to the climate change, gender, health and educational vulnerabilities associated to water supply in the area. The negative environmental and social impacts of the proposed project in both the construction and operation phase can be mitigated through implementation of the provisions in the ESMP to address stakeholder concerns, so as to have a minimal or no effect on the natural environment as well as cultural and social functions and processes of the project affected communities. The project is an intervention of the Central government (MWE) with support from the World Bank that will require collective action from stakeholders such as the Local government and regional actors in the WASH sector for its effective implementation. MWE will spear head the supervision of the construction contractor and the operator to ensure negative impacts from the project are minimised. This should entail among others, undertaking of annual environmental and social audits following provisions of the ESMP to ensure continuous improvement of the project's processes and products.

1 INTRODUCTION

1.1 BACKGROUND

The Ministry of Water and Environment (MWE) together with National Water and Sewerage Corporation (NWSC) are implementing the Integrated Water Management and Development Project (IWMDP) with funding from the World Bank and Government of Uganda. The Project Development Objective is to improve access to water supply and sanitation services, capacity for integrated water resources management and the operational performance of service providers in project areas. In particular under Component 1.2, IWMDP provides support to Refugee and Host Communities, with financing from the IDA 18 Refugees Sub-Window. The sub-component supports activities designed to improve the sustainable provision of water supply and sanitation services to refugee settlements and host communities. The sub-component's target districts where about 70 percent of the refugees in Uganda are being hosted are: Yumbe, Arua, Moyo (including Obongi district newly created from Moyo), Adjumani in West Nile, Lamwo in Northern and Kiryandongo in Central Uganda. MWE is directly responsible for implementation of IWMDP in small towns and rural growth centres whereas the National Water and Sewerage Corporation is responsible for the same in large towns.

For the proposed 3 large solar powered piped water supply systems and sanitation facilities in refugee settlement and host communities of Kiryandongo district, MWE contracted JBN Consults and Planners to undertake the Environment and Social Impact Assessment (ESIA), in accordance with the National Environment Act, 2019. This report therefore presents the findings of the ESIA exercise undertaken for the proposed water and sanitation system in Nyakabale RGC. The Consultant assessed the likely environmental and social impacts of the proposed project in line with the Guidelines for Environmental Impact Assessment in Uganda" (NEMA, July 1997), the National Environmental Impact Assessment Regulations, 2020 and the World Bank environmental and social safeguards policies.

1.2 PROJECT JUSTIFICATION

Uganda is the principal refugee hosting country in Africa and one of the top five in the world. According to the United Nations High Commission for Refugees (UNHCR)/ Office of the Prime Minister (OPM) data¹, by 30th September 2021, Uganda was host to 1,524,352 refugees, of which 72,833 (about 4.8% of the total refugee population) were living in Kiryandongo District. With a total population of about 322,300 individuals, Refugees make up about 23% of Kiryandongo District's population. The current large inflow of refugees into the district has exerted substantial stress on the social infrastructure and services. As such, there are exceptional constraints on the district's capacity to deliver effective Water, Sanitation and Hygiene (WASH) services to the

1 <https://data2.unhcr.org/en/country/uga> (Accessed on 9th November 2021)

refugee and host communities, giving rise to the need for collective action from the Central government and development partners to address the WASH challenges therein.

In order to address the water supply and sanitation gaps in Kiryandongo District, 3 solar powered piped water supply systems and 10 toilets have been proposed. These water supply and sanitation infrastructure will be implemented in the RGCs of Nyakabale, Gaspa and Mutunda as part of the strategy to improve access to clean water, improved sanitation and hygiene in the refugee settlements and host communities.

1.3 RATIONALE OF ESIA

The National Environment Act, 2019, section 113 (1) requires that, any developer who proposes to undertake a new project which falls within Schedule 5 of the Act is required to undertake an Environmental and Social Impact Assessment (ESIA) as prescribed by and reiterated in the National Environment (Environmental Impact Assessment) Regulations 2020, section 3(a)(ii). The proposed development of water supply systems and sanitation facilities in Kiryandongo District are under the categories of “Utilization of Water Resources and Water Supply” as well as “Waste Management Facilities” which are listed under schedule 5 section 4 (i) and schedule 4 Part 2 section 9 (d) respectively of the Act, that requires mandatory environmental and social impact assessment before implementation. Therefore, an Environmental and Social Impact Study was conducted before approval of the proposed project activities by the National Environment Management Authority (NEMA) for implementation.

Furthermore, this ESIA was carried out in pursuance of the World Bank Safeguards policies {Environmental Assessment (OP/BP/GP 4.01), Natural Habitats (OP/BP 4.04), Physical Cultural Resources (OP 4.11), Involuntary Resettlement (OP/BP 4.12) etc.} for investment project financing and the World Bank Group Environmental, Health, and Safety (EHS) Guidelines. This project falls under Environmental Assessment Category B given that Environmental and Social impacts are localized, site specific and small to moderate in scale.

1.4 OBJECTIVES AND TECHNICAL SCOPE OF THE ESIA

The consultant undertook ESIA studies for the proposed development of water supply system and sanitation facilities in Nyakabale Rural Growth Centre (RGC), Kiryandongo District. The overall objective of the assignment is to detail the potential adverse bio-physical and socio-economic impacts of the proposed Water Supply and Sanitation System and propose mitigation measures.

In undertaking this assignment, the consultant aimed to provide the following:

- 1 Description of the Policy, Legal and Regulatory Frameworks;
- 2 Description of the Administrative/Institutional framework;
- 3 Description of baseline environment and social conditions of potentially affected areas, including a detailed environmental and social baseline;
- 4 Description of project's potential impacts, including (direct, indirect and cumulative impacts);
- 5 Identification and analysis of project's potential impacts (positive and negative) and recommendation of feasible measures to avoid, minimize or mitigate the negative impacts and severity;

- 6 Propose mitigation measures, assess their expected effectiveness and any residual enhance the positive impacts;
- 7 Analysis of proposed alternatives identified during the feasibility study;
- 8 Evidence based meaningful public consultation/Stakeholder engagement and disclosure;
- 9 Impact assessment on any auxiliary/associated facilities that may be impacted upon by the project;
- 10 Social risk assessment and identification of existing service centres including but not limited to gender issues, vulnerable groups aspects, and labour influx, including Social conflict, Gender Based Violence (GBV), Violence against children (VAC);
- 11 Develop chance finds procedures to facilitate the handling of any unknown or known physical cultural resources, recommend grievance redress mechanism to facilitate the handling of any complaints that may arise during project implementation;
- 12 Development of an Environmental and Social Management plan (ESMP) clearly identifying institutional roles and responsibilities for implementing the mitigation measures, including potential gaps in capacity to implement the measures and how such gaps will be addressed;
- 13 Development of an environmental monitoring plan with clear monitoring indicators and institutional roles for tracking the implementation of and compliance with the proposed mitigation measures; and
- 14 Description of Inter-Agency coordination.

1.5 ESIA REPORT STRUCTURE

The ESIA report is structured as summarized herein with section-based explanatory highlights.

Table 1-1: ESIA Report Structure

| Chapter | Highlight on section content |
|--------------------------|---|
| Executive Summary | Executive Summary of the project and its activities, ESIA study methods, key findings and impacts as well as proposed mitigation measures. |
| Chapter 1 | Introduction with details of project background, objective, justification and categorization of the Project. |
| Chapter 2 | Project description which gives details of project components, location, and the proposed project activities, area of influence, project management, project proponents and cost estimates. |
| Chapter 3 | Description of ESIA approach and methodology |
| Chapter 4 | Outline of different laws, policies, regulations and international guidelines and conventions relating to implementation activities of the proposed project as well as ESIA study. |
| Chapter 5 | Description of Biophysical and Socioeconomic baseline information of the project area |
| Chapter 6 | Public consultation and stakeholder engagement processes and the outcomes of such meetings |
| Chapter 7 | Analysis of project alternatives, a comparison of the options and their significance |
| Chapter 8 | Description of the project anticipated environmental and social impacts and their mitigation measures |

| | |
|-------------------|---|
| Chapter 9 | The Environmental and Social Management Plan (ESMP) as well as the Environmental and Social Monitoring Plan |
| Chapter 10 | Conclusion |
| Chapter 11 | References |
| Chapter 12 | Annexes |

2 PROJECT DESCRIPTION

IWMDP intends to undertake construction of a water supply system and sanitation facilities in refugee settlement and host communities Kiryandongo district. These water supply and sanitation infrastructure will be implemented as part of the strategy to improve access to clean water, improved sanitation and hygiene in Nyakabale RGC.

2.1 PROJECT PROPONENT AND COST ESTIMATES

Project Proponent and Contacts:

The Permanent Secretary

Ministry of Water and Environment,

Directorate of Water Development,

Rural Water Supply Department

Plot 3-7, Kabalega Crescent Road,

P.O. Box 20026, Kampala.

Email: ps@mwe.go.ug / mwe@mwe.go.ug

Telephone: +256 41 4505942

The project has a Capital Investment Cost Estimate of US\$ 4,141,351,640 (Exclusive of VAT and Contingency) as evidenced by a certificate of the valuation of capital investment of the project issued by a qualified and registered valuer as in annex 12.

2.2 PROJECT LOCATION

The proposed water supply systems and sanitation facilities will be located in Kiryandongo District in the Nyakabale RGC, covering areas in the Sub counties of Kigumba and Mboira (**Figure 2-1**).

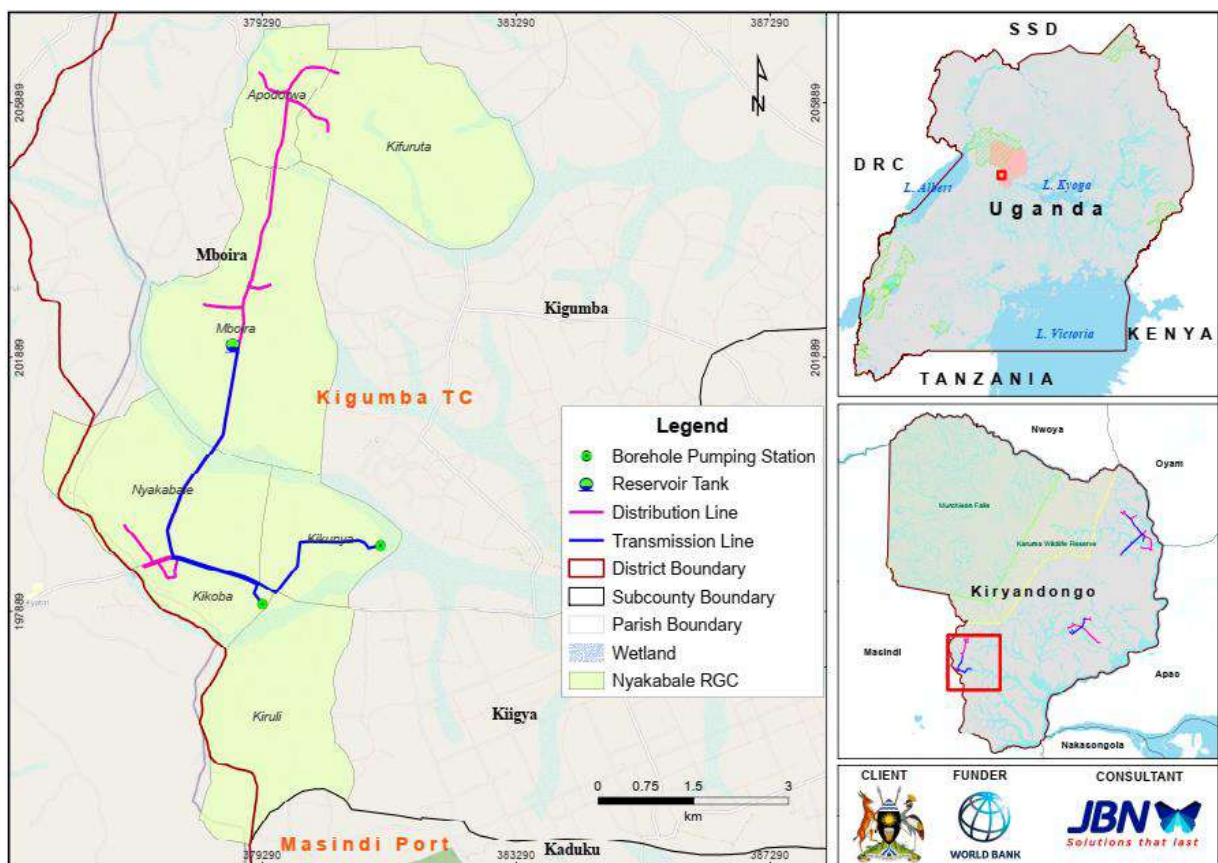


Figure 2-1: Location of the proposed water supply systems and sanitation facilities

2.3 PROJECT AREA OF INFLUENCE

The proposed piped water supply and sanitation project covers Nyakabale RGC which is located in Kigumba and Mboira sub counties, approximately 13km West of Kigumba Town Council. It comprises of 6 parishes and 10 villages (Table 2-2-1). There, supply will also cover a number of education, health and religious institutions in the RGC (Table 2-2-2), among others.

Table 2-2-1: Administrative structure (zoning) of the project area of influence

| RGC | Subcounty | Parish | Village | Project Component |
|-----------|-----------|-----------|-------------|-------------------|
| Nyakabale | Mboira | Apodorwa | Apodorwa | D, I |
| | | Kifuruta | Kifuruta I | D, I, SF |
| | | | Kifuruta II | D, I |
| | | Mboira | Mboira I | D, I |
| | | | Mboira II | T, R, D, I |
| | | Nyakabale | Kikunya | S, T, E |
| | Nyakabale | | T, D, I, SF | |
| | Kigumba | Buhoomzi | Kikooba | S, T, D, I, E |
| | | Kigumba | Katamarwa | SF |
| Kididima | SF | | | |

S=Water Source, T=Transmission, R=Reservoir, D=Distribution, I=Network Intensification, O=Office block, E=Electricity Line and SF=Sanitation Facility.

Table 2-2-2: Institutions in the Project area of influence

| Subcounty | Parish | Village | Institution Name |
|----------------|-----------|------------|--|
| Mboira | Apodorwa | Apodorwa | Apodorwa HC II Apodorwa Mosque Apodorwa Church of Uganda Apodorwa Good day Nursery and P/S Apodorwa Market |
| | Kifuruta | Kifuruta I | Kifuruta Catholic Church Kifuruta P/S |
| | Nyakabale | Nyakabale | Nyakabale Mosque Nyakabale Church of Uganda Nyakabale Market |
| | Mboira | Mboira I | Mboira Catholic Church Mboira Church of Uganda Mboira P/S Mboira SS |
| Kigumba | Kigumba | Kididima | Kigumba HC III |

2.3.1 WATER DEMAND IN THE PROJECT AREA

The water supply system was designed in reference to a 20-year design period starting with the year 2023. The population growth rate for Kiryandongo District is estimated at 2.97%. The Average Day Demand which depicts the daily water consumption by domestic and nondomestic consumers is subject to seasonal climatic variations, harvest seasons, and other factors such as transient population, and religious and cultural festivals. To allow for increased demands during these seasons, a maximum day peak factor of 1.3 was applied to the system design capacities. **Table 2-3** below summarizes the projected daily water demand for the design period in the project area.

Table 2-3: Projected water demand in the project area

| Year | | 2021 | 2023 | 2028 | 2033 | 2038 | 2043 |
|-----------------------------------|---------------------|--------|--------|--------|--------|--------|--------|
| Estimated Total Population | | 13,970 | 14,811 | 17,146 | 19,848 | 22,974 | 26,59 |
| Projected | Water Demand | 284.35 | 301.49 | 349.03 | 437.38 | 507.25 | 588.29 |
| (m³/day) | | | | | | | |

Source: MWE, Feasibility Study and Design Report, 2021

2.4 MAIN PROJECT COMPONENTS

2.4.1 SOLAR POWERED PIPED WATER SUPPLY SYSTEMS

2.4.1.1 WATER SOURCES

At the water sources (**Figure 2-2**), a submersible pump with capacity specified in **Table 2-4** will be installed at the borehole, complete with control kit and dry run protection. The drilling of these boreholes was conducted from 8th July, 2021 and completed on July 18th, 2021, while the test pumping of the same boreholes was completed on August 2nd, 2021. The test pumping results indicated a yield of 10.5 m³/hr and 36.0 m³/hr for water sources DWD 77382 and DWD 77383 respectively. This translates to a potential lifespan of 20 years for the aquifer given the projected water demand of 588.29m³/day in the RGC by the year 2043 according to the project's Feasibility Study and Design Report (MWE, 2021). The water quality as shown in the water quality analysis Section (**5.2.8**) shows that the water quality from these boreholes conforms to the national drinking water standards.

A pump-house will be constructed and detailed including plastering and painting, fitted with steel panel doors, windows and ventilation units; including security lights. A Perimeter fence of dimension (30m x 30m) will be constructed using G12 chain link and barbed wire fastened to G.I poles of dimension 75 x 75 x 3mm at a spacing of 2.5m c/c. G.I poles will be secured in a concrete foundation. Paspalum grass will be planted in the compound area. The proposed water sources DWD 77382 and DWD 77383 are located in Kikunya village and Kikooba village respectively.

Table 2-4: Details of water sources

| RGC | Borehole Yield | GPS Coordinates | Pump Capacity | Daily (16 hours pumping regime) m ³ | |
|-----------|---------------------------------------|---------------------|---|--|-----|
| Nyakabale | DWD 77383 (10.0m ³ /hr) | 379216E, 198304N | Head 245m, Flow 10.0m ³ /hr | 160 | 640 |
| | DWD 77382 (34.0m ³ /hr) | 381073E, 199234N | Head 250m, Flow 30.0m ³ /hr | 480 | |

Source: MWE, Feasibility Study and Design Report, 2021



Figure 2-2: Project Water Source Sites

2.4.1.2 WATER RESERVOIR

The water supply system in Nyakabale RGC will include one reservoir comprised of a cold pressed steel tank elevated on a steel tower as detailed in **Table 2-5**. The storage reservoir will provide for fluctuations in consumer demand during the day (e.g. the hourly peak flow), without having to design the pumping mains to match the peak flow. Furthermore, the storage will provide for a fairly constant residual pressure and flow to the consumers. 30% of the maximum day demand was adopted for storage as stipulated by the MWE Water Supply Design Manual (2013).

The Storage Reservoir will be located in Mboira II Village, Mboira Parish with a capacity of 300m³. The required storage capacity is 294m³ entailing 50% of the maximum day demand for Nyakabale RGC. The pressed steel tank will be erected on a 15m tower height with square 1.22m panels measuring 10.98m long, 8.54m wide, and 3.66m high.

Table 2-5: Specifications of the reservoirs

| RGC | Reservoir | GPS Coordinates | Capacity (m ³) | Tower Height (m) |
|-----------|---------------------|------------------|----------------------------|------------------|
| Nyakabale | Nyakabale Reservoir | 378747E, 202381N | 300 | 15 |

Source: MWE, Feasibility Study and Design Report, 2021

2.4.1.3 TRANSMISSION AND DISTRIBUTION

Water will be pumped from the boreholes using independent transmission mains into the storage reservoir. From there, the distribution network will be fed by gravity from the storage reservoirs. The distribution mains were designed with adequate capacity to meet the peak hour demands of the consumers being supplied. The transmission and distribution corridor will be gained by use of existing public roads and proposed access roads, as the pipes will be buried in the road reserves.

The piping network will traverse Apodorwa, Kifuruta I, Kifuruta II, Mboira I, Mboira II, Kikunya, Nyakabale and Kikooba villages.

Table 2-6: Specification of transmission system and distribution network

| RGC | Transmission Length (m) | | Distribution Total Length (m) |
|-----------|-------------------------|----------|-------------------------------|
| | Source 1 | Source 2 | |
| Nyakabale | 5,449 | 7,643 | 14,110 |

The 30 m³/hr (8 l/s) water in the transmission main from Source DWD 77382 will flow through a uPVC- OD 160 PN16 from the borehole to the reservoir inlet level covering a chainage of 7.643 km and a head of 250m, while the 10 m³/hr (3 l/s) water in the transmission main from Source DWD 77383 will flow through a HDPE- OD 90 PN16 from the borehole to the reservoir inlet level covering a chainage of 5.449 km and a head of 245 m.

The distribution network(s) for the project area will be gravity fed from the Storage Reservoir tank. The networks were designed for the year 2043 at a peak hour factor of 2.0. Both the uPVC and HDPE of various specifications as specified in the feasibility study report (MWE, Feasibility Study and Design Report, 2021) will be used to distribute water in the project area covering a total distance of 14.11 km (Table 2-7).

Table 2-7: Proposed distribution Network for Nyakabale RGC

| Pipe Details | Length (km) |
|------------------|---------------|
| OD 160 uPVC PN10 | 0.742 |
| OD 110 uPVC PN10 | 5.767 |
| OD 90 HDPE PN10 | 1.245 |
| OD 75 HDPE PN10 | 0.417 |
| OD 63 HDPE PN10 | 1.183 |
| OD 50 HDPE PN10 | 4.755 |
| Total | 14.110 |

Source: MWE, Feasibility Study and Design Report, 2021

2.4.1.4 NETWORK INTENSIFICATION

As a measure to increase the densification of the distribution networks as a drive to increase the customer base and allow a neater layout of the service connection pipes, some pipe work intensification will be required. The intensification lines will be demand-driven, and installed where there are adequate applications for connections. An estimated 12Km of pipe work is planned for intensification in the villages of Apodorwa, Kifuruta I, Kifuruta II, Mboira I, Mboira II, and Nyakabale. The location of the service pipes will not be known until applications for connections are received.

2.4.1.5 DISINFECTION FACILITIES

Disinfection of the water from the wells will be effected by the installation of a DOSATRON online proportional chemical dozer at the distribution reservoir. A pipe manifold will be constructed to receive the water from the borehole before disinfection is effected prior to entry into the tank. A chemical house will be constructed adjacent to the reservoir to house the doser and serve as a chemical storage, mixing and dosing place.

2.4.1.6 ACCESS ROADS

Access to majority of the project components will be through existing public roads, given their convenient location in close proximity to the existing road network. However, some project components are not in close proximity to the existing road network (**Figure 2-3**) that shall require opening of access road have been identified as detailed in **Table 2-8**. The land tenure system in the area is customary which will necessitate compensation due to the land take as captured in the project RAP.

Table 2-8: Access roads for project components

| RCG | Project Component | Land Requirements |
|------------------|---------------------------------|--|
| Nyakabale | Borehole DWD 77382 Access Road | 4,302m ² (717m long, 6m wide) |
| | Borehole DWD 77383 Access Road | 60m ² (10m long, 6m wide) |
| | Nyakabale Reservoir Access Road | 1,524m ² (254m long, 6m wide) |



Figure 2-3: Access Road to Borehole DWD 77382

2.4.1.7 POWER SUPPLY

The water supply system will be powered by a solar power augmented by hydroelectricity.

Solar power

The power requirements at the pump stations would be provided using:

Borehole DWD 77383: The system will consist of multi crystalline PV solar panels rated at 280pW 24 Volts DC, 70No. cells, with a control unit, support structure, and electrical accessories and cabling at the pump station.

Borehole DWD 77382: The system will consist of multi crystalline PV solar panels rated at 280pW 24 Volts DC, 204No. cells, with a control unit, support structure, and electrical accessories and cabling at the pump station.

Hydro Electric Power

Borehole DWD 77383: The system will a back-up power supply of 50 KVA 11,000 volts/433volts, 50Hz, 3 phase transformer, a 0.4Km extension of the 33KV overhead power line with 3 – line conductors at the pump station

Borehole DWD 77382: The system will a back-up power supply of 150 KVA 11,000 volts/433volts, 50Hz, 3 phase transformer, a 2.3Km extension of the 33KV overhead power line with 3 – line conductors at the pump station

2.4.1.8 WATER OFFICE BLOCK

The water office block will be constructed at Mboira Subcounty headquarters (378982E, 202716N), for running the day-to-day operations of the water supply system. The water office block will consist of a reception area and operations office furnished with working benches, shelves and lockable cabinets.

2.4.2 SANITATION FACILITIES

The project will construct 4 VIP Latrines at institutions and 2 waterborne public toilets to serve the residents in trading centres. The waterborne toilets will be connected to septic tank and soak pit systems. The septic tank which will be emptied on a need basis and the faecal sludge taken to the nearest waste stabilisation ponds located at Kiryandongo hospital. All sanitation facilities will be inclusive gender segregated (male, female & disability). The proposed sanitation interventions in Nyakabale RGC are detailed in **Table 2-9** below.

Table 2-9: Sanitation Facilities

| Location | GPS Coordinates | Type of Facility | Number of | |
|----------------------------------|------------------|------------------|------------|---------|
| | | | Facilities | Stances |
| Nyakabale Trading Center | 377495E, 199087N | WBT | 1 | 6 |
| Katamarwa Trading Center | 382572E, 202785N | WBT | 1 | 6 |
| Kifuruta P/S | 380370E, 205707N | VL | 2 | 5 |
| Kigumba Health Centre III | 386838E, 199577N | VL | 2 | 5 |

WTB = Waterborne toilets

VL= VIP Latrine

2.5 AUXILIARY FACILITIES

2.5.1 CAMP SITES

It will be necessary for the contractor to establish workers camp to provide accommodation for experts that might come outside the project area as well as project offices for the contractor and supervising consultants. Other facilities within the camp shall include: parking yard, material storage yard, kitchen, sanitary facilities, site clinic etc. The identification, selection, construction and operation shall be in line with the provisions in NEA 2019 and other relevant statutory requirements. All the auxiliary facilities shall be subjected to independent and comprehensive Environmental and social impact assessment or project brief and approvals shall be secured.

2.5.2 MATERIALS SOURCES

Where there is need for local materials such as water, sand, aggregates and gravels, the contractor shall be required to get from legally existing and authorized sources.

2.5.3 WASTE HANDLING AND DISPOSAL

During the construction, the contractor shall generate both hazardous and non-hazardous wastes including vegetation stripped from site, soil excavated from foundation sites, packaging waste (cement bags, paper, polythene sheets, and wood pallets), metal scrap, wire cuttings, wooden planks, polyethene sheets, PET water bottles, empty paint and solvent containers and waste oil from construction equipment or vehicles. Some of the waste materials such as paints, cement, adhesives, waste oil and cleaning solvents contain hazardous substances. The generated waste must be managed in by a licenced waste handler in accordance with the national environment (waste management) regulation 2020 and Local Government Act (Amended) 1997.

2.6 PROJECT MANAGEMENT

During construction phase, the project shall have a supervising consultant who shall oversee the implementation of the project on behalf of the developer. The supervising consultant will have in place an environmental and social safeguards team comprising of Gender and GBV officer, Health & Safety officer, environmental safeguards officer, social safeguards officer, among others.

The proposed operation and management option is to handover the water supply system and public sanitation facilities to the Northern Umbrella of Water and Sanitation (NUWS). Within the decentralization framework, the experience and capacity of Umbrella organization, applied directly to the management of the newly constructed facilities will increase the likelihood of sustainable commercial operations and management of the town systems in the next 5-10 years. The Umbrellas organisation is under the Urban water department of the Ministry of Water and Environment and can effectively plan and manage budgets agreed within a contract framework. It can use experience gained elsewhere in the past 5-years to extend services to rural & urban poor areas.

2.6.1 LABOR FORCE

For the proposed solar motorized piped water supply project, several staff for the contractor (approximately 100 workers), Supervising consultant (approximately 10 workers), Stakeholder

Engagement Consultant (approximately 10 workers) and MWE staff (approximately 5 staff) will be required during the construction phase. The major categories will include key staff, skilled, semi-skilled and unskilled workers. It's estimated about 125 workers will be deployed at the project site. The management of workers will be in accordance with Uganda labour laws, the World Bank safeguards policies and EHS requirements/guidelines.

3 ESIA APPROACH AND METHODOLOGY

3.1 GENERAL APPROACH

This ESIA was carried out in line with requirements of the legal, policy and regulatory framework of Uganda as well as the World Bank Operation Policies. The ESIA methodology presented is in line with the Environmental Impact Assessment Regulations, 2020, the National Environment Act 2019 (**Figure 3-1**), the manual for EIA Guidelines for Water Resources Related Projects in Uganda (MWE, 2011); Environmental and Social Management Framework for the IWMDP 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. Reference was also made to the NEMA Conditions of Approval of the ESIA Terms of Reference (**Annex 1**).

The ESIA study involved the following steps:

- i. Determining the issues/scope that the ESIA should address (scoping study);
- ii. Review the applicability of legal and institutional framework to the proposed projects;
- iii. Discussion of proposed project alternatives;
- iv. Consultation with stakeholders;
- v. Baseline surveys in form of data collection field surveys to establish the baseline environment, supplemented by desk-based data collection to fill any data gaps;
- vi. Impact identification and the evaluation of significance (Identification of mitigation measures (where required) to reduce the significance of, or avoid, any identified adverse impacts, evaluation of impacts, post-mitigation, to determine the significance of residual impacts, and assessment of cumulative impacts with other past, present and reasonably foreseeable future developments and plans);
- vii. Identification of appropriate monitoring requirements; and
- viii. Preparation of the ESIA study reports.

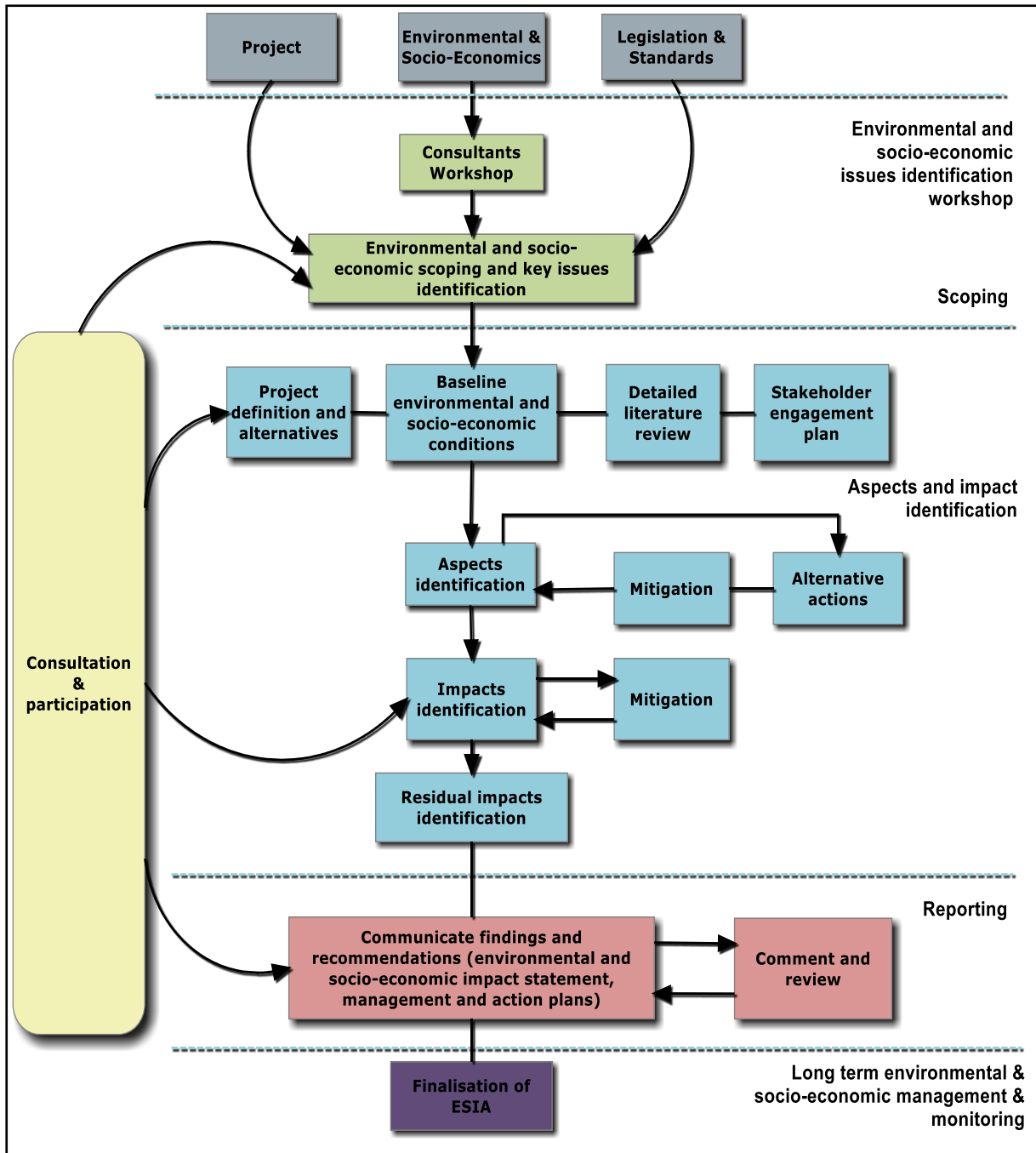


Figure 3-1: ESIA Approach

Pursuant to this approach, the following sections provide detail on how each stage of the ESIA process was applied to the proposed project.

3.2 DOCUMENT REVIEW

To gain a clear insight on baseline parameters and project characterization, a number of planning, regulatory documents, and reports were reviewed as presented below.

- i) Relevant policies and legislation of Uganda;
- ii) Relevant international covenants;
- iii) IWMDP Environmental and Social Management Framework;

- iv) IWMDP Resettlement Policy Framework;
- v) IWMDP Project Appraisal Document;
- vi) Water Resources Assessment Reports for Nyakabale RGC;
- vii) Borehole Drilling & Test Pumping Reports for Nyakabale RGC;
- viii) Feasibility Study Report for Nyakabale RGC;
- ix) Draft Engineering designs for the proposed project components;
- x) Kiryandongo District Development Plan (FY 2020/21-2024/25); and
- xi) UBOS National and District Statistical Abstracts for 2014, 2018 and 2021.

3.3 E&S SCOPING REPORT/TERMS OF REFERENCE

The purpose of the scoping phase was to identify key sensitivities and those activities with the potential to contribute to, or cause, potentially significant impacts to environmental and socioeconomic receptors and resources and to evaluate siting, layout and technology alternatives for the proposed Projects.

This stage determined the most important issues, problems, and alternatives that should be addressed in further environmental and social analyses. The consultant gathered an initial identification of the relevant environmental policies, laws, and regulations of Uganda. Also, an initial review of capacity issues concerning the prevention and mitigation of environmental impacts for individuals (in communities, professional associations and organizations, policy makers, etc.), for organizations (government departments, NGOs, private sectors etc.) and as regards an enabling environment (policies, laws, regulations, incentives, partnerships, etc.) was conducted by the consultant. The output of this stage facilitated the consultant to develop the tasks for the ESIA through consultation so as to ensure that the process and output are focused on the key issues.

The E&S scoping report formed a basis for development of Terms of reference that define the scope of the proposed impact assessment was submitted to NEMA on 13th December 2021 and was approved. The approved E&S scoping report/Terms of Reference by NEMA (**Annex 1**) formed a basis for the detailed field studies for the proposed project.

3.4 BASELINE DATA COLLECTION AND SURVEYS

The description of the baseline environmental and socio-economic conditions provides information on receptors and resources that were identified during scoping as having the potential to be significantly affected by the proposed Project activities. It also describes baseline conditions that have been used to make the assessment.

3.4.1 BIODIVERSITY ASSESSMENT

3.4.1.1 FLORA ASSESSMENT

To study the vegetation structure and composition of Nyakabale RGC, a combined methodology of field observations and sampling, guided by a Global Positioning System (GPS Garmin 62CSx) was used to locate plots along the proposed project pipeline alignment, Borehole sites and Reservoir site. The systematic sampling technique was utilised as it ensures that each unit has equal probability of inclusion in the sample. In this method of sampling, the first unit was selected

with the help of random numbers and the remaining units were selected automatically according to a predetermined pattern. Plots were laid within the limit of 30m alternating along the proposed transmission and distribution routes. Standard nested circular plots were located across all the study areas, 0.5 km intervals were used along water transmission and distribution lines from the Boreholes to the Reservoir site (**Figure 3-2**) and random sampling technique was applied to sample vegetation at the proposed reservoir, sump and borehole sites. Circular nested plots consisted of a 10m radius plot (where trees ≥ 10 cm of DBH (Diameter at breast height) were identified and counted), 5m radius plot (where lianas, shrubs and trees ≤ 10 cm DBH but greater than or equal 2.5 cm DBH were identified and counted) and a 2 m radius plot (where all grasses and herbs were identified). Sample specimens for Plant species that could not be instantly identified were collected, photographed and pressed on site for further confirmation at Makerere University Herbarium (MHU) where identification and archiving were done.

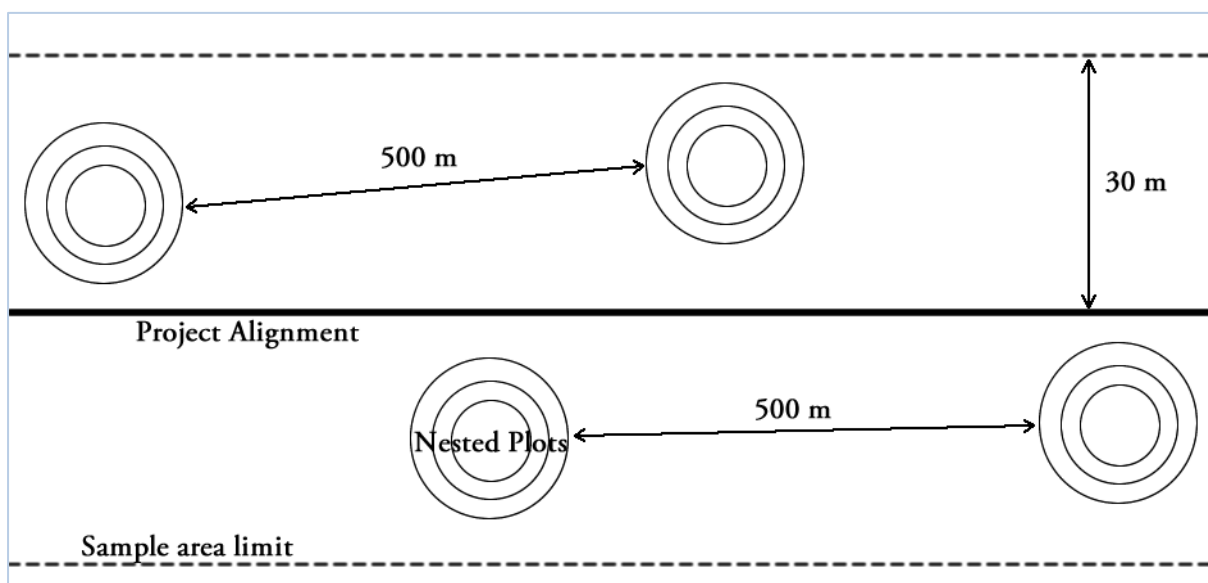


Figure 3-2: Illustration of the flora sampling technique

Although nested plots can register reasonable data on the distribution, diversity, and abundance of the various plant stratum according to the land use types of the area, a cumulative list was compiled from both the nested plots and opportunistic encounter that were recorded as they were encountered in the project Area (**Annex 6**).

3.4.1.2 FAUNA ASSESSMENT

Three main approaches were employed in conducting the baseline survey. The approaches include:

1) Literature review, 2) Informal community consultations, and 3) Use of field scientific sampling methods

3.4.1.2.1 LITERATURE REVIEW

Literature was reviewed to understand the project area and also to establish known fauna in the project area.

3.4.1.2.2 INFORMAL COMMUNITY CONSULTATION

During the field visit, the fauna specialist informally consulted the community members. The purpose was to collect data on existing fauna which the fauna specialist may not be able to get during field sampling. Discussions with the community members revolved around faunal groups / species that occur in and along the project alignment.

3.4.1.2.3 FIELD SAMPLING

Field sampling was conducted using known scientific methods and international best practices. The methods described below were used to survey the fauna along the project alignment. Six fauna groups were surveyed in the project area for their presence. The groups include Butterflies, Dragonflies, Amphibians, Reptiles, Birds and Mammals.

Butterflies

Butterflies were surveyed using Pallard's sweep net method (Gall, 1985; New, 1991; Warren, 1992; De Vries 1997) along established transects within a radius of 200m of sampling point. The method was used to document the butterfly species richness, as well as estimate their relative abundance.

At each of the sampling point, transects of 10m wide and 100m long were sampled. The fauna ecologists moved through the transect along a fixed line with 5m stretch on either side of the data collectors left and right hand. The ecologist moved at a slow and uniform / even pace of approximately 1km/h (Pellet 2007) through the transect, recording individuals sighted within the 10m width. Sampling was conducted between 9am-5pm when weather warmed up (13-17°C).

On spotting an individual butterfly, the fauna ecologist swept the net back and forth to capture the spotted butterfly. On anticipation of a capture, the net was flipped, with the bag hanging over the rim, trapping the individual fly. Trapped butterflies were gently removed from the net and identified. The captured individuals were released once identity was ascertained. If identity of an individual butterfly was not known, the butterfly was photographed and placed in collection envelopes, with details of GPS coordinates, Time and the photograph number written on the labels and taken to Makerere University Museum for identity determination. All trapped butterflies were identified to species level.

Data collected was analysed by (1) Estimating species richness based on recorded species presence or absence at the different sites sampled. (2) Estimating species relative abundance by counting and recording the number of individuals of the different butterfly species that were encountered while sampling. (3) by ascertaining species conservation status from the 2020 published IUCN red data list and the National red list of Uganda's threatened species (Wildlife Conservation Society 2016).

A standard field guide by Larsen (1991) was used to identify specimens to species level, and also by matching with Makerere University Museum collections. The species were arranged into families (Hesperiidae, Lycaenidae, Nymphalidae, Paeridae, Papilionidae) and genera.

Dragonflies

Pallard's sweep net method (Gall, 1985; New, 1991; Warren, 1992; De Vries 1997) was also used to survey dragonflies at the different project sites. Same design and analysis as for butterflies was

adopted (see above). Sampling was conducted when weather warmed up. Each sampling event was conducted between 09:00h to 17:00h time and lasted about 1hour at each sampling point. All dragonflies that were flying or be perched within 5m of transect routes were recorded. All flying species were easily detected within the project area and an aerial net was swept through the vegetation to elicit a flight response from less conspicuous, resting individuals. Same amount of sampling effort (time for searches) was applied at each site.

Herpetofauna (Amphibians and Reptiles)

Herpetofauna (reptiles and amphibians) were surveyed using a combination of scientifically tested methods as described by Heyer et al, (1994); Fellers and Freel, (1995); Halliday, (1996); and Olson, et al, (1997). The methods included the following:

- i) Visual Encounter Surveys (VES): The method involved moving through a habitat watching out for, and recording surface-active herpetofauna species. VES was complimented by visual searches, by examining under logs, leaf litter, in vegetation and crevices. Species encountered were recorded and where possible photographed.
- ii) Audio Encounter Surveys (AES): This method uses species-specific calls / vocalizations / sounds / advertising calls made by breeding males. The identity of the amphibian species heard calling and their numbers were counted and recorded.
- iii) Dip netting: Using a dip net, ponds, pools, and streams and other water collection points were dip netted. Adult amphibians and tadpoles encountered were recorded.
- iv) Opportunistic Encounters: Herpetofauna species encountered opportunistically while moving in the project area were also recorded.

The methods were used within 200 metre radius around forty four (44) pre-geo-referenced points chosen basing on the different types of habitats represented in the project area including wetlands, woodlands and farmlands / gardens. Sampling was only undertaken during the day because of the curfew imposed by the government of Uganda as one of the restrictions to control the spread of COVID-19 pandemic.

Reptiles were identified using (Schiøtz, 1975, 1999; Stewart, 1967) while amphibians were identified using Channing and Howell (2006). Data was analyzed by 1) compiling Species checklist, 2) determining the species conservation status using IUCN 2019 published Red List of threatened species as well as using the National Red List for Uganda published by Wildlife Conservation Society in 2016.

Birds

A combination of Timed Species Counts (TSCs), transect walks and opportunistic observations was used to survey bird fauna diversity within the project area (Bibby et al., 2000 and Voříšek et al., 2008). The survey targeted the different habitats identified in project locations including forest, grassland and wetlands.

The fauna ecologist walked along the transect searching for the presence of birds. Each TSC lasted one hour, during which time all bird species seen or heard were recorded in order of detection. The Timed Species Counts (TSCs) and transect walks were supplemented with opportunistic observations by recording species found present within the project area outside the time of the

count. Species identified through visual observations and species identified by their vocalizations were also recorded. The fauna ecologists' eye was aided by a 10 x 40 binocular. Efforts were made to sample the different habitats represented in the project area. Sampling was conducted in the early morning and towards the evening. All identifications were made to species level. Birds that were recorded during the survey were ecologically characterized using the following criteria:

| Main Category | Sub-Category with Codes | | Descriptions |
|---------------|-------------------------|----------------------|---|
| Forest Birds | FF | Forest specialists | Forest interior birds |
| | F | Forest generalists | Normally breed in the forest or fragments but may occur outside the forest |
| | f | Forest visitors | Non-forest birds |
| Aerial | AA | Aerial feeders | Species feeding on the wing |
| Water Birds | W | Water specialist | Restricted to wetlands or open water |
| | w | Water generalist | Often found near water |
| Grassland | G | Grassland specialist | Characteristic of open grasslands |
| | g | Grassland generalist | May be found in grassland habitats but also able to utilise woodland and forested habitats. |
| Migrants | A | Afrotropical | Species migrating within Africa |
| | P | Palaeartic | Species breeding in Europe or Asia |
| | Ap | Afro-Palaeartic | Species with both Palaeartic and Afrotropical populations |

Data analysis was done by 1) compiling Species checklist, 2) determining the species conservation status using IUCN 2020 published Red List of threatened species as well as use of the National Red List for Uganda published by Wildlife Conservation Society in 2016.

Mammals

The mammals were surveyed using three main methods:

- i) Direct observation/opportunistic encounters: This entailed the collection of direct evidence of fauna activity (e.g. sightings, vocalizations). All mammals that were seen or opportunistically sighted or heard vocalizing while moving in and around the project area were identified, counted and recorded;
- ii) Use of Signs e.g. footprints and/or dung or calls: This entailed the collection of indirect evidence (e.g. faeces or dung, footprints). Mammal species whose signs / indirect evidence were recognized were recorded for their presence; and;
- iii) Local consultations: The fauna specialist held discussions with local residents in and around sampling points about the availability of mammal species in the project area.

Nocturnal mammals were excluded since the survey was conducted during day light hours. Mammal identification was based on Kingdon (1974), Delany (1975) and Kingdon et al. (2013). The conservation status of the encountered mammal species was ascertained using the 2020 version of the IUCN Red List of Threatened Species.

3.4.2 NOISE, AIR QUALITY AND VIBRATION ASSESSMENT

3.4.2.1 NOISE MEASUREMENT

Ambient noise measurements were undertaken at four (4) sites: Nyakabale trading centre, Nyakabale P/S, Apodorwa HC II and Kifuruta P/S, selected through purposive sampling based on information gathered about the project footprint and the location of sensitive receptors. Using an Acoustic sound level calibrator type CEL-251 for every point measured, a duly calibrated Casella CEL-633B Environmental & Occupational Noise Meter was used for the assessment. The equipment was placed on a tripod stand (1.4m high) from ground and switched on to set up the run mode. The equipment does simultaneously recordings for all noise functions it completes and also makes periodic or cumulative data measurements, and stores acquired data on a set recurring interval of time. The noise readings were logged at an interval of 30 minutes and the results later downloaded to a computer for further analysis using the Casella Insight software.

All sound pressure level measurements as presented in the following section, were benchmarked against the National Environment (Noise Standards and Control) Regulations, 2003.

3.4.2.2 AMBIENT AIR QUALITY MONITORING

Ambient air quality monitoring for particulate matter (PM₁₀ & PM_{2.5}) and gas parameters namely: NO₂, SO₂, CO and VOCs was undertaken using a Portable Aeroqual S500 Monitor mounted on a tripod stand about 1.5m above the ground, at selected locations including Nyakabale Trading Centre, Nyakabale Primary School, Apodorwa Health Center II and Kifuruta Primary School, where pollution impacts including dust nuisance would likely be of concern during project implementation. The Aeroqual S500 Monitor was switched on, allowed 3 minutes of zeroing and 7 minutes of stabilizing readings at every site. The monitor was set to start data logging at a frequency of five (5) minutes for per site. Purposive sampling was used to ascertain the selected locations based on information gathered about the project footprint and the location of sensitive receptors (**Annex 7**).

All ambient air quality measurements as presented in the following sections, were benchmarked against the World Health Organisation Air Quality Guidelines (WHO AQG), 2006 and the International Finance Corporation of the World Bank Group (IFC) Environmental, Health, and Safety Guidelines: Environmental Air Emissions and Ambient Air Quality (2007).

3.4.3 SOCIO-ECONOMIC ASSESSMENT

The consultant applied a Mixed Methods approach in collecting and analysing data and information. Survey questionnaire as a quantitative method was applied during November 2021. In terms of qualitative methods, the ESIA applied focus group discussions (FGDs), key informant interviews (KIIs), in addition to integration of Participatory Learning and Action (PLA) methods.

3.4.3.1 SAMPLING PROCEDURES

Study Area & Population: The study covered 7 core villages that make up Nyakabaale RGC with a study population of 1,248 households (VHT Data, 2022).

Sample Size: A sample size of 227 respondent households was covered representing 76.3% (227 out of 297) of determined sample using Morgan and Krejcie (1970) Sample Size Determination Table as shown in **Annex 9**.

Sampling Methods: The ESIA applied 1) Probability (random) sampling methods that included a) Stratified random (divided households into strata based on location, beneficiary area; b) Simple random and 2) Non-probability (non-random) sampling methods - a) Purposive sampling using pre-determined characteristics such as proximity to proposed water facility (production well, reservoir, pipes), water source, trading centre, etc; b) Cluster sampling by identifying a manageable number of respondent households within a zone or micro catchment; d) Convenience sampling by picking respondents that are easily accessible.

Sampling Plan: A representative study sample using a two (2) stage stratified sampling method was used. In the 1st stage, it involved identifying and sub dividing beneficiary villages and non-beneficiary areas, and the 2nd stage it involved identifying respondent household members, Key Informants and groups.

| Sampling Methods | Adult Female | Adult Male | Total | REMARKS |
|---|--------------|------------|-------|---|
| Probability (random) sampling methods | | | | |
| a) Stratified random | 120 | 107 | 227 | This sampling methods overlaps in all the others. |
| b) Simple random | 111 | 101 | 212 | Applied after stratified sampling |
| Non-probability (non-random) sampling methods | | | | |
| c) Purposive sampling | | | | Applied after stratified sampling |
| <i>Widows</i> | 30 | 10 | 40 | |
| <i>Youth owning homes & living with wife & children</i> | 7 | 5 | 12 | |
| <i>Divorcee</i> | 7 | 5 | 12 | |
| <i>Above 60 years</i> | 0 | 2 | 2 | |
| Self Settler | 11 | 13 | 24 | These are migrants from outside Kigumba and Mboira Sub Counties |
| d) Cluster sampling | 9 | 6 | 15 | Applied after stratified sampling |
| e) Convenience sampling | | | | Applied after stratified sampling |
| <i>Users of PSP in Apondorwa trading center</i> | 6 | 9 | 15 | |

3.4.3.2 DATA COLLECTION INSTRUMENTS

- 1) Survey Questionnaire: The consultant applied Survey Questionnaire to collect baseline data on socio-economic characteristics that include water, sanitation & hygiene, among others. Analysed data had corresponding GPS Coordinates which were stored in GIS Database for detailed GIS mapping and analysis.

- 2) Using Digital Tools (KOBO COLLECT): The structured questionnaire was converted, validated, loaded and aggregated them into a digital form called KOBO COLLECT FORM. The form was loaded and uploaded on mobile devices (smart phones or tablets), used to collect the data. This process increases efficiency, minimize errors and ensures timely collection and analysis of data.
- 3) Qualitative tools - Consultative meetings discussion guides; Focus Group Discussion (FGD) guide; Key Informant Interview (KII) guide; Direct Observation checklist; Photography guide; Document Review Checklist.
- 4) Participatory Learning & Action (PLA) tools - Transect walks / drives; Timeline & Trend Analysis; Seasonal calendar; Pairwise Ranking.

3.4.3.3 DATA ANALYSIS METHODS

Data was analysed using a) Thematic Analysis for qualitative findings obtained from FGDs, KIIs, etc; b) Statistical Analysis using Ms Excel for quantitative findings obtained using KoboCollect. All Likert Type Data was analyzed by determining the frequency and percentage of Likert Type Items for selected variables. The Likert Items included (but not limited) Highly Agree, Agree, Disagree, among others.

3.4.3.4 DATA QUALITY MANAGEMENT

The consultant ensured proper quality management of all data processes, protocols and methods i.e., design and pretest of tools, collection, handling, processing, analysis, interpretation and reporting consistently followed appropriate data life-cycle requirements. The consultant ensured that all data collected is sufficient, accurate, reliable, valid and acceptable to serve the purposes for which it is gathered. All the 6 stages of data management cycle was properly managed and controlled namely data sources, data collection, data collation, data analysis, data reporting and data usage.

3.4.3.5 QUALITY CONTROL & ASSURANCE

Quality Control (QC) and Quality Assurance (QA) was done to ensure defect detection and prevention respectively. This was through pre-testing survey tools; training research team; debriefing of research assistants; applying mixed methods in same study areas; timely deployment of research assistants. Research ethics and principles were adhered to such as creating rapport and obtaining informed consent from respondents through use of introductory letters; ensuring cultural sensitivities such as language, dress code and conduct. At the same time, the CSA team adhered to the JBN Code of Professional Conduct.

3.4.4 HEALTH AND SAFETY ANALYSIS

The H&S assessment study assessed the likely direct and indirect safety and health effects of the project activities during both the project construction and operation phases. The study reviewed the project designs, relevant secondary information relating to the project. Additionally, consultative meetings were undertaken with key stakeholders such as Government Ministries and Departments (OSH Department, Ministry of Gender, labour and Social Development, Uganda

Police Force), statutory agencies and non-statutory agencies like schools, administrative offices etc.

Generally, OSH assessment targeted both workers' safety and health and community/public safety and healthy parameters within the direct and indirect impact areas and some of the focus parameters included:

- a) Community Health and Safety
 - Life and fire safety from construction and operation works.
 - Traffic safety especially by material haulage fleet (hotspot areas; - schools, markets, trading centres and junctions etc.)
 - Transport of hazardous materials
 - Disease prevention
 - Emergency preparedness and Response
- b) Occupational safety and health
 - Communication and training
 - Hazards (physical, chemical, biological, radiological) and risk management
 - Personal protective equipment
 - Labour and working conditions
 - Construction equipment/machinery safety
- c) Safety and Health Management Systems

3.5 IMPACT DESCRIPTION AND ASSESSMENT

The assessment identifies the intensity of the predicted impacts resulting from construction and operation of the project and the resulting level of effect against identified sensitive receptors. These impacts and effects occur a result of an interaction between project works and the identified baseline. To determine the level of effect (severity or significance), the likely intensity of the impact and the sensitivity of the receptor are defined.

3.5.1 IMPACT INTENSITY

The intensity of an impact takes into account all the various impact characteristics in order to determine whether an impact is negligible or significant (Table 3-1).

Table 3-1: Criteria for rating impact intensity

| Criteria | Intensity Description (considering duration of the impact, spatial extent, reversibility, ability of comply with legislation, etc) | Rating scales |
|--------------------------|---|---------------|
| Intensity of the impact) | Very Low - where the impact affects the environment in such a way that natural, and /or cultural and social functions and processes are negligibly affected and valued, important, sensitive or vulnerable systems or communities are negligibly affected. | 1 |

| Criteria | Intensity Description (considering duration of the impact, spatial extent, reversibility, ability of comply with legislation, etc) | Rating scales |
|----------|--|---------------|
| | Low - where the impact affects the environment in such a way that natural, and/or cultural and social functions and processes are minimally affected and valued, important, sensitive or vulnerable systems or communities are minimally affected. No obvious changes prevail on the natural, and / or cultural/ social functions/ process as a result of project implementation. | 2 |
| | Medium - where the affected environment is altered but natural, and/or cultural and social functions and processes continue albeit in a modified way, and valued, important, sensitive or vulnerable systems or communities are moderately affected. | 3 |
| | High - where natural and/or cultural or social functions and processes are altered to the extent that they will temporarily or permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. The changes to the natural and/or cultural / social-economic processes and functions are drastic and commonly irreversible. | 4 |

3.5.2 IMPACT SENSITIVITY

Sensitivity is generally site specific and criteria the was developed from baseline information gathered. The sensitivity of a receptor was determined based on review of the population (including proximity, numbers, vulnerability, among others) and presence of features (sensitive ecosystems), such as rare and endangered species, unusual and vulnerable environments, architecture, social or cultural setting, major potential for stakeholder conflicts on the site or the surrounding area. The sensitivity of the receiving environment was determined by specialists based on the baseline data collected during the study, and the generic criteria outlined in Table 3-2.

Table 3-2: Criteria for rating impact sensitivity

| Criteria | Sensitivity Description | Rating scales |
|-----------------|---|---------------|
| Very Low | Vulnerable receptor (human or ecological) with good capacity to absorb proposed changes or and good opportunities for mitigation | 1 |
| Low | Vulnerable receptor (human or ecological) with some capacity to absorb proposed changes or moderate opportunities for mitigation | 2 |
| Medium | Vulnerable receptor (human or ecological) with limited capacity to absorb proposed changes or limited opportunities for mitigation. | 3 |

| | | |
|-------------|--|----------|
| High | Vulnerable receptor (human or ecological) with little or no capacity to absorb proposed changes or minimal opportunities for mitigation. | 4 |
|-------------|--|----------|

3.5.3 IMPACT EVALUATION AND DETERMINATION OF SIGNIFICANCE OR SEVERITY

Impact severity describes the actual change that is predicted to occur to the receptor. The significance of an impact is based on expert judgement of the sensitivity (importance or vulnerability) of a receptor and the intensity of the effect that will be caused by a project-induced change. Impacts were identified and significance was attributed considering the interaction between intensity and sensitivity criteria as in the significance matrix (Table 3-3). The impact severity is then calculated as the product of the two numerical descriptors;

$$\text{Impact Severity/Significance} = \text{Impact Intensity (I)} \times \text{Impact Sensitivity (S)}$$

The results are equivalent to **negligible, minor, moderate or major**. This is a semi-qualitative method designed to provide a broad ranking of the different potential impacts of a project. More details are provided in Table 3-4.

Table 3-3: Determination of impact severity

| | | Sensitivity | | | |
|-----------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Table 3-4: Impact Severity

| Impact Rating | Impact Description | Rating scales |
|---------------|--------------------|---------------|
|---------------|--------------------|---------------|

| | | |
|---|---|------------------------------------|
| <p>Major: the impact is unacceptable and further mitigation measures must be implemented to reduce the significance</p> | <ul style="list-style-type: none"> • Highly noticeable, irreparable effect upon the environment • Significant, widespread and permanent loss of resource • Major contribution to a known global environmental problem with demonstrable effects • Causing mortality to individuals of a species classified as globally or regionally endangered • Major expedience of water/air quality and noise guidelines representing threat to human health in long and short term • Causing widespread nuisance both on and off site | <p>> or = 12</p> |
| <p>Moderate: Impact is considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical</p> | <ul style="list-style-type: none"> • Noticeable effects on the environment, reversible over the long-term Localised degradation of resources restricting potential for further usage • Sub-lethal effects upon a globally or regionally endangered species with no effect on reproductive fitness and/or resulting in disruption/disturbance to normal behaviour returning to normal in the medium term • Elevated contribution to global air pollution problem partly due to preventable releases • Frequent breaches of water/air quality and noise guidelines • Causing localised nuisance both on and off site | <p>> or = 6 but < or = 9</p> |
| <p>Minor: Impact is considered acceptable</p> | <ul style="list-style-type: none"> • Noticeable effects on the environment, but returning naturally to original state in the medium term • Slight local degradation of resources but not jeopardising further usage • Disruption/disturbance to normal behaviour of a globally or regionally endangered species returning to normal in the short term • Small contribution to global air problem through unavoidable releases • Elevation in ambient water/air pollutant levels greater than 50% of guidelines | <p>> or = 2 but < or = 4</p> |

| | | |
|--|--|-----|
| | <ul style="list-style-type: none"> • Infrequent localised nuisance | |
| Negligible: Impacts is almost not felt | <ul style="list-style-type: none"> • No noticeable or limited local effect upon the environment, rapidly returning to original state by natural action • Unlikely to affect resources to noticeable degree • No noticeable effects on globally or regionally endangered species • No significant contribution to global air pollution problem • Minor elevation in ambient water/air pollutant levels well below guidelines • No reported nuisance effects | = 1 |

3.5.4 CUMULATIVE IMPACT ASSESSMENT (CIA)

The combined, incremental effects of human activity, referred to as cumulative impacts, pose a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts accumulate over time, from one or more sources, and can result in the degradation of important resources.

Step 1: Scoping Phase I – VECs, Spatial and Temporal Boundaries

This involved identification and establishment of VECs, spatial and temporal boundaries of assessment. It further involved identification and agreement on VECs in consultation with stakeholders, determining the time frame and establishing the geographic scope. This guided on knowing whose involvement is key; which VEC resources, ecosystems, or human values are to be affected by the development (based on prior sectoral assessments or the project's ESIA); known or anticipated cumulative impact issues within the region; concerns for cumulative impacts identified in consultation with stakeholders, including potentially affected communities (these may exist at distance from the planned development); regional assessments prepared by governments, multilateral development banks (MDBs), and other stakeholders (if any); CIAs prepared by sponsors of other developments in the region and any other Information from NGOs.

Step 2: Scoping Phase I - Other Activities and Environmental Drivers

This involved identification of other past, existing, or planned activities within the analytical boundaries. Assessment of their potential presence of natural and social external influences and stressors (e.g., wildfires, droughts, floods, predator interactions, human migration, and new settlements). This guided on knowing if there are any other existing or planned activities affecting the same VEC and if there are any natural forces and/or phenomena affecting the same VEC

Step 3: Establish Information on Baseline Status of VECs

This involved definition of the existing condition of VEC; understanding VEC's potential reaction to stress, its resilience, and its recovery time through assessment of trends. This is because determination of the trend of change in the baseline condition of a given VEC over time may indicate the level of concern for cumulative impacts. Therefore, it was helpful; to know what is the existing condition of the VEC; establish the indicators to be used to assess such conditions; identify any other additional data are needed and know those who may already have this information required. Data that are needed focus on the most important VECs though the collection of baseline data tends on these VECs was limited and targeted to indicators that would allow determination of any changes in VEC conditions as it provides a baseline condition that integrates the collective effects of all existing developments and exogenous pressures.

Step 4: Assess Cumulative Impacts on VECs

This involved estimating the future state of the VECs that may result from the impacts they experience from various past, present, and predictable future developments through identification of potential environmental and social impacts and risks; assessment expected impacts as the potential change in condition of the VEC (i.e., viability, sustainability) and identification of any potential additive, countervailing, masking, and/or synergistic effects. This guided on answering the questions on key potential impacts and risks that could affect the long-term sustainability and/or viability of the VEC; the known or predictable cause-effect relationships and interaction of these impacts and risks to each other.

Step 5: Assess Significance of Predicted Cumulative Impacts

Determination of impact significance and overall agreement among affected communities and other relevant stakeholders strengthens mitigation measures and monitoring programs, focusing on expected probable cumulative impacts. The significance of all CIs was evaluated not in terms of the amount of change, but in terms of the potential resulting impact to the vulnerability and/or risk to the sustainability of the VECs assessed implying evaluation of CIs in the context of ecological thresholds. Therefore, appropriate thresholds and indicators were defined to determine impact and risk magnitude and significance in the context of past, present, and future actions including identification of identify trade-offs hence establishment of how these impacts will affect the sustainability and/or viability of the resource and/or VEC and the consequences and/or trade-offs of taking the action versus no action.

Step 6: Management of Cumulative Impacts – Design and Implementation

Depending on the context in which the development impacts occur (i.e., the impacts from other projects and natural drivers that affect the VECs) and the characteristics of the development's impacts, mitigation measures were proposed as a result of views and actions of multiple stakeholders. This involved utilisation of the mitigation hierarchy to design management strategies to address significant cumulative impacts on selected VECs; engage other parties needed for effective collaboration or coordination; propose mitigation and monitoring programs on how to manage uncertainties with informed adaptive management. This included aspect of how cumulative impacts can be avoided, minimized, and/or mitigated; how can the effectiveness

of proposed management measures be assessed and what are the triggers for specific adaptive management decisions, among others.

3.6 FORMULATION OF THE ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The Environmental and Social Management Plan (ESMP) specified mitigation measures and monitoring actions with time frames, specific responsibilities assigned, and follow-up actions defined in order to check progress and the resulting effects on the environment by the project's implementation activities. The objectives of the ESMP included:

- a. To ensure that all the recommendations in the approved ESIA report are adhered to by the relevant lead agencies/institutions;
- b. To ensure that the prescribed environmental and social mitigation measures as well as the enhancement actions are well understood and communicated to all project stakeholders;
- c. To ensure that the proposed environmental and social corrective/offset measures are implemented throughout the project implementation phases;
- d. To evaluate the effectiveness of environmental and social mitigation/offset measures; and
- e. To evaluate the effectiveness of various evaluation techniques and procedures.

The ESMP is included in **Chapter 9** of this report

4 POLICY LEGAL AND REGULATORY FRAMEWORK

This chapter presents an overview of the key policies, laws, regulatory and institutional framework relevant to the environmental and social aspects of the proposed solar powered piped water supply system and sanitation facilities. It also identifies relevant agencies, departments, and institutions responsible for the monitoring and enforcement of legal requirements specified therein.

4.1 NATIONAL LEGISLATIONS AND REGULATIONS

The following is a summary of key policy, legal and regulatory requirements governing the proposed project:

Table 4-1: Summary of policies and plans applicable to the proposed project

| Policies or Plans | Brief description and its key provisions | Relevance in the Project |
|--|--|---|
| The National Environment Management Policy, 1994 | The overall policy goal is sustainable development, which maintains and promotes environmental quality and resource productivity for socio-economic transformation. One of the key principles guiding policy development and implementation include the need to conduct an ESIA for projects that are likely to have potential impacts on the environment. | The developer has undertaken an ESIA for the proposed project, for which this ESIS has been prepared. |
| The National Policy on Conservation and Management of Wetland resources 1995 | The overall goal of this policy is to maintain an optimum and sustainable diversity of uses and users and consideration of other stakeholders when using wetland resources. The objectives of this policy include establishing the principles by which wetland resources can be optimally used now and in future; to end practices, which reduce wetland productivity; maintaining the biological diversity of natural or semi natural wetlands; maintaining wetlands functions and values; and integrating wetlands concerns into the planning and decision making of other sectors. This policy outlines guidelines for wetland resource developers. | The proposed project will have transmission and distribution lines crossing wetlands. Also, some material source sites might be in or adjacent to wetlands. All proposed project implementation activities have to adhere to this policy requirements and undertake proper impact assessment to ensure adverse impacts on the wetland ecosystems are adequately mitigated. |
| The National Water Policy, 1999 | The objective of the policy is to provide guidance on development and management of the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs, with full participation of all stakeholders and mindful of the needs of future generations. | The contractor under the supervision of the project management team (DWD and District local government) will undertake routine monitoring of all water sources to prevent their contamination by project activities in line with this policy. |

| Policies or Plans | Brief description and its key provisions | Relevance in the Project |
|---|---|--|
| National Policy on Elimination of Gender Based violence, 2016 | The policy emphasizes early intervention to prevent re-victimization of and long-term effects for girls, including interpersonal violence, sexual coercion, alcohol and drug abuse and mental health problems, reporting cases of violence against children immediately. | The contractor in liaison with Local Council officials (especially Subcounty Community Development Officers) will undertake initiatives to do away with Gender Based Violence-GBV cases relating to project implementation activities. |
| The Uganda National Land Policy, 2013 | The land policy addresses the contemporary land issues and conflicts facing the Country. The vision of the policy is: “Sustainable and optimal use of land and land-based resources for transformation of Ugandan society and the economy” while the goal of the policy is: “to ensure efficient, equitable and sustainable utilization and management of Uganda’s land and land-based resources for poverty reduction, wealth creation and overall socio-economic development”. | All the land acquisition for project components which are to be installed on private land will be conducted following an approved Resettlement Action Plan (RAP), while involvement and discussions with UNRA and the District Local government are required to streamline the implementation of components like transmission pipes in the road reserve (public land). |
| National Climate Change Policy, 2015 | <p>Climate change is a global challenge that requires a concerted effort by all nations. This National Climate Change Policy (NCCP) is Uganda’s integrated response to climate change. It has been prepared and designed within the context of the country’s vision and national development priorities; it provides a clearly defined pathway for dealing with the challenges of climate change within the socio-economic context of Uganda, and looks ahead to the opportunities and benefits of a green economy.</p> <p>The goal of the policy is to ensure a harmonized and coordinated approach towards a climate- resilient and low-carbon development path for sustainable development in Uganda. The overarching objective of the policy is to ensure that all stakeholders address climate change impacts and their causes through appropriate measures while promoting sustainable development and a green economy.</p> | The project design needs to ensure measures are put in place to manage the effects of climate change, while implementation activities will have to ensure the GHG emissions are kept low and enhance opportunities for GHG emissions reduction. |
| The National Equal Opportunities Policy 2006 | <p>The goal of the National Equal Opportunities policy is to provide avenues where individuals and groups’ potentials are put to maximum use by availing equal opportunities and affirmative action.</p> <p>The policy objectives amongst others are to:</p> | Discrimination and stigmatization, which acts as a barrier for marginalized and other groups of people in the project area to accessing employment and support opportunities will be eliminated throughout all project implementation phases. This entails |

| Policies or Plans | Brief description and its key provisions | Relevance in the Project |
|---|--|--|
| | <ul style="list-style-type: none"> a. Guide the planning processes, affirmative action, and implementation of programmes and allocation of resources to all stakeholders. b. Guide the establishment of legal, policy and institutional frameworks of all stakeholders. c. Provide a framework for assessing responsiveness of programmes and activities to equal opportunities, in redressing any imbalances therein. d. Empower marginalized and vulnerable groups for their full participation in all development processes. e. Enhance capacity of implementing agencies to provide quality services with a view to monitoring compliance with affirmative action and the constitutional provisions | equitable access to services by workers employed at the project. |
| The National Environment Health Policy 2010 | This policy establishes the environmental health priorities of the Government of Uganda and provides a framework for the development of services and programmes at national and local government levels. It has been developed in support of the National Health Policy and primarily concerns the role of the Ministry of Health. However, environmental health is a cross-cutting discipline, and the policy therefore has implications for other departments and agencies. | Environmental health encompasses a wide range of subjects but in the Ugandan context is concerned primarily with water supply, sanitation, and hygiene promotion; solid, liquid, hazardous waste management; air pollution control; food safety and hygiene; the control of insect vectors and vermin; occupational. |
| National Policy on HIV/AIDS and the world of work, 2007 | The policy obliges developing entities to mainstream HIV/AIDS interventions to their planned development interventions. | The contractor will institute structures with human and financial capacity to undertake HIV/AIDS sensitization and prevention of new infections among the project workers and local community throughout all the project implementation phases in line with the provisions of this policy. |
| Uganda Gender Policy 2007 | The Uganda Gender Policy mandates the Ministry of Gender, Labour and Social Development and other line Ministries to mainstream gender in all sectors. | The contractor will be encouraged to adopt an equal opportunity employment policy and to incorporate gender aspects and considerations in the recruitment |

| Policies or Plans | Brief description and its key provisions | Relevance in the Project |
|---|--|---|
| | | process for both skilled and non-skilled labour force as far as applicable during the project lifecycle. |
| The National HIV/AIDS Policy, 2004 | The policy aims at guiding multi-sectoral approach to HIV/AIDS control in the country. Section 3.4 of the policy talks about Impact mitigation at individual to community level. The policy aims at providing psychosocial and economic support to all those infected and directly affected by HIV & AIDS. The epidemic has severe short- and long-term effects on various population categories on development efforts at household, community, sector, and national levels. The impact on the labour force in the various sectors in communities and households affects productivity, household income and savings. Objective of this section in the policy is to minimize the socio-economic consequences of HIV & AIDS on the population and promote involvement of the infected and affected in the development efforts. Subsection I under Policy Strategies it specifically requires workplace policies in both public and non-public formal and informal sectors to be appropriately reviewed to cater for HIV&AIDS prevention & care issues in the workplace. | In line with this policy, the contractor in liaison with different local council and Local government officials such Community Development Officers and HIV/AIDS Focal Personnel among others will ensure mainstreaming HIV/AIDS interventions into project plans and implementation activities. The measures are aimed at stemming the new infections, curtailing their spread and stigmatization of victims of HIV/AIDS among the project workforce and neighbouring communities |
| National Policy on Disability 2006 | The National Policy on Disability in Uganda aims at promoting equal opportunities for enhanced empowerment, participation, and protection of rights of PWDs irrespective of gender, age and type of disability. This is in recognition that PWDs can perform to their full potential given the same conditions and opportunities irrespective of their social, economic, and cultural backgrounds. The Policy is to guide and inform the planning process, resource allocation, implementation, monitoring and evaluation of activities with respect to PWDs concerns at all levels. | With limited skills characteristic of most PWDs, accessing employment is a major challenge. Most potential employers do not give chance to PWDs to compete for employment even where they have the necessary qualifications and experience. During recruitment of workers to be employed to undertake construction activities, some PWDs will apply for some jobs and the contactor should give consideration to the PWDs applicants who qualify for such jobs |
| The Uganda National Culture Policy 2006 | It provides strategies to enhance the integration of culture into development. These strategies include advocating for culture, ensuring capacity building, ensuring research and documentation, promoting collaboration with stakeholders, and mobilizing resources for culture. These | Cultural leaders and local leaders need to be involved and consulted during the ESIA process for the proposed project activities so that they can help guide the process especially on which natural- |

| Policies or Plans | Brief description and its key provisions | Relevance in the Project |
|-----------------------------------|--|--|
| | strategies are an integral part of the Social Development Sector Strategic Investment Plan (SDIP) whose mission is to create an enabling environment for social protection and social transformation of communities. | historical and traditional collections could be preserved based on their cultural importance or historical relevance in the project implementation process. |
| Uganda Vision 2040 | Uganda’s Vision is to have “A transformed Ugandan society from a peasant to a modern and prosperous Country within 30 years”, from 2010. This involves changing from a predominantly low income to a competitive upper middle-income country within 30 years. It is envisaged that the country will graduate to the middle-income segment by 2017 and reach a per capita of USD 9,500 by 2040. For the country to achieve its Vision 2040, it is necessary to increase access to appropriate and adequate sanitation as well clean and safe water. | The proposed project is aligned to Vision 2040, by improving access to appropriate and adequate sanitation as well clean and safe water in the project area. |
| The National Development Plan III | The plan provides guidance to the nation in delivering the aspirations articulated in Uganda Vision 2040 for the period 2020/21 – 2024/25. The Goal of NDPIII is attaining Increased Household Incomes and Improved Quality of Life of Ugandans, under the theme: “Sustainable Industrialization for inclusive growth, employment and wealth creation”. NDPIII aims to stop, reduce and reverse environmental degradation and the adverse effects of climate change as well as improve utilisation of natural resources for sustainable economic growth and livelihood security. | The project implementation will follow the ESMP put forward in this ESIS to ensure sustainable utilisation of natural resources and mitigation of likely impacts on the environment. |

Table 4-2: Summary of laws applicable to the proposed project

| Laws | Brief description and its key provisions | Relevance in the Project |
|--|---|---|
| The Constitution of the Republic of Uganda, 1995 | The Constitution requires that the project be implemented without endangering human health and the environment. | The proposed project activities will be undertaken while ensuring safe and healthy environment is maintained as provided for in the Constitution. |

| Laws | Brief description and its key provisions | Relevance in the Project |
|---|---|--|
| The National Environment Act 2019 | Specifically, its Fifth Schedule lists projects that require mandatory ESIA's to be done before implementation, hence the need for this ESIA to be prepared for the proposed project. | The proposed project falls under Schedule 5 for projects which require mandatory ESIA's before implementation, as such, the need to conduct this study. |
| The Land Acquisition Act, 1965 | This Act provides for acquisition of land after its valuation and along approved procedures which ensure adequate, fair, and timely compensation to the landowners. The Act requires that adequate, fair, and prompt compensation is paid before taking possession of land and property. Dispute arising from the compensation to be paid should be referred to the court for decision if the Land Tribunal cannot handle | The key consideration regarding this Act in the project is to ensure landowners affected by the project are adequately and timely compensated. |
| The Land Act, Cap 227, of 1998 | The Land Act, Cap 227 of 1998 provides for the tenure, ownership, and management of land. Under Section 44 the Government or the local government shall hold land in trust for the people and protect natural lakes, ground water, natural streams, wetlands and any other land reserved for ecological purposes for the common good of Ugandans. | Proposed project activities will be implemented with the footprint covering both private and public land. Therefore, land acquisition needs to follow the provisions of the Act. |
| The Physical Planning Act 2010 and The Physical Planning (Amendment) Act 2020 | <p>An Act to consolidate the provisions for the orderly and progressive development of land, towns, and other areas, whether urban or rural. In respect of every area declared to be a planning area under section 5, there shall be a planning committee or planning committees. This planning committee shall be the municipal council or shall consist of such persons as the board, after consultation with any local authority concerned, shall appoint for town areas and rural areas respectively.</p> <p>Section 2A of the Amendment provides a right to clean and health environment. And every Ugandan has a duty to create, maintain and enhance a well-planned environment. Any result of act or omission by any person likely to breach a physical development plan or physical planning standard report to relevant authorities or file a civil suit against any person whose act or omission has breached or</p> | This is a relevant Act to the proposed project activities. Different provision of this act will be implemented during the different phases (construction and operation) of the proposed project. |

| Laws | Brief description and its key provisions | Relevance in the Project |
|------------------------------------|--|--|
| | likely to breach a physical development plan or physical planning standard. | |
| National Climate Change Act, 2021 | The Act gives the force of law in Uganda to the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement; provides for climate change response measures; provides for participation in climate change mechanisms; provides for measuring of emission, reporting and verification of information; provides for institutional arrangements for coordinating and implementing climate change response measures; provides for financing for climate change; and for related matters. | The project design needs to ensure measures are put in place to manage the effects of climate change. When the District Climate Action Plan is developed, implementation activities will have to ensure alignment. |
| The Uganda Wildlife Act, 2019 | In order to support sustainable utilization of wildlife for the benefit of the people of Uganda, the purpose of the Act among others is to provide for the conservation of wildlife throughout Uganda so that the abundance and diversity of their species are maintained at optimum levels commensurate with other forms of land use. | <p>Karuma wildlife reserve is located north of the project area at approximately 4.5 km from the nearest beneficiary area (Apodorwa trading centre) where water supply will be implemented. However, during stakeholder consultations there was no concerns raised related to human-wildlife conflicts in the latest past. In addition, the project shall take into consideration to prohibit any worker in possession of unauthorised wildlife meat or products.</p> <p>Considering that some of the water pipes will go through remote section of the countryside involving clearing of vegetation, and excavation of land to create holes etc, this Act is quite relevant, and relevant provisions should be complied forthwith for project implementation.</p> |
| The Historical Monuments Act, 1968 | The Act provides for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical, and traditional interest and for other matters connected therewith. The Act requires that any chance finds encountered during project construction shall be preserved by the Department of Monuments and Museum in the Ministry of Tourism, Wildlife and Antiquities. | Some objects of cultural and/or historical significance might be encountered/affected during project implementation and their preservation is called for by this act. |

| Laws | Brief description and its key provisions | Relevance in the Project |
|---|--|--|
| The Public Health Act, Cap 281 | Under this Act, the Minister may cause to be made such inquiries as he or she may see fit in relation to any matters concerning the public health in any place. When such a directive is made, the person directed to make the inquiry shall have free access to all books, plans, maps, documents and other things relevant to the inquiry and shall have in relation to witnesses and their examination and the production of documents similar powers to those conferred upon commissioners by the Commissions of Inquiry Act, and may enter and inspect any building, premises or place, for the purpose of inquiry. | The provisions of this Act will be relevant for the project implementation activities such as construction civil works, establishment of ancillary facilities such as workers camps, material holding areas, equipment storage/parking yards as well as maintenance of project machinery to control incidences occupational health and safety accidents, among others. Construction activities will take all possible mitigations to make sure that, all impacts to human and environment are avoided and where not possible or in case of accident, there will be compensation. |
| The Water Act Cap, 152 1997 | The Act provides for the use, protection and management of water resources and supply in Uganda. The Water Resources Regulations of 1998 established under this Act stipulates a requirement to apply for a permit to construct, own, occupy or control any works on or adjacent the land as per Regulation 10. | Abstraction of water for the project will follow the provisions of the Act including obtaining an abstraction permit from the DWRM. Any disposal of waste shall also need to be in line with the waste discharge regulations; proper management of fuel/oil spills is essential for minimizing chances of water contamination |
| The National Forestry and Tree Planting Act, 2003 | The Act provides for the conservation, sustainable management and development of forests for the benefit of the people of Uganda. It also provides that the Central Government or local government shall hold in trust for the people and protect forest reserves for ecological, forestry and tourism purposes for the common good of the citizens of Uganda. | The project will encourage tree planting as part of its integrated catchment protection and management measures. |
| Traffic and Road Safety Act, Cap.361 | Section 119 of the Traffic and Road Safety Act stipulates that every person who uses, parks or stands a motor vehicle, trailer or engineering plant on any road carelessly or without reasonable consideration for other persons using the road commits an offence. | The contractor will ensure that all project machinery (construction equipment and material haulage fleet) observe traffic and road safety procedures including observing minimum speed limits, routine maintenance and observing road signs among others. Additionally, more safety measures such as traffic guides/controllers, humps and road signage will be adopted to ensure safety of all road users during project implementation activities as guided by this Act. |

| Laws | Brief description and its key provisions | Relevance in the Project |
|--|---|---|
| The Roads Act, 2019 | The Act prohibits erection of any building or planting of any trees or placing of pipelines within the road reserve except with a written permission of an appointed road authority. | The project developer will apply to the appointed road authority to carry out activity in the road reserve while also stipulating measures for restoration upon completion of project activity. |
| The Occupational Safety and Health Act, 2006 | The Occupational Safety and Health Act of 2006 makes provisions for the health, safety, welfare, and appropriate training of persons employed in workplaces. | The employer (contractor) must protect the health and safety of all project workforce by providing them with all requisite PPEs, safety training, clean and healthy work environment, sanitary conveniences, washing facilities, First Aid facilities, clean drinking water, and meals among others throughout the project implementation phases in accordance with this act. |
| The Workers' Compensation Act, Cap. 225 | The Act outlines matters of compensation for injuries and accidents as well as the responsibility of employees to take care of their health and safety while on the project. | The employer (contractor) must protect the health and safety of all project workforce by providing them with all requisite PPEs, safety training, clean and healthy work environment. The Act seeks to safeguard the workers and ensure that they are appropriately compensated in case of injuries resulting from project implementation activities. |
| The Employment Act, 2006 | This Act is the governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, management, and compensation of workers. It provides for matters governing individual employment relationships in terms of circumstances of provision of labour. It is quite explicit on matters of forced labour that, no one should be forced to work, there should be no discrimination with regard to recruitment process, and it prohibits sexual harassment in employment. | This Act is relevant in that, it addresses matters of engagement of workers and their rights while at work. The contractor shall adhere to the provision of this Act for all project-related recruit of workforce. |
| Children Act Cap 59 | The Act defines a child as a person below the age of 18. It lists the right for children to be with their parents, circumstances under which they should not, foster care and adoption procedures as well as mandates of local authorities and roles of community. | Child labour is to be prohibited during project implementation activities i.e., no employment of children below 18 years for all the project implementation activities. |
| Domestic Violence Act 2010 | The Act provides for the protection and relief of victims of domestic violence; provides for the punishment of perpetrators of domestic | This act gives guidance to the contractor and their workers on how to handle cases of domestic violence. |

| Laws | Brief description and its key provisions | Relevance in the Project |
|--------------------------------|---|---|
| | <p>violence and spells out procedures and guidelines to be followed by the courts in relation to the protection and compensation of victims of domestic violence as well as matters relating to cases of domestic violence in general.</p> | |
| The Survey Act, 1964 | <p>Section 23 of the Act also points out compensation for injury done by clearance during the act of survey. For the purpose of the topographic survey of the project site this act will be relevant in this project.</p> | <p>In line with the project footprint and land requirements, it is necessary to undertake land survey for this project, as guided by the Act and conducted by a registered surveyor authorized by the commissioner for surveys in Ministry of Lands, Housing and Urban Development.</p> |
| Access to information Act 2005 | <p>The Act aims to promote an efficient, effective, transparent and accountable Government; give effect to article 41 of the Constitution by providing the right to access to information held by organs of the State, other than exempt records and information; protect persons disclosing evidence of contravention of the law, maladministration or corruption in Government bodies; promote transparency and accountability in all organs of the State by providing the public with timely, accessible and accurate information; and empower the public to effectively scrutinise and participate in Government decisions that affect them.</p> <p>Section 5 of the Act highlights the right of access to information and records in the possession of the State or any public body, except where the release of the information is likely to prejudice the security or sovereignty of the State or interfere with the right to the privacy of any other person.</p> | <p>Upon approval of this ESIA Study by NEMA and the World Bank, the report will have to be published by NEMA and the Project developer on their respective websites to enable stakeholder access to the pertinent information.</p> |

Table 4-3: Summary of regulations and standards applicable to the proposed project

| Regulations or standards | Brief description and its key provisions | Relevance in the Project |
|---|---|---|
| The National Environment (Environmental and Social Assessment) Regulations, 2020 | The National Environment Management Authority (NEMA) issued Environmental Impact Assessment Regulations, 2020, for conduct of ESIA's, which are now part of the Environmental Legislation of Uganda. | The developer has undertaken this ESIA study with particular focus on the content specified within the Second Schedule of these Regulations and any other development or changes shall have to follow the same assessments. |
| Water Resources Regulations, 1998 | The Regulations apply to motorized water abstraction from boreholes or surface watercourses or diverting, impounding, or using more than 400m ³ of water within a period of 24 hours. | The project implementation will follow the conditions set out in the regulations. The Contractor will be required to abide by provisions of this law in regard to water usage and conservation during use for construction civil works and associated project facilities such material yards, workers' camps among others. |
| The National Environment (Wetlands, Riverbanks and Lakeshores Management) Regulations 2020. | These Regulations guide on the development procedures to be followed where developments are to be undertaken in wetlands, riverbanks, and lakeshores. | <p>The some of the proposed project components will cross through wetlands. Likewise, the material source sites might be in or adjacent to wetlands.</p> <p>All proposed project implementation activities have to adhere to these regulations requirements and undertake proper impact assessment to ensure adverse impacts on the wetland ecosystems are adequately mitigated. In addition, where applicable the project will acquire wetland use permits for any activity specified in the second schedule of the regulations.</p> |
| Draft National Air Quality Standards, 2006 | Considering that construction equipment and machinery are powered by diesel/ gasoline engines, pollutants such as CO ₂ , NO _x , SO _x , VOC, and particulates are expected to be emitted. The draft National air quality standards provide the following regulatory limits for these emissions. | A number of proposed project activities such as material haulage, material extraction of both murrum and stones, construction works among others will likely impact on the local ambient air quality. Guided by provisions of these standards, the contractor will adopt appropriate measures to minimize, mitigate and prevent air quality deterioration resulting from project implementation activities. |
| The National Environment (Waste Management) Regulations, 2020 | These Regulations apply to all categories of hazardous and non-hazardous waste, storage and disposal of hazardous waste and their movement into and out of Uganda and to all waste disposal facilities, landfills, and sanitary fills and to incinerators. | Certainly, waste will be generated during project implementation activities especially from contractor facilities such as camps, material yards, among others. The contractor guided by these regulations will ensure that all generated |

| Regulations or standards | Brief description and its key provisions | Relevance in the Project |
|--|---|---|
| | | wastes throughout all project implementation phases are appropriately managed/disposed of. |
| National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations, 2020 | These regulations provide standards for effluent discharge. Schedules 2, 3 and 4 detail maximum permissible limits for regulated contaminants, which must not be exceeded before effluent is discharged into water or on land. | Proposed project activities will certainly generate effluent waste. The contractor should employ appropriate measures to manage effluent waste generated by project activities especially ancillary facilities such as workers' camps, material yards, mechanical workshops and construction site among others. |
| The National Environment (Noise Standards and Control) Regulations, 2003 | Part III Sec. (1) requires machinery operators to use the best practicable means to ensure that the emission of noise does not exceed the permissible levels. | Indisputably, implementation of proposed project activities and other associated activities will trigger noise generation. These standards shall however be applied to keep the noise levels in permissible limits as well as mitigating noise generation at the source. |
| National Environment (Control of Smoking in Public Places) Regulations, 2004 | According to WHO, Second-hand smoke (SHS) is a human carcinogen for which there is no "safe" exposure level 1. To avoid public health risk from SHS, Uganda enacted this Regulations to regulate smoking in public places. Under this law, a public place is defined as, "any place to which members of the general public or segments of the general public ordinarily have access by express or implied invitation and includes any indoor part of a place specified in this schedule". These places include, office buildings, workplaces, eating areas, toilets and public service vehicles. The regulations task owners of such places to designate "NO SMOKING" and "SMOKING AREAS" in premises. In this project, these regulations will apply to areas communally used by construction workers such as site offices, eating areas in camps and workers transport vehicles. | Requirements of these regulations should be fulfilled by the contractor through instituted structures especially within construction site and workers' facilities such as changing rooms, resting areas, dinning among others, to avoid exposure of workers to tobacco Second Hand Smoke and associated health risks. |

4.2 REQUIRED APPROVALS, PERMITS AND LICENSES

Several approvals and licenses will be required before commencement of construction activities while some prior to particular activities during project implementation. Securing of approvals requires preparation of the relevant documentation and payment of fees. This needs to be done during mobilization to ensure that all approvals are secured in a timely manner to avoid construction delays. It is important to ensure that all materials (sand and aggregates) are sourced from quarries, borrow pits and sand mines approved by NEMA and compliant with environmental laws. For all new materials sites to be opened up, NEMA approval must be secured while all existing sites should undertake/provide proof of having undertaken environmental compliance audits. The following permits and licenses may be required by the project as presented in **Table 4-4**.

Table 4-4: Approvals, permits and licenses potentially required by the project

| Approvals, Permits and Licenses Required | Issuing Authority | Party responsible for acquiring permit/license | Legal Framework |
|--|---------------------------------|--|--|
| Water Abstraction Permit | DWRM | MWE & Contractor | Water Act, cap 152 |
| Waste Disposal Permit | NEMA | MWE & Contractor | National Environment Act 2019; National Environment (Waste Management) Regulation 2020 |
| Waste Transportation License | NEMA | Contractor | National Environment Act 2019; National Environment (Waste Management) Regulation 2020 |
| ESIA Approval for Campsites and hoarding areas | DLG | Contractor | National Environment Act 2019 |
| Permit to carry out a Regulated activity in a Wetland, Riverbank, Lakeshore (River Nile) | NEMA | Contractor & MWE | National Environment Management (Wetland, Riverbank, Lakeshore) Regulation 2020 |
| License to emit noise in excess of permissible noise levels | NEMA | Contractor | National Environment Act 2019 |
| Mining Permit, Extraction of minerals, opening up of quarries and sand pits | DGSM/ MEMD/ NEMA approval | Contractor | Mining Act, Cap 148 |

| | | | |
|--|-----------------------------|---|--|
| Permit for Storage of Petroleum Products and dispensing license | PSD/MEMD | Contractor | Petroleum Act, Cap 2003 |
| Work Place Registration Permit | MGLSD | Contractor | OHS Act, 2006 |
| Work Permits | Ministry of Internal Affair | Contractor & Supervising, Consultant/ MWE | Immigrations Act, Cap 66 |
| Statutory Certification of equipment | MGLSD, UNBS | Contractor | OHS Act, UNBS Act |
| Permit if the water transmission line is to cross the UNRA road (Road Permits) | UNRA | MWE | The Uganda National Roads Authority (General) Regulations 2017 |
| Traffic Diversions consent | Uganda Police | Contractor | Traffic and Road Safety Act 1998 |
| RAP approval conditions for this project | CGV | MWE | The Land Act Cap 227 |

4.3 INTERNATIONAL PROTOCOLS AND CONVENTIONS

The relevant international protocols and conventions for which Uganda is a signatory to as presented in **Table 4-5** below.

Table 4-5: Summary of international protocols and conventions applicable to the proposed project

| Protocol or Convention | Purpose |
|--|---|
| African Convention on the Conservation of Nature, 1968 | Encourages individual and joint action for the conservation, utilisation and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view. |
| United Nations Framework Convention on Climate Change (UNFCCC), 1992 | The Convention requires parties to avoid adverse effects on the environment and adopt measures and policies to control carbon dioxide emissions in technologies, taking into account their common, yet differentiated responsibilities, as well as their specific national and regional development priorities, objectives and circumstances. They are required to take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimising adverse effects on the economy, on public health and on the quality of the environment |

| Protocol or Convention | Purpose |
|---|---|
| | of projects or measures undertaken by them to mitigate or adapt to climate change. |
| United Nations Convention to Combat Desertification (UNCCD), 1994 | Binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007 with a view to <i>forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability.</i> |
| Montreal Protocol for the Protection of the Ozone Layer, 1987 | The protocol was designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion. All of the ozone depleting substances controlled by the Montreal Protocol contain either chlorine or bromine (substances containing only fluorine do not harm the ozone layer). The provisions of the Protocol include the requirement that the Parties to the Protocol base their future decisions on the current scientific, environmental, technical, and economic information that is assessed through panels drawn from the worldwide expert communities |
| Stockholm Convention on Persistent Organic Pollutants, 2001 | Protects human health and environment from Persistent Organic Pollutants that remain intact in the environment for long periods and can become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife, which can lead to serious health effects. |
| Strategic Approach to International Chemicals Management, 2006 | Fosters sound management of chemicals and to ensure that by the year 2020, chemicals are produced and used in ways that minimise significant adverse impacts on the environment and human health. |
| International Labour Organisation Convention, 1998 | Sets out basic principles and labour rights at work, based on international best practise. |

4.4 WORLD BANK OPERATIONAL POLICIES (OPS)

The large solar powered piped water supply system and sanitation facilities to be constructed under IWMDP interventions in Kiryandongo 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 World Bank. The operational policies triggered in this project are summarized in **Table 4-6** below:

Table 4-6: Summary of how the planned project activities trigger WB OPs

| Safeguard Policies | Triggered/ Not Triggered | Remarks |
|---|--------------------------------|---|
| Environmental Assessment OP/BP 4.01 | Triggered | The proposed project may have adverse environmental and social impacts through its infrastructure activities, particularly civil works for water supply and sanitation. The project alignment goes through rural growth centres with a number of activities and therefore potential impacts relating to influx of labour, drainage, traffic, noise generation among others are likely. In general, the project falls under Category B of the World Bank's Environmental Assessment classification of projects requiring an ESIA/ESMP given that its potential of moderate environmental and social impacts will be site specific, few if any are irreversible, and in most cases mitigation measures can be readily designed. |
| Natural Habitats OP/BP 4.04 | Triggered | There will be potential loss or degradation of natural habitats including riparian and wetland habitats, due to the planned construction works for transmission and distribution lines in these ecologically sensitive areas. The likely impacts on the natural habitats have been assessed as part of the ESIA and appropriate mitigation measures included in the ESMP |
| Forests OP/BP 4.36 | Not Triggered | The proposed site for project implementation and the immediate neighbourhood do not have any forest or land gazetted as forest reserve. |
| Pest Management OP 4.09 | Not Triggered | No application of pesticides is envisaged in the project. |
| Physical Cultural Resources OP/BP 4.11 | Triggered | The project will involve excavations and there are chances of inadvertently finding PCRs. Chance Finds Procedure has been developed as part of the ESIA to guide in managing of PCRs should they be found during project implementation. |
| Indigenous Peoples OP/BP 4.10 | Not triggered | No known Indigenous Peoples exist within the project area. |
| Involuntary Resettlement OP/BP 4.12 | Triggered | The project will involve land acquisitions for sites planned for the water sources and reservoir. Therefore, the project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons; and in particular, for this project, economic loss is possible. Acquisition of land should be through free, prior and informed consent; and the potentially affected persons should have the right to refuse land acquisition or restrictions on land use that can result into displacement. In order to guide proper implementation of the involuntary resettlement aspects of the project, a Resettlement Action Plan has been prepared in parallel with this ESIA. |

| Safeguard Policies | Triggered/ Not Triggered | Remarks |
|---|--------------------------|--|
| Safety of Dams OP/BP 4.37 | Not Triggered | This OP is not triggered because the project works do not involve dam related works. |
| Projects on International Waterways OP/BP .50 | Not Triggered | The project does not affect international water ways. The source of water supply for this project are two boreholes. |
| Projects in Disputed Areas OP/BP 7.60 | Not Triggered | There are no disputed areas along the project corridor. |
| World Bank Policy on Access to Information (2015) | Triggered | There is need for disclosure of information to all the project stakeholders through the sharing of information with stakeholders such as district technocrats, Town council/ Sub County leaders, Local council leaders, and communities among others during the consultations process. Project information will remain accessible by them. |

4.4.1 GAP ANALYSIS BETWEEN THE KEY WORLD BANK SAFEGUARD POLICIES AND GOVERNMENT OF UGANDA'S ENVIRONMENTAL AND SOCIAL REQUIREMENTS (AS ADOPTED AND UPDATED FROM THE IWMDP ESMF, 2018 AND UGANDA CLIMATE SMART AGRICULTURAL PROJECT ESMF, 2022)

The platform upon which Uganda's country system has been built is the Constitution, which commits government to protecting natural resources on behalf of the people. It explicitly encompasses the concept of sustainability, including meeting the needs of present and future generations. The State is also committed to preventing or minimising environmental damage and upholding the right of *"every Ugandan to a clean and healthy environment"*. This represents the highest-level commitment to sustainability. The NEA 2019 is the key legislation for environmental (and to a lesser extent, social) risk management.

From an environmental perspective, Uganda's institutions have well-enough defined mandates and adequate enabling legislation, albeit with some gaps, overlaps and weaknesses. For the most part, policies, laws, regulations, and guidelines are adequately aligned with regards to the World Bank Environmental and Social Safeguards Policies, especially given that the National Environment Act 2019 (NEA 2019) has been revised and significantly improved, and that new Environmental and Social Impact Assessment (ESIA) regulations have been revised following Good International Industry Practice, with participation of the World Bank.

It is worth noting that environmental management in Uganda has been largely supported by the World Bank, right from the development of the National Environment Management Policy in 1994, the National Environment Act in 1995 (updated in 2019) and the accompanying Regulations, including the establishment of NEMA. Owing to this, most of the environmental requirements are largely influenced by the World Bank's Environmental and Social Safeguard Policies. Most of the provisions of OP 4.01 were adopted and as such the E&S screening and assessment methodology is virtually the same as seen in the Uganda's EIA Guidelines of 1997 and Regulations 2020.

Therefore, in cases where gaps are found between the WB E&S Safeguards Policies and the Government of Uganda Environmental requirements, the World Bank Safeguard Policies shall take precedence especially on matters which are not explicitly provided in the National Legislation requirements.

Some of the differences include the following: first and foremost, the Ugandan Laws do not provide for Framework Approach (ESMF and RPF) but rather only specific instruments (ESIA, ESMP, Environmental Audits, RAPs). Whilst Uganda's ESIA systems are relatively strong on biophysical considerations, they are weaker regarding assessment of social and related issues. Whereas the WB Policies provide for independent review mechanism (the Inspection Panel), there is no explicit requirement for independent review of ESIA reports under Uganda's laws, though the ESIA Regulations (2020) provide for a reference to relevant experts who may be consulted to provide specialist knowledge and to assist with understanding and interpreting technical aspects of the project. Furthermore, there is no applicable legislation on a minimum wage. Aspects of the Employment Act contradict other Ugandan laws, by allowing for the employment of children aged 14 for "light work" under adult supervision, in contradiction to Section 7 of the Children (Amendment) Act (2016) which sets the employment age at 16. The Employment Act does not clearly define hazardous employment. The legal framework also fails to provide penalties for the violation of laws prohibiting the employment of minors, contributing to high school drop-out rates, teenage pregnancies, and health issues as children find work on project sites.²

Under OP 4.04 Natural Resources, Uganda lacks Regulations to implement the National Forestry and Tree Planting Act and the Wildlife Act. Therefore, OP 4.04 and OP 4.36 on Forests shall be used to assess any impacts on natural habitats. On OP 4.11 Physical Cultural Resources, the Ugandan legal framework is limited in scope. For example, it does not cover certain aspects such as the intangible heritage. The other area is under OP 4.12 (Involuntary Resettlement) whereby Uganda's Land Act legal framework is restricted to fair, adequate and prompt compensation (cash), while the World Bank policy requires the need to provide alternative land, resettling the Project Affected Persons (PAPs) to levels or standards of livelihood similar to or better than before compensation. The Ugandan legislation also does not provide for restoration of livelihoods, resettlement assistance and compensation at replacement value. Under circumstances like these regarding short-comings in the Uganda law on compensation and ESMF process, the provisions of OP 4.12 shall be applied.

The existing gaps are summarized in Table 4-7 below:

² Uganda Social Risk Management (SRM) Technical Paper (2019)

Table 4-7: Summary of Gap Analysis between Uganda and World Bank Safeguards

| World Bank's Safeguard Policies | Uganda's Legal and Regulatory Framework | Gaps identified in Uganda legal and regulatory framework | Provisions for this ESIA |
|--|--|--|--|
| Environmental Assessment (OP 4.01) | <ul style="list-style-type: none"> • National Environment Management Policy, 1994. • National Environment Act No.5 of 2019. • National Environment (Environmental and Social Assessment) Regulations, 2020. | <ul style="list-style-type: none"> • Independent review is not specifically provided for under ESIA Regulations of Uganda and as a result, the review of ESIA's is commonly reviewed by government agencies; • In the EIA review process, there is no specific legal/regulatory framework that caters for examination of the quality of the ESIA reports. Only conditions of approval/reasons for non-approval of ESIA's are provided by NEMA; • There are no administrative mechanisms for appealing a decision taken on an EIA. | The WB (as a financing agency has to review reports to ensure compliance with E&S regulations and approve them before releasing the funding) |
| Natural Habitats (OP 4.04) and Forests (OP 4.36) | <ul style="list-style-type: none"> • The Constitution 1995 as amended; • the National Environment Act No.5 of 2019; • The National Forestry and Tree Planting Act, 2003; | There are general gaps which include lack of Regulations to implement the National Forestry and Tree Planting Act and the Wildlife Act. | UWA has been proposed as one of the responsible institutions over the wildlife incise animals are identified in the project area |

| | | | |
|---|--|---|--|
| | <ul style="list-style-type: none"> • The Uganda Wildlife Act 2019; • The Land Act Cap 227; • The Fish Act Cap 197; • The Plant Protection Act Cap 31. | | |
| Physical Cultural Resources (OP 4.11) | <ul style="list-style-type: none"> • The Constitution 1995 as amended • The National Environment Act, 2019 • The Historical Monuments Act, Cap 46 <ul style="list-style-type: none"> • The Institution of Traditional or Cultural Leaders Act, 2011 | <ul style="list-style-type: none"> • The legal framework is limited in scope. For example, it does not cover certain aspects such as the intangible heritage; • There is no strong institution to regulate and manage heritage resources; • The sites and monuments are not adequately maintained, documented and in addition, some of the antiquities are not collected; • There is limited enforcement of the legal framework related to Physical Cultural Resources in Uganda because most developers and government officials do not understand the importance of conserving physical cultural resources. | A Chance Findings Procedure (CPF) has been developed and included under section 9.3.13 to guide on the process |
| <p>The current Historical Monuments Act is being reviewed to provide for an efficient law for the protection of the cultural resources of the country. The new law shall be inclusive of all aspects of culture, the tangible, intangible heritage of the country. The revised Environmental and Social Impact Assessment Regulations provide that risk assessment should include risks to cultural heritage.</p> | | | |

Table 4-8: Gaps between World Bank and Ugandan legislation applicable to OP 4.12 Involuntary Resettlement

(Adopted from the Uganda Climate Smart Agricultural Project-RPF)

| Category of PAPs/ Type of Lost Assets/ Impact | Ugandan Law | OP 4.12 | Gap Analysis | Provisions for this ESIA and ensuing RAPs |
|---|---|--|--|---|
| Land Owners | <p>The Constitution of Uganda, 1995 recognizes four distinct land tenure systems, Customary tenure, Freehold tenure, Leasehold tenure and Mailo land tenure.</p> <p>Land is valued at open market value and a 15% to 30% disturbance allowance must be paid if six months or less notice is given to the owner.</p> <p>Cash compensation is the recommended option.</p> | <p>World Bank Policy recognises the rights of those affected people:</p> <ul style="list-style-type: none"> • Who have formal legal rights to the land or assets they occupy or use. • Who do not have formal legal rights to land or assets, but have a claim to land that is recognized or recognizable under national law. • Who have no recognizable legal right or claim to the land or assets they occupy or use. <p>Compensation of lost assets at full replacement costs.</p> <p>Cash compensation is recommended where there are active land markets and livelihoods are not land based.</p> | <p>The Ugandan law does not compensate those without legal right or claim to the land.</p> <p>WB OP 4.12 does not consider disturbance allowance.</p> <p>Uganda laws and the WB OP 4.12 are consistent in compensation at full replacement cost and cash compensation.</p> | <p>Alternative land (wherever available) or Cash compensation at full replacement value or (based on market value + 15% to 30% disturbance allowance).</p> <p>All forms of tenancy based on formal or informal rights.</p> <p>In kind compensation should be offered as an option to the PAPs where (alternative land is available for the PAPs).</p> |

| Category of PAPs/ Type of Lost Assets/ Impact | Ugandan Law | OP 4.12 | Gap Analysis | Provisions for this ESIA and ensuing RAPs |
|---|---|---|---|---|
| Land Tenants | Leasehold tenure is created either by contract or by operation of the law. The landlord grants the tenants or lease exclusive possession of the land, usually for a period defined and in return for a rent. The tenant has security of tenure and a proprietary interest in the land. Cash compensation is based upon market value of land and disturbance allowance (15-30%). Entitled to compensation based upon the amount of rights they hold upon land. | Must be compensated, whatever the legal recognition of their occupancy. | The Ugandan law does not compensate those without legal right or claim to the land. | Land owners Compensate for land and all assets at full replacement cost or replacement of land at equal/ greater value and compensate for other assets. World Bank OP 4.12 does not recognize depreciated value for replacement of assets (which should be replaced at market value). Additionally, 15% disturbance allowance will be given to the PAPs on top of the compensation. |
| Land squatters | Leasehold tenure is created either by contract or by operation of the law. The landlord grants the tenants or lease exclusive possession of the land, usually for a period defined and in return for a rent. The tenant has security of tenure and a proprietary interest in the land. Cash compensation is based upon market value of land and disturbance allowance (15-30%). Entitled to compensation based upon the amount of rights they hold upon land. | Must be compensated, whatever the legal recognition of their occupancy | The Ugandan law does not compensate those without legal right or claim to the land. | Squatters are only entitled to compensation for the development on the land and ample time will be given to the PAPs to harvest their crops. Additionally, 15% disturbance allowance will be given to the PAPs on top of the compensation. |

| Category of PAPs/ Type of Lost Assets/ Impact | Ugandan Law | OP 4.12 | Gap Analysis | Provisions for this ESIA and ensuing RAPs |
|---|--|---|---|---|
| Owners of non-permanent buildings such as kiosks, butchery shops, wooden shacks for food vendors etc. | Cash compensation based upon rates per m2 established at District level, disturbance allowance (15% or 30%). | Recommends in-kind compensation or cash compensation at full replacement cost. Recommends resettlement assistance. | OP 4.12 does not provide for the disturbance allowance. Ugandan law does not provide for resettlement assistance. | District compensation rates + 15% disturbance allowance. Cash compensation. Livelihood restoration, including identification of alternative sites. |
| Owners of permanent buildings. | Valuation based on replacement value and guidance from CGV & disturbance allowance (15% or 30%). | Compensation at full replacement cost. | The Ugandan laws are consistent with OP 4.12 in regard to replacement cost. | Cash Compensation at replacement value + 15% disturbance allowance. |
| Perennial Crops | Cash compensation based upon rates per m2/bush/tree/plant established at District Level and disturbance allowance (15% or 30%). | Compensation at full replacement cost. Income restoration. | OP 4.12 does not provide for the disturbance allowance. | Cash compensation using affected District rates + disturbance allowance. |
| Seasonal crops | No compensation. 3-6 months' notice given to harvest crops. | No specific provision | | No compensation is expected for crops to be harvested. However, in the event that livelihoods are lost compensation will be given. |
| Loss of income | No specific provision | Livelihoods and living standards are to be restored in real terms to pre-displacement levels or better | The Ugandan legislation does not provide for restoration of livelihoods. | In the context of this project, practical livelihood restoration measures have been proposed. |
| Vulnerable groups | The 1995 Uganda Constitution stipulates that: "the State shall take affirmative action in favour of groups marginalised on the basis of gender, age, disability or any other reason [...] for the purpose of redressing imbalances which exist against | Particular attention should be paid to the needs of vulnerable groups among those displaced such as those below the poverty line, landless, elderly; women and children and indigenous peoples and ethnic minorities. | Both the Ugandan Constitution and WB OP 4.12 favour vulnerable groups. However, the Ugandan law, vulnerable groups are not fully described in the context | Special attention will be paid to vulnerable persons affected and necessary measures will be provided in the entitlement matrix of the RAP. |

| Category of PAPs/ Type of Lost Assets/ Impact | Ugandan Law | OP 4.12 | Gap Analysis | Provisions for this ESIA and ensuing RAPs |
|---|--|--|---|---|
| | them". This regulation is not fully described in the context of resettlement and land acquisition. | | of resettlement and land acquisition. | |
| Relocation and Resettlement | Both the Constitution, 1995 and The Land Act, 1998 give the government and local authorities, power to compulsorily acquire land. The Constitution states that "no person shall be compulsorily deprived of property or any interests in or any right over property of any description except" if the taking of the land is necessary "for public use or in the interest of defence, public safety, public order, public morality or public health." | Avoid or minimize involuntary resettlement and, where this is not feasible, assist displaced persons in improving or at least restoring their livelihoods and standards of living in real terms relative to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. | There is no requirement under the Ugandan law to minimize land acquisition. | Measures to minimize involuntary resettlement shall be considered in the RAP following a WB mitigation hierarchy. |
| Livelihood restoration and assistance | There are no explicit provisions under resettlement or relocation for livelihood assistance. | Livelihoods and living standards are to be restored in real terms to pre-displacement levels or better | Ugandan policy and legislation would need to be aligned with Bank policy to effectively guarantee rights of all affected persons of involuntary resettlement. | The project will provide transition allowance. |
| Consultation and disclosure | There are no explicit provisions for consultations and disclosure but there are guidelines issued by separate ministries (e.g. roads and energy). The Land Acquisition Act, | Consult project-affected persons, host communities and local NGOs, as appropriate. Provide them opportunities to participate in the planning, implementation, and | While the consultation requirement is inherent in the ESIA, it contains several differences with the requirements of Bank policy. | No gap. |

| Category of PAPs/ Type of Lost Assets/ Impact | Ugandan Law | OP 4.12 | Gap Analysis | Provisions for this ESIA and ensuing RAPs |
|---|--|--|---|--|
| | however, makes provision for an enquiry whereby the affected person can make formal written claim and the assessment officer is obliged to conduct a hearing before making his award. | monitoring of the resettlement program, especially in the process of developing and implementing the procedures for determining eligibility for compensation benefits and development assistance (as documented in a resettlement plan), and for establishing appropriate and accessible grievance mechanisms. | | |
| Grievance mechanism and dispute resolution | The Land Act, 1998 states that land tribunals must be established at all districts. The Land Act empowers the Land Tribunals to determine disputes and it provides for appeal to higher ordinary courts. The Land Acquisition Act provides for the aggrieved person to appeal to the High Court. | Establish appropriate and accessible Grievance Redress Mechanism. | GRC structures exist within the Local Councils of Governance in Uganda, but in most cases, they are dysfunctional and ineffective given the limited projects knowledge. | Grievance committees to be instituted within the procedure and will not replace the existing legal process in Uganda; rather it seeks to resolve issues quickly so as to expedite receipt of entitlements and smooth resettlement without resorting to expensive and time-consuming legal action. If the grievance procedure fails to provide a settlement, complainants can still seek legal redress. |
| Calculation of compensation and valuation | According to the Land Act, Cap 227 (section 77), the value of | Bank policy requires: (a) prompt compensation at full replacement cost for loss of assets attributable to the project; | There is no equivalent provisions on relocation assistance, transitional | Market value is based on recent transactions and thus if alternative property is purchased within a reasonable period of the |

| Category of PAPs/ Type of Lost Assets/ Impact | Ugandan Law | OP 4.12 | Gap Analysis | Provisions for this ESIA and ensuing RAPs |
|---|---|---|---|---|
| | <p>Customary land shall be the open market value of the unimproved land. Value of the buildings shall be at open market value for urban areas and depreciated replacement cost for rural areas.</p> <p>The crops and buildings of a non-permanent nature are compensated at rates set by District Land Boards</p> | <p>(b) if there is relocation, assistance during relocation, and residential housing, or housing sites, or agricultural sites of equivalent productive potential, as required; (c) transitional support and development assistance, such as land preparation, credit facilities, training or job opportunities as required, in addition to compensation measures; (d) cash compensation for land when the impact of land acquisition on livelihoods is minor; and (e) provision of civic infrastructure and community services as required.</p> | <p>support, or the provision of civic infrastructure.</p> <p>The basis of compensation assessment is not stated in the Land Acquisition Act (an old law due for review), although the Constitution provides for 'prompt, fair and adequate' compensation. (article 26).</p> | <p>payment of compensation, it is likely that market value will reflect full replacement value.</p> <p>However, local inflation in price land or construction materials can affect what is determined as replacement cost. If this is not reflected in recent transactions, market value may not reflect replacement value.</p> |

4.5 WORLD BANK EHS GUIDELINES

The World Bank has a number of sector-based EHS guidelines below, many of which are applicable to various components of the proposed project namely:

- Water and Sanitation
- Air emissions
- Hazardous waste management
- Noise
- Occupational health and safety.
- Community health and safety including traffic safety such as during project construction or disease prevention
- Construction and decommissioning.

While most of above WBG guidelines apply to the proposed project in one way or the other, in sections below are discussed five environmental, health and safety (EHS) guidelines that are of relevance to the proposed project, namely:

- a. EHS Guidelines – Water and Sanitation
- b. EHS Guidelines – Air Emissions and ambient air quality
- c. EHS Guidelines – Waste Management
- d. EHS Guidelines – Hazardous Materials Management
- e. EHS Guidelines – Construction and decommissioning

The study will explicitly and adequately evaluate all the occupational health and safety aspects of the proposed project activities for all implementation phases including health and safety aspects of project workforce and the general public (construction phase). Appropriate mitigation measures will be recommended for adoption at relevant stages of project implementation.

4.5.1 WBG EHS GUIDELINES: WATER AND SANITATION

The EHS Guidelines for Water and Sanitation include information relevant to the operation and maintenance of:

- a. Potable water treatment and distribution systems
- b. Collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities.

The EHS guidelines outline Industry specific-impacts and their management that comprise;

- a. Environmental issues associated with water and sanitation projects may principally occur during the construction and operational phases, depending on project-specific characteristics and components
 - a. Drinking water – water withdrawal, water treatment, water distribution,
 - b. Sanitation – faecal sludge and septage collection, sewerage (Domestic wastewater discharges, Industrial wastewater discharges, Leaks and overflows), Wastewater and

Sludge Treatment and Discharge (Liquid effluents, Solid waste, Air emissions and odours, Hazardous chemicals, Ecological impacts).

- b. Occupational Health and Safety during the construction and decommissioning of Water and Sanitation facilities. Occupational health and safety impacts associated with the operational phase of water and sanitation projects primarily include the following:
 - a. Accidents and injuries
 - b. Chemical exposure
 - c. Hazardous Atmosphere
 - d. Exposure to pathogens and vectors
 - e. Noise
- c. Community health and safety impacts during the construction of water and sanitation projects are discussed including;
 - a. Drinking Water – Water Intake (Water Supply Protection), Water Treatment (Drinking Water Quality and Supply, Hazardous Chemicals) and Water Distribution.
 - b. Sanitation – Wastewater and Septage Collection (Preventing sewerage system overflows, Preventing build-up of potentially toxic and explosive gases in the sewer), Wastewater and Sludge Treatment (Liquid effluents, Air emissions and odours, Physical hazards)

4.5.2 WBG EHS GUIDELINES: AIR EMISSIONS AND AMBIENT AIR QUALITY

4.5.2.1 GENERAL APPROACH

These guidelines require projects with “significant” sources of air emissions, and potential for significant impacts to ambient air quality to prevent or minimize impacts by ensuring that emissions do not result in pollutant concentrations that reach or exceed relevant ambient quality guidelines and standards by applying national legislated standards (or in their absence, the current WHO Air Quality Guidelines, or other internationally recognized sources). Uganda currently has (draft) national air quality standards applicable to this project.

In these guidelines “significant” refers to sources which can contribute a net emission increase of one or more of the following pollutants within a given air shed:

- Particulate matter of size 10 microns (PM10): 50 tons per year (tpy).
- Oxides of nitrogen (Nox): 500 tpy.
- Sulphur dioxide (SO₂): 500 tpy; or as established through national legislation.
- Equivalent heat input of 50 MWt or greater.

This ESIA study will exhaustively explore the air quality aspects relating to project implementation, most importantly, the major air pollutions sources (gaseous and dust emissions), receptors and elaborate on mitigation and monitoring measures to curb/prevent air quality impacts.

The study further recommends continuous monitoring to regularly track the deviations in air quality parameters and thus apply appropriate mitigation measures in a timely manner.

4.5.3 WBG EHS GUIDELINES: WASTE MANAGEMENT

4.5.3.1 GENERAL APPROACH

In relation to the proposed water supply and sanitation project works, this guideline provides for construction waste generated by and throughout all implementation phases. Large waste volumes will be generated especially at project/construction site, material holding/stockpile yards, site workshop and construction equipment parking lot, batching plant, temporarily contractor workforce shelters among others. The guidelines advocate for waste management planning where waste should be characterized according to composition, source, types, and generation rates. These guidelines call for implementation of a waste management hierarchy that comprises prevention, recycling/reuse, treatment, and disposal. The guidelines require segregation of *conventional waste* from *hazardous waste* streams. Examples of hazardous construction waste are waste oil from vehicles and machinery paint waste, thinners, and concrete wash water (e.g., from cleaning concrete mixers).

Improper management of construction waste would pose environmental and public health impacts. The contractor will have a contractual obligation to ensure proper construction waste management.

4.5.4 WBG EHS GUIDELINES: HAZARDOUS MATERIALS MANAGEMENT

4.5.4.1 APPLICATION AND APPROACH

These guidelines apply to projects that use, store, or handle any quantity of hazardous materials (Hazmats), defined as materials that present a risk to human health, property, or the environment due to their physical or chemical characteristics. Hazmats can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; and corrosive substances.

Facilities which manufacture, handle, use, or store hazardous materials should establish management programs that are commensurate with the potential risks present. The main objectives of projects involving hazardous materials should be the protection of the workforce and the prevention and control of hazardous chemicals releases and accidents. These objectives should be addressed by integrating prevention and control measures, management actions, and procedures into day-to-day business activities. Implementation of the proposed project activities involves handling of hazardous materials such as fuel and lubricants, paint, compressed gas cylinders especially at the construction site, fuel storage area and mechanical workshop among others.

4.5.5 WBG EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING

These provide guidance, specific guidance on prevention and control of community health and safety impacts that may occur during new project implementation activities. By thematic categories, they address three major aspects (environment, OHS and community health and safety) below.

- **Environment:**
 - a. **Noise and Vibration:** During construction and decommissioning activities, noise and vibration may be caused by the operation of material haulage fleet, earth moving and

excavation equipment, concrete mixers, cranes and the transportation of equipment, materials, and people.

- b. **Air Quality:** Project will involve excavations and handling of construction materials such as aggregates, sand, cement among others and this could generate fugitive dust affecting adjacent environs. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of construction waste.
- c. **Solid Waste:** During project implementation, non-hazardous solid waste generated at construction sites including domestic waste and other wastes such as wood and metals.
- d. **Hazardous Materials:** Fuel, lubricating oils and other forms of hazardous waste may be encountered.

- **Occupational Health and Safety**

Likely OHS risks during the proposed project include over-exertion, slips, and falls, work at heights, hot works (welding), and electrocution, being struck by objects, injury by moving machinery and dust from demolition and construction activities.

- **Community Health and Safety**

The guidelines recommend implementation of risk management strategies to protect the general community from physical, chemical, or other hazards associated with sites under demolition, construction, and decommissioning.

- **Traffic Safety**

Project activities may result in a significant increase in movement of heavy vehicles for the transport of construction materials and equipment increasing the risk of traffic-related accidents and injuries to workers, local communities and road users.

4.6 INSTITUTIONAL FRAMEWORK

4.6.1 MINISTRY OF WATER AND ENVIRONMENT

The Ministry of Water and Environment (MWE) has the overall mission: to promote and ensure the rational and sustainable utilization, development and effective management of water and environment resources for socio-economic development of the country. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA). MWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.

4.6.1.1 DIRECTORATE OF WATER RESOURCES MANAGEMENT

The Directorate of Water Resources Management (DWRM) is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary water resources and peaceful cooperation with Nile Basin

riparian countries. DWRM issued the water abstraction permits for the project and will monitor compliance to the conditions of the permits throughout the project's lifetime.

4.6.1.2 WETLANDS MANAGEMENT DEPARTMENT

Wetlands Management Department (WMD) is mandated to manage wetland resources and its goal is to sustain the biophysical and socio-economic values of the wetlands in Uganda for present and future generations. WMD will issue wetland use permits for activities to be carried out in wetlands and monitor compliance to the conditions of the permit, so as to ensure sustainable utilisation of wetland resources.

4.6.2 NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

National Environment Management Authority (NEMA) was designated under the National Environment Act No.5 of 2019 as the principal agency in Uganda charged with the responsibility of coordinating, monitoring, regulating and supervising environmental management in Uganda. In this context, NEMA will be responsible for review and approval of this environmental impact assessment, ensuring proposed mitigation measures are implemented, monitoring compliance with approval conditions, and ensuring any other impacts that may arise are mitigated.

4.6.3 UGANDA WILDLIFE AUTHORITY

Uganda Wildlife Authority (UWA) is mandated to ensure sustainable management of wildlife resources and supervise wildlife activities in Uganda both within and outside the protected areas. UWA will provide guidance for instances where wildlife is encountered during project implementation and undertake any wildlife capture and relocation activities.

4.6.4 OFFICE OF THE PRIME MINISTER

The Office of the Prime Minister (OPM) through its Department for Refugees is mandated to lead and enhance National Response Capacity to Refugee Emergency Management through:

- i) Receiving and granting asylum to refugees in accordance with both international and national legal frameworks;
- ii) Settling refugees granted asylum, developing and implementing humanitarian interventions;
- iii) Advising government and other stakeholders on refugee matters;
- iv) Providing physical protection to refugees;
- v) Improving the physical infrastructure of the Refugee settlements, ranging from roads; staff accommodation, offices, reception centres among others; and
- vi) Enhancing the Refugee livelihoods through provision of Income Generating Activities (IGAs).

In parallel, OPM is implementing and coordinating activities under the Uganda Development Response to Displacement Project (DRDIP), whose Project Development Objective (PDO) is to improve access to basic social services, expand economic opportunities, and enhance environmental management for refugees and communities hosting refugees in the target areas of Uganda. OPM is a key stakeholder in the proposed project as it will impact refugee hosting

communities, and their involvement could avail lessons learnt and contacts that can facilitate smooth project implementation.

4.6.5 MINISTRY OF LANDS, HOUSING AND URBAN DEVELOPMENT

The Mandate is “To ensure a rational: sustainable and effective use and management of land and orderly development of urban and rural areas as well as safe, planned and adequate housing for socioeconomic development”. The MoLHUD, through the Office of the Chief Government Valuer, and the District Land Boards, provided guidance on land acquisition and property valuation while undertaking the Resettlement Action Plan. MoLHUD will also issue certificates of titles for land purchased by and registered to the Government under this project.

4.6.6 UGANDA NATIONAL ROADS AUTHORITY

The mandate of UNRA is to develop and maintain the national roads network, advise Government on general roads policy and contribute to addressing of transport concerns, among others. Some of UNRA responsibilities include: management of the National Roads Network; maintenance and development of the national roads network; and establishing and maintaining road reserves among others. UNRA is a key stakeholder under the project because the transmission and distribution lines run along the road reserves of Kigumba-Masindi road and crossing at Nyakabale trading centre. UNRA will authorise construction of project components in the road reserve as well as provide guidance and supervision for the project contractor in constructing service ducts for the pipe crossing on roads.

4.6.7 MINISTRY OF GENDER, LABOUR AND SOCIAL DEVELOPMENT

Ministry of Gender Labour and Social Development is mandated to empower communities to harness their potential through skills development, labour productivity and cultural growth. This ministry sets policy direction and monitoring functions related to labour, gender and general social development. Its OHS Department in the ministry is responsible for inspection and monitoring occupational safety in workplaces and this could be during project construction and operation of the laboratory facilities. It is responsible for work place registration and certification of equipment.

The OHS Department in this Ministry will be responsible for undertaking inspections of construction sites to ensure safe working conditions; issue certification of equipment in compliance with the OHS act and registration of work places.

4.6.8 KIRYANDONGO DISTRICT LOCAL GOVERNMENT

The 1997 Local Government Act provides for decentralization and devolution of government functions, powers and services from the central to Local Governments and sets up the political and administrative functions of local governments. The Local Governments are responsible for the protection of the environment in their respective areas of jurisdiction. Local Governments were consulted on projects to be located within their jurisdiction and on matters that affect their environment. Local government structures are important for mobilising support for the project as well as monitoring its social-environmental impacts both during construction and operation phases. At the District Level, the District Environmental Officers, District Water Officer District

Engineer and Community Development Officers in the respective areas of project implementation will participate in monitoring the project to ensure that mitigation measures are adequate and advise or point out additional compliance requirements following their inspections. The District Land Boards and Lands Officers will provide support on matters of compensation or land acquisition.

5 ENVIRONMENTAL AND SOCIAL BASELINE

This section describes environmental and social baseline conditions of the area in which the proposed water supply project is to be located and in which impacts may be experienced.

5.1 ADMINISTRATIVE SET UP AND DESCRIPTION OF KEY PROJECT SITES

The service areas for the project are well within the boundaries of Kiryandongo district in Mboira and Kigumba Sub counties (Figure 5-1).

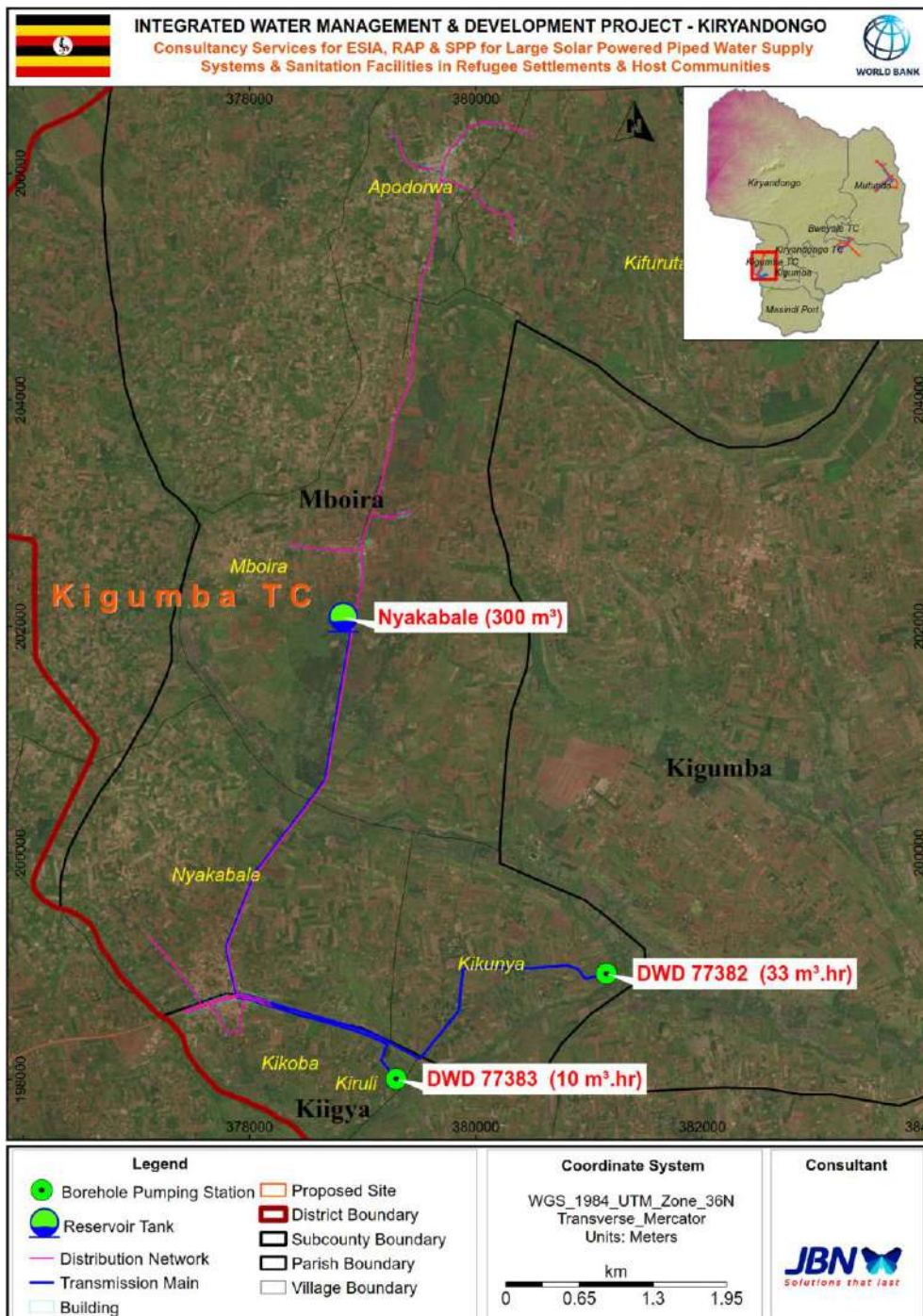


Figure 5-1: Map of layout of the proposed infrastructure system for Nyakabale RGC

5.1.1 BOREHOLES (WATER SOURCES)

5.1.1.1 BOREHOLE DWD 77382 (30M³/HR YIELD)

Source DWD 77382 is located in Kikunya Village, Mboira Parish and Kigumba Town Council, about 2.5 km off Masindi – Kigumba Tarmac Road (**Figure 5-2**). The borehole pumping main will deliver water from the borehole to the water reservoir with an independent transmission main. There is a 717 m narrow site access road traversing some homesteads, gardens and bushland hence a need for rehabilitation and expansion during implementation. The site surrounding is characterized by gardens (currently for maize) (**Figure 5-3**). The site is not flood prone and the activities in surrounding are less likely to cause contamination.



Figure 5-2: Location of Borehole DWD 77382 and its environs



Figure 5-3: Location, surrounding and access of water source (Borehole) DWD 77382 in Kikunya

5.1.1.2 BOREHOLE DWD 77383 (10 M³/HR)

Source DWD 77383 is located in Kikoba Village, Kiigya Parish and Kigumba Town Council, about 0.4 km off Masindi – Kigumba Tarmac Road (**Figure 5-4**). The borehole pumping main will deliver water from the borehole to the water reservoir with an independent transmission main. There is a narrow site access road traversing one homestead (compound), gardens and bushland hence a need for rehabilitation and expansion during implementation. The site surrounding is characterized by gardens (**Figure 5-5**). It is in a lowland (flood prone) where inundation by surface run-off may occur during heavy rains pausing a risk of contamination, especially for instances where well casings or caps aren't water tight.



Figure 5-4: Location of Borehole DWD 77383 and its environs



Figure 5-5: Existing environment and access of the water source (Borehole) DWD 77383



Figure 5-6: Existing narrow access road to source DWD 77383

5.1.2 NYAKABALE RESERVOIR TANK

Nyakabale RGC will have one reservoir tank located in Mboira Village, Mboira Parish, Kigumba Town Council. –The chosen tank site is located on a raised land along the slopes of a hill about 4km from Nyakabale trading centre at 1155 m.a.s.l and 250m off the Nyakabale – Mboira murram road on a privately owned land (**Figure 5-7**). The access to the site is not possible since the site is on hill and in the bush. Therefore, there is a need to open up an access road to the site during implementation. The site is currently being used as a grazing land (**Figure 5-8**). The area has neither sensitive ecosystems nor endangered species.

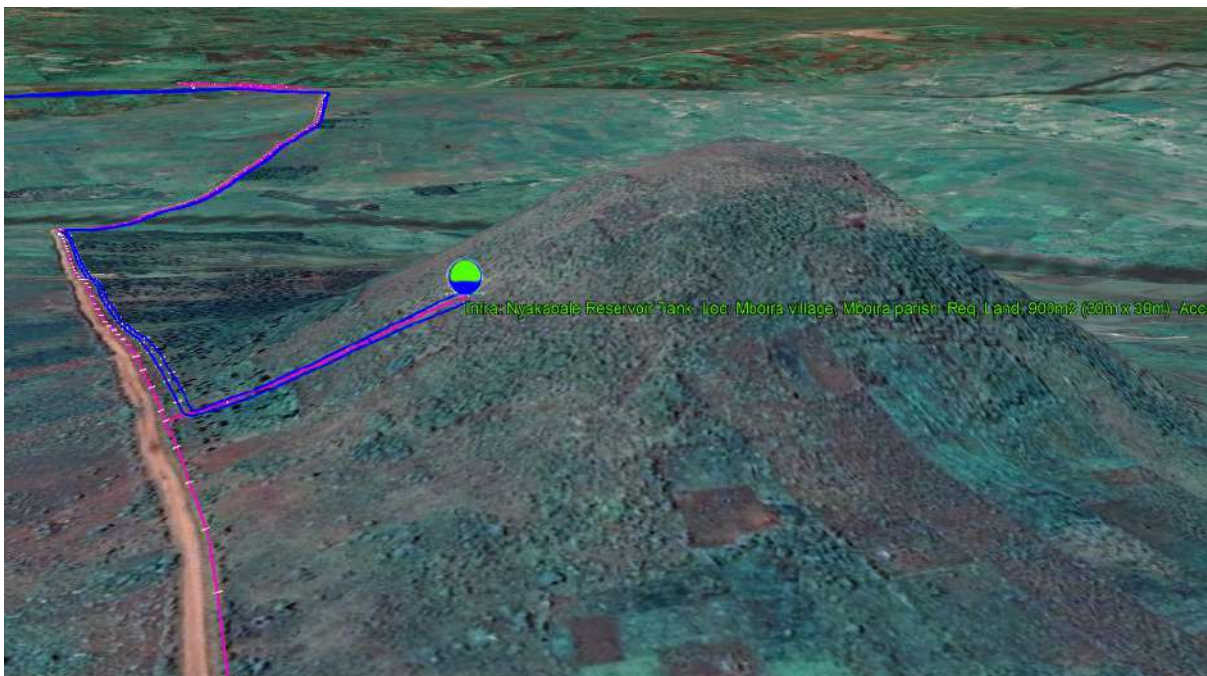


Figure 5-7: Location of Nyakabale reservoir tank and its environs

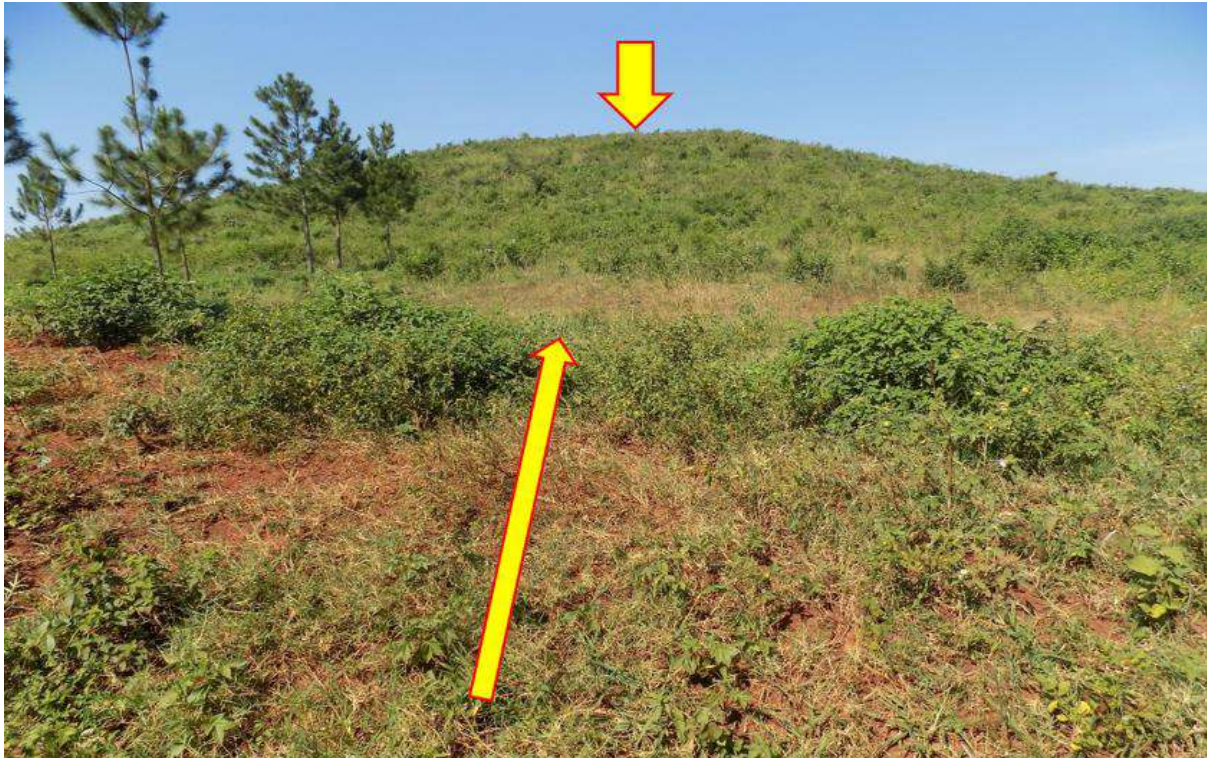


Figure 5-8: Existing environment and access of Nyakabale reservoir tank

5.1.3 TRANSMISSION SYSTEM

5.1.3.1 TRANSMISSION MAIN FROM WATER SOURCES TO THE MAIN TANK

The two borehole pumping mains from the drilled boreholes will deliver water to the storage reservoir through independent transmission mains (**Figure 5-9**). The pipeline from borehole DWD 77382 will traverse several land uses and land cover including but not limited to food crop gardens, homesteads and bushlands (**Figure 5-10**) to the Kigumba – Masindi tarmac road (**Figure 5-11**) where it will join the pipeline from source DWD 77383 after 2.4km (**Figure 5-12**).

The pipeline from borehole DWD 77383 will cross Kikoba Village while traversing food crop gardens, premises of an existing borehole, one homestead and a pine woodlot (**Figure 5-13**) before reaching the Kigumba – Masindi tarmac road where it will join the pipeline from source DWD 77382 after 0.4 km (**Figure 5-14**).

Beyond the points where the transmission mains join the Kigumba – Masindi Tarmac road (**Figure 5-12**), they will both move along the demarcated road reserve. The pipelines for DWD 77382 and DWD 77383 will move about on the right (1.7 km) and left (1.4) road reserves respectively up to Nyakabale trading centre (**Figure 5-15**).

In Nyakabale trading Centre, the transmission mains of both pipes will make major road crossings i.e. pipe from DWD 77382 will cross the Nyakabale – Mboira Murram Road while pipe from DWD 77383 will cross the Kigumba – Masindi Tarmac road hence the two major road crossing (**Figure 5-16 and Figure 5-17**). Beyond Nyakabale to the storage tank in Mboira, the transmission mains will maintain the left side (reserve) of the Nyakabale – Mboira murram road for 3.7km i.e. in the

opposite direction to the distribution line. However, the pipelines will cross River Nyama and its swamp stretching across 140m between E378367, N200223 and E378597, N200522 (Figure 5-18).

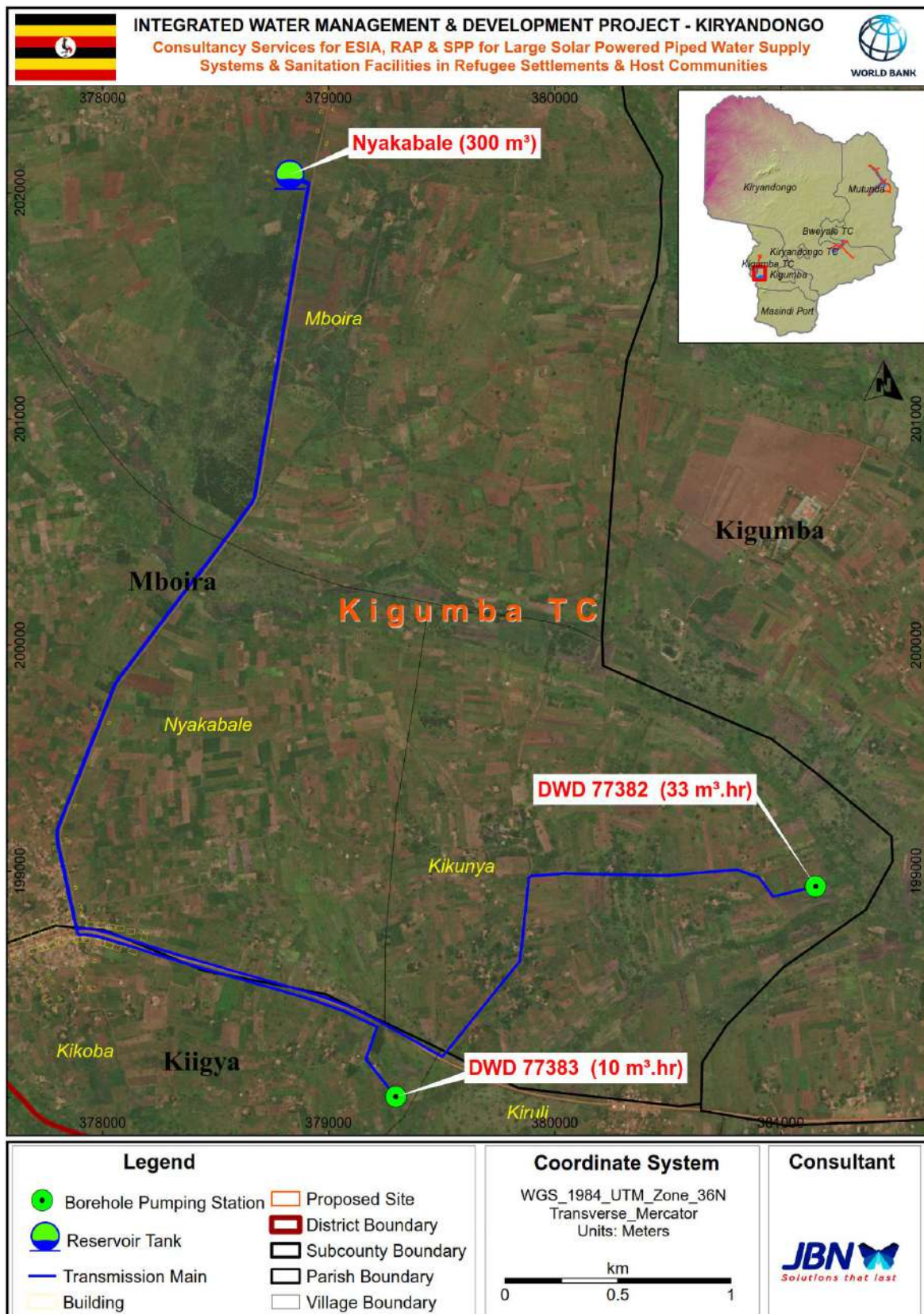


Figure 5-9 Transmission network layout for Nyakabale RGC



Figure 5-10: Food crop gardens where the transmission main from DWD 77382 will pass



Figure 5-11: Kigumba – Masindi road where the transmission main from DWD 7782 will join the road reserves at E379502 , N198180

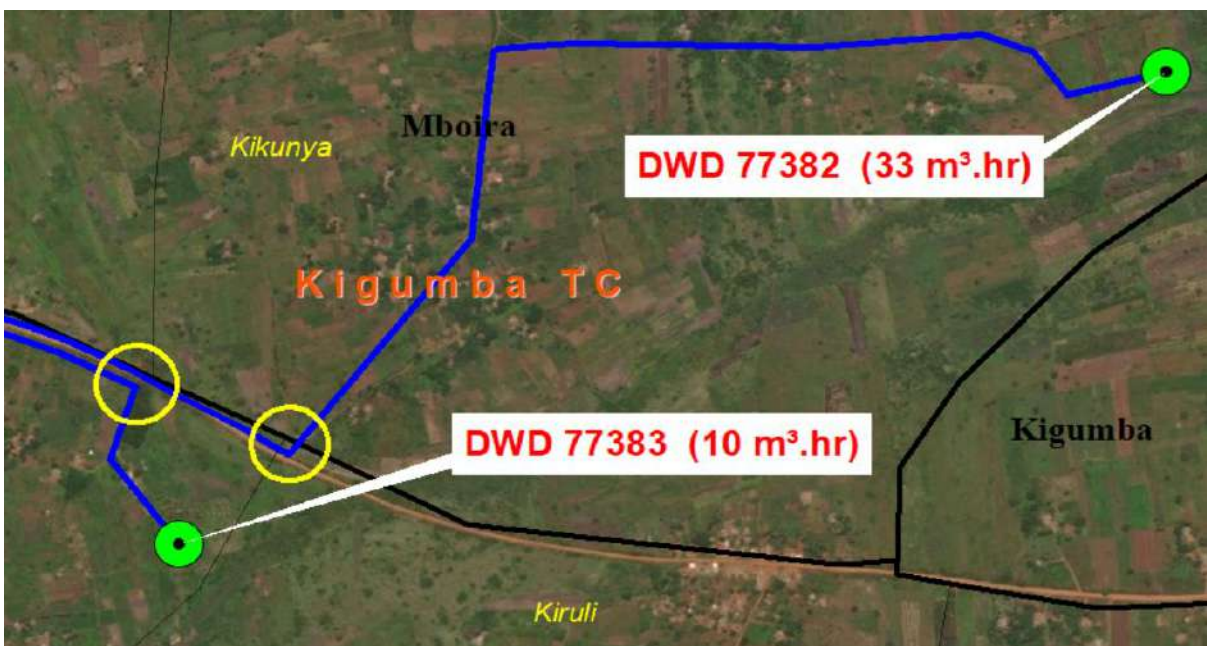


Figure 5-12: Aerial view of transmission mains from DWD 77382 and DWD 77383 and where they join the road reserves of Kigumba – Masindi road

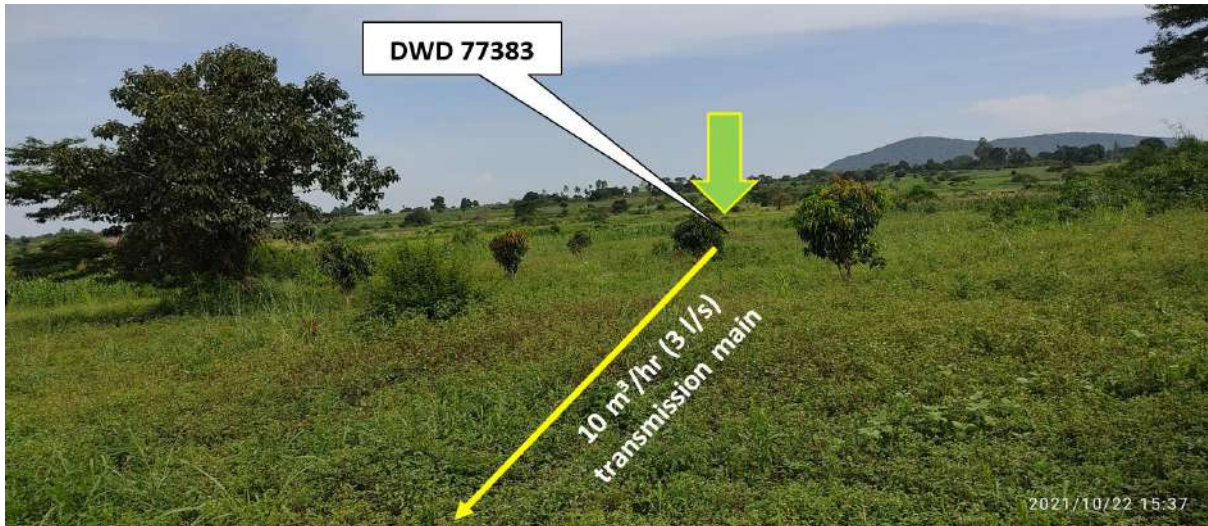


Figure 5-13: Transmission main from DWD 7783 via the existing borehole site at E379237, N198062



Figure 5-14: Key features to be traversed by transmission main from DWD 7783 before joining Kigumba – Masindi Road



Figure 5-15: Transmission mains from both boreholes moving along the Kigumba – Masindi road



Figure 5-16: An aerial view of the major road crossings by the transmission mains in Nyakabale town



Figure 5-17: Key road crossing points along the transmission mains from Sources DWD 77382 and DWD 77383 at E377899, N198745 and E377886, N198732 in Nyakabale town



Figure 5-18: River Nyama (swamp) which the transmission mains will cross after Nyakabale town

5.1.4 DISTRIBUTION NETWORK

The distribution pipeline is designed to have a T-junction at the roadside for the line to Mboira (7.704 km) and Nyakabale (6.781 km) respectively. The Mboira line will move on the left side of the road covering 3 villages and their trading centres i.e. Mboira, Kifuruta and Apodorwa (**Figure 5-19**).

The Nyakabale line will move along a pine forest (**Figure 5-21**) on the same side as the transmission main (right) through towards Nyakabale town to supply 2 areas of Kikoba and Nyakabale, passing along the road reserve and will not affect the standing trees. The biggest part of this distribution will be intensified in Nyakabale trading centre along Kigumba – Masindi Road (**Figure 5-22**). The areas of distribution and where distribution network pass have neither sensitive ecosystems nor endangered species and will distribute to different villages and trading centres.



Mboira Trading Centre and Primary School (E 378989, N 202683)



Aerial view of Mboira area



Apodorwa Trading Centre (E379716 , N206082)



Aerial view of Apodorwa area



Kifuruta Primary School (E380351, N205463)



Aerial view of Kifuruta P/S and its environs



Nyakabale Trading Centre (E377828, N198722)



Aerial view of Nyakabale area

Figure 5-19: Areas to be supplied (distribution) under Nyakabale RGC



Figure 5-20: Mboira Trading Centre along Nyakabale - Apodorwa Road

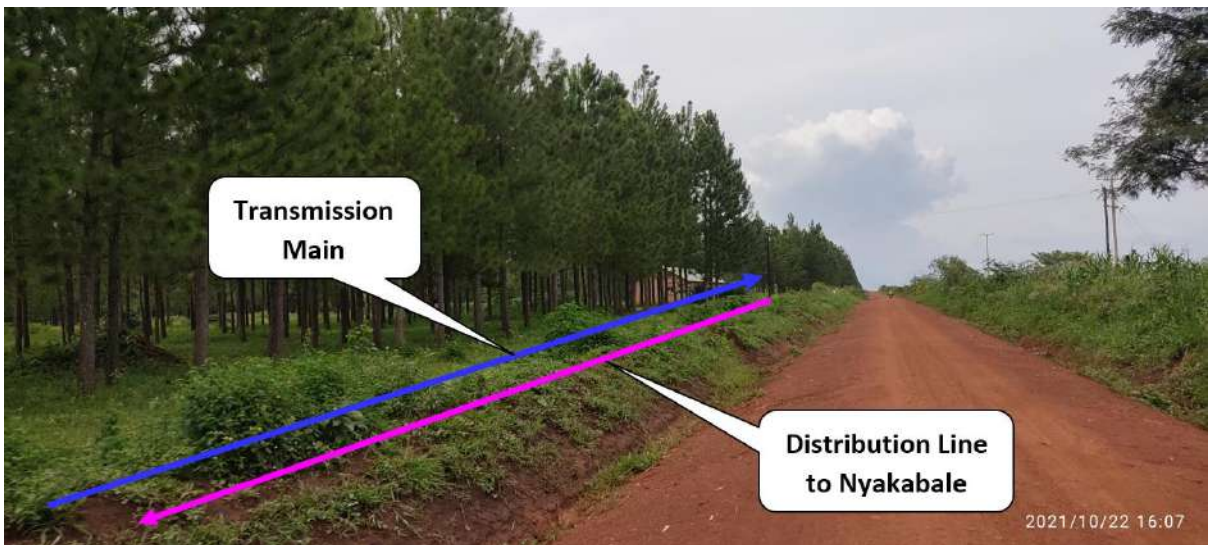


Figure 5-21: Pine forest along the Nyakabale - Mboira Road where the pipes will pass.



Figure 5-22: Nyakabale Trading Centre along Kigumba - Masindi Road

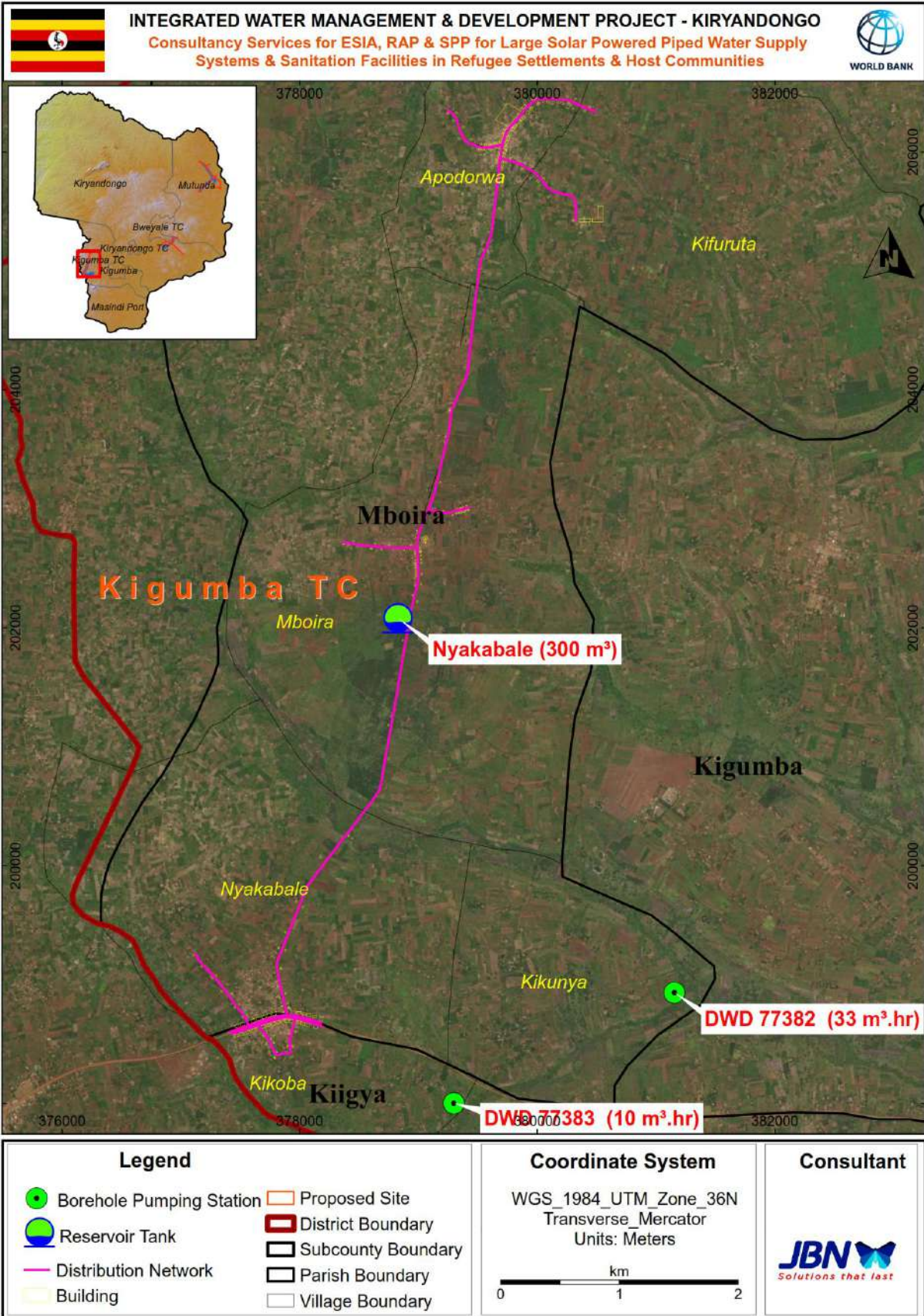


Figure 5-23: Distribution network layout for Nyakabale RGC

5.2 PHYSICAL ENVIRONMENT

5.2.1 CLIMATE AND WEATHER

Kiryandongo District (project area) is located in climatic zone I with a reported annual average rainfall of 1340mm. The nearest operational weather station close to the project area is Masindi port station (MWE, Feasibility Study and Design Report, 2021). The rainfall distribution in the project area is bimodal characterized by one rainfall season with two peaks from March - May and a long one from August - November. Based on the amount of rainfall received, the district can be divided into three (3) major climatic zones.

- i. High rainfall zones: These are areas which receive more than 1000 mm of rainfall per annum. No Sub County receives this rainfall amount in Kiryandongo District.
- ii. Medium rainfall zones: These are areas with total amount of rainfall ranging between 800mm – 1000mm per annum. Areas which fall under this zone include Kigumba and Kiryandongo sub counties as well as part of Mutunda Sub County.
- iii. Lower rainfall zones: These are areas which receive less than 800mm of rainfall per annum. Localities in Masindi Port Sub County receive this rainfall amount.

The dry season is experienced from December - February. The annual rainfall averages about 1372 mm during the which is quite favourable. The **Figure 5-24** below shows the distribution of the average monthly rainfall, temperature and evapotranspiration in the project area. The hot season lasts for 2.0 months, from January to March, with an average daily high temperature above 32°C and the hottest month of the year is February, with an average high of 34°C and low of 20°C. The cool season lasts for about six (6) months, from April to November 20, with an average daily high temperature below 28°C whereas the coldest month of the year is July, with an average low of 20°C and high of 28°C. The annual average evapotranspiration in the project area based on FAOCLIM database is about 1435 mm and exceeds rainfall especially in the dry season. Using Thornthwaite Climate Classification System (1948), the climate is classified as “moist sub-humid” and is characterized by “a large water surplus during the rainy seasons and only moderate water deficiencies during the dry season”. Hence, the climate is generally favourable. Daily minimum temperatures are in the range of 18 – 19 °C. Maximum temperatures range between 28 – 32 °C with the highest temperatures experienced in February. Average temperatures range between 23 – 26 °C.

Relation of baseline to the project: Kiryandongo experiences a favourable climate for implementation of the project both construction and operation phases. During the construction phase, works sensitive to climate, such as excavation and earth works are favourable in moderate rainy days and sunny days/ months to reduce on the impact of soil erosion, and dust and air quality nuisance from the sites.

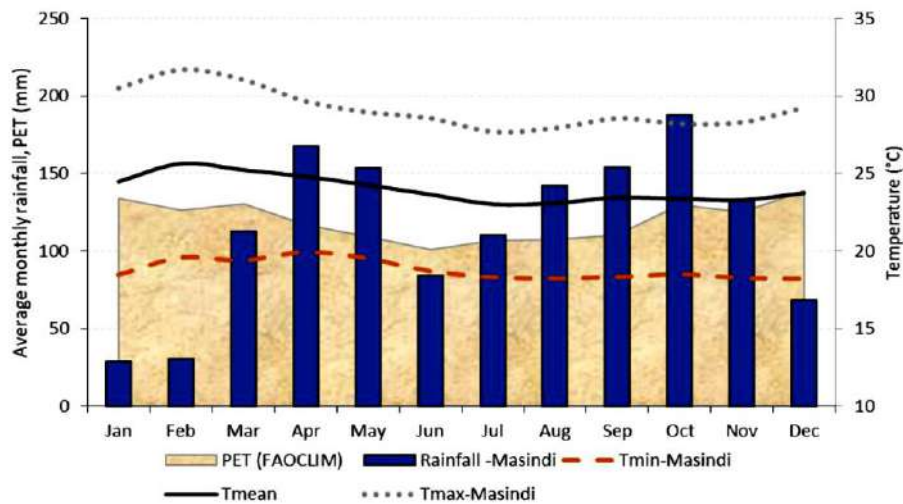


Figure 5-24: Monthly distribution of climatic variables

5.2.2 WATER RESOURCES AND HYDROLOGY

Uganda has four (4) main Water Management Zones (WMZs) (Upper Nile, Kyoga, Victoria and Albert) and eight (8) river basins (Albert Nile, Aswa, Kidepo, L. Kyoga, L. Victoria, L. Edward, L. Albert and Victoria Nile). Kiryandongo district has both surface and ground water resources. According to the data for existing boreholes in the Kiryandongo, borehole yields in the project area is very good ranging between 3 – 48 m³/hr with an average of 8.65 m³/hr. The district (project area) is located in the Albert WMZ and Victoria Nile Basin. Victoria Nile is a section of the River Nile that connects Lake Victoria, Lake Kyoga and Lake Albert as it flows downstream from Lake Victoria. Kiryandongo district is also gifted with several wetlands in numerous locations. The most outstanding wetlands are Nanda wetland in Mutunda, Titti wetland in Kigumba (the longest) and Nyakabale/Nyama wetland in Masindi port sub-county (**Figure 5-26**). However, due to the flat nature of the area i.e., a raised plateau with a relatively uniform elevation indicating devoid of water reserves during the dry season, these wetlands are largely seasonal. Wetlands are also facing degradation from agriculture and settlements.

The biggest part of the district including the RGCs and the above-mentioned wetlands drain eastwards towards Victoria Nile which is the largest surface water source in the district. The section between Lake Kyoga to Lake Albert is commonly called the Kyoga Nile and about a distance of 25 km from Nyakabale RGC. The main surface water body in the project area is Victoria Nile. The river flows along the eastern boundary of the district. Victoria Nile is about 25 Km south east of Nyakabale RGC, 13 Km south of Gaspa RGC and 5 Km east of Mutunda RGC.



Nyamarwu Stream - a tributary to R. Nyama, whose buffers are highly cultivated with rice



Ground water (borehole) in Kikoba (E379239, N 198063)



River Nyama along Nyakabale – Apodorwa Road at E378395, N200263

Figure 5-25: Surface and ground water resources in Nyakabale RGC project area

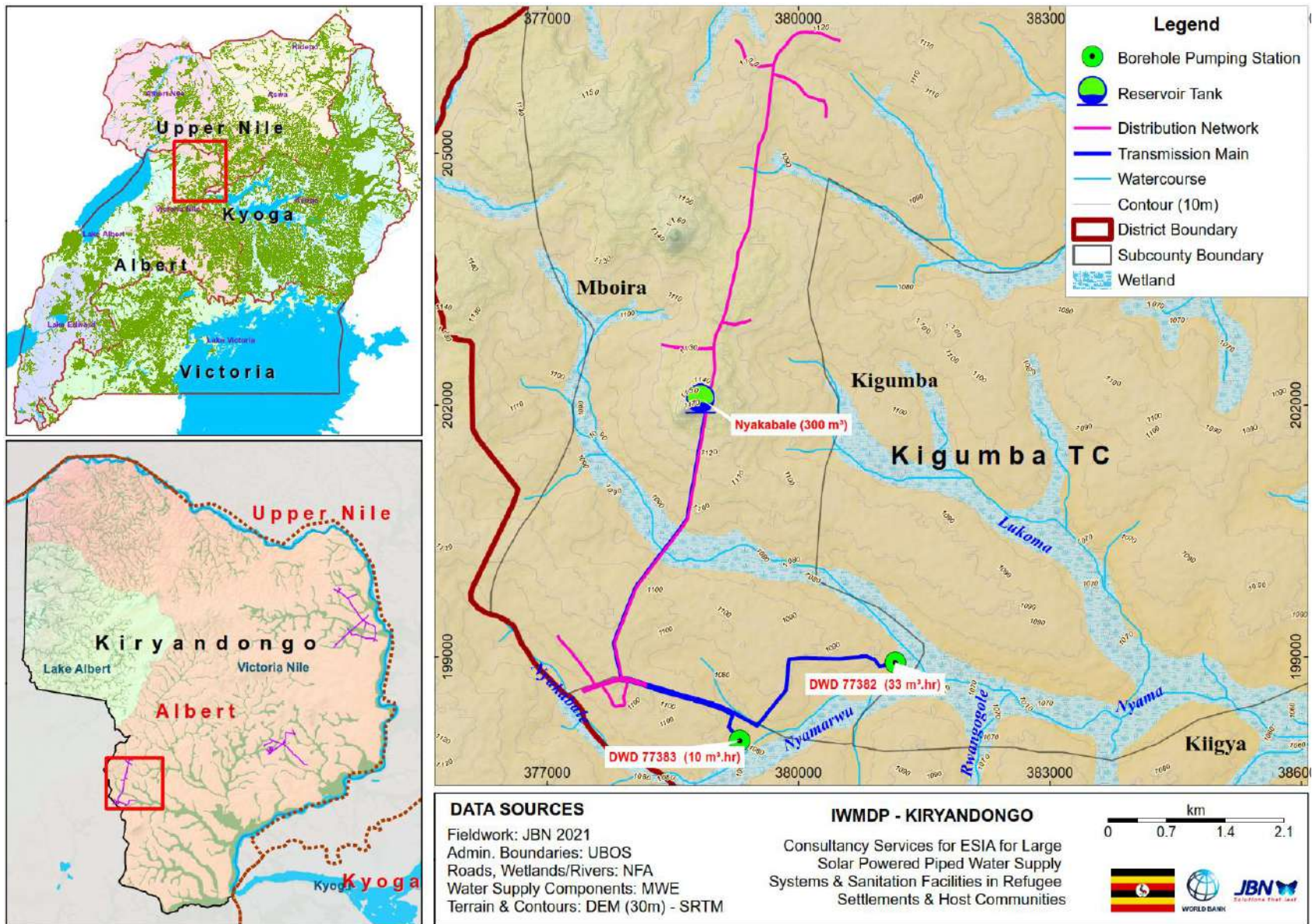


Figure 5-26: Water resources and drainage network of Nyakabale RGC project area

5.2.3 TOPOGRAPHY

Kiryandongo district is generally a plateau land with an average elevation of 1,295 meters above sea level. The district has undulating hills with high points in some localities. In Nyakabale RGC, the topography is generally gently sloping with only modest variations in elevation (undulating hills mainly in Mboira). The lowest and highest elevations are 1064m and 1212m above the sea level. The area has a maximum elevation change of 148m and an average elevation above sea level of 1138m (Figure 5-27).

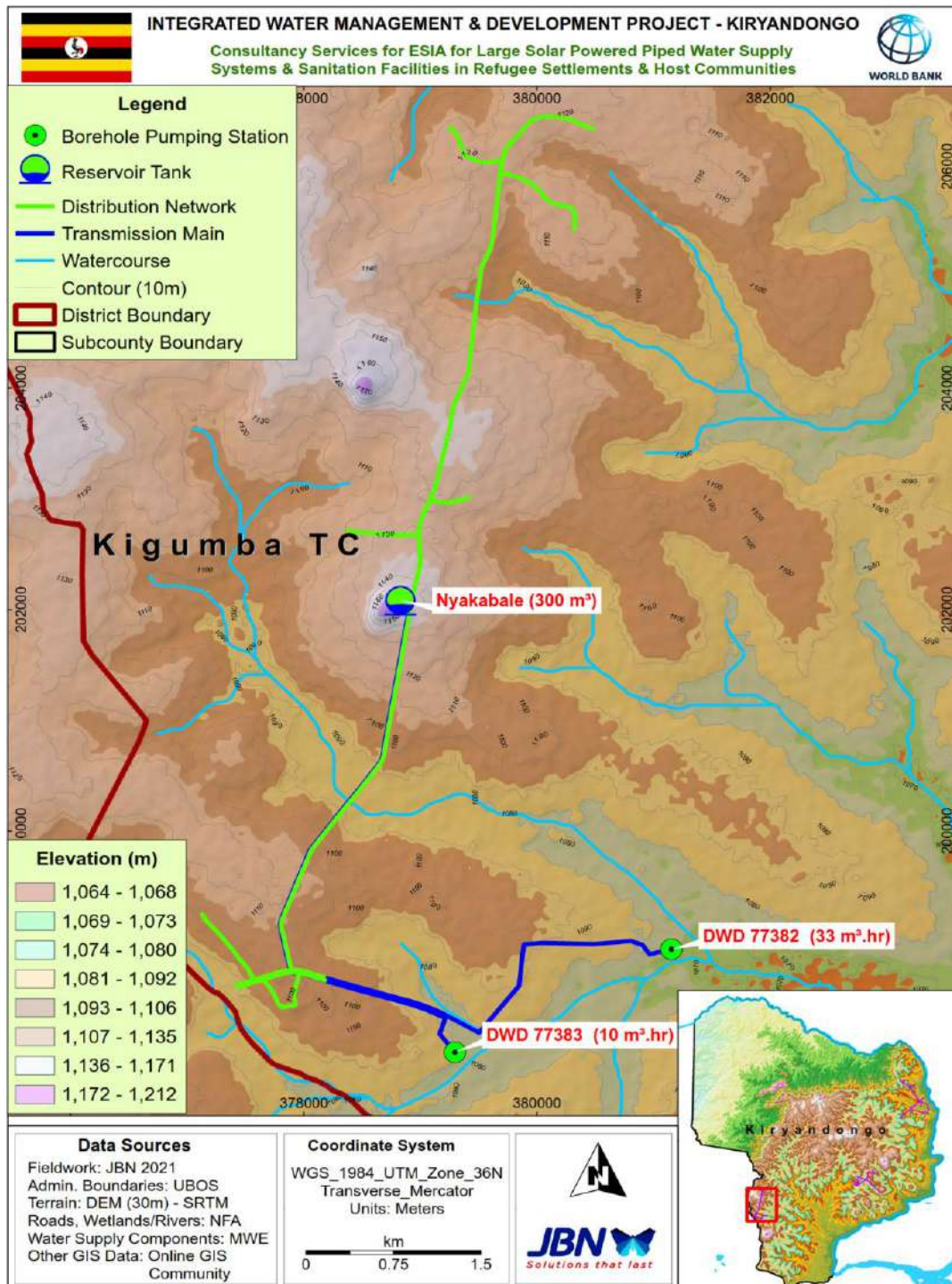


Figure 5-27: Elevation map of Nyakabale RGC

The gradient of the distribution main increases with distance from the Nyakabale Reservoir **Table 5-1** and **Figure 5-28**. Nyakabale and Mboira trading centres have maximum and minimum head difference of 44 m and 18m with distance of 3.5km and 0.8km from the reservoir respectively thus providing enough pressure for water flow.

Table 5-1: Distance, elevation and head differences from Reservoir

| Location | Distance from Reservoir (km) | Elevation (m) amsl | Difference from Reservoir (m) |
|--------------------------|------------------------------|--------------------|-------------------------------|
| Nyakabale Reservoir | 0 | 1145 | 0.0 |
| Apodorwa trading center | 4.1 | 1116 | 29 |
| Nyakabale Trading centre | 3.5 | 1101 | 44 |
| Mboira trading centre | 0.8 | 1132 | 13 |



Figure 5-28: Elevation profile of the Water pipe line for distribution lines of Nyakabale RGC

The changes in meters with distance from reservoir are reflected in the elevation profile in **Figure 5-28**. From the profile it was observed that Apodorwa and Nyakabale have a gentle slopping as compared to Mboira trading centre and all trading centres are at lower elevations that can be served well from the reservoir tank.

5.2.4 TECTONICS AND SEISMOLOGY

The site is largely located on an unfairly stable geological unit with high seismic hazard (risk levels) above the Albertine environment (western rift valley). Although, numerous faults exist within the country and tremors due to earthquakes that do occur, the site area is located within the shield area, but only approximately 30 – 70 km from the western rift and about 80 km south of the Aswa Fault Zone. It is therefore susceptible to the potential effect of major tectonic features of regional scale. The site is in the main, located in Zone 1 of the Seismic Zoning of Uganda, implying a high risk (**Figure 5-29**). According to US 319:2003 Uganda Standard for Seismic code of practice for structural designs, the seismic zoning factor of Zone 1 is 1.0 (Z_{max}). Therefore, appropriate design of seismic acceleration values consistent with Contract Technical Specifications and National standards should be adopted during structural foundation designs due to the high likelihood of earthquake occurrence in the area.

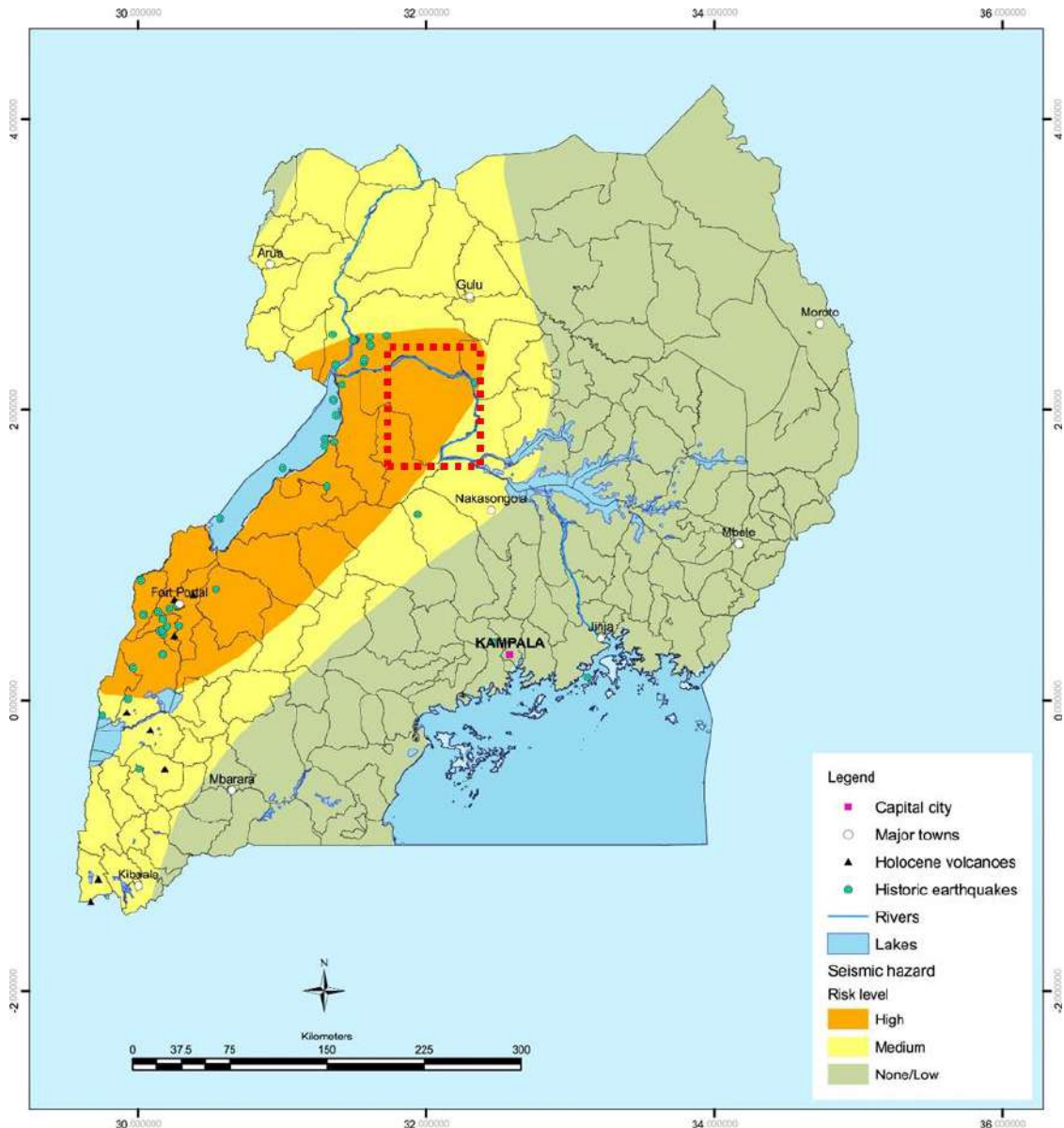


Figure 5-29: Seismic hazard zonation map of Uganda:

Source: Office of the Prime minister (OPM)

5.2.5 GEOLOGY AND GEOMORPHOLOGY

Geology of Uganda is composed predominantly of Archaean basement rocks formed mainly between >3.08 Ga and 2.55 Ga³. Kiryandongo district lies in the North Uganda Terrane (NUT) of Uganda's geology which comprises of both the Mesoarchaeon and Neoproterozoic rocks which are further divided into two (2) building blocks; the Karuma Complex (a Mesoarchaeon phase of crust formation, mainly composed of granulitegrade metasediments) and Neoproterozoic Complex

3 Geology and Geodynamic Development of Uganda with Explanation of the 1:1,000,000 -Scale Geological Map.

(further divided into five (5) supracrustal rock units of the Amuru Group and into 22 rock units of deformed granitoids, gneisses and migmatites of igneous or uncertain origin). The southern part of Kiryandongo is covered by the Mesoproterozoic rocks. The general project area is composed of Bunyoro Group (shale, slate, phyllite, sandstone and quartzite) of Neoproterozoic rocks (541 – 1000 Ma) towards Kyoga; Igisi Group (mica schist, quartzite and ironstone) of Mesoproterozoic rocks (1000 – 1600 Ma); Metagabbro, Amuru Group (gneiss and amphibolite) and Variable gneissic granitoid (2591±27 Ma and 2652±8 Ma) of Neoarchaean rocks (2500 – 2800 Ma) and Karuma Group (felsic and mafic granulite) of Mesoarchaean rocks (2800 – 3200 Ma) (**Figure 5-30**).

The geology of Nyakabale RGC project area is mainly underlain by the Variable gneissic granitoid (2591±27 Ma and 2652±8 Ma) which are comprised of the undifferentiated gneisses and granulites facies rocks in the north (Basement Complex) (**Figure 5-31**). The geomorphology of area is majorly formed of areas of infill and rock formation and types that form the remnants of the low surfaces and scarps related to rift sediments of the western rift valley (warped basin lake) (**Figure 5-32**).

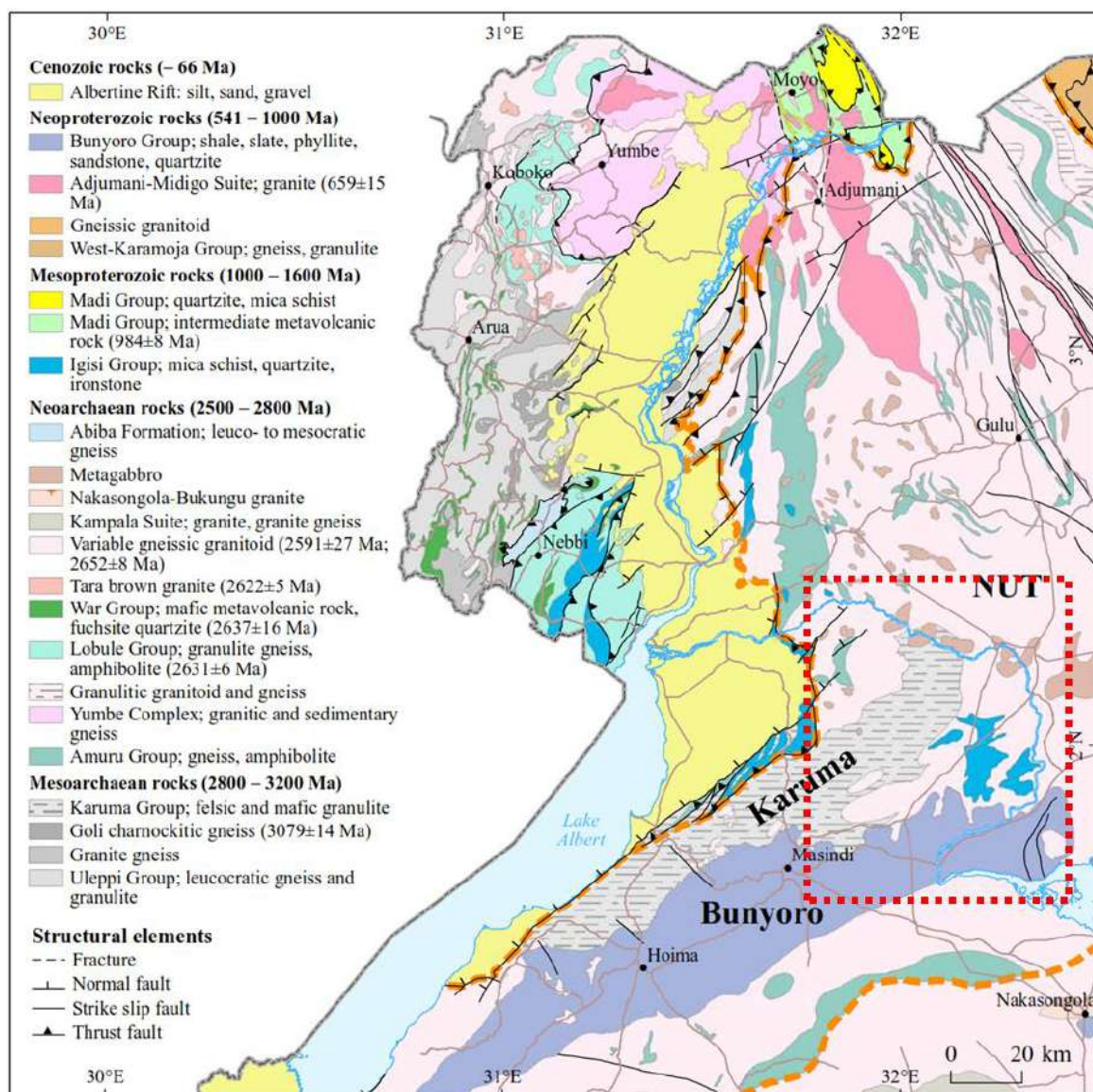


Figure 5-30: Geological outline of the western part of the North Uganda Terrane (NUT)

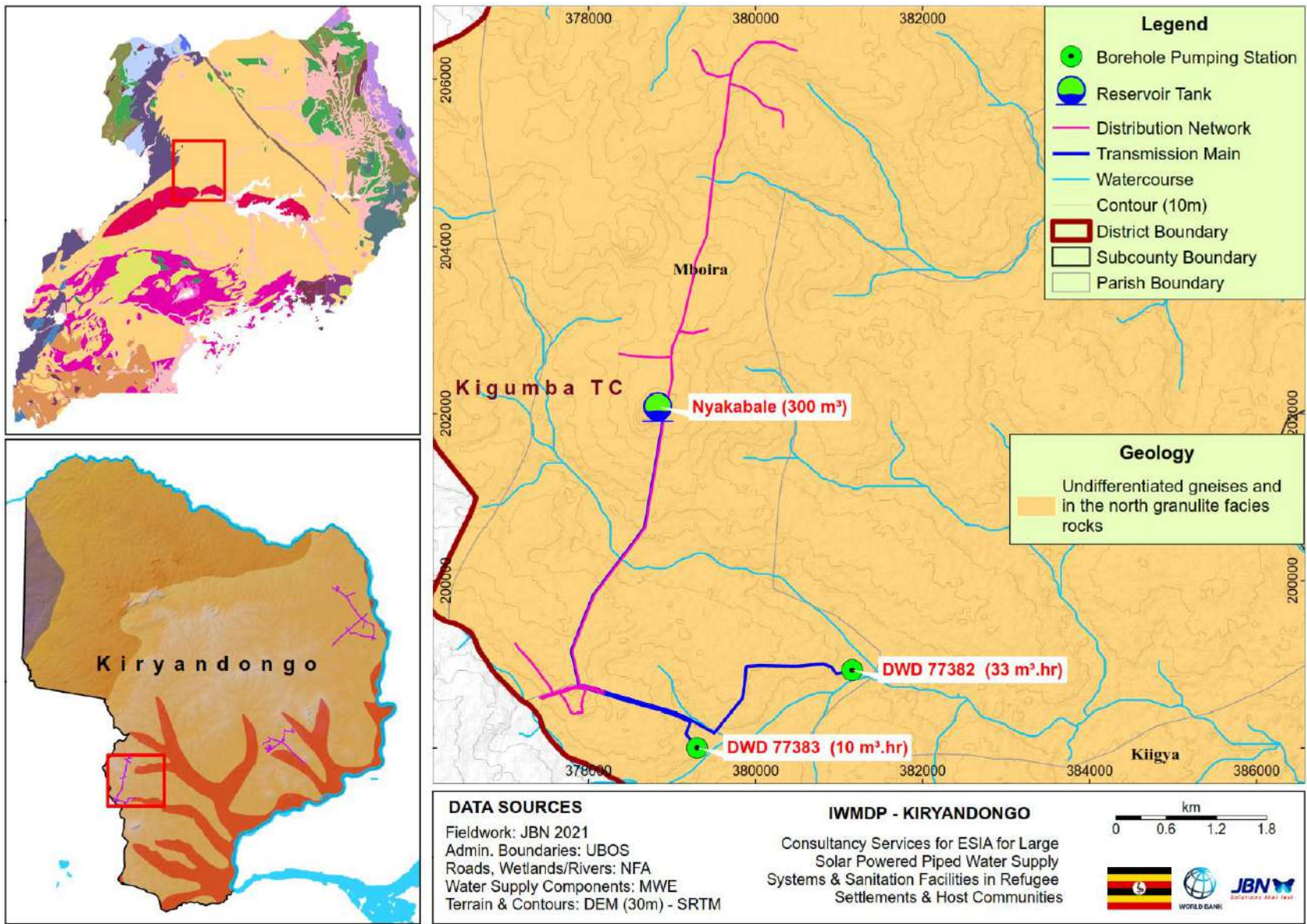


Figure 5-31: Geology of Nyakabale project area

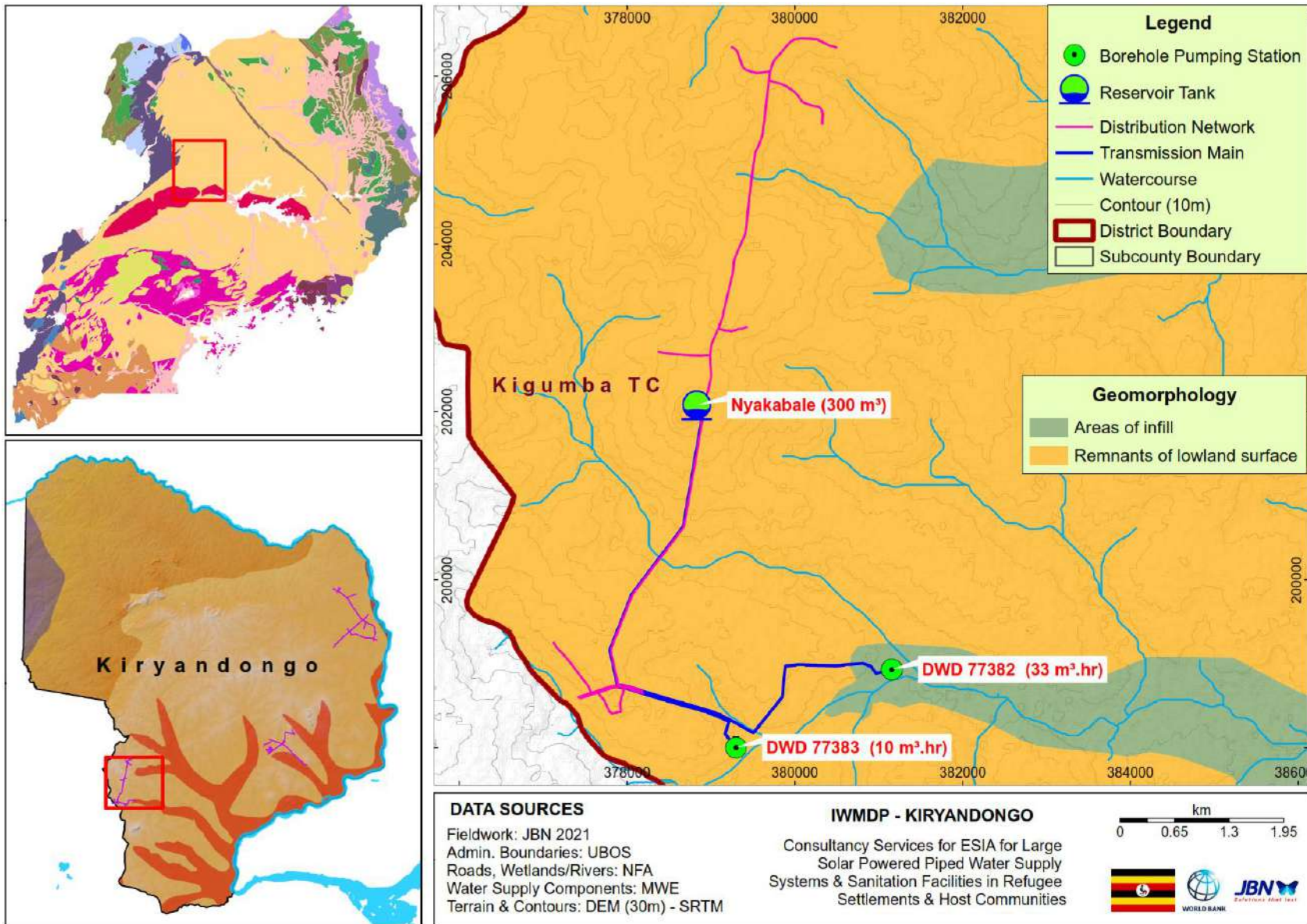


Figure 5-32: Geomorphology of Nyakabale project area

5.2.6 SOILS

According to Langlands (1974) classifications, the soil consists of ferruginous soil (rocks changed into clay soil (kaolinite) and sesquioxides. In some areas, the soils have a high percentage of sandy and sandy loam soils and therefore susceptible to erosion while in others they are heavily textured ranging from clay loam to clay. Due to its sandy nature, the soil has low water retention capacity and high rate of water infiltration. The soils are usually deep with little differentiation into clearly defined zones and possess fine granular structure, others moulded into large, weak coherent clods that are very porous. Kiryandongo district is also endowed with vast fertile soils which can support quite a number of both cash/food crops. The soils in the project area are mainly ferrosols and are characterized with a reddish colour. The soils are moderately productive in terms of agriculture. Such soils are also susceptible to runoff and logging. The district is predominantly covered by the Acric Ferralsols (54%), Leptosols (19%), Petric Plinthosols (Acric) (16%), Gleysols (7%), Leptosols (2%), Arenosols (1.3%), Histosols (1.1%) and water or lake (0.2%) (**Figure 5-33**).

Acric Ferralsols: Dark red clay loams occasionally lateritized and Red sandy clay loams over laterite and granite formed from Karagwe - Ankolean Phyllites and granite e.g. the Kitonya Catena and Kigumba Catena soil mapping units. Reddish and reddish brown gritty clay loams and shallow brown sandy loams over rock or laterite formed from basement complex granites, gneisses and schists e.g. the Rukiri Complex and Anaka Complex soil mapping units. Shallow dark brown or black sandy loams often very stony formed from granites, gneisses, schists, amphibolites eg the Bugangari Series soil mapping unit. These soils are Vulnerable to erosion.

Gleysols: Dark brown sandy loams over dark grey clays and Black and grey clays often calcareous formed from recent river alluvium. Examples are soils in the Bukora Series and Undifferentiated Alluvium mapping units respectively. This soil is non-vulnerable to erosion.

Petric Plinthosols (Acric): Reddish brown sandy loams and loams on laterite formed from basement complex gneisses and granites e.g., Buruli Catena soils mapping unit. This soil is Vulnerable to erosion

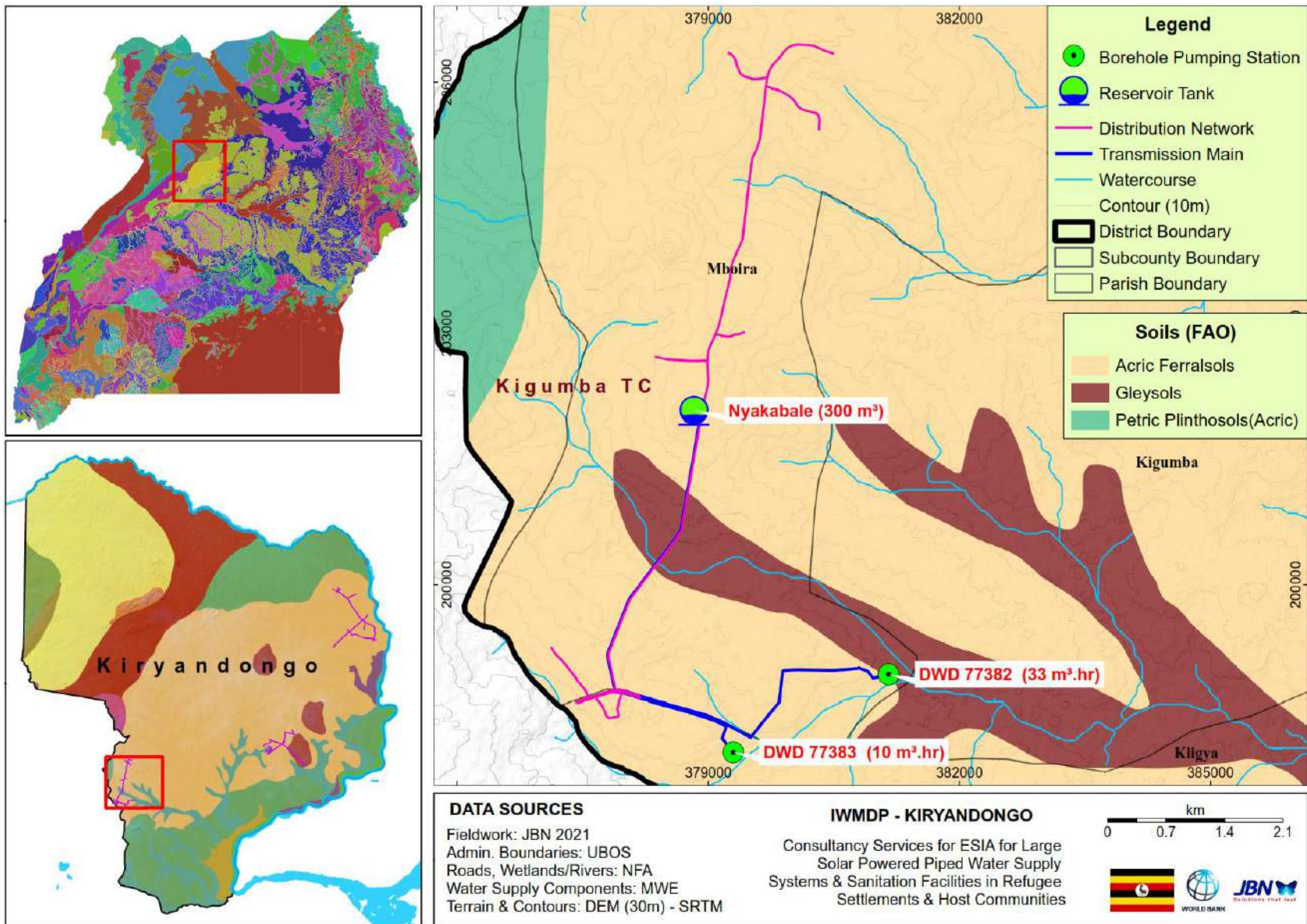


Figure 5-33: Soils of the Nyakabale project area

5.2.7 HYDROGEOLOGY

The hydrogeology of Uganda and a large part of the east African region in the tropics is characterized by crystalline bedrocks of the Precambrian era (gneiss granitoids). These rocks usually contain water in fractures and fissures in rocks and are able to sustain groundwater supply especially in rural areas. The wells yields are usually less than 1 l/s (3.6 m³/hr). The weathered regolith overlying the crystalline bedrock is also an important source of aquifer that provides water for rural communities and has been shown to have better yields than the fractured aquifers. Groundwater accessed from deep fractured or fissured zones can however provide higher yields for large scale water supply.

Groundwater data obtained from the National groundwater database in Entebbe was used to reconstruct the hydrogeology of the project area (**Figure 5-34** and **Figure 5-35**). The data indicated that:

- i. The overlying layer above the rock is a weathered regolith consisting of mainly laterite and micaceous clays and sands.
- ii. The depth of the first water strike varies from 17.75 mbgl in Kiigya parish to 48.6 mbgl in Mboira with an average of 40.4m. This implies that groundwater in Mboira is close to the upper fissured or fractured bedrock zone while in Kiigya, it is within the weathered regolith. Hence, aquifers in the project area can be in the overburden or bedrock aquifers.
- iii. The depth to static water level varies from 9 mbgl in Kiigya parish to 25.6 mbgl in Mboira parish with an average of 23.1 m, so that most static water levels in the drilled wells occur with the weathered zone.
- iv. The hard/fresh basement rock ranges between 50 to 80 m deep (**Figure 5-34**).
- v. The constant discharge in the project area varies from 0.8 m³/hr to 20 m³/hr. The average constant discharge is about 5.3 m³/hr which is good for both rural and motorized boreholes.
- vi. The average thickness of the overburden regolith (depth to the weathered bedrock) is about 25 m.

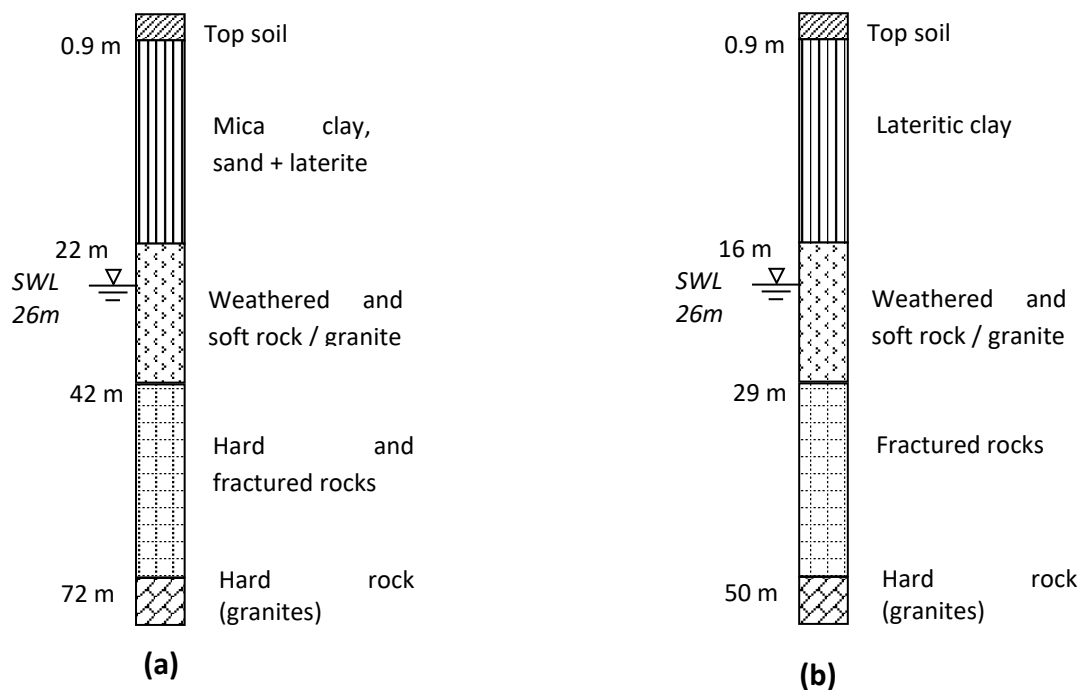


Figure 5-34: Representative lithology of the project areas (a) Kiigya parish (b) Mboira parish

Source: MWE, Feasibility Study and Design Report, 2021

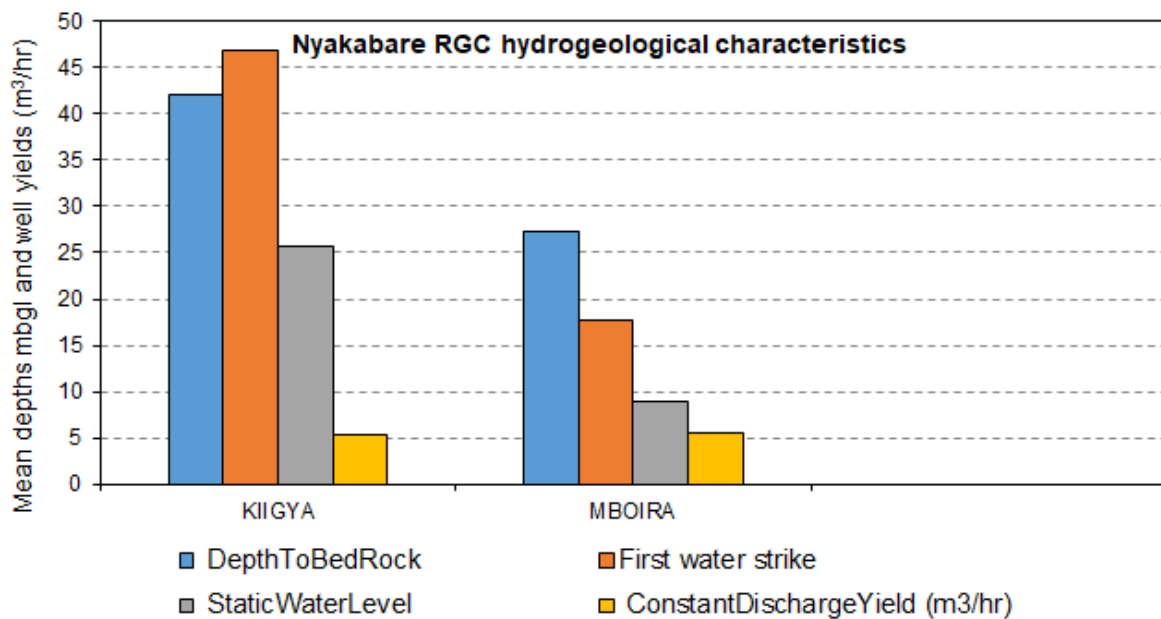


Figure 5-35: Summary of hydrogeological characteristics in the Project area

Figure 5-36 show the geo-statistical analysis of well yields in the entire district with respect to their geological formations. The average well yield in the district is 5.9 m³/hr. The best formation to exploit appears to be the granite-gneiss formation with yields as a high as 70 m³/hr possible (Figure 5-36). The formation with the least yields recorded was Mica schists.

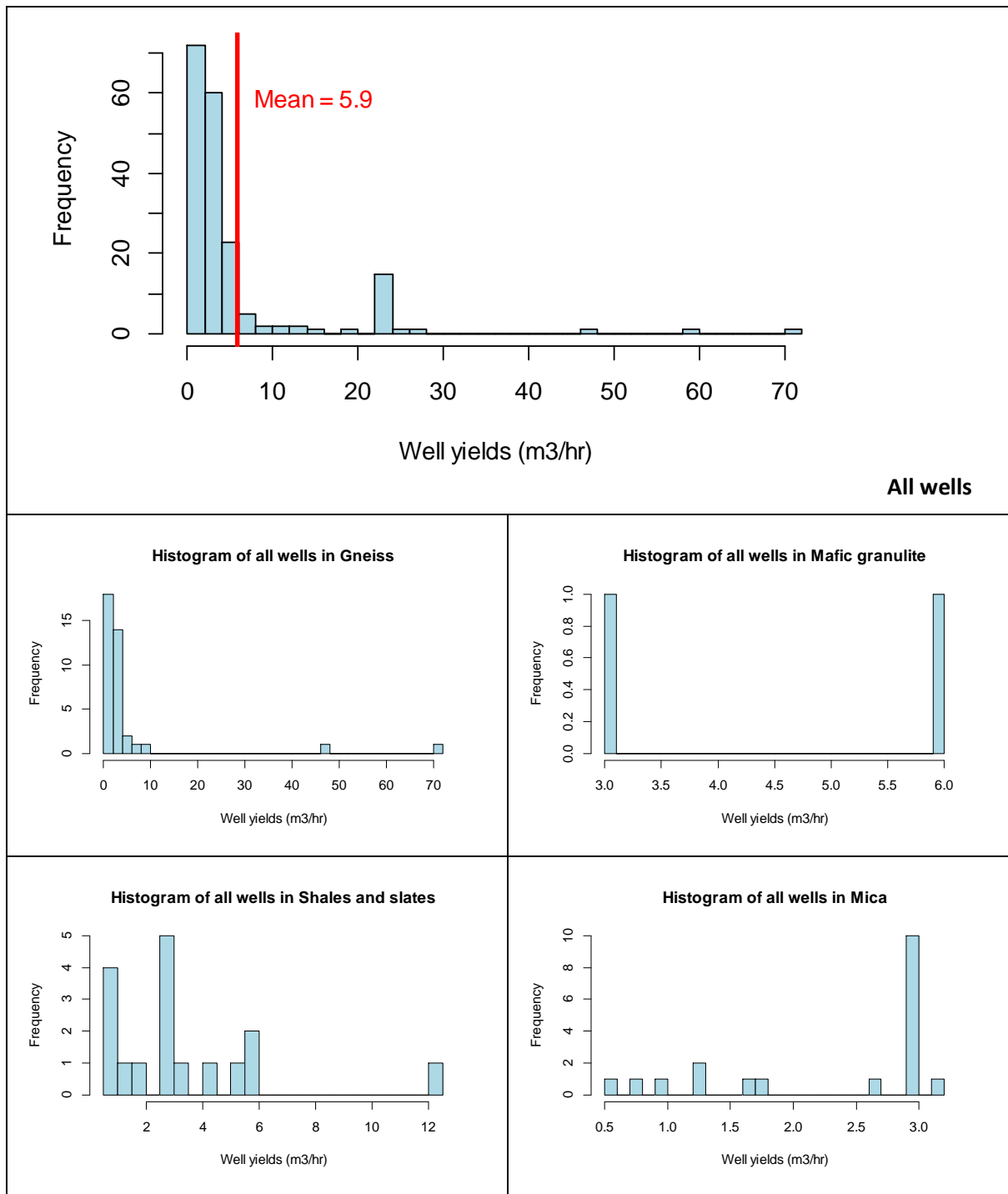


Figure 5-36: Statistical distribution of well yields in Kiryandongo district

Source: MWE, Feasibility Study and Design Report, 2021

Two boreholes were drilled and constructed to supply water for the project with their summary of attributes indicated in **Table 5-2**. The recommended long term operation submersible pump installation depth for DWD 77378 is 56.0mbgl when pumping at 60.0m³/hr and that for DWD 77379 is 90.0mbgl when pumped at 5.0m³/hr. All in due consideration of a pumping regime of 7 hours for a Solar Powered and 16 hours for electricity powered water supply system.

Table 5-2: Hydrogeological attributes of Project Boreholes

| Borehole | GPS Coordinates | Depth (m) | Regolith Depth (m) | 1st Water Strike (m) | Main Water Strike (m) | Driller's yield (m ³ /hr) |
|-----------|------------------|-----------|--------------------|----------------------|-----------------------|--------------------------------------|
| DWD 77382 | E381154, N198933 | 138.16 | 23.28 | 10 | 34, 74, 124-126 | 36.0 |
| DWD 77383 | E379297, N198003 | 133.43 | 23.16 | 11 | 16, 38, 72.5, 110 | 10.5 |

The feasibility assessment report (MWE, Feasibility Study and Design Report, 2021) asserts that groundwater flows towards Victoria Nile. For a large part of Mutunda sub-county, groundwater flows westerly towards Victoria Nile near Mutunda. For the southern parts, groundwater flows south towards Gaspa and then to Victoria Nile. Groundwater flows from a higher position to lower position by gravity in the same manner as surface water.

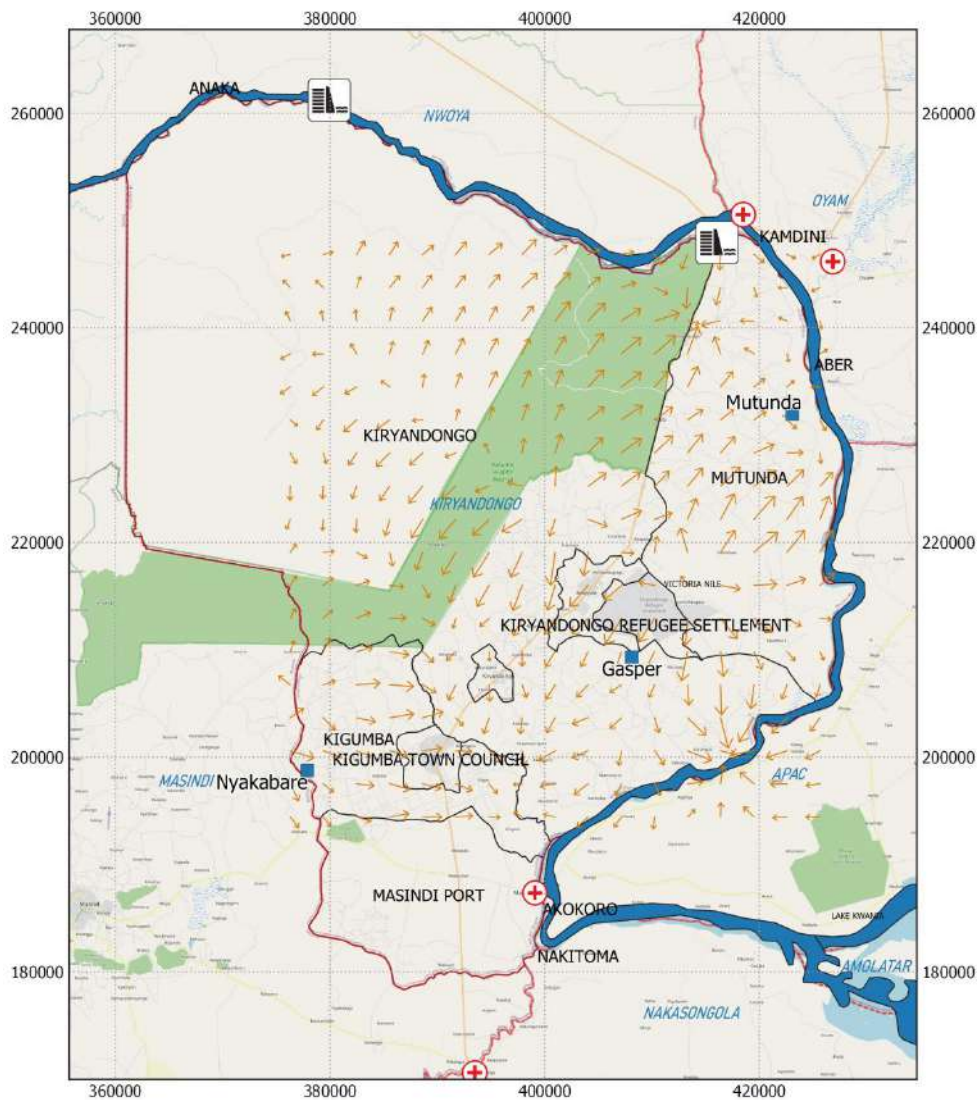


Figure 5-37: Groundwater flow direction in the project area.

Source: MWE, Feasibility Study and Design Report, 2021

Test pumping was conducted on the two boreholes DWD 77382 and DWD 77383 to ascertain the depth at which the submersible pumps will be installed and sustainable abstraction rates.

Step-drawdown tests were carried out at a 90-minute interval for borehole DWD 77382 (at Kikunya) at a 30.00 m³/hr and 40.00m³/hr. The borehole was then allowed to recover to 96.4% of the created drawdown in 6hours. It was then pumped at a Constant discharge rate of 32.00m³/hr for 72 hours and recovery monitored up to 95.0% of the created drawdown in 6 hours.

The borehole at Kikooba DWD 77383 was first subjected to step-drawdown tests of 7.00, 10.00, 13.00 and 16.00m³/hr. The steps were carried out for 90minutes each. The borehole was then allowed to recover to 94.0% of the created drawdown in 6hours. It was then pumped at a Constant discharge rate of 10.80m³ /hr for 72 hours and recovery monitored up to 95.0% of the created drawdown in 6hours.

Table 5-3: Test Pumping Results of the Drilled Boreholes

| Borehole | Draw Down (m) | Time for Recovery (hr) | Level of Recovery (%) |
|-----------------|----------------------|-------------------------------|------------------------------|
| DWD 77382 | 90.67 | 6 | 95% |
| DWD 77383 | 30.11 | 6 | 95% |

The duration of the test pumping of the two boreholes was longer than the planned duration of abstraction by the proposed water supply project. This means that if the boreholes DWD 77382 and DWD 77383 are pumped at the planned abstraction rates of 30.0 m³/hr and 10 m³/hr respectively, they will be able to sustainably supply the Mutunda water supply system.

The boreholes feeding the water supply systems of Mutunda and Gaspa are located in different micro catchments situated 53km and 30km away respectively from Nyakabale micro catchment (**Figure 5-38**) Based on the location of the boreholes, there will be no cumulative impacts related to abstraction of groundwater. This is based on the fact that in crystalline / fractured situations, the aquifer boundary mimics the (micro) catchment area of surface water.

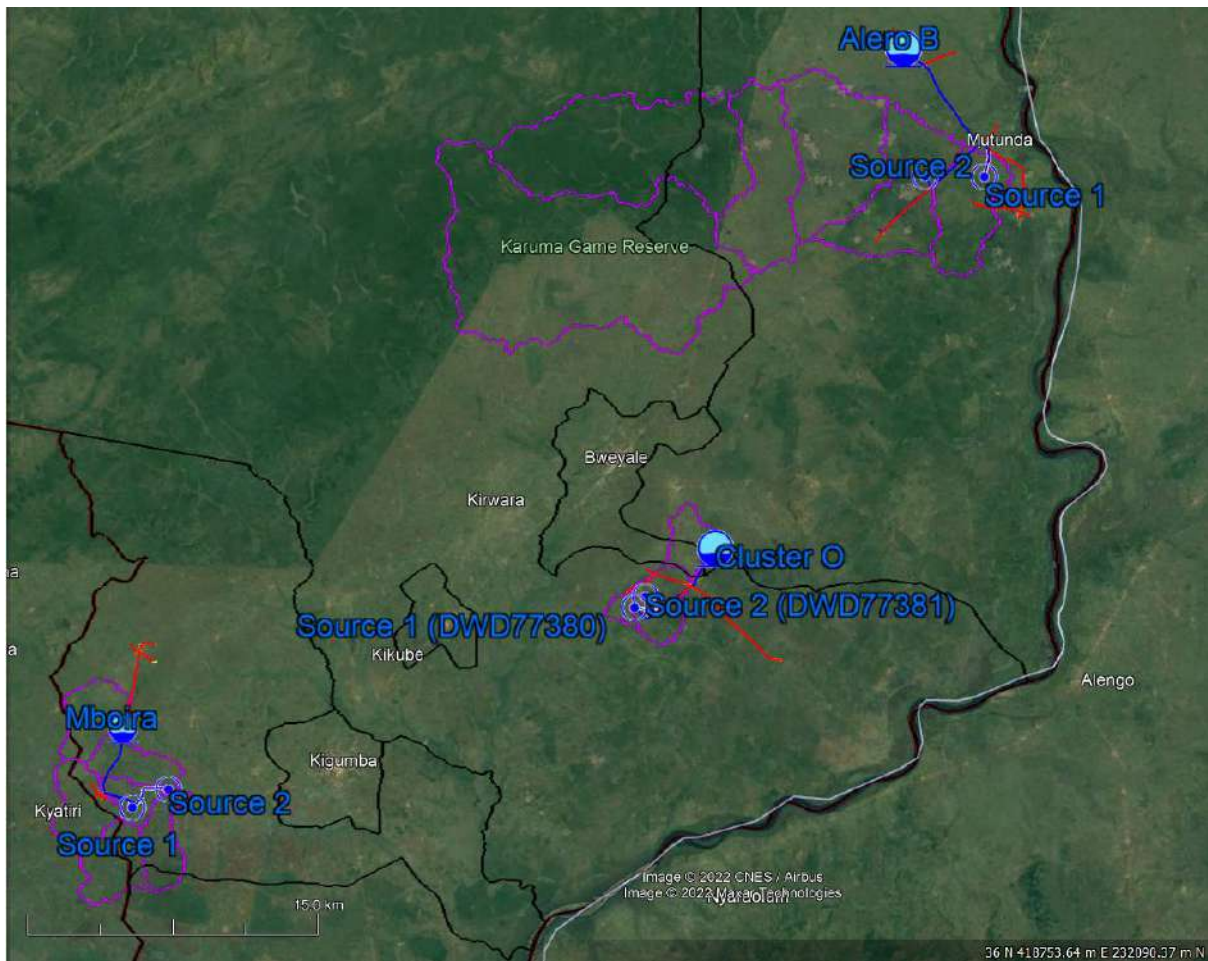


Figure 5-38: Water source micro catchments of Nyakabale, Gaspa and Mutunda water supply systems

5.2.8 WATER QUALITY

In water quality assessment, both the identified surface water and groundwater sources were considered based on its proximity to the Nyakabale RGC borehole location. Water quality sampling was conducted on 15th November 2021 for laboratory analysis. The sampling followed recognized and conventionally acceptable protocols. For groundwater, one (1) sample was collected from a nearest existing borehole to the drilled borehole in the project area. For surface water sampling, a sample was picked from both the upstream and downstream of each identified stream nearby the drilled borehole. Samples for laboratory analysis were collected in 1 litre sterilized plastic bottles and kept in a cool box at 4 °C until analysis (Figure 5-39 and Table 5-4).

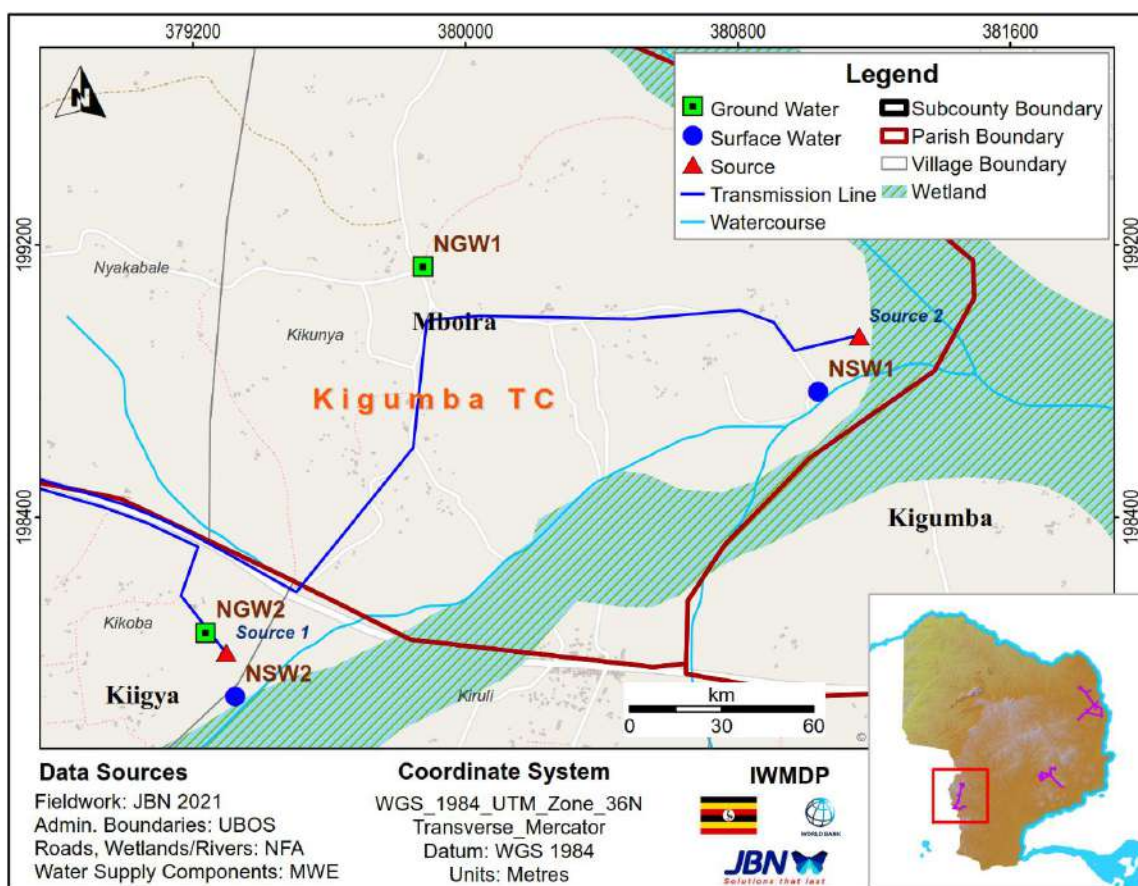


Figure 5-39: Map of water quality sampling sites in Nyakabale RGC

These parameters were analysed at the National Water Quality Reference Laboratory (NWQRL) of the Water Quality Management Department (WQMD) in the Directorate of Water Resources Management (DWRM), Ministry of Water and Environment (MWE) in Entebbe. Water samples were analysed for physical, chemical and micro-biological parameters. These included E.coli, pH, Turbidity, TDS – Total Dissolved Solids, Nitrite (NO₂), Nitrate (NO₃), Sulphate, Fluoride (Fe), Chloride (Cl), Manganese (Mn), Iron total (Fe), Hardness (CaCo₃) and E.Conductivity. The water quality analysis of the proposed water sources was done in accordance with both the Ugandan drinking water standards (US EAS 12: 2014).

Table 5-4: Surface and ground water quality sampling sites in Nyakabale RGC

| ID | Sample | Village | Parish | Sub county | Location UTM | RGC Borehole |
|----|--------------------------|---------|--------|------------|---------------------|--------------|
| 1 | NSW1 – Near Source 2 | Kikunya | Mboira | Mboira | E381036, N198770 | DWD 77382 |
| 2 | NGW1 - Existing Borehole | | | | E379875, N199136 | |
| 3 | NWS2 – Near Source 1 | Kikoba | Kiigya | Kigumba | E379324, N197874 | DWD 77383 |
| 4 | NGW2 - Existing Borehole | | | | E379237, N198062 | |

* NSW – Nyakabale Surface Water, *NGW – Nyakabale Ground Water



Figure 5-40: Surface and ground water quality sampling sites in Nyakabale RGC boreholes

According to the laboratory analysis results for the samples collected by the ESIA team (Table 5-5), all parameters for ground water samples were within national standard limits for drinking water. However, total iron and E. coli for surface water samples picked from Kikunya and Kikoba were above the limit. The potential causes of relatively high E.coli could be due to open defecation as well as animal excretes especially from cattle. The high iron content could be associated with the area geological composition. The sampled ground water resources in Nyakabale RGC conform to the Uganda drinking water standards (US EAS 12: 2014). Details are provided in the water quality certificate in Annex 5.

Table 5-5: Water Quality Analysis Results

| Parameter | Units | Sample Source | | | | Drinking Water Standards (EAS 12:2014 Maximum Permissible for Natural Portable Water) |
|-----------|-------|--------------------------------|-------------------------------|------------------------------------|-----------------------------------|---|
| | | Surface Water | | Ground Water | | |
| | | NSW1 – Near Source 2 (Kikunya) | NWS2 – Near Source 1 (Kikoba) | NGW1 - Existing Borehole (Kikunya) | NGW2 - Existing Borehole (Kikoba) | |
| Turbidity | NTU | 0.2 | 17.3 | 4.7 | 0.1 | 25 |
| pH | Units | 7.34 | 7.12 | 8.07 | 6.92 | 5.5-9.5 |

| Parameter | Units | Sample Source | | | | Drinking Water Standards (EAS 12:2014 Maximum Permissible for Natural Portable Water) |
|-------------------------------------|-----------|--------------------------------|-------------------------------|------------------------------------|-----------------------------------|---|
| | | Surface Water | | Ground Water | | |
| | | NSW1 – Near Source 2 (Kikunya) | NWS2 – Near Source 1 (Kikoba) | NGW1 - Existing Borehole (Kikunya) | NGW2 - Existing Borehole (Kikoba) | |
| Electrical Conductivity | µS/cm | 265 | 459 | 339 | 430 | 2500 |
| Total Dissolved Solids | mg/L | 169 | 294 | 217 | 275 | 1500 |
| Total Hardness as CaCO ₃ | mg/L | 98 | 165 | 130 | 145 | 600 |
| Flouride | mg/L | 0.211 | 0.23 | 0.17 | 0.26 | 1.5 |
| Sulphates | mg/L | 4.9 | 8.7 | 6.8 | 7.9 | 400 |
| Chlorides | mg/L | 23 | 33 | 28 | 31 | 250 |
| Nitrates – N | mg/L | 0.16 | 0.21 | 0.12 | 0.24 | 10 |
| Nitrites – N | mg/L | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 |
| Manganese | mg/L | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total Iron | mg/L | 0.28 | 0.82 | 0.19 | 0.34 | <0.5 |
| E.Coli | CFU/100ml | 10 | 4 | <1 | <1 | <1 |

Results of the water quality tests that were carried out for the 2 water sources during the feasibility study were also explored to examine their fitness to supply water for domestic use (Table 5-6). The results of the analysis of the water samples from the boreholes indicated true colour, total iron and total suspended solids were beyond the limit for DWD 77382 (Source 2), while all the parameters for DWD 77383 (Source 1) were within the limits. Details are provided in the water quality certificate in Annex 5.

Table 5-6: Borehole Water Quality Analysis Results

| Parameters | Units | Source 1 DWD 77383 | Source 2 DWD 77382 | National Potable water standards |
|------------------------------|-----------|--------------------|--------------------|----------------------------------|
| Alkalinity: Total | mg/L | 32 | 92 | 500 |
| Ammonia-N | mg/L | 0.18 | 0.24 | 0.5 |
| Bact: Eschericha coil | CFU/100mL | 0 | 0 | 0 |
| Bact: Faecal coliforms | CFU/100mL | 0 | 0 | 0 |
| Bi-Carbonate | mg/L | 39.04 | 112.24 | 500 |
| Calcium Ca ²⁺ | mg/L | 19.2 | 19.2 | 150 |
| Chloride | mg/L | 49 | 22 | 250 |
| Colour (True) | TCU | 0 | 63 | 50 |
| Electrical Conductivity (EC) | uS/cm | 217 (244) | 228 (250) | 2500 |
| Fluoride | mg/L | 0.29 | 0.42 | 1.5 |
| Hardness: Total | mg/L | 88 | 92 | 600 |
| Iron: Total | mg/L | 0.000 | 0.332 | 0.3 |
| Magnesium Mg ²⁺ | mg/L | 9.60 | 10.56 | 100 |

| Parameters | Units | Source 1 DWD 77383 | Source 2 DWD 77382 | National Potable water standards |
|------------------------------|-------|-----------------------|-----------------------|-------------------------------------|
| Manganese | mg/L | 0.015 | 0.017 | 0.1 |
| Nitrate-N | mg/L | 0.53 | 0.20 | 45 |
| pH | - | 5.34 (5.33) | 5.74 (5.58) | 5.5 – 9.5 |
| Sulphate | mg/L | 3.638 | 3.638 | 400 |
| Total Dissolved Solids (TDS) | mg/L | 138.88 | 145.92 | 1500 |
| Total Suspended Solids (TSS) | mg/L | 0 | 4 | 0 |
| Turbidity | NTU | 0.27 | 7.82 | 25 |

Source: MWE, Feasibility Study and Design Report, 2021

Overall, the ESIA has established that water samples from the proposed production wells for the project were within the National drinking water quality standards for Uganda.

5.2.9 AIR QUALITY BASELINE

5.2.9.1 PARTICULATE MATTER

The ambient average levels for PM10 ranged from 0.017mg/m³ to 0.022mg/m³ while ambient average levels for PM2.5 ranged from 0.006mg/m³ to 0.016mg/m³ respectively. The recorded average levels for PM2.5 and PM10 at all sampled sites were within the WHO Air quality limits. The low levels of particulate matter recorded can be attributed to location of sampled sites being in rural agricultural sparsely populated areas with less vehicular traffic, with the exception of Nyakabale Trading Centre located along Kigumba-Masindi Road.

Additionally, the PM levels were mainly influenced by weather, during the assessment weather was calm with less wind which causes resuspension of dust particles into the surrounding air. This therefore reduced resuspension of particulate matter into surrounding atmosphere as well as decreasing the dispersion rates of dust particles in the surrounding air.

Table 5-7: Summary of Baseline Particulate Matter Readings for Nyakabale RGC

| Location | Date and Time | Coordinates | PM10 (mg/m ³) | | | | PM2.5 (mg/m ³) | | | |
|--------------------------|------------------------------|-----------------------|---------------------------|-------|-------|---------|----------------------------|-------|-------|-----------|
| | | | Min | Max | Aver | WHO AQG | Min | Max | Aver | WHO (AQG) |
| Nyakabale TrC | 10/11/2021 10:47am-1:37pm | 377879 E, 198751 N | 0.010 | 0.032 | 0.017 | 0.05 | 0.005 | 0.008 | 0.006 | 0.025 |
| Nyakabale Primary School | 10/11/2021 2:42pm-4:52pm | 376320 E, 203549 N | 0.008 | 0.024 | 0.014 | 0.05 | 0.004 | 0.008 | 0.006 | 0.025 |
| Apodora HC II | 13/11/2021 8:46am-11:16am | 379797 E, 206290 N | 0.009 | 0.260 | 0.022 | 0.05 | 0.007 | 0.182 | 0.016 | 0.025 |
| Kifuruta Primary School | 13/11/2021 11:56am-3:56pm | 380386 E, 205468 N | 0.013 | 0.058 | 0.021 | 0.05 | 0.009 | 0.017 | 0.011 | 0.025 |

WHO AQG: PM2.5: 0.025 mg/m³(24hr averaging), PM10: 0.050 mg/m³ (24hr averaging)

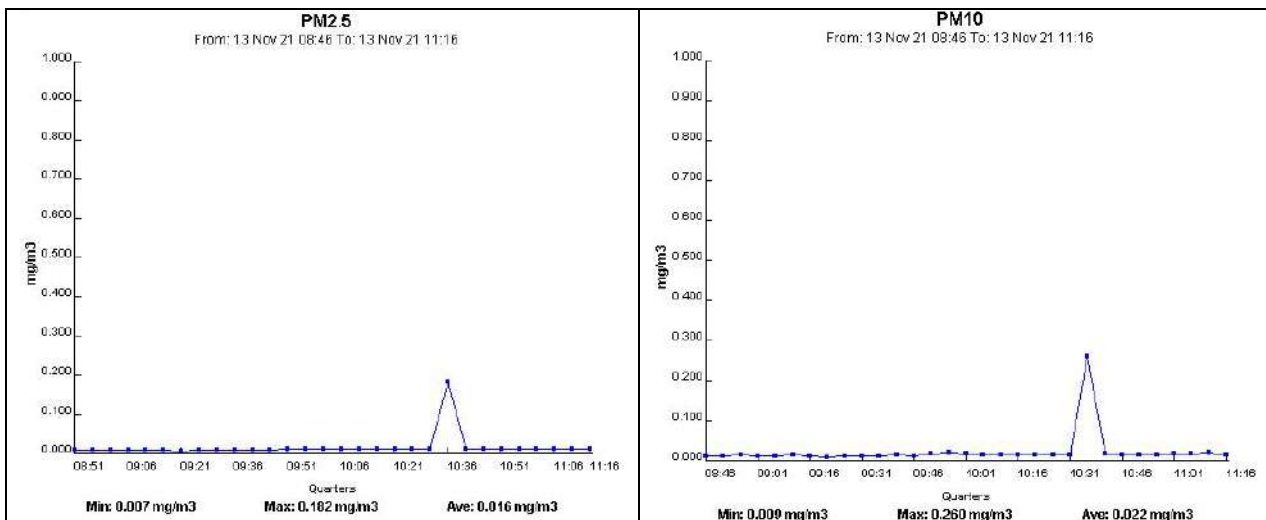


Figure 5-41: Variation of PM10 with Time of the day at Kifuruta Primary School

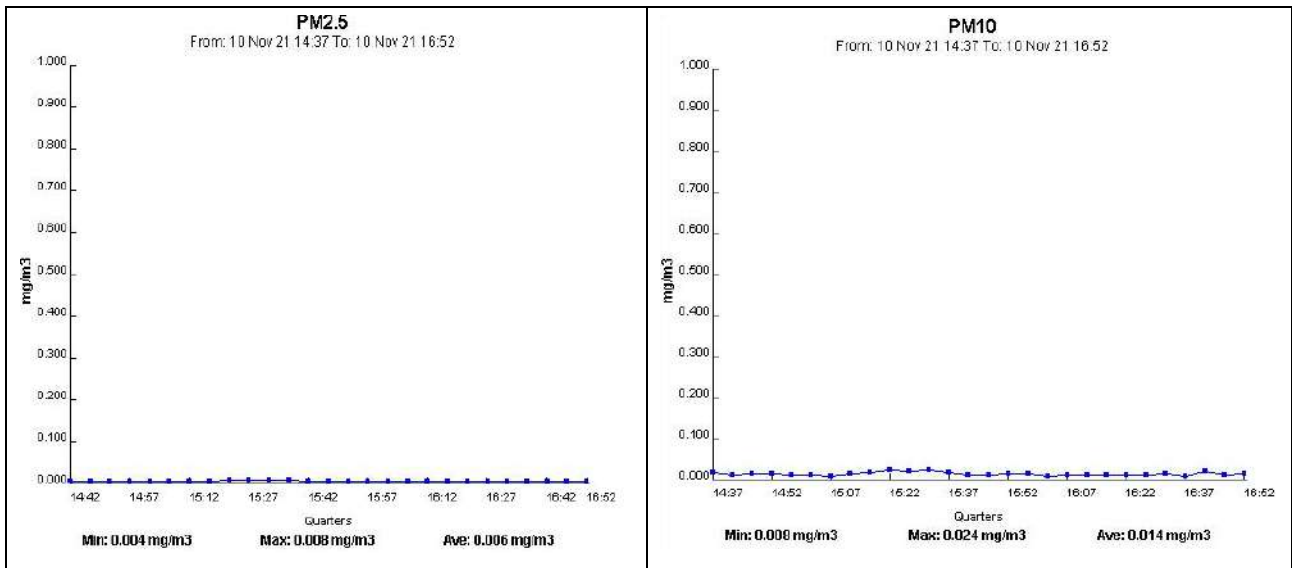


Figure 5-42: Variation of PM2.5 levels with Time of the day at Apodorwa Health Centre II

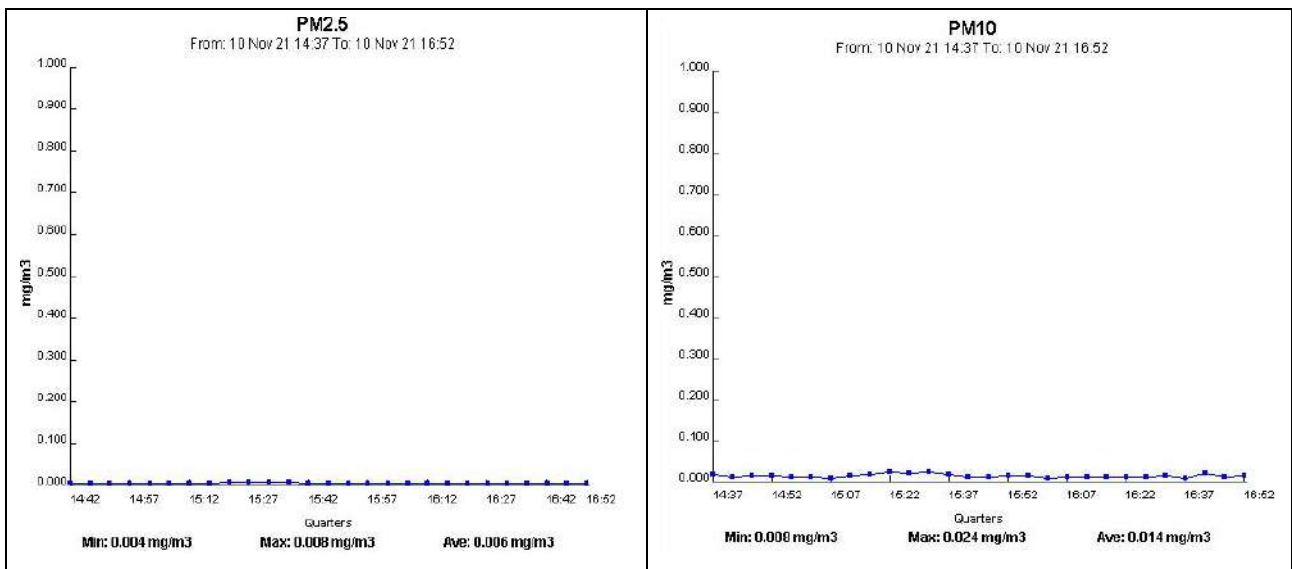


Figure 5-43: Variation of Particulate matter levels with time of the day at Nyakabale Primary School

5.2.9.2 GAS EMISSIONS BASELINE

The four, most common gas emissions considered during the assessment included NO₂, SO₂, CO and VOC. By volume, ambient air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.04% CO₂ plus a host of other gases in small amounts (SO_x, CO_x & VOC).

At all the four (4) sites monitored, Nitrogen Dioxide (NO₂) average values ranged from 0.066ppm to 0.089ppm, Sulphur Dioxide (SO₂) average values ranged between 0.00ppm – 0.150ppm, Carbon Monoxide (CO) average values ranged from 0.0ppm to 0.029ppm.

Average values for all gases across the different sites monitored did not vary significantly and were very low compared, conforming to the WHO Ambient Air Quality standards at the time of the survey although there are no standards for VOCs yet. The low levels of gases can be attributed

to limited activities at the sites monitored as these are located in rural areas with little traffic with exception of trading centres.

VOCs are products of combustion of fossil fuels (coal, gas, wood, kerosene, tobacco products and oil) especially fuel used in cars. VOCs can also come from personal care products such as perfume and hair spray, cleaning agents, dry cleaning fluid, paints, lacquers, varnishes, hobby supplies and from copying and printing machines.

Table 5-8: Summary of Baseline Gas Emissions Readings for Nyakabale RGC

| Location & Details (e.g., school, hospital, residence, etc.) | Date & Run time | Readings | | | |
|--|-----------------|-----------------------|-----------------------|-------------------|------------------|
| | | NO ₂ (ppm) | SO ₂ (ppm) | CO (ppm) | VOCs (ppm) |
| Site 1: Nyakabale Trading Center | 10/11/2021 | Min: 0.022 | Min: 0.00 | Min: 0.00 | Min: 0.00 |
| | 10:47am-1:37pm | Ave: 0.066 | Ave: 0.00 | Ave: 0.26 | Ave: 0.00 |
| | | Max: 0.113 | Max: 0.00 | Max: 5.42 | Max: 0.00 |
| Site 2: Nyakabale Primary School | 10/11/2021 | Min: 0.052 | Min: 0.00 | Min: 0.00 | Min: 0.00 |
| | 2:42pm-4:52pm | Ave: 0.089 | Ave: 0.13 | Ave: 2.21 | Ave: 0.00 |
| | | Max: 0.111 | Max: 0.32 | Max: 8.77 | Max: 0.00 |
| Site 3: Apodorwa Health Centre II | 13/11/2021 | Min: 0.00 | Min: 0.00 | Min: 0.00 | Min: 0.00 |
| | 8:46am-11:16am | Ave: 0.00 | Ave: 0.00 | Ave: 0.290 | Ave: 0.00 |
| | | Max:0.00 | Max: 0.00 | Max: 2.97 | Max: 0.00 |
| Site 4: Kifuruta Primary School | 13/11/2021 | Min: 0.066 | Min: 0.00 | Min: 0.00 | Min: 0.00 |
| | 11:56am-3:56pm | Ave: 0.088 | Ave: 0.02 | Ave: 0.00 | Ave: 0.00 |
| | | Max:0.120 | Max: 0.15 | Max: 0.00 | Max: 0.00 |
| WHO AQG: NO₂: 0.2mg/m³ or 0.106ppm (1-hour averaging) WHO AQG: SO₂: 0.5mg/m³ or 0.2ppm (10-minute averaging) WHO, 1999: CO: 10mg/m³ or 9ppm (8-hr averaging) | | | | | |

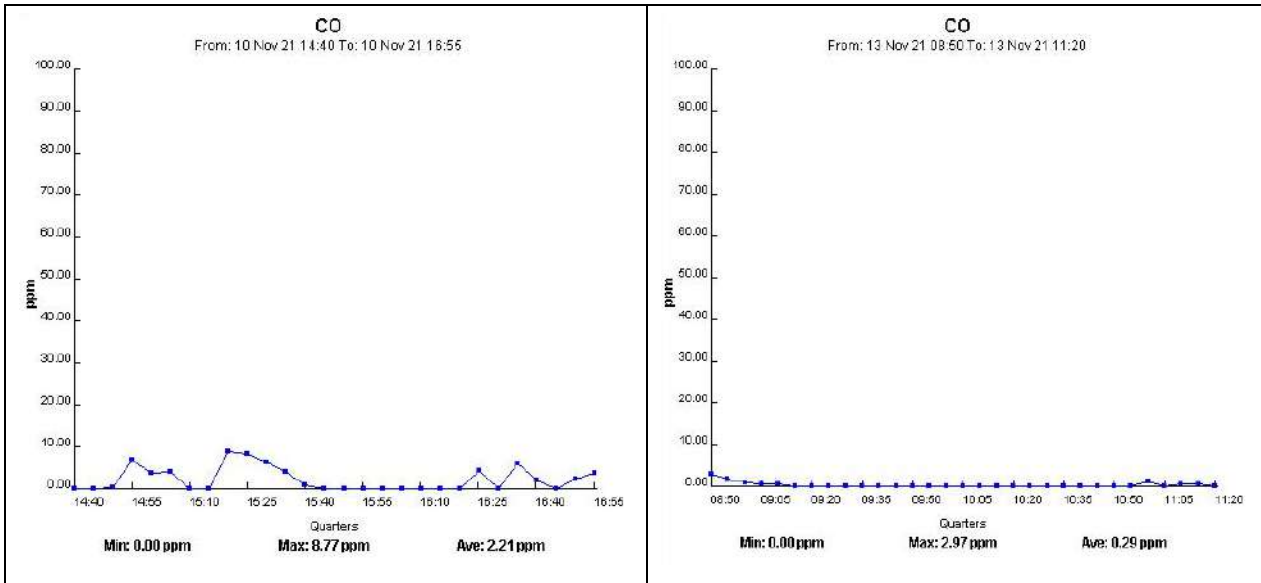


Figure 5-44: Variation of CO levels with time of the day at Nyakabale P/S and Apodorwa HCII respectively

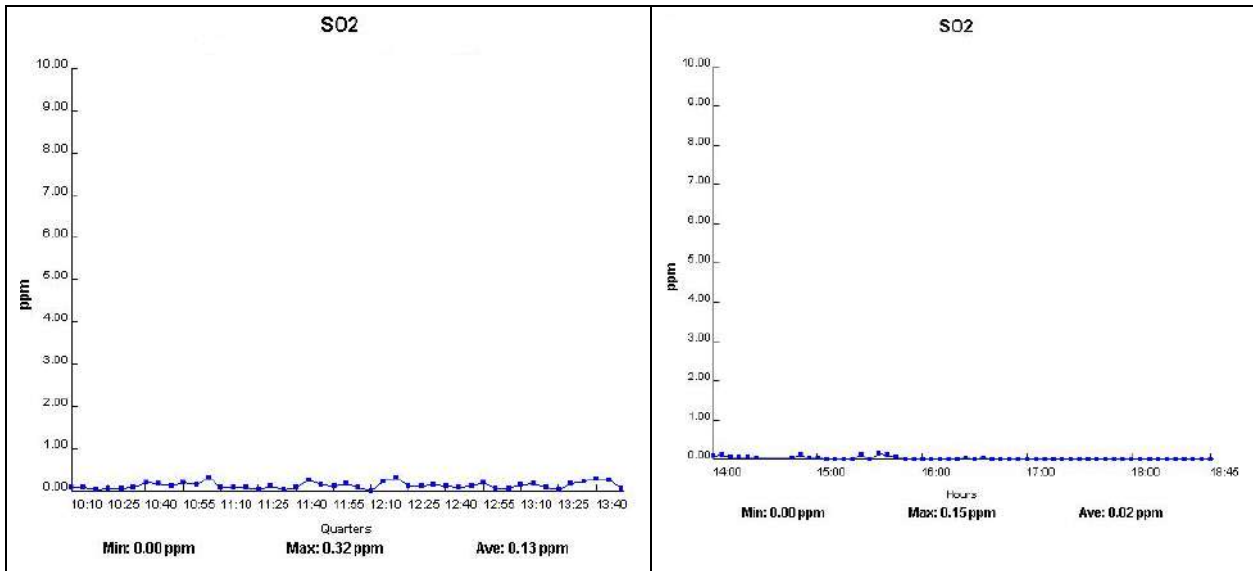


Figure 5-45: Variation of SO2 levels with time of the day at Nyakabale and Kifuruta Primary School respectively

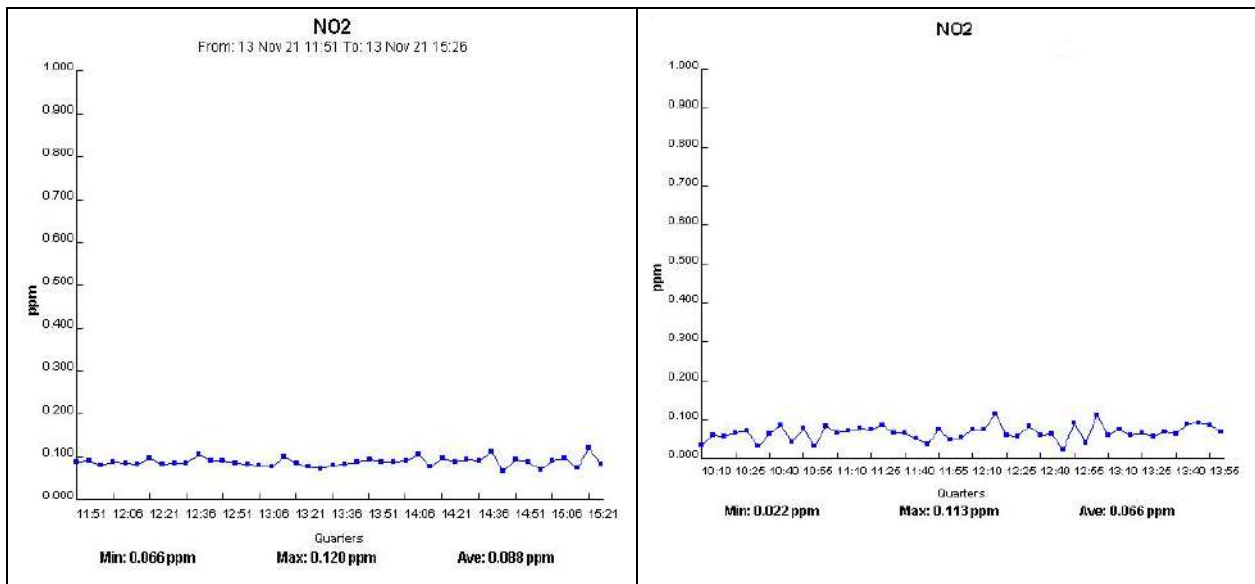


Figure 5-46: Variation of NO2 levels with time of the day at Kifuruta P/S ad Nyakabale trading centre respectively

5.2.10 NOISE MEASUREMENT RESULTS

The noise levels recorded at these different sampled receptors varied depending on the noise sources at a specific monitoring time of the day. These noise levels (LAeq) for the monitored sites ranged from 43.7dB (Site 3: Apodorwa Health Centre II in a mixed land use area) to 54.3dB (Site 1: Nyakabale Trading Centre a commercial and residential area). The baseline noise levels for Apodorwa Health Centre II and Nyakabale Trading centre were within the permissible noise limits for such receptors whilst ambient noise levels for Nyakabale P/S and Kifuruta P/S were slightly above the NEMA acceptable noise limits for such land use. High noise levels at Kifuruta Primary school were attributed to noise emissions from children singing in a nearby catholic church and loud music from the staff quarters at the time of assessment. For Nyakabale Primary school, during the time of assessment the school field had village children utilizing it to play soccer thereby emitting a sizeable amount of noise as indicated in **Table 5-9** below.

Table 5-9: Summary of noise results at measured receptors

| Location & Details (e.g., school, hospital, residence, etc.) | GPS Coordinates | LAFmin (dB) | LAFmax (dB) | LAeq (dB) | Maximum Permissible Noise Limits Day (dBA) |
|--|--------------------|-------------|-------------|-----------|--|
| Site 1: Nyakabale Trading Centre | 377879 E, 198751 N | 36.2 | 82.1 | 54.3 | 55 |
| Site 2: Nyakabale Primary School | 376320 E, 203549 N | 37.1 | 81.4 | 48.7 | 45 |
| Site 3: Apodorwa HC II | 379797 E, 206290 N | 31.6 | 71.6 | 43.7 | 55 |
| Site 4: Kifuruta Primary school | 380386 E, 205468 N | 30.2 | 72.4 | 46.4 | 45 |

5.3 BIOLOGICAL ENVIRONMENT

5.3.1 LANDUSE/LAND COVER

There were various land uses encountered within the project footprint for the water transmission and distribution, water sources, and reservoir in Mboira area. The proposed project is located in an area well known for high intensity agriculture as one of the leading producers of maize and sugar cane, with a few areas having subsistence farming, scrubland/bushes and resettlements. The high intensity agriculture in the district has resulted into severe natural habitat clearance since land tilling is usually done by machines such as tractors on large blocks of land.

The spatial analysis of the landuse brings out at the following characteristic elements landuse/cover types. The dominant land cover/use type is crop land/agriculture representing approximately 57% followed by grass land representing approximately 34% as shown in **Table 5-10**, **Figure 5-47** and **Figure 5-48** below. The landuse of the project area is divided into six broad subdivisions: Bushland, Crop land, Forest, Grassland, Other land (settlement), wetland and woodland.

Table 5-10: Land use/cover of Nyakabale

| Nyakabale | | |
|----------------|-------------|--------------|
| Land use/cover | Area (ha) | % cover |
| Bushland | 91 | 2.0 |
| Cropland | 2623 | 57.4 |
| Forests | 249 | 5.5 |
| Grassland | 1562 | 34.2 |
| Otherland | 41 | 0.9 |
| Water Body | 0 | |
| Wetland | 4 | 0.1 |
| Woodland | 0 | |
| Total | 4569 | 100.0 |

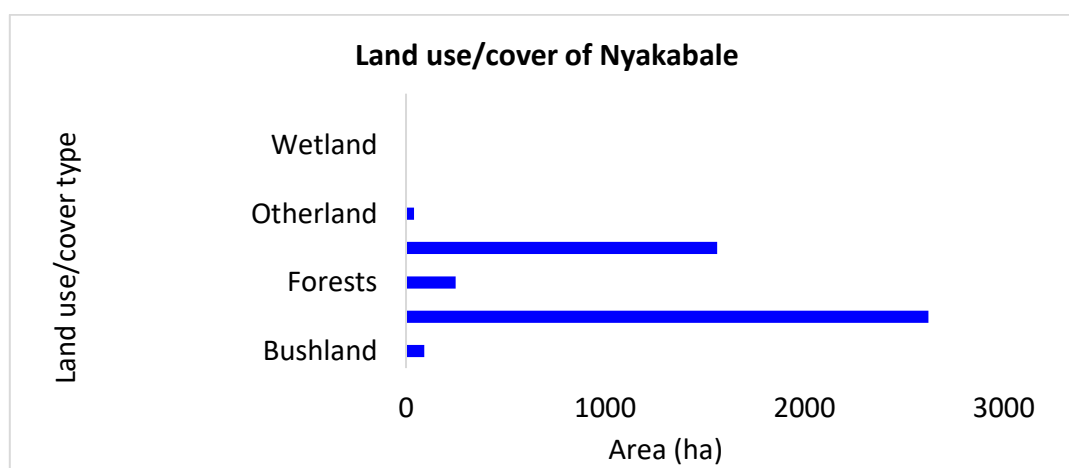


Figure 5-47: Land use/cover of Nyakabale

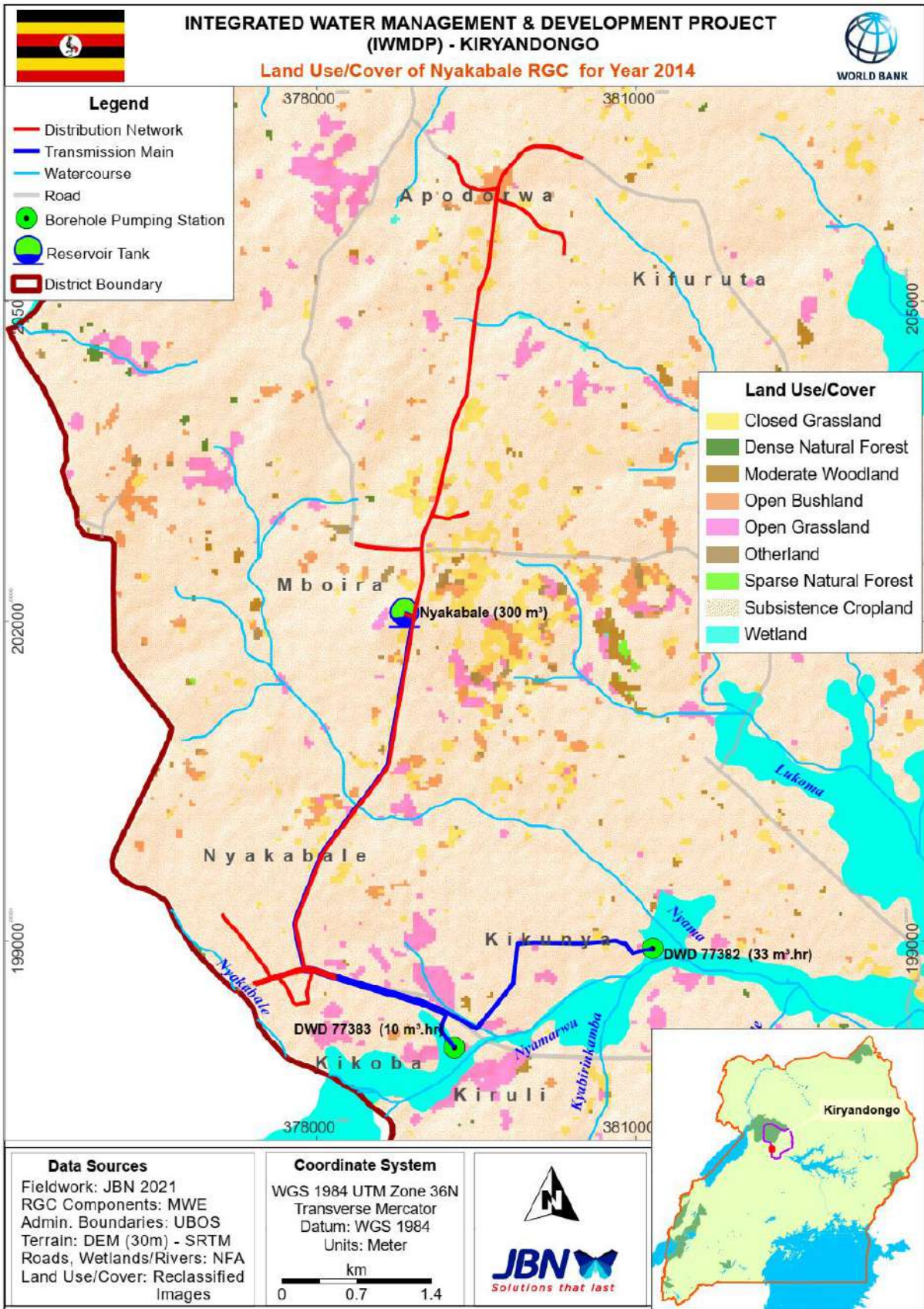


Figure 5-48: Land use/land cover of Nyakabale RGC

Land uses also include livestock rearing and subsistence farming. Some of commonly encountered crops were; - Cassava tuber gardens, banana (matooke) *musa ssp*, cowpea, groundnuts, sorghum, bean seeds, pigeon pea, rice, sweet potatoes, millet, sugar cane, soya bean, tomato, okra, sim sim and leafy vegetables. Because of the extensive farming system, the entire district land cover has been severely degraded and natural habitats have reduced to 5%, causing a huge shortage of fuelwood in the district due to maize and sugarcane which requires total land clearance.

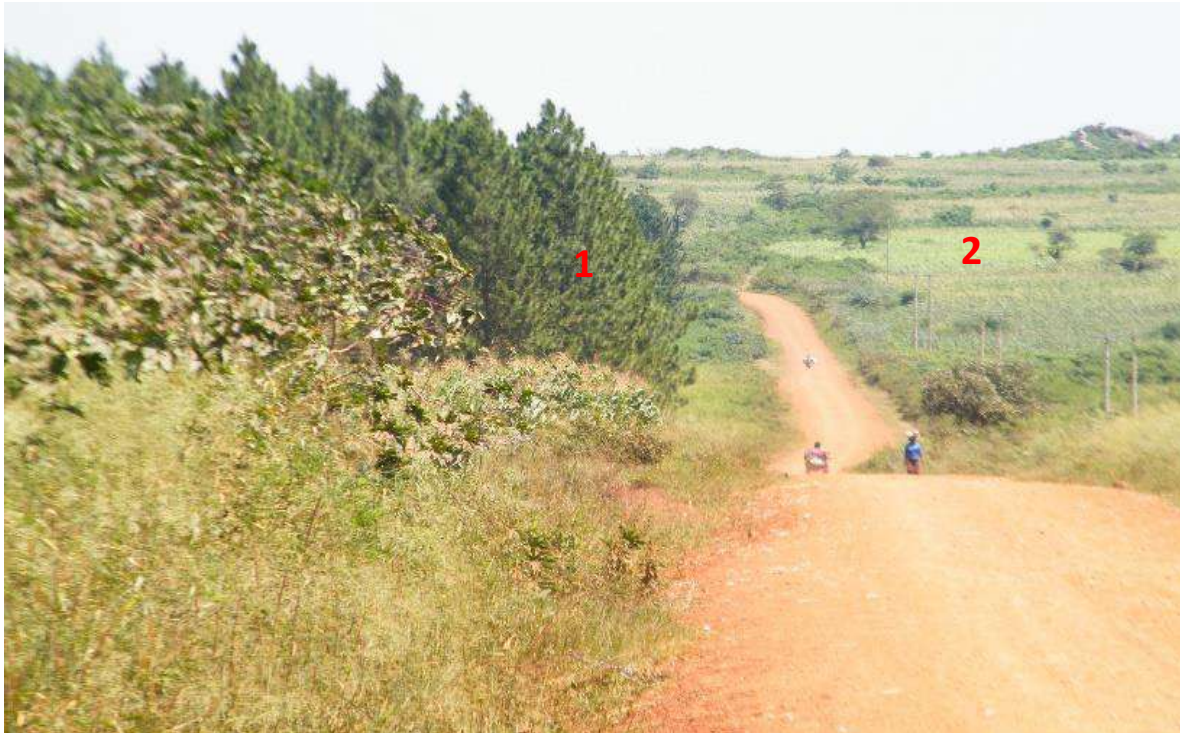


Figure 5-49: Pine plantation (1), Sugar cane plantation (2) along Nyakabale - Mboira route (E-378339, N-200183)

5.3.1.1 ECOLOGICALLY SENSITIVE AREAS

Karuma wildlife reserve is one of the ecologically sensitive areas in the district. It is located north of the project area at approximately 4.5 km from the nearest trading center (Apodorwa) where water supply will be implemented. Therefore, the project is likely to have little to no impact on the Karuma wildlife reserve.

5.3.2 FLORA

5.3.2.1 HABITAT DESCRIPTION

In general, the entire project footprint is largely covered by modified habitats (accounting for about 90% of the land cover) with the remaining 10% attributed to natural habitat such as; - swamps, bushes, and fallows, which is a reflective of the significant human activities in the project area. Land use/habitat coverage present within the project footprint are; - Subsistence farmland, Sugarcane blocks, tree plantation, trading centres infrastructures, agro-pastoral, and schools.

These are described below in more details; -

- ❖ **Subsistence farmland and Monoculture:** Within the entire proposed sites for the water reservoir, and the two boreholes (water source 1 & 2) are characterized by subsistence agriculture practices. About four (4) common species of annual and perennial crops were located within the project area includes; - *Zea mays* (maize) contributing about 65%, cassava (Manhot), *Saccharum officinarum* (sugarcane), *Helianthus annuus* (sunflower), Soyabean, sorghum bicolar, banana, millet, rice and *Sesamum indicum*. Apart from maize, most crops are grown on small scale plots as it was observed during a field visit. other monoculture species were: - *Pinus caribea* plantation, Eucalyptus ssp, and *Saccharum officinarum* (sugarcane) and were all recorded along the proposed Nyakabale-Mboira water transmission line to Mboira water reservoir.
- ❖ **Settlements:** A significant proportion of the project foot print lies within areas that have undergone through several vegetation transform and currently these natural habitats are considered as secondary with degraded due to several anthropogenic factors such as; - the infrastructure like schools, health centres, homestead, sub county and trading centres such as Nyakabale, Mboira, and others. Water source 2 is located within an area used for cultivation of maize and water source 1 at edge of swamp with crop and fallow type of vegetation. The entire Kiryandongo district is devoid of natural habitats, however small fragments of modified habitats (i.e. open falls with remnant trees vegetation verges, mixed gardens, degraded swamps with crumps of shrubs which provide refuge points for the few remaining wildlife mainly the birds and small mammals.
- ❖ **Agro-pastoral:** These are modified habitat types within the project footprints are agro-pastoral and fallow land which are generally located in degraded swamps.

5.3.2.2 VEGETATION DESCRIPTION

The vegetation in the project area is described from the species available which is sometimes influenced by the prevailing environmental conditions such as; -land form, soils, microclimate and anthropogenic factors such as fire, logging, mining, settlements, agriculture and farming methods etc. The proposed project lies within areas that have undergone several land transformations from primary vegetation settings to extensive maize, sugarcane blocks and large tree plantations. Open fallows are used as livestock grazing areas. The vegetation of the project area is not uniform due to several types of the land uses, therefore the vegetation classification was done based on these land uses as:

- ✓ Extensive maize fields mixed with small gardens of beans and cassava.



Figure 5-50: Extensive maize growing at the site of Borehole DWD 77382 in Kikunya Village

- ✓ **Open fallow / shrub land** which are at times used as livestock grazing corridors with some shrubs such as; - *Combretum molle*, *C. collinum*, *Terminalia glaucescens* and *Acacia polyacantha*. Mboira reservoir is located at the slopes characterised by bushes dominated by *Lantana camara*, *Acacia hockii*, *Combretum molle*, and *Combretum collinum* shrubs.
- ✓ **Monoculture land/Wood lot** or characterized by *Pinus caribea* and *Eucalyptus ssp* plantation, *Saccharum officinarum* blocks.



Figure 5-51: Pine plantation at Mboira stretching about 500m along the road and 15 meters width off the road

- ✓ **Wetland or Swamp habitat** - Only one swamp was observed along Nyakabale-Mboira transmission and distribution lines. One side of the wetland was in use of rice growing and another side as the road separates the swamp, is used for grazing. The seasonally impended

swamp is characterized by shallow water column, and herbaceous such as *Leersia hexandri* contributing 35%, *Cynodon dactylon* 30%, *Sporobolus pyramidalis* 15% and *Imperata cylindrical*, associated with *Acacia polyacantha*, *Piliostigma thonningii*, *combretum collinum* and clumps of *Grewia mollis*.



Figure 5-52: Rice growing and grazing in a Nyama wetland in Mboira (E-378406, N-200275)

5.3.2.3 FLORISTIC COMPOSITION, DISTRIBUTION, DENSITY AND DIVERSITY OF NYAKABALE WATER SYSTEM

From all the surveyed three sites, a total of one hundred, fifty-seven (157) individual species were recorded from thirty-seven (39) families. Herbaceous species recorded the highest individuals with ninety-two (97) contributing 62%, followed by trees/shrubs with fifty-seven (48) representing 30%, and lastly liana with only ten (12) species contributing only 8% of the species composition. The number of species recorded in any geographical location depends more on the time factor and sample size before other factors such as; ecological and anthropogenic activities. All the proposed areas differed in area covered, a factor which determined the number sampling units. Borehole 1 & 2 and their access roads registered the highest number of species 145, followed by Nyakabale-Mboira transmission and distribution lines with 105, reservoir site 58, and Nyakabale loop with only 23.

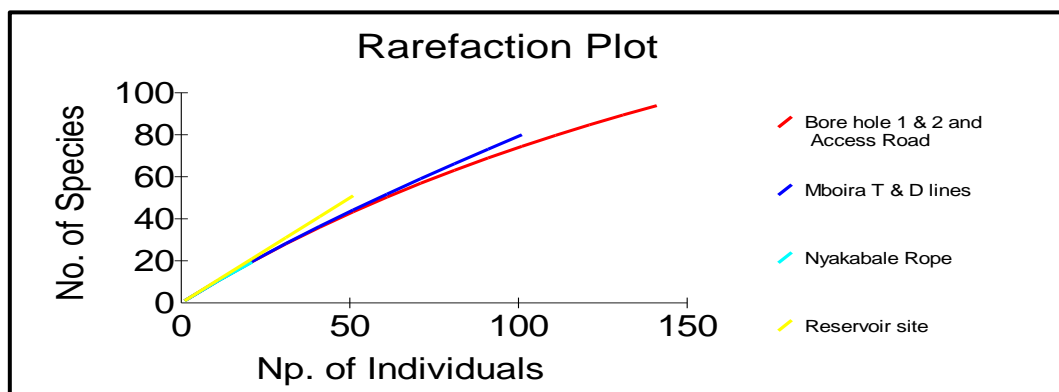


Figure 5-53: Rarefaction curve

The **Figure 5-53** above, shows sampling intensity and species richness in plots from all the study routes and sites. The figure reveals low species richness accumulatively from the sampled routes. All the sites and routes for the distribution and Transmission of water had been modified and replaced with maize fields and that affected the species diversity of the flora. Water source 1, 2, and the access road recorded the highest number of species because of the thickets which were observed along water source 1 route. Nyakabale to Mboira route was the longest with 8.2 kilometres and this recorded the second highest number of species although low in richness because much of route is covered by sugar cane and Pine plantation.

Table 5-11: Shannon-Wiener and Alpha diversity values for plants from Nyakabale water system

| Index | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Route | Reservoir site |
|---------------------------|---------------------------------|--------------------|-----------------|----------------|
| Shannon H' Log Base 10. | 1.926 | 1.86 | 1.321 | 1.756 |
| Shannon Hmax Log Base 10. | 1.982 | 1.914 | 1.342 | 1.756 |
| Alpha | 121.933 | 179.028 | 128.149 | 627879.75 |

Diversity of an area is considered to the number of different species. From the field survey conducted in Nyakabale-Mboira water system project area, diversity was considered to be low according to the log series. The Fabaceae (Papilionaceae) registered the highest individual species with 31, followed by Poaceae (Graminae) 28, Asteraceae (Compositae) 18, Malvaceae 13, Euphorbiaceae 11, Verbenaceae 8, Acanthaceae 6 respectively, the rest registered 4 or less (**Annex 6**).

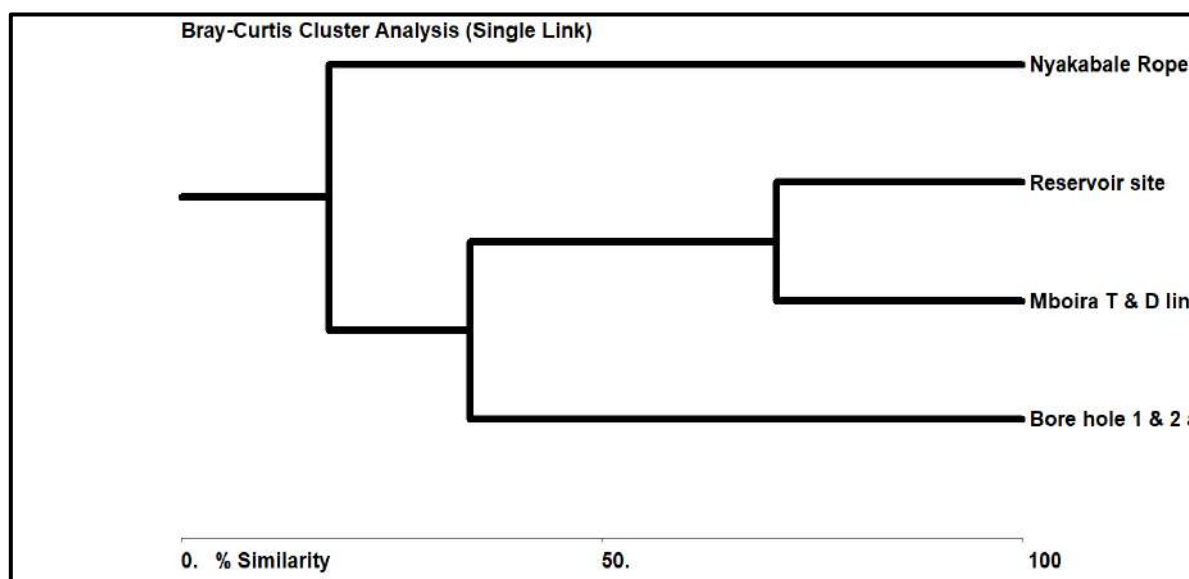


Figure 5-54: Similarities in species composition from different the study areas for plants

All sites were dissimilar at only 15%. Mboira transmission route was similar to the reservoir site which is along the Nyakabale - Mboira route, in terms of plant communities and species composition. The borehole sites, and transmission route (access road) and Nyakabale loop were the most dissimilar in terms species composition.

5.3.2.4 CONSERVATION STATUS OF THE SPECIES

Out of the one hundred and fifty-seven (157) plant species encountered in all study areas, no species have been listed on the IUCN Redlist of Uganda of 2016. Therefore, the species are of no conservation concern in the country and in the region although vegetation clearance may result into land degradation that might affect the micro climate and water balancing of the surface water and may greatly contribute to global warming.

5.3.2.5 ECONOMIC PLANTS

The economic importance of these plants varies and they include their uses as; income generating, fuelwood, timber, vegetable, edible fruits, seed bank, medicinal and religious believes. A list of the common plants encountered within the study areas during field trip are presented in the **Table 5-12** & **Table 5-13** below reflecting the numbers for each species. The density of the economic plants in all the study areas was not calculated and no actual density was given. The economically important plants registered from Nyakabale includes; - *Saccharum officinarum* (sugarcane) poaceae, and *Tectona grandis* (Verbenaceae). the rest are economic plants in terms of fruit production, or ornamental such as; *Artocarpus heterophyllus* (Jackie fruit tree), *Mangifera indica* (mango tree) and *Persea americana* (ovacado).

Table 5-12: List of economic trees encountered along the water transmission and distribution routes in Nyakabale (Nov, 2021)

| S/N | Family | Scientific Name | Uses | Number | Size |
|-----|---------------|--------------------------------|------------|--------|---------|
| 1 | Moraceae | <i>Artocarpus heterophylla</i> | Fruits | 3 | 20-50cm |
| 2 | Anacardiaceae | <i>Mangifera indica</i> | Fruits | 7 | 20-80cm |
| 3 | Lauraceae | <i>Persea americana</i> | Fruits | 4 | 10-20cm |
| 4 | Myrtaceae | <i>Eucalyptus grandis</i> | Wood | 15 | 4-10cm |
| 5 | Pinaceae | <i>Pinus caribaea</i> | Wood | 67 | 8-22cm |
| 6 | Rutaceae | <i>Citrus sinensis</i> | Fruits | 18 | 5-7cm |
| 7 | Anacardiaceae | <i>Anacardium occidentale</i> | Fruits | 2 | 20cm |
| 8 | Rhamnaceae | <i>Maesopsis eminii</i> | wood | 7 | 5-30cm |
| 9 | Rubiaceae | <i>Coffea</i> | Commercial | 26 | 3-5cm |

Table 5-13: List of Crops encountered in Nyakabale water transmission area (Nov, 2021)

| S/N | Scientific Name | Common Name | Importance | Range of farm size |
|-----|------------------------------|----------------|------------|-------------------------|
| 1 | <i>Zea mays</i> | Maize | Commercial | Extensively |
| 2 | <i>Manihot esculenta</i> | Cassava | Food | Small scale |
| 3 | <i>Ipomoea batatas</i> | sweet potatoes | Food | Small scale |
| 4 | <i>Phaseolus vulgaris</i> | Beans | Food | Small gardens |
| 5 | <i>Cucurbita ssp</i> | Pumpkin | Food | rare |
| 6 | <i>Arachis hypogaea</i> | Groundnuts | Food | Small scale |
| 7 | <i>Sesamum indicum</i> | Sim sim | Food | Small scale |
| 8 | <i>Cajanus cajan</i> | Pigeon pea | Food | Small scale |
| 9 | <i>Sorghum bicolor</i> | Sorghum | Food | Small scale |
| 10 | <i>Musa ssp</i> | Banana | Food | Small scale |
| 11 | <i>Saccharum officinarum</i> | sugarcane | Commercial | Large scale (Extensive) |

5.3.2.6 INVASIVE PLANTS

The term invasive has been defined differently. Cronk and Fuller (1995) refer to natural area weeds as invasive plants and the non-native plants as aliens. Mosango et al (1999) refer to weeds as invasive and any plant growing where it is not wanted and interfering with human activity to be a weed. Aliens (exotics) are non-endemic plants spreading naturally without the direct assistance of man in natural or semi natural habitat, to produce a significant change in terms of composition, structure or ecosystem processes. According to the definitions of Mosango, Cronk and Fuller, a total number of fourteen (14) plant species were identified as invasive from Nyakabale-Mboira in Kigumba SC. According to FAO, CAB, and IUCN categories of invasiveness, many species recorded were found to be invasive in the wild throughout the tropics, but some of those are useful to communities where they occur, therefore only fourteen (14) were considered to be aggressive and responsible for habitat alteration in Uganda. The lists of some of the species and their impacts are presented in table 5-13 and 5-14 below respectively. Most of these invasive species have high to moderate impacts in the area.

Table 5-14: A list of invasive species, and their Impact of invasiveness

| Sort | Family | Row Labels | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|---------------|------------------------------|---------------------------------|--------------------|----------------|----------------|----------|----------|
| 1 | Asteraceae | <i>Bidens pilosa</i> | 3 | X | X | X | Herb | Invasive |
| 2 | Asteraceae | <i>Chromolaena odorata</i> | X | 1 | X | X | Herb | Invasive |
| 3 | Asteraceae | <i>Tagetes minuta</i> | 1 | X | X | X | Herb | Invasive |
| 4 | Asteraceae | <i>Tithonia diversifolia</i> | X | 1 | X | X | Herb | Invasive |
| 5 | Euphorbiaceae | <i>Euphorbia tirucalli</i> | X | 1 | X | X | Shrub | Invasive |
| 6 | Euphorbiaceae | <i>Ricinus communis</i> | X | 1 | X | X | Shrub | Invasive |
| 7 | Fabaceae | <i>Acacia hockii</i> | 1 | 1 | X | 1 | Tree | Invasive |
| 8 | Fabaceae | <i>Mimosa pigra</i> | X | 1 | X | X | Liana | Invasive |
| 9 | Fabaceae | <i>Senna spectabilis</i> | 1 | 1 | X | 1 | Tree | Invasive |
| 10 | Malvaceae | <i>Sida acuta</i> | 3 | 3 | 1 | 1 | Herb | Invasive |
| 11 | Myrtaceae | <i>Psidium guajava</i> | 1 | X | X | X | Tree | Invasive |
| 12 | Poaceae | <i>Imperata cylindrica</i> | X | 2 | 1 | 1 | Herb | Invasive |
| 13 | Verbenaceae | <i>Lantana camara</i> | 1 | 2 | X | 1 | Shrub | Invasive |
| 14 | Verbenaceae | <i>Stachytarpheta indica</i> | 1 | 1 | X | 1 | Herb | Invasive |

Key:

| | |
|--|---|
| | Species is listed worldwide (and in Uganda) as invasive and dangerous to the ecosystem |
| | Species is listed worldwide (and in Uganda) as invasive but with minimal impact on the ecosystem |
| | Species is listed worldwide (and in Uganda) as invasive but with minimal impact on the ecosystem and also useful in the community |

Table 5-15: A list of invasive species encountered in Nyakabale water distribution areas

| Family | Species | Status | Impact | Uses |
|---------------|------------------------------|-------------------------------------|---|---|
| Asteraceae | <i>Bidens pilosa</i> | native to South and Central America | high reproductive potential and fast-growing rates to rapidly spread and colonize new areas. outcompete and eliminate crops and native vegetation. | Medicinal |
| Asteraceae | <i>Chromolaena odorata</i> | Introduction | One of the world's worst weeds. highly competitive that can great colonizes an entire area where it occurs hence reducing grazing space for animals | Can be used in mulching of degraded agriculture land |
| Asteraceae | <i>Tagetes minuta</i> | Introduced | | used as an insect repellent |
| Asteraceae | <i>Tithonia diversifolia</i> | Introduced | Rapid vegetative reproduction, By forming dense stands it prevents the growth of young native plants | Cover plant |
| Euphorbiaceae | <i>Euphorbia tirucalli</i> | Naturalized | grows forming thickets mostly in disturbed sites. | ornamental, hedge plant, potted plant and for soil conservation |
| Euphorbiaceae | <i>Ricinus communis</i> | Native | highly prolific and precocious producer of toxic seeds, negative impacts on biodiversity | castor oil production, |
| Fabaceae | <i>Acacia hockii</i> | Native | Damaged ecosystem services, Habitat alteration, Modification of: fire regime, nutrient regime, successional patterns. | Fuelwood, exudate gum, |
| Fabaceae | <i>Mimosa pigra</i> | Introduced | Infests wetlands, alters open grasslands into dense thorny thickets and negatively impacts on native biodiversity, affects large mammal distribution and their health | |
| Fabaceae | <i>Senna spectabilis</i> | Introduced | Ecosystem change/ habitat alteration, Modification of nutrient regime | Forage, agroforestry, fuel wood, vegetable |
| Malvaceae | <i>Sida acuta</i> | Introduced | infests various habitats, becomes most problematic in pastures and rangelands | |
| Myrtaceae | <i>Psidium guajava</i> | Introduced | form dense thickets which displace native vegetation | Fruit tree |

| Family | Species | Status | Impact | Uses |
|---------------|------------------------------|---------------|---|--|
| Poaceae | <i>Imperata cylindrica</i> | Native | Prolific producer of seeds which are dispersed by wind over long distances to colonize cleared land. Affects animal's eyes hence determining their distribution | Fodder at early stages after burning |
| Verbenaceae | <i>Lantana camara</i> | Introduced | Damaged ecosystem services, fire regime, Negatively impacts: agriculture animal health; forestry; human health, Reduced native biodiversity | Fodder, ornamental, Erosion control, Fuelwood |
| Verbenaceae | <i>Stachytarpheta indica</i> | Introduced | Damaged ecosystem services, Habitat alteration, Nutrient regime, Successional patterns, Monoculture formation, Negative impact on grazers, and Reduced native biodiversity. | Fodder, ornamental, Erosion control, medicinal |

5.3.3 INSECTS

5.3.3.1 BUTTERFLIES

Thirteen (13) species of butterflies were registered in the project area (Table 5-16). The species are classified into eleven (11) genera and Six (6) families. Butterflies appear at different times of the year depending on season, and also the more time you spend in an area, the more species you encounter. So, this cannot be taken as a complete species checklist for the project area. Several species could be added on to the list with a longer survey. Four of the species recorded are migratory in nature, Six of the species are wide spread and occur in a wide range of habitats, while three species are forest edge/woodland species and are more often encountered in a variety of forest edge, degraded forest and woodland habitats. Four species are categories as open habitat species and prefer or occur in open habitats or grassland habitats. The Scalloped Sailer *Neptidopsis ophione*, Brown Pansy *Junonia stygia* and Lady's Maid *Vanessula milca* occur in forest, woodland areas. African Migrant *Catopsilia florella* is a fast-flying butterfly that moves swiftly between flowers. It often engages in mud-piddling and is at times seen migrating in numbers.

Table 5-16: Butterflies encountered during the survey

| Family | Species recorded | No. Counted | IUCN Red List Status |
|---------------------|--|-------------|----------------------|
| Acraeidae | <i>Acraea anacreon</i> Orange Acraea – W | 1 | Least Concern |
| Acraeidae | <i>Acraea encedon</i> Encedon Acraea - W | 1 | Least Concern |
| Danaidae | <i>Danaus chrysippus</i> African Queen – O/m | 4 | Least Concern |
| Nymphalidae | <i>Hamanumida daedalus</i> Guineafowl - W | 1 | Least Concern |
| Nymphalidae | <i>Junonia oenone</i> Dark Blue Pansy - W | 1 | Least Concern |
| Nymphalidae | <i>Junonia stygia</i> Brown Pansy – f | 2 | Least Concern |
| Nymphalidae | <i>Neptidopsis ophione</i> Scalloped Sailer – f | 1 | Least Concern |
| Nymphalidae | <i>Vanessula milca</i> Lady's Maid - f | 5 | Least Concern |
| Papilionidae | <i>Papilio demodocus</i> Citrus Swallowtail – W/M | 5 | Least Concern |
| Pieridae | <i>Belenois aurota</i> Caper White – O/m | 1 | Least Concern |
| Pieridae | <i>Catopsilia florella</i> African Migrant – O/M | 14 | Least Concern |
| Pieridae | <i>Eurema desjaridinsi</i> Angled Grass Yellow – W | 13 | Least Concern |
| Pieridae | <i>Nepheronia buqueti</i> Plain Vagrant - O | 2 | Least Concern |

African Migrant *Catopsilia florella* and Angled Grass Yellow *Eurema desjaridinsi* were the most common butterflies during time of the survey. Fourteen and thirteen individuals were recorded respectively. Six of the species encountered during the survey registered one individual each.

No butterfly species of conservation concern were registered during the study. The 2020 IUCN Red List of Threatened species categorizes the butterflies as Least Concern (LC). The national red list for Uganda also categorizes the registered butterflies as Least Concern.

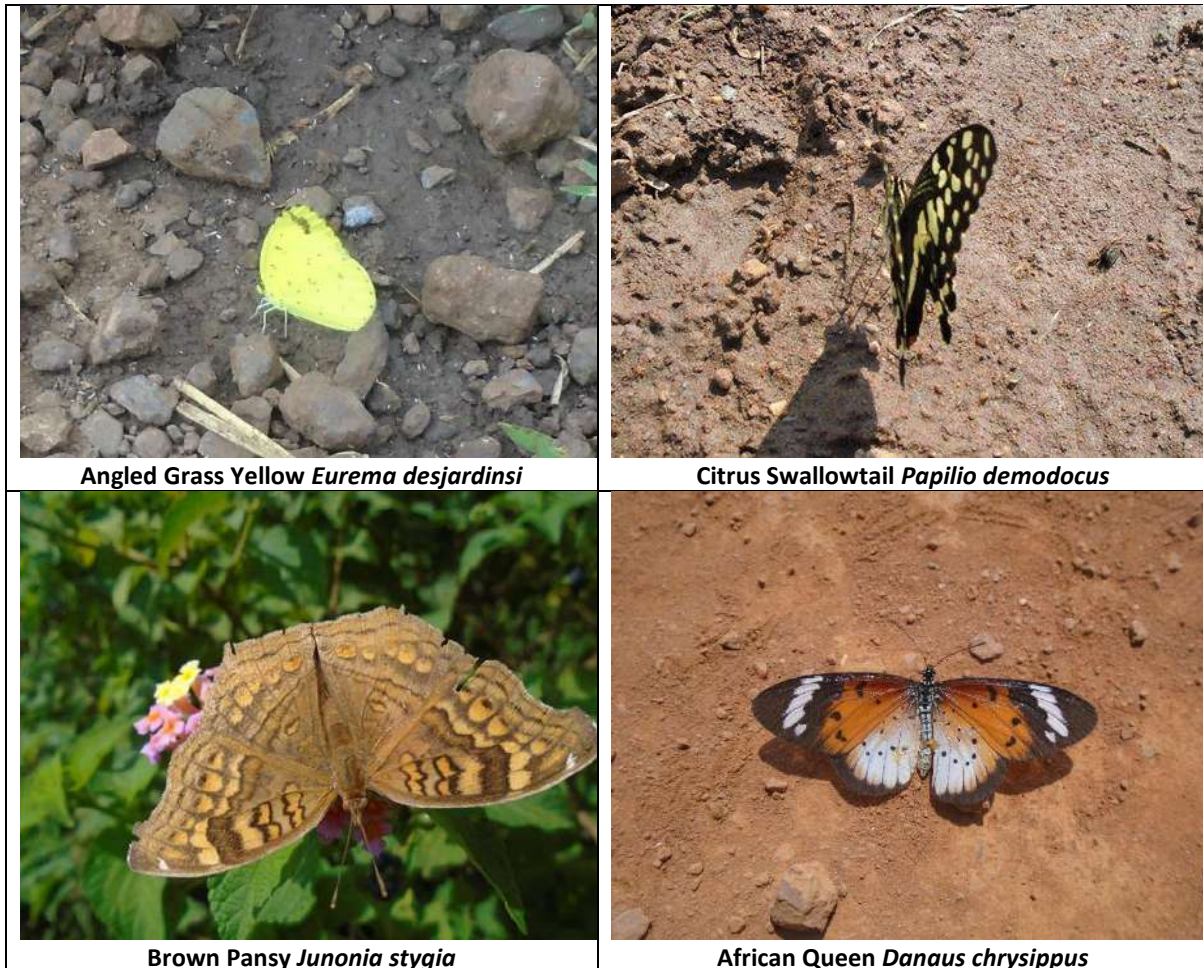


Figure 5-55: Some of the Butterfly species encountered during the survey

5.3.3.2 DRAGONFLIES

Two species of dragonflies were recorded during the survey. The species include the Lucia Widow *Palpopleura lucia* and Fiery Darter *Trithetrum navasi*. They both belong to the same family Libellulidae. *Trithetrum navasi* Fiery Darter was the most common relative to Lucia Widow *Palpopleura lucia*. Three individuals were recorded for the Fiery Darter *Trithetrum navasi* and one individual for Lucia Widow *Palpopleura lucia*. No species of conservation significance was recorded. The two species are categorized by IUCN 2020 Red List of Threatened species as being least concern.

5.3.4 HERPETOFAUNA

5.3.4.1 AMPHIBIANS

Nine species of amphibians were recorded during the survey (**Table 5-17**). One was a toad and six were frogs. The species represent five families and five genera. Presence of two species Anchieta's Rocket Frog *Ptychadena anchietae* and Sharp-nosed Ridged Frog *Ptychadena oxyrhynchus* was detected basing on the tadpoles that were encountered in the project area. Mascarene Rocket Frog *Ptychadena mascareniensis* was the most common relative to other species encountered during the survey. No species of conservation significance was registered during the survey. All the species encountered are categorized as least concern according to 2020 IUCN Red List of threatened species. The IUCN regards the species as widespread and common over much of their range (Rödel. 2000).

Table 5-17: List of amphibian species encountered in the project area

| Family | Species and Common Name | No. Recorded | IUCN Red List Status |
|-------------------|---|---------------|----------------------------------|
| Bufo | <i>Sclerophrys steindachneri</i> Steindachner's Toad | 1 | Least Concern |
| Dicroglossidae | <i>Hoplobatrachus occipitalis</i> Eastern Groove-crowned Bullfrog | 1 | Least Concern |
| Hyperoliidae | <i>Hyperolius kivuensis</i> Kivu Reed Frog | 1 | Least Concern |
| Hyperoliidae | <i>Hyperolius viridiflavus</i> Common Reed Frog | 1 | Least Concern |
| Phrynobatrachidae | <i>Phrynobatrachus mababiensis</i> Dwarf Puddle Frog | 1 | Least Concern |
| Phrynobatrachidae | <i>Phrynobatrachus natalensis</i> Natal Puddle Frog | 1 | Least Concern |
| Ptychadanidae | <i>Ptychadena anchietae</i> Anchieta's Rocket Frog | Tadpoles seen | Least Concern |
| Ptychadanidae | <i>Ptychadena mascareniensis</i> Mascarene Rocket Frog | 2 | Least Concern/ Data deficient |
| Ptychadanidae | <i>Ptychadena oxyrhynchus</i> Sharp-nosed Ridged Frog | Tadpoles seen | Least Concern |

5.3.4.2 REPTILES

Table 5-18 lists the reptile species recorded along alignments of the Mboira W & S project area. Six (6) species of reptiles were recorded during the field survey. They include Three Lizards and three snakes. Five (5) families and five (5) genera were represented. The species were recorded at different points in the project area. Occurrence of three of the species was reported by the local community members found working in the field. Those reported include the Black-Necked Spitting Cobra *Naja nigricollis*, Central Africa Rock Python *Python sebae* and Puff Adder *Bitis arietans*. The rest of the species were encountered during the survey. Presence of green snakes were also reported but their description was not conclusive enough to arrive at their identity.

Table 5-18: List of reptile species encountered during the survey

| Family | Species and Common Name | No. Recorded | IUCN Red List Status |
|-------------------|---|--------------|----------------------|
| Agamidae | <i>Acanthocercus atricolis</i> Blue Headed Tree Agama | 1 | Least Concern |
| Agamidae | <i>Agama agama</i> Red-Headed Rock Agama | 2 | Least Concern |
| Elapidae | <i>Naja nigricollis</i> Black-Necked Spitting Cobra | reported | Least Concern |
| Pythonidae | <i>Python sebae</i> Central Africa Rock Python | reported | Least Concern |
| Varanidae | <i>Varanus niloticus</i> Nile Monitor | 1 | Least Concern |
| Viperidae | <i>Bitis arietans</i> Puff Adder | reported | Least Concern |

No species of conservation significance was recorded. None of the reptiles encountered and those reported by the community members is of conservation concern. All the species are listed as least concern by IUCN 2020 Red List of threatened species. The Central Africa Rock Python *Python sebae* and the Nile Monitor *Varanus niloticus* are listed under the Endangered Species Decree of 1985, which means that international trade of the species is prohibited. The Species are listed under CITES Appendix II (Branch 1998). However, in Uganda the two species were down listed from Appendix II because the two species are still abundant and wide spread in the Country. They however suffer from habitat destruction and from hunting for their skin, meat and are frequently used in traditional medicines by local people.

5.3.5 AVIFAUNA

Thirty-Six (36) species of birds were positively identified and recorded (**Table 5-19**). The project area generally has a high bird diversity as almost each species belongs to its own genera. Twenty-Six (26) families and Thirty-Three (33) genera are represented (**Table 5-20**). The high diversity may be attributed to the different habitats represented in the project area or its proximity to Karuma Wildlife Reserve (KWR). Unfortunately, all of the habitats have been modified by human activity.

Table 5-19: Bird species encountered in the Nyakabale Project area

| Family | Species Recorded | No. of Individuals Encountered | Species Red List Status |
|---------------------|---|--------------------------------|------------------------------------|
| ACCIPITRIDAE | 122 - <i>Lophaetus occipitalis</i> Long-Crested Eagle - F | 1 | Least Concern |
| ACCIPITRIDAE | 75 - <i>Milvus migrans</i> Black Kite - pA | 1 | Least Concern & Palearctic Migrant |
| ALAUDIDAE | 489 - <i>Mirafra rufocinnamomea</i> Flappet Lark - G | 1 | Least Concern |
| ALCEDINIDAE | 375 - <i>Halcyon senegalensis</i> Woodland Kingfisher – O | 1 | Least Concern |
| APODIDAE | 365 - <i>Apus affinis</i> Little Swift - W | 2 | Least Concern |
| ARDEIDAE | 26 - <i>Ardea melanocephala</i> Black-Headed Heron – w | 2 | Least Concern |

| Family | Species Recorded | No. of Individuals Encountered | Species Red List Status |
|-----------------------|---|--------------------------------|------------------------------------|
| BUCEROTIDAE | 420 - <i>Lophoceros nasutus</i> African Grey Hornbill - f | 1 | Least Concern |
| CISTICOLIDAE | 650 - <i>Cisticola natalensis</i> Croaking Cisticola - G | 3 | Least Concern |
| CISTICOLIDAE | 677 - <i>Camaroptera brachyura</i> Grey-Backed Camaroptera - f | 4 | Least Concern |
| COLUMBIDAE | 270 - <i>Turtur tympanistria</i> Tambourine Dove - F | 4 | Least Concern |
| COLUMBIDAE | 283 - <i>Streptopelia semitorquata</i> Red-Eyed Dove – f | 2 | Least Concern |
| COLUMBIDAE | 289 - <i>Streptopelia senegalensis</i> Laughing Dove - O | 5 | Least Concern |
| CUCULIDAE | 323 - <i>Centropus superciliosus</i> White-Browed Coucal - O | 1 | Least Concern |
| ESTRILIDIDAE | 963 - <i>Lagonosticta rubricata</i> African Firefinch - O | 4 | Least Concern |
| ESTRILIDIDAE | 974 - <i>Uraeginthus bengalus</i> Red-Cheeked Cordon-Bleu - O | 2 | Least Concern |
| ESTRILIDIDAE | 980 - <i>Spermestes cucullata</i> Bronze Mannikin - Widespread | 4 | Least Concern |
| ESTRILIDIDAE | 981 - <i>Spermestes bicolor</i> Black-and-White Mannikin - f | 11 | Least Concern |
| HIRUNDINIDAE | 499 - <i>Riparia paludicola</i> Plain Martin – O | 1 | Least Concern |
| HIRUNDINIDAE | 513 - <i>Hirundo rustica</i> Barn Swallow - Pw | 17 | Least Concern & Palearctic Migrant |
| LANIIDAE | 812 - <i>Lanius excubitoroides</i> Grey-Backed Fiscal – Afw | 3 | Least Concern |
| MACROSPHENIDAE | 621 - <i>Melocichla mentalis</i> Moustached Grass Warbler - O | 1 | Least Concern |
| MALACONOTIDAE | 843 - <i>Laniarius erythrogaster</i> Black-Headed Gonolek - f | 4 | Least Concern |
| MEROPIDAE | 385 - <i>Merops pusillus</i> Little Bee-Eater - G | 1 | Least Concern |
| MOTACILLIDAE | 522 - <i>Anthus cinnamomeus</i> African Pipit - G | 1 | Least Concern |
| MUSCICAPIDAE | 576 - <i>Cossypha heuglini</i> White-Browed Robin-Chat - f | 1 | Least Concern |
| NECTARINIIDAE | 787 - <i>Chalcomitra senegalensis</i> Scarlet-Chested Sunbird - f | 1 | Least Concern |
| NUMIDIDAE | 142 - <i>Numida meleagris</i> Helmeted Guineafowl - G | 1 | Least Concern |

| Family | Species Recorded | No. of Individuals Encountered | Species Red List Status |
|----------------------|---|--------------------------------|-------------------------|
| ORIOLIDAE | 850 - <i>Oriolus larvatus</i> Eastern Black-Headed Oriole - f | 2 | Least Concern |
| PASSERIDAE | 880 - <i>Passer cordofanicus</i> Rufous Sparrow - O | 1 | R-RR |
| PLOCEIDAE | 908 - <i>Ploceus cucullatus</i> Black-Headed Weaver - O | 3 | Least Concern |
| PLOCEIDAE | 928 - <i>Euplectes hordeaceus</i> Black-Winged Bishop - O | 1 | Least Concern |
| PLOCEIDAE | 930 - <i>Euplectes franciscanus</i> Northern Red Bishop - G | 2 | Least Concern |
| PYCNONOTIDAE | 562 - <i>Pycnonotus barbatus</i> Common Bulbul -f | 17 | Least Concern |
| RALLIDAE | 178 - <i>Zapornia flavirostra</i> Black Crane - W | 3 | Least Concern |
| STENOSTIRIDAE | 732 - <i>Elminia longicauda</i> African Blue-Flycatcher - f | 1 | Least Concern |
| STURNIDAE | 872 - <i>Lamprotornis purpuroptera</i> Ruppell's Starling - O | 3 | Least Concern |

Table 5-20: Numbers of bird species recorded in the project area

| No. of families | No. of genera | No. of species |
|-----------------|---------------|----------------|
| 26 | 33 | 36 |

Ecological characterization of the encountered species revealed that one species of forest generalist was registered (**Table 5-21**). Eleven species were forest visitors. These two categories of birds prefer trees as an ecological feature. Three (3) bird species were recorded in wetlands and floodplains / seasonal wetlands rivers and streams. These were either wetland specialists or wetland visitors. Seventeen species were categorized as open habitat or grassland species. One species is categorized as widespread and can be encountered in a wide range of habitats. One Afro-tropical migrant (Black Kite *Milvus migrans*) and One Palearctic migrant (Barn Swallow *Hirundo rustica*) were registered during the survey. The Afrotropical migrants come from other African countries while the palearctic migrants come from European countries during time of winter to Uganda.

Table 5-21: Birds and their ecological types

| Ecological Type | No. of species |
|---|----------------|
| Forest generalists (F) | 2 |
| Forest visitors (f) | 11 |
| Wetland/Aquatic/swamp Specialists (A) | 2 |
| Wetland/Aquatic/swamp Visitors (a) | 1 |
| Open habitat (O) or Grassland species (G) | 17 |
| Widespread species (W) | 1 |

Common Bulbul *Pycnonotus barbatus*, Barn Swallow *Hirundo rustica* and Black-and-White Mannikin *Spermestes bicolor* were the most common species in the project area relative to others. Seventeen (17), Seventeen (17) and Eleven (11) individuals respectively were recorded during the survey. One individual each was recorded for 16 species encountered in the project area. These constituted the least common relative to other bird species.

According to IUCN 2020 red list of threatened species no species of conservation significance was recorded during the survey. It is only the Rufous Sparrow *Passer cordofanicus* whose conservation has been assessed as a regional responsibility (R-RR). The rest of the species are categorized as Least Concern. The IUCN Red List of Threatened Species 2020 considers the Barn Swallow a species of Least Concern due to its extremely large range and global population size of 290–487 million individuals. Barn swallows are gregarious birds and in the absence of suitable roost sites, they sometimes roost on wires and many of them were recorded roosting on wires. The Barn Swallow *Hirundo rustica* are long-distance migrants and individual birds tend to return to the same wintering locality each year.

5.3.6 MAMMALS

Only one mammal species (*Chlorocebus pygerythrus* Vervet monkey) was recorded during the survey. The Vervet monkey *Chlorocebus pygerythrus* was reported by one residence as having seen it a few days before this survey was conducted. The monkey is listed by IUCN 2020 Red list of threatened species as being Least Concern. However, the threat to the monkey is hunting. It is one of those animals listed as being vermin in most districts of Uganda. Being in close proximity with Karuma Wildlife Reserve (KWR) a number of mammals could have roamed the area.

5.4 SOCIO-ECONOMIC BASELINE

5.4.1 DEMOGRAPHICS

5.4.1.1 POPULATION

The core villages have a total population of 4,285 people (2,285 female; 2,000 male) and 876 households. In comparison, the immediate influence zone (non-beneficiary area) has a total of 7,169 people (3,978 female; 3,191 male) and 1,191 households (Source: VHT Data, April 2022). as shown in **Table 5-22**, **Table 5-23**, **Figure 5-56** below and **Annex 9**. Its notable that new administrative unit called Mboira Sub County Local Government was curved out of the original Kigumba Sub County. However, the project area remained the same. The project zone comprises of core area with 7 villages namely Apodorwa, Kifuruta II, Nyakabale, Kikunya, Mboira I, Mboira II and Kikooba. The population density is 183 people/km² in Kigumba and Mboira Sub Counties (DWD/MWE, 2021).

Table 5-22: Population in project area (Nyakabale RGC)

| Project Zone | Households | | Female | | Male | | Total | |
|--|------------|------|--------|------|-------|------|--------|------|
| | No. | % | No. | % | No. | % | No. | % |
| Core beneficiary area (11 villages) | 876 | 42.4 | 2,285 | 36.5 | 2,000 | 38.5 | 4,285 | 37.4 |
| Immediate influence zone (18 villages) | 1,191 | 57.6 | 3,978 | 63.5 | 3,191 | 61.5 | 7,169 | 62.6 |
| Overall | 2,066 | 100 | 6,263 | 100 | 5,191 | 100 | 11,454 | 100 |

Table 5-23: Population in core beneficiary villages - Nyakabale RGC

| CORE BENEFICIARY AREA | | | | | | |
|-----------------------|-----------|----------------------|------------------|--------------|--------------|--------------|
| SUB COUNTY | PARISH | VILLAGE | HHS | FEMALE | MALE | TOTAL |
| Mboira SC | Apodorwa | Apodorwa | 51 | 267 | 201 | 468 |
| | | Kifuruta II | 81 | 214 | 159 | 373 |
| | Nyakabale | Nyakabale | 202 | 584 | 350 | 934 |
| | | Kikunya | 97 | 303 | 277 | 580 |
| | Mboira | Mboira I | 64 | 204 | 349 | 553 |
| | | Mboira II | 97 | 179 | 166 | 345 |
| | | | Sub Total | 592 | 1,751 | 1,502 |
| Kigumba SC | | Kikooba | 284 | 534 | 498 | 1,032 |
| | | Sub Total | 284 | 534 | 498 | 1,032 |
| | | OVERALL TOTAL | 876 | 2,285 | 2,000 | 4,285 |

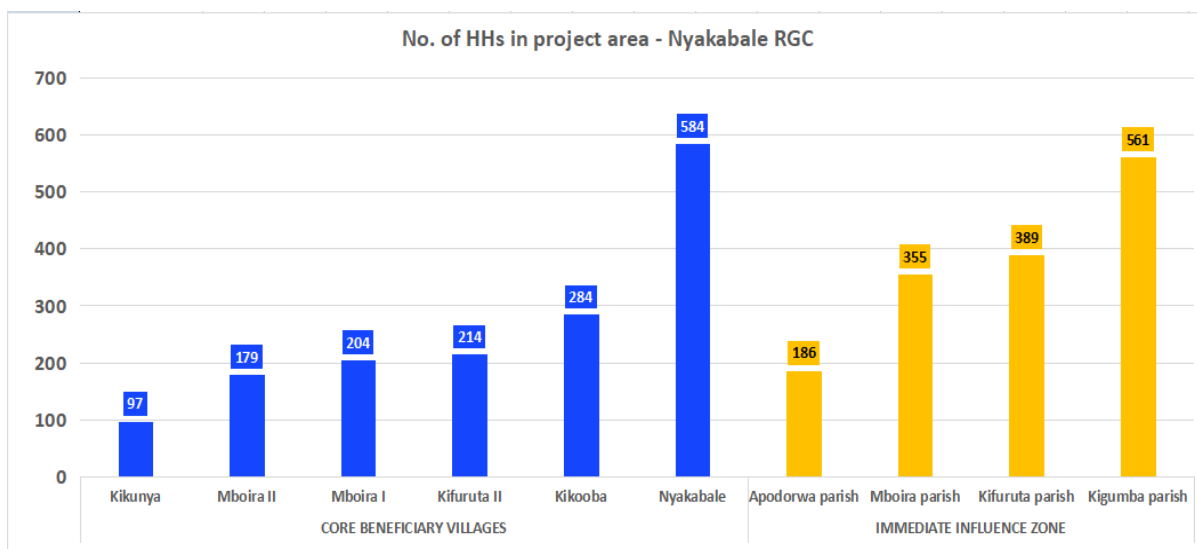


Figure 5-56: No. of HHs in project area - Nyakabale RGC

5.4.1.2 DURATION OF SETTLEMENT

Survey findings indicated that 89.4% (203 out of 227) of the respondents regard themselves as local residents (born in the area). Of these, 60.8% (138 out of 227) have stayed in the area for more than 5 years. In comparison, 10.6% (24 out of 227) were self-settlers (Ugandans who migrated from other parts of the country), and 3.5% have stayed for period between 6 – 12 months as shown in **Table 5-24** below. Kiigya parish had the highest number of self-settlers at 14.9%. The survey did not inquire the ethnicity of the respondent at the time the ESIA was conducted.

Table 5-24: Category of residents by years of settlement

| Years of settlement by category | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Overall | |
|---|-----------|------------|-----------|-------------|-----------|-------------|-----------|-------------|------------|-------------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Local residents | 15 | 100 | 80 | 85.1 | 74 | 89.2 | 34 | 97.1 | 203 | 89.4 |
| 1- 5 years | 0 | 0 | 20 | 25.0 | 28 | 37.8 | 4 | 11.4 | 52 | 22.9 |
| 1 year | 0 | 0 | 4 | 5.0 | 7 | 9.5 | 2 | 5.7 | 13 | 5.7 |
| More than 5 years | 15 | 100 | 56 | 70.0 | 39 | 52.7 | 28 | 80 | 138 | 60.8 |
| Self-Settlers (Ugandan migrants) | 0 | 0 | 14 | 14.9 | 9 | 10.8 | 1 | 2.9 | 24 | 10.6 |
| 1- 5 years | 0 | 0 | 2 | 14.3 | 5 | 55.6 | 0 | 0 | 7 | 3.1 |
| 1- 6 months | 0 | 0 | 4 | 28.6 | 0 | 0 | 0 | 0 | 4 | 1.8 |
| 1 year | 0 | 0 | 0 | 0 | 2 | 22.2 | 1 | 2.9 | 3 | 1.3 |
| 6 - 12 months | 0 | 0 | 8 | 57.1 | 0 | 0 | 0 | 0 | 8 | 3.5 |
| More than 5 years | 0 | 0 | 0 | 0 | 2 | 22.2 | 0 | 0 | 2 | 0.9 |
| Overall | 15 | 100 | 94 | 100 | 83 | 100 | 35 | 100 | 227 | 100 |

5.4.1.3 ETHNIC COMPOSITION

Basing on findings of obtained through Key Informant Interview with Kigumba Sub County team, the major ethnic groups that are living within the area include the Banyoro (who are the

indigenous community) and self-settlers (Ugandans who migrated from other parts of the country) who include mainly the, Alur, Kebu, Lugbara (all from West Nile), Baganda, Basoga, Bagisu among others. The major factors that attract human settlement include availability of cheap and vacant land, fertile soils and hospitality of the local communities. It should be noted that there are no refugees within Nyakabale RGC because it's situated far away and outside Kiryandango Refugees settlement. However, the entire Kiryandango district is classified as refugee hosting area by OPM & UNHCR. On the same note, there is not available Census data on ethnic composition within Nyakabale RGC.

Implication on ESIA:

- The project will directly benefit 42.4% (876 out of 2,066) of the total households and 36.5% (2,285 out of 6,263) female and 38.5% (2,000 out of 5,191) male.
- Due to the high demand for clean and safe water, about 57.6% of the households in the immediate influence zone of the project will likely to access and utilize the same piped water facilities. In the same, it's also likely that the intensification phase will cover additional villages.
- There is need to extend domestic connection to source area (Kikunya village) which hosts the production well (DWD 77382).
- The improved access to safe and clean water will contribute to local economic development as an effective strategy for poverty eradication of in Kigumba and Mboira sub counties..
- According to the design report, adjustments on the supply system is planned to be expanded in the ultimate year 2040 in consideration of an increasing population within the area.

5.4.1.4 HUMAN SETTLEMENT PATTERNS & HOUSING

5.4.1.4.1 SETTLEMENT PATTERNS

There are 3 major human settlement patterns namely;- a) Compact or Nucleated settlements - this is common in trading centres where large number of dwellings are constructed very close to each other as shown in **Figure 5-57** ; b) Dispersed / dotted Settlements - here dwellings are located far apart and often scattered / dotted within a given landscape and/or village; c) Linear settlements - this is commonly seen along roads. Its common throughout the project area.



Figure 5-57: Apodorwa trading centre

5.4.1.5 HOUSING CHARACTERISTICS

The survey findings indicate that 51.1% (116 out of 227) of the respondent households live in a house that is built with bricks, not cemented but roofed with iron sheets; 44.5% (101 out of 227) live in a cemented, brick, plastered & Iron roofed shelter; 4.4% (10 out of 227) live in mud & wattle / grass shelter as shown in **Table 5-25** below.

Table 5-25: Housing Characteristics in Kigumba and Mboira SC

| Type of house / shelter | Apodorwa | | Nyakabale | | Mboira | | Kiigya | | Overall | |
|---|-----------|------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Mud & wattle / grass | 3 | 20 | 1 | 2.9 | 1 | 1.2 | 5 | 5.3 | 10 | 4.4 |
| Cemented, Brick, plastered & Iron roofed | 3 | 20 | 16 | 45.7 | 33 | 39.8 | 49 | 52.1 | 101 | 44.5 |
| Not cemented, with bricks & iron sheets | 9 | 60 | 18 | 51.4 | 49 | 59.0 | 40 | 42.6 | 116 | 51.1 |
| Overall | 15 | 100 | 35 | 100 | 83 | 100 | 94 | 100 | 227 | 100 |

Implications: There are mushrooming urban agglomerations evidenced majorly through expansion of hamlets and villages into trading centres that are traversed by the project namely Kizibu, Nyakabaale, Mboira 2, Apodorwa trading centres. It's notable that the housing characteristics has direct influence on the design criteria of the project. More specifically, the clocation of yard taps (40 l/c/d) and PSPs (20 l/c/d) was influenced by human settlement and housing characteristics. Therefore, its predictable that the need for yard taps and PSPs may outstrip that for domestic connections. At the same time, there is also need to scale-up intensification of lines even before the ultimate year 2046.

5.4.2 SECURITY SITUATION

The project area is served by a police post located at Apodorwa Trading centre. This police post is inadequately staffed, with limited space and lacks a patrol vehicle or motorcycle. According to the Officer in Charge (OC) of the post, the most common cases are minor assault, fights for water, domestic violence, theft and sometimes defilement, all of which are not frequent.

5.4.3 EMPLOYMENT AND OCCUPATIONS

5.4.3.1 EMPLOYMENT STATUS

The employment status is categorized as employed, under-employed and unemployed among the working age group (14-65 years). In reference to the International Labour Organization (ILO, 2019), unemployment among the working age group (14-64 years) is categorized as: 1) those without work, not in paid employment or self-employment; 2) those currently available for work (paid employment or self-employment); and 3) those seeking work and have taken specific steps in a specified recent period to seek paid employment or self-employment.

Survey findings indicated that 52% (118 out of 227) of the respondents considered themselves as self-employed, 22% (49 out of 227) as under-employed and 26% (60 out of 227) as unemployed as shown in **Table 5-26**. In addition, during community meeting with youth at Kiigya- Buhozi village

(Figure 5-58), it was noted that unemployment mostly affects the youth and their major coping mechanism is resort to sports betting, gambling, under-paying casual labour, alcoholism, among others. The participants requested that as a counter measure, there is need to provide jobs during construction works.

Table 5-26: Employment status by gender

| Employment status by sex / gender | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Overall | |
|-----------------------------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|------------|------------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Self-employed | 5 | 33.3 | 47 | 50 | 55 | 59.8 | 11 | 42.3 | 118 | 52 |
| <i>Female</i> | 1 | 6.7 | 18 | 19.1 | 24 | 26.1 | 11 | 42.3 | 52 | 23 |
| <i>Male</i> | 4 | 26.7 | 29 | 30.9 | 31 | 33.7 | 0 | 0.0 | 64 | 28 |
| Under-employed | 4 | 26.7 | 17 | 18.1 | 20 | 21.7 | 8 | 30.8 | 49 | 22 |
| <i>Female</i> | 2 | 13.3 | 13 | 13.8 | 11 | 12.0 | 8 | 30.8 | 34 | 15 |
| <i>Male</i> | 2 | 13.3 | 4 | 4.3 | 9 | 9.8 | 0 | 0.0 | 15 | 7 |
| Unemployed | 6 | 40.0 | 30 | 31.9 | 17 | 18.5 | 7 | 26.9 | 60 | 26 |
| <i>Female</i> | 3 | 20.0 | 15 | 16.0 | 7 | 7.6 | 7 | 26.9 | 32 | 14 |
| <i>Male</i> | 3 | 20.0 | 15 | 16.0 | 10 | 10.9 | 0 | 0.0 | 28 | 12 |
| Overall | 15 | 100 | 94 | 100 | 92 | 100 | 26 | 100 | 227 | 100 |



Figure 5-58: An Infographic showing employment trends and consultation meeting with youth at Buhomози / Kizibu trading center

5.4.3.2 OCCUPATIONS

Subsistence farming - Survey findings indicated that the 60.4% (137 out of 227) of the respondent households are engaged in subsistence farming (crop and animal husbandry) as shown in **Table 5-27**. A review of UBOS Census Data shows that about 75.1% (41,743) households are dependent on subsistence farming is their major occupation within Nyakabale RGC (UBOS SAP Data (2014)). The dominant crops grown for income include root tubers (cassava, sweet potatoes), cereals (maize, rice, sorghum), tobacco, coffee and plantains (bananas). The animals rared for income majorly include local poultry (local breed chicken), livestock (cattle, goats, sheep, piggery), rabbits

and apiary. There are also other agricultural value chain based activities such bulking and grain milling.

Petty business & services – Survey findings indicated that 36.1% (82 out of 227) of the households are engaged in petty business and services such as commuter motorcycles (a.k.a bodaboda), shop keeping, selling food stuffs, stone quarrying, water vending, etc. During KII with local leaders in Kikunya village, it was noted that Its notable that there are only 6 water vendors (4 adult male & 2 boys of school going age) who serve Kikunya / Kizibu trading center located near production well (DWD 77382) in Nyakabale RGC. During KII with LC 3 Chairperson of Mboira SC, it was conformed that there are no water vendors in the beneficiary villages in Apodorwa, Mboira and Nyakabale parishes.

Other occupations - 2.6% (6 out of 227) are engaged on other source of livelihoods such as casual labour and artisanal fishing as shown in **Figure 5-59**; and 0.9% having salaried jobs.

Table 5-27: Major occupations in Nyakabale RGC

| Major Occupations | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Overall | |
|---|----------|-----|--------|------|--------|------|-----------|------|---------|------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Salaried job | 0 | 0 | 0 | 0 | 2 | 2.2 | 0 | 0 | 2 | 0.9 |
| Other (e.g. casual labour, artisanal fishing) | 0 | 0 | 0 | 0 | 6 | 6.5 | 0 | 0 | 6 | 2.6 |
| Farming | 12 | 80 | 68 | 72.3 | 50 | 54.3 | 7 | 26.9 | 137 | 60.4 |
| Overall | 15 | 100 | 94 | 100 | 92 | 100 | 26 | 100 | 227 | 100 |

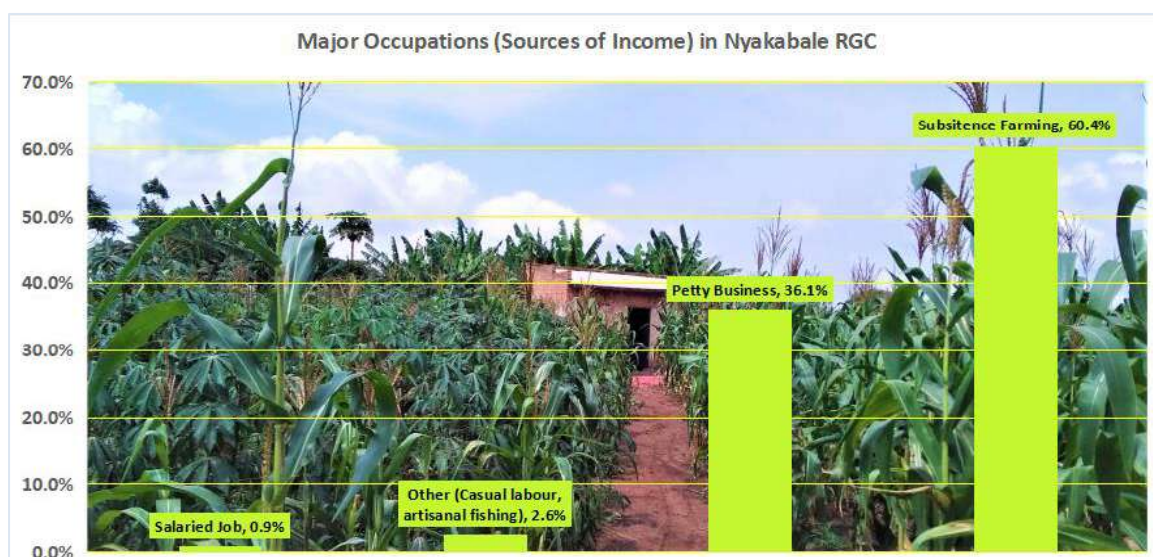


Figure 5-59: Major occupations in Nyakabale RGC; Inset is maize crop field at homestead in Kikoba village (Latitude 1.47333707; Longitude 31.54489959)

Implications:

- There will be direct job creation. It's certain that the project will create jobs in the short, medium and long term across the implementation stages (pre-construction, construction, operation and maintenance). The members of the local community (especially youth and women) will be given short term jobs such as trenchers, porters, drivers, plumbers, masons, painters, electricians. It's been noted that other direct jobs could be PSP attendants and Yard Tap owners will also arise. It's not possible to ascertain the number of jobs to be created per category at the time of baseline assessment.
- In addition, there will also be indirect employment opportunities such as selling food stuffs, soft drinks, among others.
- It's anticipated by local leaders in Kikunya / Kizibu trading center that the water vendors will lose jobs if modification of the distribution line is done to cover their area. It should be noted that this village is omitted as per the System Design Report August 2021. However, the extension of piped water to the area may certainly increase number of water vendors who will collect and serve many other underserved areas.

5.4.4 POVERTY LEVELS

According to the NDP III 2020/21-2024/25, poverty is a major constraint for both local and national development characterized by persistent vulnerabilities such as zero/no income in both urban and rural communities (NPA, 2021). Nationally, one indicator of poverty is the 'population (in percentage) below the poverty line of \$1 US Dollar per day. A review of Kigumba Sub County 5-years Development Plan (2020/2021 - 2024/2025) indicated that the major poverty conditions affecting communities include lack and/or limited income, food, water and poor housing were. Further to this, survey findings indicated that 27.8% (63 out of 227) respondents were earning below \$1 US dollar per day; 45.4% (103 out of 227) earn between UGX 3,500-7,00 (\$1- 2 USD dollars per day); 4% (9 out of 227) earn between \$2-3 USD per day; 22% (52 out of 227) earn above \$3 US dollars per day as shown in **Table 5-28**. The distribution of households earning below poverty line (<\$1 US dollar per day) shows that 46% live in Kiigya parish; 31.7% in Mboira parish; 12.7% in Nyakabale parish; 9.5% in Apodorwa parish as shown in **Figure 5-60** below.

Table 5-28: Income levels per day, per type of housing / shelter

| Income levels per day, per type of housing / shelter | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Overall | |
|--|----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|------------|-------------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Below UGX 3,500 (<\$1 USD) | 6 | 9.5 | 29 | 46.0 | 20 | 31.7 | 8 | 12.7 | 63 | 27.8 |
| <i>Cement & brick, plastered & Iron roofed</i> | 0 | 0.0 | 10 | 15.9 | 6 | 9.5 | 1 | 1.6 | 17 | 27.0 |
| <i>Mud & wattle / grass</i> | 2 | 3.2 | 2 | 3.2 | 1 | 1.6 | 0 | 0.0 | 5 | 7.9 |
| <i>Not cemented, with bricks & iron sheets</i> | 4 | 6.3 | 17 | 27.0 | 13 | 20.6 | 7 | 11.1 | 41 | 65.1 |
| UGX 3,500 - 7,000 (\$1-2 USD) | 6 | 5.8 | 38 | 36.9 | 39 | 37.9 | 20 | 19.4 | 103 | 45.4 |
| <i>Cement & brick, plastered & Iron roofed</i> | 1 | 1.0 | 22 | 21.4 | 17 | 16.5 | 10 | 9.7 | 50 | 48.5 |
| <i>Mud & wattle / grass</i> | 1 | 1.0 | 2 | 1.9 | | 0.0 | 1 | 1.0 | 4 | 3.9 |
| <i>Not cemented, with bricks & iron sheets</i> | 4 | 3.9 | 14 | 13.6 | 22 | 21.4 | 9 | 8.7 | 49 | 47.6 |
| UGX 7,000 - 10,000 (\$2-3 USD) | 1 | 11.1 | 1 | 11.1 | 7 | 77.8 | | 0.0 | 9 | 4.0 |
| <i>Cement & brick, plastered & Iron roofed</i> | 1 | 11.1 | 1 | 11.1 | 3 | 33.3 | 0 | 0.0 | 5 | 55.6 |

| | | | | | | | | | | |
|--|-----------|------------|-----------|-------------|-----------|-------------|-----------|-------------|------------|-------------|
| <i>Not cemented, with bricks & iron sheets</i> | 0 | 0.0 | 0 | 0.0 | 4 | 44.4 | 0 | 0.0 | 4 | 44.4 |
| Above UGX 10,000 (>\$1 USD) | 2 | 3.8 | 26 | 50.0 | 17 | 32.7 | 7 | 13.5 | 52 | 22.9 |
| <i>Cement & brick, plastered & Iron roofed</i> | 1 | 1.9 | 16 | 30.8 | 7 | 13.5 | 5 | 9.6 | 29 | 55.8 |
| <i>Mud & wattle / grass</i> | 0 | 0.0 | 1 | 1.9 | 0 | 0.0 | 0 | 0.0 | 1 | 1.9 |
| <i>Not cemented, with bricks & iron sheets</i> | 1 | 1.9 | 9 | 17.3 | 10 | 19.2 | 2 | 3.8 | 22 | 42.3 |
| Overall | 15 | 100 | 94 | 100 | 83 | 100 | 35 | 100 | 227 | 100 |

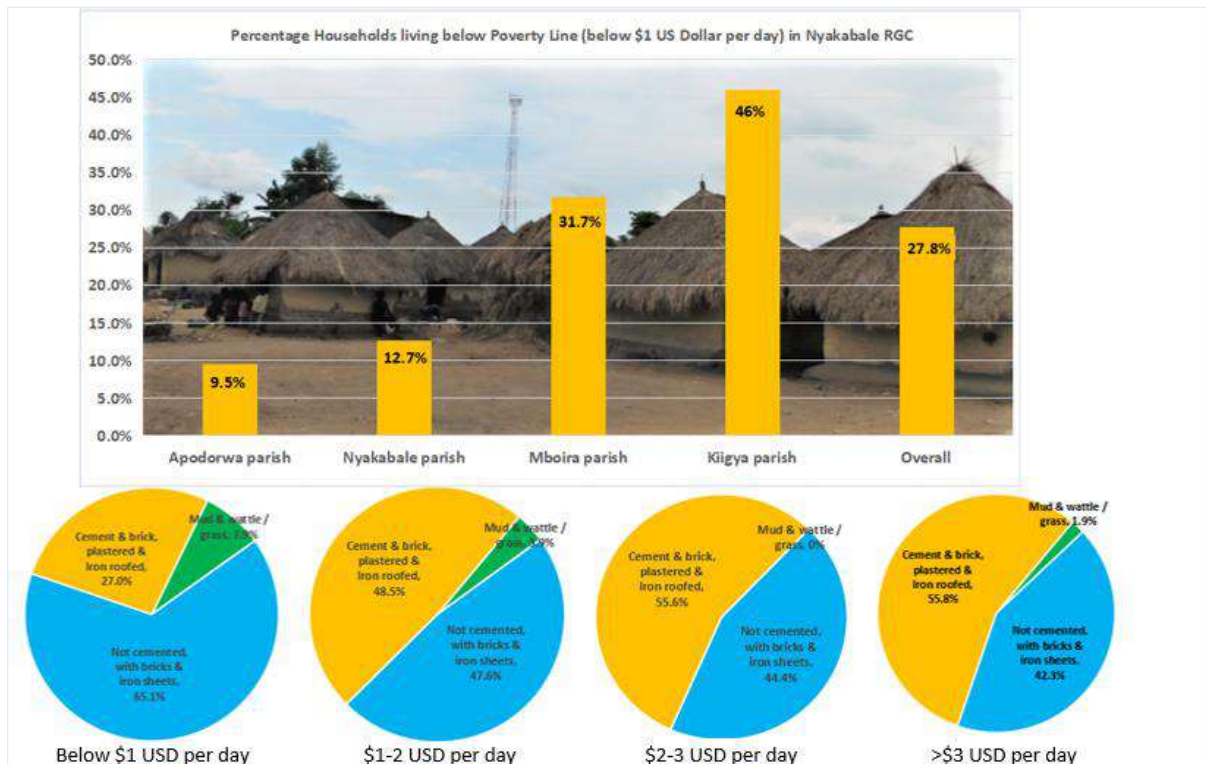


Figure 5-60: Percentage Households living below Poverty Line (<\$1 US Dollar per day) in Nyakabale RGC

Implications:

- Its noticeable that poverty levels will have direct impact on the piped water supply project especially in the operation phase. Positively, the utilization of safe and clean water will increase due to ability to afford connections and pay water bills.
- Negatively, the inability to pay will increase the level of substitutability. This means that those who are unable to afford resorting to free and/or cheaper sources within the area. One cheaper source of piped water is Apodorwa Mini Scheme constructed by MWE where residents pay less than \$1 US Dollar (UGX 2,000/=) per month. In a similar way, there are free open surface water sources that serve as alternatives in case of inability to afford piped water. Survey findings indicated that about 70.9% (161 out of 227) respondents mentioned ponds as alternative sources of water for domestic use; 22.5% mentioned River Nyakafunyo and 6.6% said River Apodorwa (refer to Section 5.4.5.1 for details). In order to counter the negative impact of the above scenarios, its important to continue investing in construction of more safe water source points such as deep boreholes.

5.4.5 ACCESS TO WATER

By definition, access to safe water is the ratio of people served by a safe water point and piped water supply to the total population, calculated basing on the estimated number of people per water point type (DWD/MWE, 2021). Data provided by Ministry of Water and Environment indicates that access to safe water in Kiryandongo district stands at 71%, with rural access at 77% and urban access at 48%.

5.4.5.1 WATER SOURCE POINTS

Within Nyakabale RGC, there are only 5 deep boreholes; 1 rain water harvesting tank (RWHT) at Apodorwa HC III; 1 mini-solar powered piped water system with 4 PSPs in Apodorwa parish (**Figure 5-61**). There are no protected springs, shallow wells, valley tanks, valley dams, domestic and institutional connections as shown in **Table 5-29**. Additionally, there are 38 non-functioning water sources (3 protected springs; 18 Shallow wells; 17 deep boreholes) in the entire Kigumba / Mboira SC as shown in **Table 5-29**. The major reasons for non-functionality are diversely attributed to technical breakdown at 32%; vandalism at 18%; use of alternative sources nearby at 14%; low yield at 18%; non-functioning water and sanitation committees; water quality related at 5% and other unspecified factors at 9% (Uganda Water Atlas, 2021). Another case is point is Apodorwa Mini Solar Powered system.

Table 5-29: Water sources points in Nyakabale RGC and entire Kigumba / Mboira Sub Counties

| Type of water source points | Nyakabale RGC - Direct Beneficiary Area | | | | | Kigumba / Mboira SC | |
|-----------------------------|---|--------|--------|-----------|----|---------------------|----|
| | Apodorwa | Kiigya | Mboira | Nyakabale | TT | Functional | NF |
| Protected spring | 0 | 0 | 0 | 0 | 0 | 1 | 3 |
| Shallow wells | 0 | 0 | 0 | 0 | 0 | 41 | 18 |
| Deep Boreholes | 2 | 1 | 1 | 1 | 5 | 62 | 17 |
| Rain water harvesting tanks | 1 | 0 | 0 | 0 | 1 | - | - |
| Valley Dams | 0 | 0 | 0 | 0 | 2 | 0 | 0 |
| Valley Tanks | 0 | 0 | 0 | 0 | 4 | 6 | 0 |
| PSP / Kiosk, Tap Stands | 4 | 0 | 0 | 0 | 4 | - | - |
| Yard Taps | 0 | 0 | 0 | 0 | 0 | 1,020 | 0 |
| Household connections | 0 | 0 | 0 | 0 | 0 | 19 | 0 |
| Institutional connections | 0 | 0 | 0 | 0 | 0 | 21 | 0 |



Figure 5-61: Deep borehole serving Kiruli, Kizibu ad Buhomozi villages (located at Latitude 1.47189348; Longitude 31.55295607)

5.4.5.2 CASE OF APODORWA MINI PIPED WATER SYSTEM

Challenges faced in operating Apodorwa Mini Solar Powered Piped Water System - Nyakabale RGC

Apodorwa Mini Solar pumping system was constructed in 2014 and rehabilitated in 2019. It serves 4 villages within Apodorwa parish namely Abiira, Apodorwa 1 and Apodorwa 2. The system consists of one production borehole (No. 43049), 20 solar panels @ 120 W, a 100AH battery, a 20m³ storage tank situated at Apodorwa HCIII and 4 PSPs. The system often experiences a problem of routine power failure due to weak storage battery especially when there is no sun shine. There is no standby generator and smaller reservoir. This leads to supply of insufficient water for human consumption. This forces many households o resort to unsafe water sources located in long distances (over 1km away) hence increasing exposure to disease and GBV related risks. There is a high cost of repair and maintenance, high rate of default due to delayed payment of user fees (\$0.57 USD / UGX 2,000/= per month). There is no technically trained personnel. The average distance to nearest PSP is between 5 – 300 meters (also refer to Table 5-30 in section 5.4.9).



Figure 5-62: Apodorwa solar pumping system



Figure 5-63: Current state of storage batteries and reservoir

5.4.5.3 ALTERNATIVE WATER SOURCES

Survey findings showed that 70.9% (161 out of 227) respondents mentioned that they would use open ponds located in close proximity as an alternative water source; 22.5% (51 out of 227) mentioned collecting from River Nyakafujo as an alternative; 6.6% (15 out of 227) mentioned River Apodorwa as shown in **Table 5-31** below.

Table 5-31: Alternative water sources

| Alternative water sources (Free & Cheap) | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Overall | |
|--|----------|-----|--------|-----|--------|------|-----------|-----|---------|------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Open ponds | 0 | 0 | 94 | 100 | 41 | 44.6 | 26 | 100 | 161 | 70.9 |
| River Apodorwa | 15 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 6.6 |
| River Nyakafujo | 0 | 0 | 0 | 0 | 51 | 55.4 | 0 | 0 | 51 | 22.5 |
| Overall | 15 | 100 | 94 | 100 | 92 | 100 | 26 | 100 | 227 | 100 |

Implications: The level of level of substitutability to payable piped water within beneficiary villages would majorly be influenced by the inability to pay water tariffs and bills. In non-beneficiary area (immediate influence zone), the ability to use alternative open surface water sources is probably high.

5.4.5.4 AMOUNT OF WATER CONSUMED PER DAY

Survey findings indicate that 33.5% (76 out of 227) use atleast 100 liters (5 jerrycans) of water per day; 24.2% use 4 jerrycans (80 liters); 15.4% use 2 jerrycans (40 liters); 12.8% use 3 jerrycans (60 liters); 11% use 6 jerrycans (120 liters); 3.1% use 7 jerrycans (140 liters) as shown in **Table 5-32** below.

Table 5-32: Amount of water consumed per day

| | Apodorwa | Kiigya | Mboira | Nyakabale | Overall |
|--|----------|--------|--------|-----------|---------|
| | | | | | |

| Number of Jerry cans of 20 liters capacity used per day | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
|---|------|------|------|------|------|------|------|------|------|------|
| 2 cans (40 liters) | 1 | 6.7 | 11 | 11.7 | 17 | 18.5 | 6 | 23.1 | 35 | 15.4 |
| 3 cans (60 liters) | 2 | 13.3 | 13 | 13.8 | 11 | 12.0 | 3 | 11.5 | 29 | 12.8 |
| 4 cans (80 liters) | 4 | 26.7 | 27 | 28.7 | 19 | 20.7 | 5 | 19.2 | 55 | 24.2 |
| 5 cans (100 liters) | 5 | 33.3 | 29 | 30.9 | 34 | 37.0 | 8 | 30.8 | 76 | 33.5 |
| 6 cans (120 liters) | 2 | 13.3 | 11 | 11.7 | 8 | 8.7 | 4 | 15.4 | 25 | 11.0 |
| 7 cans (140 liters) | 1 | 6.7 | 3 | 3.2 | 3 | 3.3 | | 0 | 7 | 3.1 |
| Overall | 15 | 100 | 94 | 100 | 92 | 100 | 26 | 100 | 227 | 100 |

Implications: The project will be able to increase supply of water. At baseline the lowest water use per capita (for all water sources) is at 40 liters. However, the project will provide sufficient and reliable supply of clean and safe water that conforms to the post emergency standard of 20 litres per capita per day (Design Report, 2021). Further still the system will be enough to maximum day demand is between 284.35 m³/day for initial year 2021 and 642.24 m³/day for ultimate year 2046 (Design Report, 2021). In addition, there are safety measures to ensure reliable supply of quality water. However, the contractor and utility operators will have to ensure that the taste, odour or appearance of supplied water conforms to the consumers' preferences in order to avoid a scenario where system is rejected / abandoned.

5.4.6 WHO COLLECTS WATER THE MOST

Survey findings showed that 80.2% (182 out of 227) of respondents said all children (boys and girls) below age 15 years take the biggest burden of collecting water compared to 14.1% (32 out of 227) who said it's the women; 1.8% said men and 4% said water vendors as shown in **Table 5-33** below.

Table 5-33: Who collects water most

| In your opinion who mostly collects the water for in your home? | Freq. | Percentage (%) |
|---|-------|----------------|
| All children below 15 years | 182 | 80.2% |
| <i>Girl child below 15 years</i> | 142 | 62.6% |
| <i>Boy child below 15 years</i> | 40 | 17.6% |
| Women (wife / mother / older woman) | 32 | 14.1% |
| Men | 4 | 1.8% |
| Water vendors | 9 | 4% |
| Total | 227 | 100% |

Implications: At household level, the burden of collecting water among the children (girls and boys) has direct influence on other development dimensions such as education, school attendance, gender inequality, vulnerability and marginalization. Among the key dimension is the

issue of GBV, violence against children (VAC), violence against women and girls, discussed in **Section 5.4.22**.

5.4.7 DISTANCE TO NEAREST WATER SOURCE POINT

Survey findings indicated that 42.7% (97 out of 227) of the respondents said the average distance to nearest safe water source (borehole, PSP) was between 100- 300 meters; 22.5% (51 out of 227) said it was between 50-100 meters and 300-500 meters respectively; 12.3% (28 out of 227) said he distance was more than 500 meters as shown in **Table 5-34** below. Often the common mode of transport for long distance is use of bicycles by children, women and men.

Table 5-34: Distance to nearest water source in Nyakabale RGC

| Average distance to nearest safe water source | <100 meters | | 100-300 meters | | 300-500 meters | | >500 meters | | Overall | |
|---|-------------|------|----------------|------|----------------|------|-------------|------|---------|-----|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Apodorwa | 0 | 0 | 15 | 100 | 0 | 0 | 0 | 0 | 15 | 100 |
| Kikoba | 0 | 0 | 3 | 25 | 3 | 25 | 6 | 50 | 12 | 100 |
| Kikunya | 0 | 0 | 11 | 30.6 | 9 | 25 | 16 | 44.4 | 36 | 100 |
| Kiruli - Kizibu | 28 | 35.4 | 13 | 16.5 | 27 | 34.2 | 11 | 13.9 | 79 | 100 |
| Mboira 1 | 0 | 0 | 3 | 100 | 0 | 0 | 0 | 0 | 3 | 100 |
| Mboira 2 | 0 | 0 | 36 | 75 | 6 | 12.5 | 6 | 12.5 | 48 | 100 |
| Nyakabale | 0 | 0 | 16 | 47.1 | 6 | 17.6 | 12 | 35.3 | 34 | 100 |
| Overall | 28 | 12.3 | 97 | 42.7 | 51 | 22.5 | 51 | 22.5 | 227 | 100 |

Implications: The average distance to a safe water source will be reduced to less than 300 meters within the core villages (intermediate access -onsite yard taps and PSP), and at least 1km within the influence zone (basic access within 1 km / within 30 min round-trip), as per the WHO standards for drinking water (WHO⁴, 2017).

5.4.7.1 TIME OF COLLECTION AND WAITING TIME (ROUND TRIP)

Collection time: In terms of time for water collection, 42.3% of the households collect in morning hours of between 7.00am and 10.00am; 29.1% collect between 10.00am-2.00pm; 19.4% between 2.00pm-7.00pm; 9.3% between 5.00am-7.00am as shown in **Table 5-35** below.

Table 5-35: Time for collecting water in Nyakabale RGC

| Time of the day when water for domestic uses is collected | Freq. | % |
|---|-------|------|
| 7.00am-10.00am | 96 | 42.3 |
| 10.00am-2.00pm | 66 | 29.1 |
| 2.00pm-7.00pm | 44 | 19.4 |
| 5.00am-7.00am | 21 | 9.3 |

⁴ WHO Guidelines for Drinking-water Quality, 2017

| | | |
|--------------|------------|--------------|
| Total | 227 | 100.0 |
|--------------|------------|--------------|



Figure 5-64: Girl child going to collect water at Nyakabale RGC

Waiting Time: Survey findings show that about 44.1% (100 out of 227) of the respondents said the waiting time at water source is less than 30 minutes; 40.5% (92 out of 227) said its 1 hour; 9.3% said it's between 30 minutes - 1 hour; 6.2% said its 2 hours as shown in **Table 5-36** below.

Table 5-36: Waiting time at source

| Waiting time at source | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Overall | |
|------------------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|------------|------------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| <30mins | 9 | 60 | 28 | 29.8 | 44 | 47.8 | 19 | 73.1 | 100 | 44.1 |
| 1 hour | 6 | 40 | 52 | 55.3 | 27 | 29.3 | 7 | 26.9 | 92 | 40.5 |
| 2 hours | 0 | 0 | 14 | 14.9 | 0 | 0 | 0 | 0 | 14 | 6.2 |
| 30mins - 1 hour | 0 | 0 | 0 | 0 | 21 | 22.8 | 0 | 0 | 21 | 9.3 |
| Overall | 15 | 100 | 94 | 100 | 92 | 100 | 26 | 100 | 227 | 100 |

Implications: The project aims to improve access to water source point, sufficient volumes of good quality water that meet peak demand, as well as year-round service which is uninterrupted. In this case, the burden of going to water source point early in the morning will reduce, since consumers will be assured of reliable and low cost water at a 27/7 basis. This will directly contribute to other human capital development parameters. Firstly, there will be reduced interference with school reporting time hence increases in school attendance among school going children (boys and girls). Secondly, there will be health gains accruing from improved service levels more in terms of sanitation and hygiene promotion. In addition, there is likely to be a reduction to vulnerabilities to GBV related to men complaining about their wives and/or children over delaying.

5.4.7.2 HOUSEHOLD EXPENDITURE ON WATER

Survey findings showed that 88.5% (201 out of 227) of the respondent households spend \$0.29 USD (UGX 2,000/=) per month as borehole user fees; 6.6% (15 out of 227) pay \$0.57 USD (UGX 2,000); 4.8% ((11 out of 227) spend above \$8.9 USD (UGX 30,000 to buy from water vendors as shown in **Table 5-37** and **Figure 5-65** below.

Table 5-37: Monthly household expenditure on water per source

| Expenditure per water source | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Overall | |
|--|----------|-----|--------|------|--------|-----|-----------|-----|---------|------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Borehole (UGX 1,000 /\$0.29 USD) | 0 | 0 | 83 | 88.3 | 92 | 100 | 26 | 100 | 201 | 88.5 |
| PSP- Public Stand Point (UGX 2,000 / \$0.57 USD) | 15 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 6.6 |
| Water vendors (> UGX 30,000 (\$8.9 USD) | 0 | 0 | 11 | 11.7 | 0 | 0 | 0 | 0 | 11 | 4.8 |
| Overall | 15 | 100 | 94 | 100 | 92 | 100 | 26 | 100 | 227 | 100 |



Figure 5-65: Monthly HH Expenditure per water source in Nyakabale RGC

Implications:

- The project will provide water at affordable. The planned cost of accessing water (tariff) at house Connection, Yard Tap, PSP and Part Time Users has been determined at UGX 83/20 litres under NWSC operation areas. However, unlike the house connection, the end user collecting from a PSP and Yard tap will more likely have to pay between UGX 100 – 200/= / 20 litres jerrycan.
- In contrast, the cost of water will be higher than the prevailing average monthly cost of UGX 1,000/= (\$0.29) at deep boreholes and UGX 2,000/= (\$0.57 USD) paid at 4 PSPs under Apodorwa mini water system.

5.4.7.3 WILLINGNESS TO PAY FOR PIPED WATER

Survey findings indicate that 97.2% (221 out of 227) of the respondents said YES, they are willing to pay for piped water; 2.6% (6 out of 227) said NO, they are not willing with majority being in Apodorwa and Kiruli - Kizibu villages as shown in **Table 5-38** below.

Table 5-38: Willingness to pay for piped water

| Willingness to pay for piped water by beneficiary village | No | | Yes | | Overall | |
|---|----------|-------------|------------|--------------|------------|------------|
| | Freq | % | Freq | % | Freq | % |
| Apodorwa | 3 | 20% | 12 | 80% | 15 | 100 |
| Kikoba | 0 | 0% | 12 | 100% | 12 | 100 |
| Kikunya | 0 | 0% | 36 | 100% | 36 | 100 |
| Kiruli - Kizibu | 3 | 3.8% | 76 | 96.2% | 79 | 100 |
| Mboira 1 | 0 | 0% | 3 | 100% | 3 | 100 |
| Mboira 2 | 0 | 0% | 48 | 100% | 48 | 100 |
| Nyakabale | 0 | 0% | 34 | 100% | 34 | 100 |
| Overall | 6 | 2.6% | 221 | 97.4% | 227 | 100 |

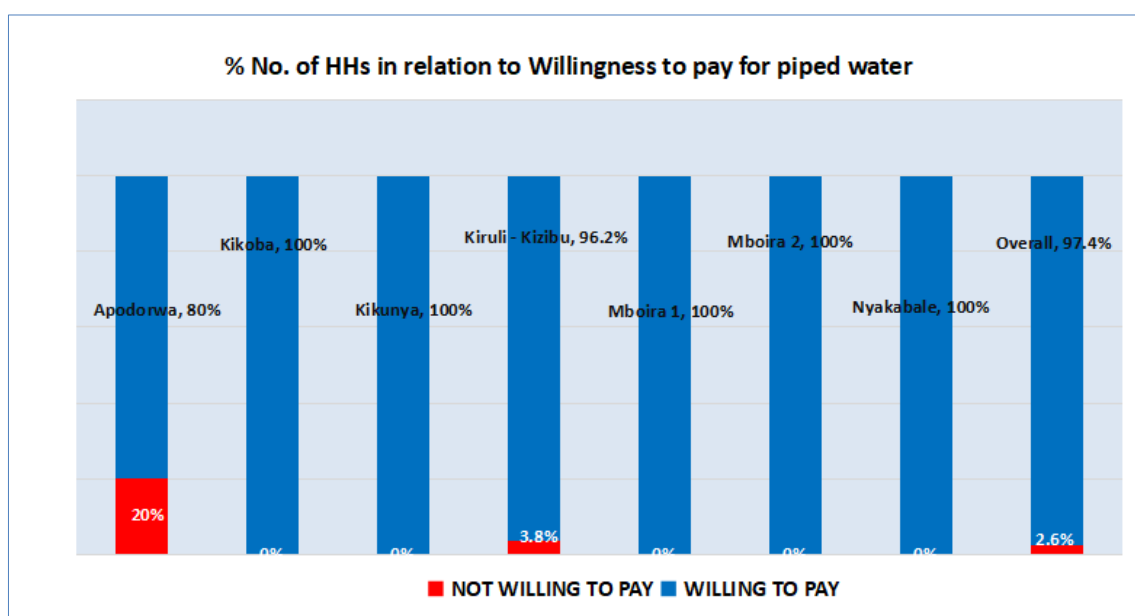


Figure 5-66: Willingness to pay for piped water

5.4.7.4 AMOUNT THEY ARE WILLING TO PAY

Survey findings indicated that 48% (109 out of 227) of the respondents are willing to pay between UGX 200-300/= (\$0.06 - 0.09 USD) per jerrycan of water of 20 liter capacity; 23.3% (53 out of 227) are willing to pay UGX 100 - 200/= (\$0.03- 0.06 USD); 21.6% (49 out of 227) are willing to pay UGX 400 - 500/= (\$0.11 - 0.14 USD) and 7% (16 out of 227) want to access water for free without paying as shown in **Figure 5-67** below.

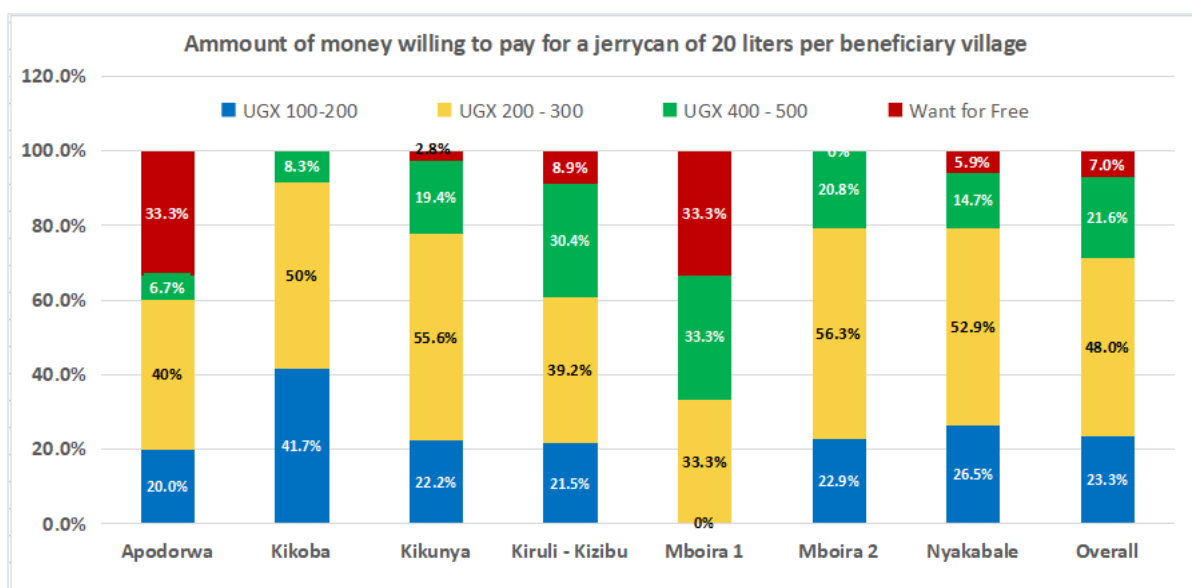


Figure 5-67: Amount They Are Willing To Pay

Implication: The acceptability and willingness to pay water is among the key determinants of access and utilization of piped water systems. Since a big proportion (48%) are willing to pay UGX 200-300/= (\$0.06 - 0.09 USD) per jerry can (20 litres), it's certain that the usability will be high.

5.4.7.5 ACCESS TO MOBILE PAYMENT METHODS

Survey findings showed that in case paying for water tariffs required use of mobile phone payment platforms, there are 98.7% (224 out of 227) who have access to cash-less mobile money payment services such as Airtel Money, MTN Mobile Money and Mobile Banking services. In comparison, only 6.3% (3 out of 227) don't have access especially in Mboira 1 village (Table 5-39).

Table 5-39: Access to water bill payment services

| Access to water bill payment services (cashless /mobile money platforms) | No | | Yes | | Overall | |
|--|----------|------------|------------|-------------|------------|------------|
| | Freq | % | Freq | % | Freq | % |
| Apodorwa | 0 | 0 | 15 | 100 | 15 | 100 |
| Kikoba | 0 | 0 | 12 | 100 | 12 | 100 |
| Kikunya | 0 | 0 | 36 | 100 | 36 | 100 |
| Kiruli - Kizibu | 0 | 0 | 79 | 100 | 79 | 100 |
| Mboira 1 | 0 | 0 | 3 | 100 | 3 | 100 |
| Mboira 2 | 3 | 6.3 | 45 | 93.8 | 48 | 100 |
| Nyakabale | 0 | 0 | 34 | 100 | 34 | 100 |
| Overall | 3 | 1.3 | 224 | 98.7 | 227 | 100 |

Implications: It's anticipated that since NWSC is likely to be a utility manager of the system, paying a water bill will be easier for the owners of water connections through use of cash-less mobile money payment services such as Airtel Money, MTN Mobile Money and Mobile Banking services. Note that country wide the water bills charged by NWSC are payable either by cash less payment platforms and/or direct deposit on NWSC bank account.

5.4.8 WATER IN HEALTH CARE FACILITIES

In Uganda, there 33% of health facilities with basic water supply (WHO Global Baseline Report, 2019). According to UNICEF/JMP5, Uganda ranks highest in terms of ‘Limited’ water at HCF at 65.15% in Sub Saharan Africa in terms of indicators on Water in Health Care Facilities (WinHCF). It ranked 6th in terms of having ‘Basic’ water at 30.81% and 10th rank for having ‘No Service’.

There are 4 health facilities (Gov’t, PFP, PNFP) namely Kigumba HC III, Apodorwa HC III, Kigya HC II and Mpumwe HC II. All these facilities have inadequate access to Water in Health Care Facilities (WinHCF). During a KII with DHO-Kiryandongo district, it was revealed that in many of health facilities, there is no water supply especially within all treatment wards and in waiting areas.

Table 5-40: Status of Water Sources in Apodorwa HC II and Kiigya HC II

| | Health Facility | Catchment Area (parishes) | Major Source of water supply | Distance to source | Jerry cans Per Day | Cost month | Functional RWHTs | Capacity in Litres | OPD Utilization / clients per Annum |
|--|----------------------------|--|------------------------------|--------------------|--------------------|------------|------------------|--------------------|-------------------------------------|
| 1 | Apodorwa HC II (Govt/ MoH) | 4 parishes, Apodorwa, Mboira, Nyakabale, Kifuruta) | Borehole 1 Tap 1 Tank | Onsite | 15 (300 liters) | Zero | 3 | 12,000 | 26% (1,27 patients) |
| | Remarks: | There are 2 additional RWHTs (1,000 liters capacity), donated by OPM/DRDIP. The borehole is not motorized but its onsite. There is no recurring cost incurred for water supply. The Health In-charge confirmed that they don’t have any problem with water, they have more water than they use daily. They also have adequate toilet facilities (5 stance for patients; 3 stance for staff and new one constructed but not yet commissioned by OPM/DRDIP program) In-Charge (Nelson - 0771407873) | | | | | | | |
| 2 | Kigya HC II (Govt/ MoH) | Kiigya parish | NWSC - Yard Tap | Onsite | 30 (600 liters) | UGX 30,000 | 1 | 130 | 76% (3,224 patients) |
| | Remarks | There is 130 liter drum that stores water. The latrines are inadequate for both staff and patients. Water is useful for infection control, but no maternity services are offered at the facility In-Charge (Mevis - 0782928725) | | | | | | | |
| Source: HC In-charges & DHO | | | | | | | | | |



Figure 5-68: Water sources, storage and hand washing facilities at Kiigya HC II



Figure 5-69: RWHTs, Borehole, Storage tanks at Apodorwa HC III with support from OPM/DRDIP/ World Bank

Implications: There is adequate water supply for both Apodorwa HC II and Kiigya HC II for additional provision of billed piped water supply. Kiigya HC II has an onsite yard tap by NWSC and Apodorwa HC II has adequate onsite water supply sources. However, there is need to provide adequate water storage tanks for Kiigya HC II and VIP pit latrine atleast 5 stance for patients due to high OPD Utilization Rate of 76% (3,224) by 2021 in comparison with Apodorwa HC II.

5.4.9 ACCESS TO WATER IN SCHOOLS

The global target of achieving universal access to basic WASH services in schools by 2030 aims at extending water beyond the household to include institutional settings, such as schools, healthcare facilities and workplaces (UNICEF , 2020). Its notable that water in schools has direct impact on education outcomes in primary, secondary and tertiary levels (MOES, 2020). A document review of Kigumba SC Development Plan (2021-2025) revealed that the government aided schools are faced with a high demand of water amidst inadequate water storage facilities. Survey findings indicated that all schools have access to deep borehole with an average distance of between 100 - 500 meters and above. In term of water storage, only 14.3% (1 out of 7) schools (both Gov't & private) own a rain water harvest tank (RWHT) as shown in **Table 5-41** below..

Table 5-41: Status of water sources, storage and capacity at schools in Nyakabale RGC

| | Name of school | School population (enrollment) | Major Source of water supply | Distance to source (meters) | Jerry cans per day | Liters per day | Cost month | Functional RWHTs | Capacity in Litres | Functional Pit Latrine |
|---|------------------|--------------------------------|------------------------------|-----------------------------|--------------------|----------------|------------|------------------|--------------------|------------------------|
| 1 | Mboira P/s - UPE | 512 | Borehole | 300 | 60 | 1,200 | 2,000 | 0 | na | YES |

| | | | | | | | | | | |
|---|-----------------------|--------------|----------------|------|-----|--------------|---------------|----------|--------------|------------|
| 2 | Kifuruta P/S - UPE | 1,571 | Borehole | 200 | 300 | 6,000 | 2,000 | 1 | 500 | YES |
| 3 | Nyakabale P/S - UPE | 1,425 | Borehole | 400 | 250 | 5,000 | 2,000 | 0 | na | YES |
| 4 | Kyakakuguru P/S - UPE | 621 | Borehole | 1km | 200 | 4,000 | 2,000 | 0 | na | YES |
| 5 | Nyakabale CoU P/s | 436 | Borehole | >1km | 150 | 3,000 | 2,000 | 1 | 500 | YES |
| 6 | Good Day Nursery | 281 | PSP / Yard Tap | 100 | 50 | 1,000 | 2,000 | 0 | na | YES |
| 7 | Mboira SSS | 332 | Borehole | >500 | 100 | 2,000 | 2,000 | 0 | na | YES |
| | Total | 5,178 | | | | 1,110 | 22,200 | 2 | 1,000 | YES |

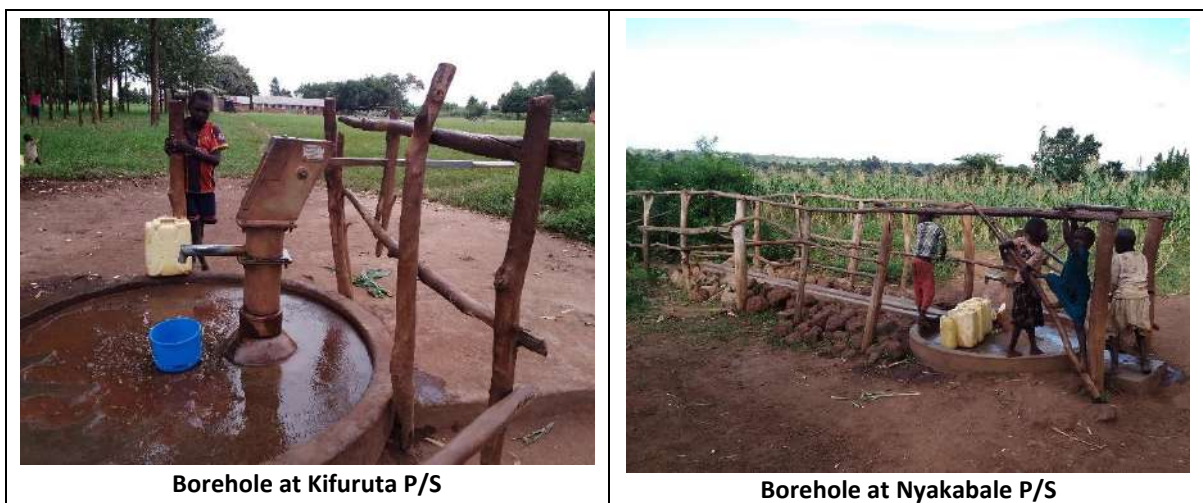


Figure 5-70: Access to water in Schools

From the above, it is notable that there is increasing demand for water amidst limited supply. In addition, the demand for water, sanitation and hygiene facilities has impacted on the educational outcomes within the area. During consultation meeting with Mboira SC team, it was revealed that water scarcity contributes to high rate of school dropout, absenteeism and performance among learners and teachers. The LC 3 Chairperson Mboira SC stated that ***“Before Covid-19 lockdown children were always forced to collect water from 7.am up to 10.am which is class hours. This mostly happens in villages without any reliable water supply such as borehole. During covid-19 lockdown, the few water source have been acting as meeting points for adolescent boys and girl who miss use the opportunity. We have been having many cases of early child pregnancy during this lockdown period. We hope they victims go back to school”***, said Mr. Watube Jean Mike (0785001822), LC 3 Chairperson - Mboira Sub County, Kiryandongo DLG. Further to this, the LC 3 Female Councillor (Nyonga Florence - 0778597292) revealed that they with the re-opening of schools (after covid19 lockdown), anticipate an increase in scenarios of children dropping out of school due to water scarcity especially among the poor households.

Implications: There is need for more institutional connections as well as water storage facilities. The availability of water at school has a direct influence on a number of educational outcomes such as reduction in school dropout rate; school feeding among others. The actual baseline values

for education outcomes were not possible to be obtained from Kiryandongo District Education Office at time of ESIA.

5.4.10 WATER FOR PRODUCTION

The demand for water for production especially crop irrigation is increasing, amidst limited efforts on providing adequate sources e.g. valley dams and valley tanks. Majority of farmers rely on rainfall, whose patterns are changing due to climate variability. Drought and dry spells are major barriers to agricultural production and productivity, and in turn affect livelihoods especially water stress and insecurity. This is causing conflict over the limited water resources. With an increasing influx of cattle keepers in the area, there is great demand for water for production (crop and animals). Livestock is driven to any nearest open water sources, and many times herdsman take livestock to boreholes. The severity of water scarcity is causing human migrations to water catchments such as Nyama wetland.

Implications: The piped water will to a small extent be used in farm production especially livestock.

5.4.11 SANITATION COVERAGE AND USAGE

5.4.11.1 OPEN DEFECCATION

According to UNICEF, open defecation refers to the practice whereby people go out in fields, bushes, forests, open bodies of water, or other open spaces rather than using the toilet to defecate. There is significant evidence of open defecation in the area. Survey findings showed that 45.8% (104 out of 227) respondents acknowledged that YES, they had witnessed conditions (such as human faeces) of open defecation in open grounds (shrubs, roadside, crop fields, bushes, etc); 37.9% (86 out of 227) said YES, they had witnessed similar conditions nears / within wetlands, river and ponds; 30.4% (69 out of 227) said YES, they had witnessed it in market place areas as shown in **Table 5-42** below.

Table 5-42: Open Defecation

| Open defecation | Yes | | No | | Not Sure | | Grand Total | |
|---|------|------|------|------|----------|------|-------------|-----|
| | Freq | % | Freq | % | Freq | % | Freq | % |
| Open defecation in open ground (shrubs, roadside, crop fields, bushes, etc) | 104 | 45.8 | 93 | 41.0 | 30 | 13.2 | 227 | 100 |
| Open defecation in wetlands, river and ponds | 86 | 37.9 | 114 | 50.2 | 27 | 11.9 | 227 | 100 |
| Open defecation in market place areas / stalls | 69 | 30.4 | 106 | 46.7 | 52 | 22.9 | 227 | 100 |

Implications: Open defecation is a contributing factor to water and food contamination, hence increasing the risk of exposure to incidence and prevalence of water borne diseases (WHO, 2015). According to UNICEF (2020), the risk of disease is higher due to open defecation because given its intensity more people are affected. UNICEF further states that one gram (1g) of AM of faeces contains 10,000,000 viruses, 1,000,000 bacteria and 1,000 parasite cysts, with Child faeces

containing more germs than adults. It's anticipated that reducing / eliminating open defecation may require a combination of approaches that are appropriate (such as Community Approaches to Total Sanitation, CATS) before construction of public toilets, pit latrine is done. In this regard, the project will have meaningful contribution.

5.4.11.2 PIT LATRINE COVERAGE

Households with Pit Latrine: Pit latrine is critical sanitation facility within the households and community, and it has direct influence on the water, sanitation and hygiene (WASH). There is low latrine coverage in Kigigya parish at 45.9% as shown in **Table 5-43** and **Figure 5-71**. The common structures are uncovered and poorly constructed (**Figure 5-72**).

Table 5-43: Pit latrine coverage per parish in Nyakabale RGC

| Parishes | Total HHs | No. Of HHs With Pit Latrines | | HHs without pit latrines |
|----------------|--------------|------------------------------|------------|--------------------------|
| | | Freq | % | % |
| Kiigya | 555 | 255 | 45.9% | 54.1% |
| Apodorwa | 217 | 139 | 64.1% | 35.9% |
| Nyakabale | 341 | 221 | 64.8% | 35.2% |
| Mboira | 431 | 280 | 65% | 35% |
| Kifuruta | 588 | 386 | 65.6% | 34.4% |
| Overall | 2,419 | 1,428 | 59% | 41% |

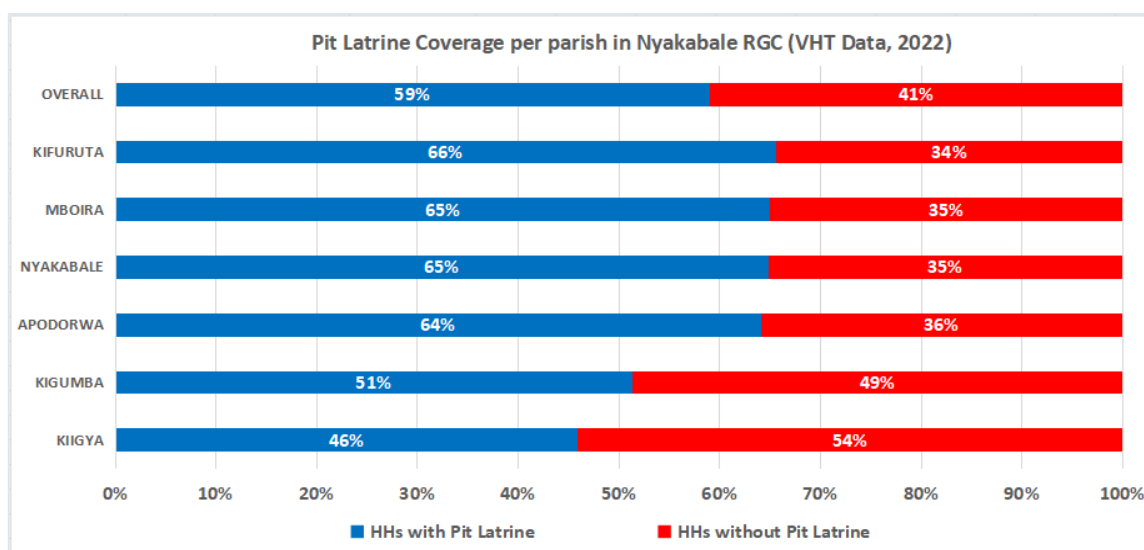


Figure 5-71: Pit latrine coverage per parish in Nyakabale RGC

Sharing pit latrine: Survey findings indicated that 53.7% (122 out of 227) share pit latrine with neighbours; 46.3% (105 out of 227) don't share latrine as shown in **Table 5-44** below.

Table 5-44: Sharing pit latrine

| Share pit latrine with neighbors | No | | Yes | | Overall | |
|----------------------------------|------|------|------|------|---------|-----|
| | Freq | % | Freq | % | Freq | % |
| Apodorwa | 6 | 40 | 9 | 60 | 15 | 100 |
| Kiigya | 46 | 48.9 | 48 | 51.1 | 94 | 100 |
| Mboira | 31 | 33.7 | 61 | 66.3 | 92 | 100 |

| | | | | | | |
|----------------|------------|-------------|------------|-------------|------------|------------|
| Nyakabale | 22 | 84.6 | 4 | 15.4 | 26 | 100 |
| Overall | 105 | 46.3 | 122 | 53.7 | 227 | 100 |

Implications: The project will provide public toilets. In case there are conditionality of first having a functional toilet facility, then there will be an increase in construction of it latrine in order to meet the eligibility criteria for connection. In this case it latrine coverage will increase from the current baseline values of 59% by 2015



Kikunya Village



Nyakabale Market



Nyakabale P/S



Kifuruta P/S

Figure 5-72: Pit latrines in Nyakabale RGC

5.4.11.3 PUBLIC TOILETS/ LATRINES

Survey findings indicated that 59.9% (136 out of 227) of respondents support construction of public toilet while 40.1% (291 out of 227) said NO.

Table 5-45: Need for a public toilet

| Need for a public toilet | No | | Yes | | Overall | |
|--------------------------|-----------|-------------|------------|-------------|------------|------------|
| | Freq | % | Freq | % | Freq | % |
| Apodorwa | 9 | 60 | 6 | 40 | 15 | 100 |
| Kiigya | 25 | 26.6 | 69 | 73.4 | 94 | 100 |
| Mboira | 34 | 37.0 | 58 | 63.0 | 92 | 100 |
| Nyakabale | 23 | 88.5 | 3 | 11.5 | 26 | 100 |
| Overall | 91 | 40.1 | 136 | 59.9 | 227 | 100 |

Implications: The project will construct 4 public toilets in Nyakabale RGC located at Nyakabale Trading Centre, Kifuruta P/S, Katamarwa P/S, Kigumba HC III. The design will be a) Construction of 1No. 6 stance waterborne toilets; b) Construction of 1No. 5 stance VIP latrines for girls; c) Construction of 4No. 5 stance VIP latrines for boys.

5.4.12 HAND WASHING

Within Nyakabale RGC, there are 93.4% households who have hand washing facilities, while 6.6% don't have as shown in Table 5-46 (ESIA/WASH Survey, 2021).

Table 5-46: Availability / use of hand washing facility

| Availability / use of hand washing facility | No | Yes | Grand Total |
|---|--------------|---------------|----------------|
| Apodorwa | 0.00% | 100.00% | 100.00% |
| Kiigya | 0.00% | 100.00% | 100.00% |
| Mboira | 16.30% | 83.70% | 100.00% |
| Nyakabale | 0.00% | 100.00% | 100.00% |
| Grand Total | 6.61% | 93.39% | 100.00% |

Implications: Hand washing is a key parameter of community and personal health. It's dependent on accessible and sufficient water supply.

5.4.13 HUMAN NUTRITION (WATER AND FOOD INTAKE)

Source of drinking water: Survey findings indicated that 96% (218 out of 227) of the respondent households depend on deep boreholes as the major sources of drinking water; 4% (9 out of 227) use PSP/yard tap especially in Apodorwa parish as shown in **Annex 9**.

Method of water treatment: Survey findings indicated that 74.4% (169 out of 227) households don't boil water for drinking; 21.6% (49 out of 227) households boil water on weekly basis and 4% boil on daily basis as shown in **Annex 9**.

Energy sources used to boil drinking water: Survey findings indicated that 60.3% (35 out of 58) of the households use charcoal as source of energy for boiling drinking water; 39.7% (23 out of 58) use firewood as shown in **Annex 9**.

Storage of drinking water: Survey findings indicated that 61.25 (139 out of 227) of the households store drinking water in jerrycans/jerry cans; 23.8% (54 out of 227) use kilned clay pots; 6.6% (15 out of 227) use buckets; 5.7% (13 out of 227) use jugs / flasks; 2.6% use fridge as shown in **Annex 9**.

Number of Meals per day: Survey finding indicated that 41.4% (94 out of 227) of the households can afford 2 meals per day; 37% (84 out of 227) get 3 meals per day; 21.6% (49 out of 227) get 1 meal per day as shown in **Annex 9**.

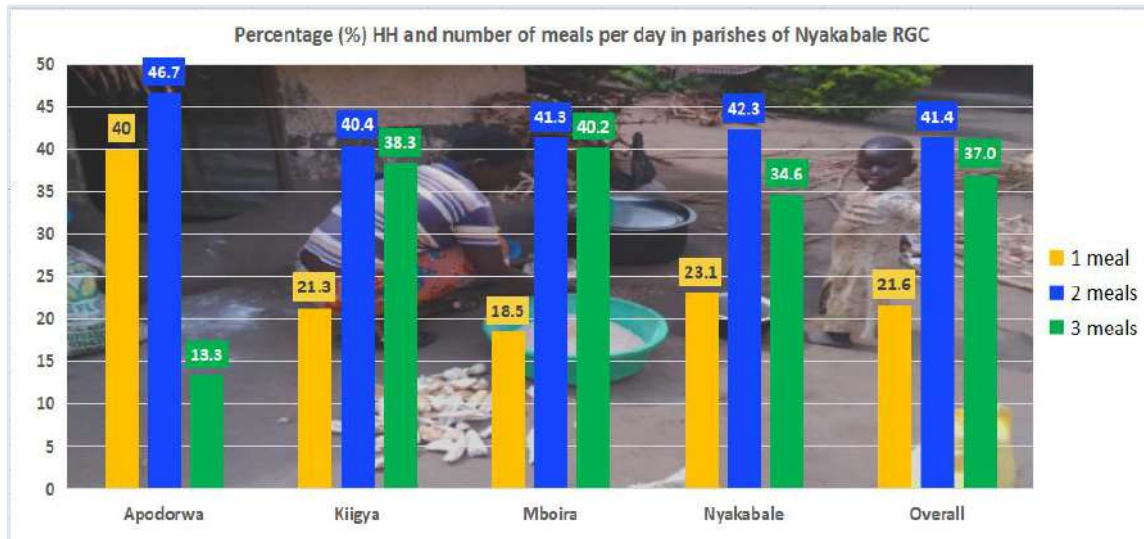


Figure 5-73: No. Of meals per HHs per day in Nyakabale RGC

Implications: It should be noted that safe drinking water is essential human nutrition and health. Drinking unsafe water can increase incidence and prevalence of water related diseases. The project will directly contribute to increase in access to water which is easily treatable for drinking. However, there is need to promote the use of energy saving stoves that can be used in reducing the cost per capita on charcoal and firewood used in boiling water and cooking food. The increase in access and utilisation of energy saving stoves will also have directly contribute to sustainable environmental management of water catchments.

5.4.14 WASTE MANAGEMENT

The major solid waste streams generated are crop and food residues, polyethene bags, plastics, among others. There is no designated landfill, neither a service provide within Nyakabale RGC.

Waste materials - Survey findings indicate that 98.3% (223 out of 227) of the respondents said that the major waste generated in the area composed of food, crop residues, plastic bottles, polythene bags and waste water from washing and bathing.

Waste management - Survey findings indicated that 100% of the households use open dumping and burning as the common practice respectively; while 52% (118 out of 227) - YES bury the solid waste as shown in **annex 9**. On same note, there are no known farmers who use compost as soil conditioner in their gardens.

Implications: In order to maximize the benefits of piped water, there is need to ensure clean environment in order to minimize contamination at point of collection and storage at household and institutional levels.

5.4.15 ORDINANCES AND BYLAWS ON WASH

There is an ordinance passed by Kiryandongo district local government and Bylaw passed by Kigumba sub county lower local government. Findings of the household survey conducted during the ESIA study indicated that 62.9% (44 out of 70) of the households are aware about ordinance & bylaw on water, sanitation & hygiene (WASH) passed by local governments. 31.4% (22 out of 70) are not aware and 5.7% not sure.

Implications: The operation and maintenance of solar piped water system may invoke local governments and refugee administration units to enforce and/or pass new laws and regulations regarding eligibility of connections, operation and maintenance. The local governments are mandated to enforce against poor water, sanitation and hygiene conditions. At Lower LG level, this function is done by the Health Inspectors, Town Agents and Parish Chiefs.

5.4.16 DISEASE BURDEN

Within Nyakabale RGC, the catchment population served by Apodorwa HC III and Kiigya HC II is affected by both communicable and non-communicable diseases. Some of the disease Incidence & prevalence is attributed to poor water, sanitation and hygiene conditions. Kiryandongo DLG/DHO/HMIS2 data for 2020-2021 indicated that the major diseases (OPD attendance) were Cough or Cold, Malaria, Diarrhoea, Intestinal worms, Gastrointestinal Disorders, Pneumonia, STIs, GBV related injuries, Typhoid, Stomach Aches, HIV/AIDs, Covid19 . *NOTE: Disease Incidence refers to the number of new cases in a period of time usually one year. Disease Prevalence refers to the number of individuals who have an illness or condition at any moment (WHO, 2004).*

5.4.16.1 WATER RELATED DISEASE

It notable that constraints related to domestic water supply, access and utilization are directly linked to Incidence and Prevalence of water related diseases (**Figure 5-74**). According to WHO (2014), there are water related diseases that are both communicable and non-communicable.

WHO further notes that water related diseases encompasses illness resulting from both direct and indirect exposure to water, whether by consumption or by skin exposure. It includes disease due to waterborne or water-associated pathogens and toxic substances. Further to this, it also includes illness related to water shortage or water contamination during adverse climate events, such as floods and droughts, diseases related to vectors with part of their life cycle in water habitats; and disease related to inhalation of contaminated water aerosols (R Stanwell-Smith⁶, 2020).

Basing on the above context, findings obtained during a review of Kiryandongo DLG/DHO/HMIS2 data for 2020-2021, that the major water related diseases included Cholera, Typhoid fever, Intestinal Worms, Diarrhea, No reported case, Scabies, Trachoma as shown in **Table 5-47**.

Furthermore, survey findings indicated that 89.4% (203 out of 227) of the respondents said their household members had been affected by malaria; 76.6% (174 out of 227) said Cough; 65.6% (149 out of 227) mentioned Typhoid; 10.6% said Bilharzia; 8.4% (19 out of 227) said Ulcers; 7.5% (17 out of 227) said HIV/AIDs; 0.9% (2 out of 227) mentioned Gastronomic disorders.

By end of 2021, malaria had the highest prevalence rate at 73.7% (3,207 cases); 51.3% (2,232 cases) for Cough or cold - Not Pneumonia.

Table 5-47: Prevalence rate of Water related diseases in Nyakabale RGC (Catchment area of Apodorwa HC II and Kiigya HC II)

| Category of water related Diseases | Description | Risk & Exposure factors | Reported Diseases & illnesses | Prevalence Rate (Source: Kiryandongo DHO/HMIS, 2020-2021) | | | | | |
|-------------------------------------|---|---|-------------------------------|--|---------|---------|---------|---------|---------|
| | | | | Total Yr 2020 | | yr 2021 | | Overall | |
| | | | | Freq | % | Freq | % | Freq | % |
| Waterborne microbiological diseases | Diseases related to consumption of pathogens consumed in water; most due to human or animal faecal contamination of water | Ingestion of food, water, drink, or another substance into the body by swallowing or absorbing it | Cholera | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | Typhoid fever | 35 | 0.8 | 40 | 0.7 | 74 | 0.7 |
| | | | Intestinal Worms | 393 | 9.0 | 385 | 6.7 | 778 | 7.7 |
| | | | Diarrhea | 229 | 5.3 | 132 | 2.3 | 361 | 3.6 |
| | | | Dysentery | No data | No data | No data | No data | No data | No data |
| Waterborne chemical diseases | Disease related to ingestion of toxic substances in water | Drinking contaminated water | No reported case | 0 | 0 | 0 | 0 | 0 | 0 |
| Water hygiene diseases | Diseases whose incidence, prevalence or severity can be reduced by using safe (clean) water to improve | Contaminated water used for washing / personal hygiene | Skin diseases (Scabies) | 135 | 3 | 863 | 15.1 | 998 | 9.9 |
| | | | Trachoma | 13 | 0 | 13 | 0 | 26 | 0 |

⁶ Royal Institute of Public Health[<http://www.eolss.net/sample-chapters/c03/e2-20a-01-01.pdf>], 2020).

| | | | | | | | | | |
|-------------------------------|---|--|-----------------------------------|--------------|--------------|--------------|--------------|---------------|------|
| | personal and domestic hygiene | | | | | | | | |
| Water contact diseases | Caused by skin contact with pathogen infested water or with chemical contaminated water | Contaminated open surface / fresh water sources | Schistosomiasis (Bilharzia) | 34 | 0.8 | 44 | 0.8 | 79 | 0.8 |
| Water vector habitat diseases | Diseases where vector lives all or part of its life in or adjacent to a water habitat | Rivers, Streams, wetlands, bushes; Small collections of stagnant water e.g., water butts | Malaria (mosquitoes) | 3,207 | 73.7 | 3,170 | 55.4 | 6,377 | 63.3 |
| Excreta disposal diseases | Diseases related to unsanitary disposal of human waste (faeces and urine) | Diseases related to human / animal waste in drinking water; (ii) diseases related to direct/ indirect contact with faeces/ urine | Faecal-oral infections - Trachoma | 13 | 0 | 17 | 0 | 30 | 0 |
| Water aerosol diseases | Diseases related to respiratory transmission, where a water aerosol airway | water containing suspended pathogens enters residential buildings; (ii) raw water sources | Viral gastroenteritis | 520 | 12.0 | 260 | 4.5 | 780 | 7.7 |
| | | Overall OPD Utilization Rate / Clients | | 4,351 | 43.2% | 5,727 | 56.8% | 10,078 | |

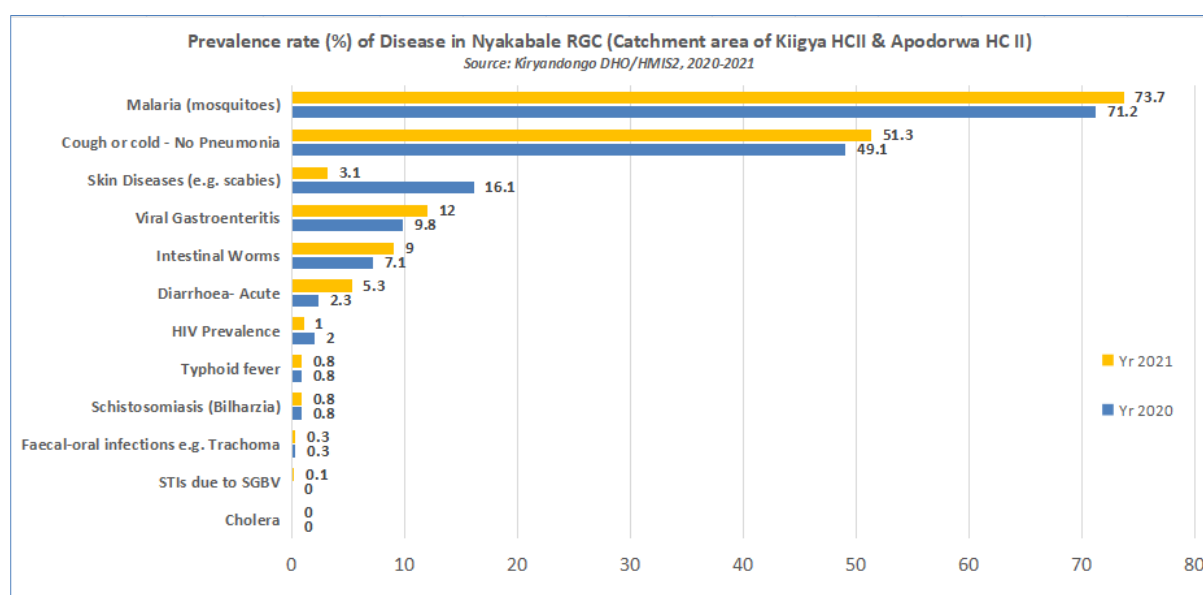


Figure 5-74: Prevalence rate of Water related diseases in Nyakabale RGC (Catchment area of Apodorwa HC II and Kiigya HC II)

Implications: the project will contribute to reduction in disease incidence and prevalence. It's notable that the propagation of the most of the water related disease can be avoided by prevention through a) supplying sufficient quantities of clean drinking water; b) good personal and food hygiene; c) hygienic excreta evacuation; d) Ingestion of boiled food and water, uncontaminated drinks, or substance into the body by swallowing or absorbing it; e) malaria vector control methods such as using mosquito nets, cleaning physical environment (proper waste management practices). However, the provision and access to safe and clean water, may not entirely translate into reduced disease burden in short run. Therefore, measuring attribution of water supply to reduction in disease burden is outside the scope of this baseline assessment.

5.4.17 HIV/AIDS, STIS AND COVID-19

HIV Prevalence Rate: Nationally, the Mid-West region (covering Kiryandongo district which covers Nyakabale RGC), has an HIV/AIDs rate at 5.1% among the adults age d15-64 years by 2017 slightly lower than in rural areas at 5.8% in Central 1 region (UPHIA, 2017). At national level, the prevalence of STI (active syphilis) is higher among rural residents at 2.3% compared to 1.6% in urban areas (UPHIA, 2017). The ART initiation rate is at 88% with 46.5 % having HIV positive Individuals with presumptive TB. A review of HMIS2 data (2020-2021) for Apodorwa HC II and Kiigya HC II (serving a catchment area covering Nyakabale RGC) indicated that the HIV prevalence rate reduced from 2% in 2020 to 1% in 2021 and 0.1% for STIs due to SGBV. Further to this, survey findings indicated that 7.5% (17 out of 227) of the respondent households acknowledged to have been affected by HIV/AIDs in their households (either a relative / neighbor / self).

Drivers of Infections: During the key informant interview with District Health Officer (DHO) it was revealed that the major driver of HIV infections are majorly a) risky sexual behaviours such as having unprotected sexual intercourse, including early sexual debut, multiple sexual relationships, limited and inconsistent condom use; b) rampant transactional, cross-generational and sexual activities; c) poor attitudes such as stigma; d) limited awareness about personal and/or partner HIV status; e) high prevalence of sexually transmitted infections and diseases (STI/Ds); f) low utilization of antenatal care (ANC) and delivery services such as PMTCT; g) low uptake of safe male circumcision (SMC) services; h) sub-optimal scale-up of ART; i) gender inequalities including gender-based violence (GBV) exacerbated by alcohol drinking; j) exposure to risk due to effects of Covid-19 lockdown especially among young girls (adolescents and youth).

Most At Risk Populations: During community meetings with youth at Kikunya and Mboira, it was revealed that the Most At Risk Populations (MARPs) include school going age children, adolescents, traders (transiting outside project area), bodaboda riders, Bar and lodge attendants, married couples, sex workers, migrant workers, transit traders, casual labourers, rural-urban migrants, HIV+ve persons.

COVID-19: Covid19 pandemic has impacted on the communities within Nyakabaale RGC. Survey findings indicate that 54.3% of the respondents said the measures for Covid19 prevention were Satisfactory; 32.9% said Highly Satisfactory; 11.4% and 1.4% Not-Satisfactory and Not Sure respectively.

5.4.17.1 HIV TESTING

Survey findings revealed that 54.3% (38 out of 70) respondents had never taken an HIV test in the past 12 months compared to 45.7% (32 out of 70) who said YES as shown in table 41 below. Mboira trading centre had the highest number of respondents at 39.5% who had never taken HIV test.

Table 5-48: Number of Persons who had ever taken HIV Test in past 12 months

| Ever taken an HIV test in the past 12 months | | | | | | | | |
|--|----------------------|------------|-----------|-------------|------------|-------------|-------------|------------|
| Parishes | I CAN'T DO IT / FEAR | | NO | | YES | | Grand Total | |
| | Freq | % | Freq | % | Freq | % | Freq | % |
| Apodorwa | 0 | 0 | 0 | 0 | 15 | 100 | 15 | 100 |
| Kiigya | 3 | 3.2 | 47 | 50 | 44 | 46.8 | 94 | 100 |
| Mboira | 0 | 0 | 45 | 48.9 | 47 | 51.1 | 92 | 100 |
| Nyakabale | 0 | 0 | 3 | 11.5 | 23 | 88.5 | 26 | 100 |
| Overall | 3 | 1.3 | 95 | 41.9 | 129 | 56.8 | 227 | 100 |

Implications: The risk of HIV/AIDs and Covi-19 spreading is predictively possible especially during construction phase due to influx of workers. It's a requirement to have in place the following:

- HIV/AIDS workplace policy that emphasizes no-discrimination and/or stigmatizing HIV+ve workers, and allowing them to access ART services;
- Contractor procuring a nominated HIV service provider - condoms, VCT, male circumcision, HIV testing, BCC / IECs materials by contractor and service provider such as Kiryandongo Hospital and other community outreach service providers; ;
- Provide Voluntary counseling and testing among worker and communities;
- Provide condoms.
- Abide by the COVID-19 prevention SOPs.

5.4.18 TRANSPORT AND ROAD SAFETY

Transport services in the RGC comprise of trucks, pickups, motorcycles (bodaboda) and bicycles. According to the OC Station Apodorwa Police Station, the most common means of transport are motorcycles, and the most common accidents are motorcycle accidents. There has been an increasing trend in Road Traffic Accidents in Kiryandongo District as captured by the HMIS, mainly occurring on the Kampala-Gulu highway.

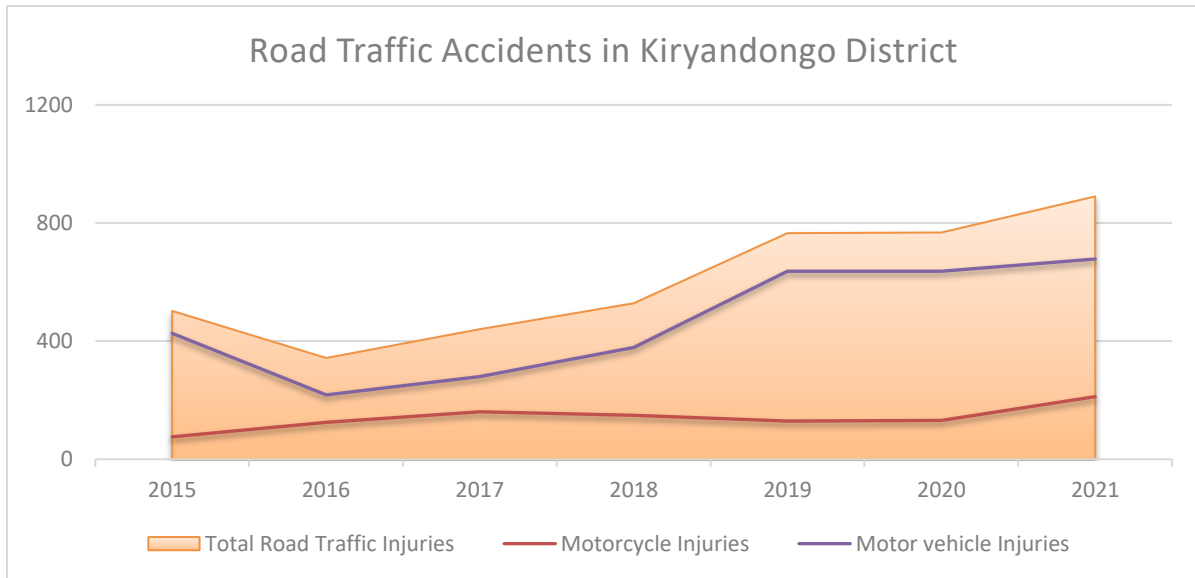


Figure 5-75: Road Traffic Accidents in Kiryandongo District From 2015 - 2021

Implications: Pipe laying for the project will follow the road reserve, in particular the water sources will follow the road reserve on both sides of Kigumba – Masindi main road which is very busy. Once the pipe laying reaches Nyakabale trading centre, the pipes will cross the main road, hence affecting the flow of traffic along Masindi – Kigumba Road. Due to the nature of traffic along Masindi – Kigumba Road, the contractor needs to develop a traffic management plan to manage their fleet and traffic along the road during the digging and laying of pipes.

5.4.19 EMERGENCY PREPAREDNESS

5.4.19.1 MEDICAL FACILITIES

For the two water sources and Nyakabale trading centre, the nearest health facility is Kigumba Health Centre III, while for the Mboira-Apodorwa area, the nearest health facility is Apodorwa Health Centre II. Kigumba HCIII provides both inpatient and outpatient medical services, while Apodorwa HCII only provides outpatient medical services. Patients from Apodorwa HCII that require further attention and or more specialised medical care are referred to Kigumba HCIII or Kiryandongo Hospital. Kigumba HCIII or Kiryandongo Hospital are equipped with ambulances unlike Apodorwa HCII.

5.4.19.2 FIRE READINESS

Kiryandongo district lacks a fire station, a situation that has made it difficult for the Authorities to respond to fire outbreak and fire related emergencies in time. According to the District Police

Commander, the nearest fire station is the one in Masindi, about 30km away, serving the district and big factories like Kinyara Sugar Works Ltd.

5.4.20 LAND TAKE AND ACQUISITION

During project construction, the project developer, MWE, intends to mostly use road reserves of the existing public roads which are government land for the transmission and distribution lines. However, the water source site, access roads and storage reservoir sites shall be located on private land as indicated in Error! Reference source not found., whose owners will be engaged MWE in the process of land acquisition in accordance with the land act and World Bank Environmental and Social safeguard policies as well as relevant national laws. According to the RAP (2022), the project will require a permanent land take of 1.195 ac and an easement corridor of 10.910 ac and a total of 260 PAPs.

Table 5-49: Project land takes

| Infrastructure | Site location by village & parish | GPS Coordinate | Land Tenure | Land use/cover | Original land size estimate | Land uptake, sq.mtr | Land owner |
|---------------------------------|-----------------------------------|--------------------|-----------------------|---------------------|-----------------------------|--|---|
| Borehole Pump Station DWD 77382 | Kikunya village, Mboira parish | 381073 E, 199234 N | Customary (Un titled) | Farming (Maize) | 2 acres | 900m ² (30m square) | Byansi Godfrey 0779767772 |
| Borehole DWD 77382 Access Road | Kikunya village, Mboira parish | | Customary (Un titled) | | | 4,302m ² (717m long, 6m wide) | Byansi Godfrey - 0779767772 Adam Idi – 0788822233 |
| Borehole Pump Station DWD 77383 | Kikoba village, Kiigya parish | 379216 E, 198304 N | Freehold | Farming (Soya Bean) | 25 acres | 900m ² (30m square) | Asango Rose & Okuta Charles Wilfred 0772955116 |
| Borehole DWD 77383 Access Road | Kikoba village, Kiigya parish | | Freehold | | | 60m ² (10m long, 6m wide) | Asango Rose & Okuta Charles Wilfred 0772955116 |
| Nyakabale Reservoir Tank | Mboira village, Mboira parish | 378747 E, 202381 N | Customary (Un titled) | Grass land | 50 acres | 900m ² (30m square) | Byabagambi John c/o Mboira SC Chairperson – Watube Mike Jean (0775001822) |
| Nyakabale Reservoir Access Road | Mboira village, Mboira parish | | Customary (Un titled) | | | 1,524m ² (254m long, 6m wide) | Byabagambi John c/o Mboira SC Chairperson – Watube Mike |

| | | | | | | | |
|---|--|---------------------|--------------------------|------------------|--|-----------------------------------|--|
| | | | | | | | Jean (0775001822) |
| 1No 6 stance WBT in Nyakabale Trading Center | Nyakabale Village, Mboira Parish | 377495E, 199087N | Customary (Un titled) | Trading | | 225 m2 (15m long, 15m wide) | c/o Nyakabale Chairperson – Obomba Cornelious (0773974550) |
| 1No 6 stance WBT in Katamarwa Trading Center | Katamarwa Village, Kigumba Parish | 382572E, 202785N | Customary (Un titled) | Trading | | 225 m2 (15m long, 15m wide) | c/o Katamarwa Chairperson – Lumago Abas (0777461120) |
| 2No 5 stance VL in Kifuruta P/S | Kifuruta Village, Kifuruta Parish | 380370E, 205707N | Customary (Un titled) | School | | 225 m2 (15m long, 15m wide) | c/o Deputy Headteacher Chandibale Gasper - (0779023807) |
| 2No 5 stance VL in Kigumba Health Centre III | Kigumba Parish | 386838E, 199577N | Customary (Un titled) | Health Center | | 225 m2 (15m long, 15m wide) | c/o Facility Incharge – Muhumuza Ronald (0775131231) |



Figure 5-76: Wife to land owner at Source 2 (DWD 77383) at Kikoba village in Nyakabale RGC



Figure 5-77: Local leaders and land owner (middle) for Source 2 (DWD 77383) at Kikoba village in Nyakabale RGC



Figure 5-78: Nyakabale reservoir site

5.4.21 PHYSICAL CULTURAL RESOURCES (PCR)

The physical cultural resources encountered was a graveyard lying directly within the planned transmission line path from Kikoba production well (Borehole Pump Station DWD 77383) to Nyakabale reservoir as shown in **Figure 5-79** below. The land owner asserted that the TL should be extended upwards by at least 10 meters to avoid relocation of their graveyard.

Implications: The proposed transmission line alignment will pass through the PAP's homestead and directly affect the grave yard. In order to avoid impacting the PCR, the feasibility alignment of the transmission line will be adjusted by about 10 meters relative to point (379214E, 198114N), to run along the access road (**Figure 5-80**).



Figure 5-79: PCR (grave yard) directly adjacent to the proposed transmission line alignment (by 30cm) from borehole to Nyakabale reservoir



Figure 5-80: Proposed re-alignment of the transmission line

5.4.22 GENDER, VULNERABILITIES AND MARGINALISATION

Gender, as a social construct of roles, behavior, activities and attributes considered appropriate and ascribed to men and women, has direct linkage to water, sanitation and hygiene. In order to obtain baseline conditions, a gender analysis was conducted within the project area. It assessed the roles of female and males, and their access to and control of resources related to water supply and utilization; relation and power (decision making); benefits and the constraints they face. The assessment involved data collection using survey questionnaire; direct observation; KII; FGDs while integrating gender activity profiles; gender access, control and benefits profiles.

5.4.22.1 GENDER ROLES & DECISION MAKING

Gender Roles: Survey findings indicated that 80.2% (182 out of 227) of respondents said all children (boys and girls) below age 15 years carried a heavy burden of collecting water; compared to 14.1% (32 out of 227) who said it's the women and 1.8% (4 out of 227) who said men. Further to this, 78% (142 out of 182) of the respondents said the girl child carries a bigger role of collecting water and doing many household chores compared to 22% (40 out of 182) who said the boy child carried out the same. Findings from community consultations with women group at Apodorwa indicated that women and children (**Figure 5-81**) bear the heavy burden of collecting water, moving long distances (not matter whether conditions – dry or rainy conditions), loss time and not paid for the work done.



Figure 5-81: Women awaiting to collect water at source point in Mboira - Nyakabaale RGC area

Household Decision Making: Survey findings indicated that 44.5% (101 out of 227) of the respondents said that decisions making related to purchasing household items are major done by BOTH man and women; 36.6% (83 out of 22) said its mostly by men; 18.9% (43 out of 227) said women especially when they both married, single, widow, divorced or separated as shown in **Table 5-50** below.

Table 5-50: Decision making on household purchases

| In your opinion, who decides most when purchasing household items e.g. Assets? | | | | | | | | |
|--|------|------|------|------|-------|------|-------------|-----|
| Gender | Both | | Man | | Woman | | Grand Total | |
| Parish | Freq | % | Freq | % | Freq | % | Freq | % |
| Apodorwa | 7 | 46.7 | 7 | 46.7 | 1 | 6.7 | 15 | 100 |
| Kiigya | 43 | 45.7 | 32 | 34.0 | 19 | 20.2 | 94 | 100 |
| Mboira | 41 | 44.6 | 38 | 41.3 | 13 | 14.1 | 92 | 100 |
| Nyakabale | 10 | 38.5 | 6 | 23.1 | 10 | 38.5 | 26 | 100 |

| | | | | | | | | |
|----------------|------------|-------------|-----------|-------------|-----------|-------------|------------|------------|
| Overall | 101 | 44.5 | 83 | 36.6 | 43 | 18.9 | 227 | 100 |
|----------------|------------|-------------|-----------|-------------|-----------|-------------|------------|------------|

Implications: In all the village communities. Gender socialization is a cultural norm and practices, where girls and boys, women and men learn social roles based on their sex, which leads to different behaviors and creates differing expectations and attitudes by gender. This done by all major socialization agents namely at family, community, school, religion, media. The effect of the gender socialization is that it creates gender stereotypes that are commonly related to water. The most profound one is that girls and women do more household chores, such as cooking and cleaning. It's notable that the project will likely not reverse the above gender socialization processes and gender stereotypes. However, it will contribute to the following:

- Improve access to safe and clean water with sufficient volumes to meet household needs (especially drinking, cooking, washing), hence lessening the burden of water collection in case of frequent shortages.
- Reduce the burden of moving long distances to collect water.
- Provide a reliable and year-round service supply of water even during peak hours, days, and seasons.
- Provide quality clean and safe water, with no contaminants that exposes women, men, boys and girls to diseases and illnesses.
- Improved levels sanitation and hygiene (household and personal hygiene)

5.4.22.2 ACCESS, CONTROL AND OWNERSHIP OF RESOURCES

A gender access, control and benefits profile (**Table 5-51**) was used during a meeting with women group in Apodorwa. Findings showed that land is mainly controlled by men, though with equal access and benefits for all family members (women, men and children).

Household Assets: In some households, women also have control and ownership over land. During village meeting at Mboira trading centre, it was confirmed that some women acquire, own and control land mainly through direct purchase but not inheritance. It was noted that some women engage in petty trading such as buying and selling food stuffs. The water collection items (e.g. jerry cans, buckets) are accessed by all, controlled majorly by women, children and benefits to all. In terms of common transport means to water source, the men mainly control bicycles, with equal access and utilization to all, as well as benefits. Both men and women have access to money because each of the genders in many household has ability to work, earn, save and/or remittances. However, men have an upper hand over money than women.

Community Resources: In terms of community resources, the deep boreholes and PSPs are mainly controlled by both men and women who compose the water user committees. An example is the water user committee for Apodorwa Mini Water Supply system that has a composition of 50% women and 50% men as shown in Fig.31.. All genders have equal access and utilization for roads (see Fig, 30), open surface water points (e.g. River Apodorwa). Both women and men equally participated in the construction of Nyakabale-Apodorwa-Kigumba road under the OPM/DRDIP Program. Both women and men were part of the community project management committee (CPMC), Community Procurement Committee (CPC), Community and community

monitoring (CMC). However, decisions on repair and maintenance of road, boreholes and mini water system are majorly done by Local Governments dominated by men.

Table 5-51: Access, Control and Benefits Profile for water related household assets and community resources at Apodorwa Trading centre

| Household assets / Resource | Access & Utilisation | | | | Control & Ownership | | | | Benefits | | | |
|---|----------------------|-------|------|-------|---------------------|-------|------|-------|----------|-------|------|-------|
| | Men | Women | Boys | Girls | Men | Women | Boys | Girls | Men | Women | Boys | Girls |
| Land | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Water collection items e.g. jerry cans, buckets | ✓ | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Household Utensils e.g. cups, plates | ✓ | ✓ | ✓ | ✓ | ✓ | ✓✓ | | | ✓ | ✓ | ✓ | ✓ |
| Bicycles | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Money | ✓ | ✓ | ✓ | | ✓✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Radio | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Solar lights | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Electricity | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Boreholes | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓✓ | | | ✓ | ✓ | ✓ | ✓ |
| PSPs | ✓ | ✓ | ✓ | ✓ | ✓✓ | ✓✓ | | | ✓ | ✓ | ✓ | ✓ |
| Open surface water – River Apodorwa | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ |
| Roads | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ |

Note: There are no water tanks in the area



Figure 5-82: Girls, women and men using Nyakabale-Apodorwa-Kigumba Road

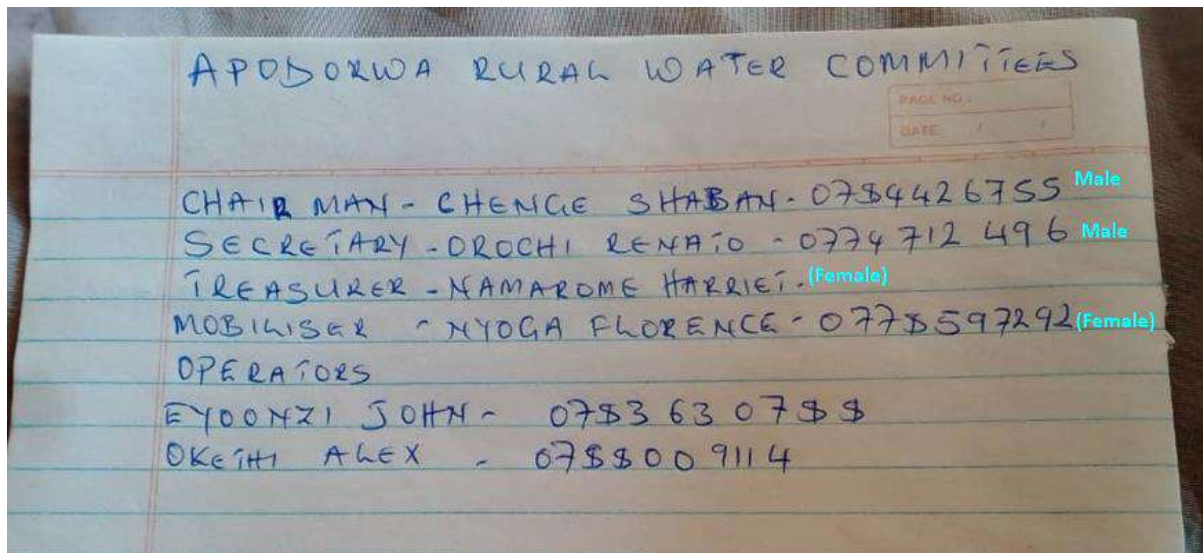


Figure 5-83: Water User Committee for Apodorwa Mini Water System (4 PSPs)

Implications: Household assets are a major poverty and wealth indicator in many of the communities, and in this case, they have direct influence on the level of access and utilisation of piped water. It's clear that wealth household will have more assets, hence ability to afford household connections unlike the poor households with few assets. The nature of access, control and ownership is generally the same among both poor and rich households often based on cultural norms that prioritize patriarchal hierarchical relationships. However, the project will make significant contributions as outlined below;

- The gender needs are taken into consideration. Firstly, the Practical Gender Needs (PGNs) will be enhanced. These PGNs encompass needs required to maximise benefit of development opportunities as well as overcome constraints. In this case, the project will contribute to enhancing PGNs by; a) improving access to water clean and safe water (availability, quantity, quality, affordability, reliability); b) increasing access to sanitation facilities (public toilets; hand-washing); c) contribute to reduction of burden of water related diseases hence lowering morbidity and household expenditures; d) provide employment opportunities. However, concerns of menstrual health should be included into design of public toilets.
- Secondly, the project also considers Strategic Gender Needs (SGNs). These encompass the requirements of women and men to improve their position or status, by enabling all genders to have control over their lives beyond socially-defined restrictive roles. In this case, the project will contribute to enhancing SGNs by; a) provide equal access to community assets such as water source points (PSPs, public toilets); b) equal participation in project related decision making such as project design (Feasibility, ESIA, RAP) and future project events such as disclosure meetings, ground breaking, commissioning, utility operations; c) benefit from any available skills transfer opportunities. It's advisable that the both the contractor and utility operator gives priority to women and female youth, men and male youth.
- There are vulnerable and marginalised groups with in Nyakabale RGC whose needs and interests need to be critically given attention such as the orphans and vulnerable children (OVC), people with disabilities (PWDs), older persons.

- The project shall ensure repair and maintenance of water supply infrastructures especially repair of broken pipes and taps.
- The water connection charges for household connections will have to be affordable, as well as the tariff.

5.4.22.3 VULNERABLE & MARGINALISED INDIVIDUALS AND GROUPS

From lessons learnt, it's critical to have commitment towards enhancing development opportunities specifically for disadvantaged or vulnerable and marginalized individuals or groups. In similar way, there is also need to have commitment against prejudice and discrimination of the same categories of people. According to the World Bank, a vulnerable individual or group is a population that has some specific characteristics that make it at higher risk of falling into poverty and constrained from maximising benefits of development opportunities than others living in areas targeted by a given project. The ESIA assessed the various categories of vulnerable and marginalised individual and groups using survey questionnaires, KII, FGD, document review, direct observations and photography.

Findings obtained during the FGD with women and youth groups in Kikunya and Apodorwa villages indicated that the most vulnerable and marginalised individuals and groups who may not maximally benefit from piped water supply include majorly Poorest of the poor households (HHs) such as child headed HHs, female headed HHs and older person headed HHs.

A reviews of UBOS 2014 Census data for Kiryandongo district (old Kiigya and Mboira parishes) revealed that the number of child headed HHs are 0.5% (26); female headed HHs are 18.7% (1,022) and ; older person headed are 22.7% (802). This gives a total of 1,850 HHs representing a mean / average of 14% as shown in **Table 5-52**. However, the data obtained from UBOS Census Report does not classify these households either poor or not poor. It therefore recommended that any report on poverty study (classification) be provided by UBOS. Therefore, a survey findings give an insight on the degree of poverty (income levels) for sampled female and older persons headed HHs but not child headed HHs (because none was encountered).

Table 5-52: Vulnerable & Marginalized individuals & groups in Nyakabale RGC

| Vulnerable & Marginalized individuals & groups (UBOS Census, 2014) | Number | Percent % |
|---|------------------|-----------------------------|
| Child Headed HHs | 26 | 0.5% |
| Female Headed HHS | 1,022 | 18.7% |
| Older Person Headed | 802 | 22.7% |
| Total | 1,850 HHs | Mean / Average = 14% |

Survey findings in **Table 5-53** indicate the opinions of respondents on whether the project will be helpful to vulnerable individuals and groups namely poor households headed by children, women, disabled, older persons within Nyakabale RGC. The data show a higher proportion of 64.3% respondents who YES-Highly that poor women headed HHs will benefit; 56.4% for poor child headed HHs; 40.1% for poor older persons HHs; and 37.4% for poor PWDs headed HHs. Further consultations with local leaders revealed that there is small proportion of these vulnerable groups

more so child headed and PWD headed HHs. It was further noted that poorest vulnerable HHs are clearly earmarked and excepted from paying monthly fees at Apodorwa Mini Water System (4 PSPs). In addition, findings indicate that the project may not be so much helpful (as shown in **Table 5-53**) for poor PWD headed HHs with 62.6% saying YES; 59.9% for poor older persons HHs; 43.7% for poor child headed HHs and 35.7% for women headed HHs. The major underlying reason is related to inability to afford water (lack / limited disposable income to buy water daily or even pay monthly fees).

Table 5-53: Opinion on how project will be useful to vulnerable groups

| Survey Question per category of vulnerable HHs | Yes- Highly | | Yes, but not so much | | Total | |
|--|-------------|-------|----------------------|-------|-------|------|
| | Freq | % | Freq | % | Freq | % |
| In your opinion, do you think the piped water supply project will be helpful to poor households headed by People with Disabilities (PWDs) in your area? | 85 | 37.4% | 142 | 62.6% | 227 | 100% |
| In your opinion, do you think the piped water supply project will be helpful to poor households headed by Older Persons above 65 years in your area? | 91 | 40.1% | 136 | 59.9% | 227 | 100% |
| In your opinion, do you think the piped water supply project will be helpful to Poor Child Headed Households (OVCs) in your area? | 128 | 56.4% | 99 | 43.6% | 227 | 100% |
| In your opinion, do you think the piped water supply project will be helpful to poor households headed by Women in your area? | 146 | 64.3% | 81 | 35.7% | 227 | 100 |

Implications:

- The project will enhance human rights, child rights, older persons rights, disability right and women rights. For instance, it increases the potential for vulnerable persons to take advantage of project benefits such as a) jobs for women, PWD, older persons but not children; b) access to public services (providing safe water source points); c) access to information during disclosure and consultation process in a meaningful way.
- There is likely to be no discrimination of the vulnerable and marginalized individuals that violates the legal frameworks during construction and operation phases.. It notable that child labour is prohibited, so orphans and vulnerable children (OVC) will be protected.
- The project has mechanisms of minimizing vulnerabilities resulting from loss of property (land, crops, fruit trees) and displacement due to construction activities (distribution lines, easement, transmission lines, water source, toilets). These mechanism involves compensation (refer to RAP Report).
- Accessibility to safe and clean water will be improved. However, the accessing ‘free’ services by selected vulnerable HHS that collect water from Apodorwa mini water system may not be altered by the project.
- It may not be possible to offer ‘free water’ to vulnerable persons by the utility operator.

5.4.22.4 GENDER BASED VIOLENCE (SGBV)BV

Gender Based Violence (GBV) refers to :”Any act that result in a bodily, psychological, sexual and economic harm to somebody just because they are female or male (MoGLSD, 2017). In view of this the ESIA assess the baseline condition in regard to GBV. The findings were obtained through survey questionnaire, KII, FGD and document review.

5.4.22.4.1 PREVALENCE OF GBV (VICTIMS)

A review of GBV Register (2021-2022) revealed that there are 274 reported SGBV incidents (victims) in Nyakabale RGC representing 15.8% (274 out of 1,735) of the total number of reported GBV incidents in whole of Kiryandongo district. By category, 18.5% (151) were Physical Assault; 16.7% rape; 14% Psychological Abuse; 13.9% sexual assaults; 13% Defilement; 13% Denial of Resources, opportunities & services; 7.7% child marriage as shown in **Table 5-54** and **Figure 5-84** below. further to this, a review of Kiryandongo HMIS2 data indicate that there were 3 OPD cases handled between year 2020 and 2021 at Kiigya HC II (Kiryandongo DHO/HMIS2, 2020-2021).

Table 5-54: Prevalence of GBV in Nyakabale RGC

| Reported GBV Incidents | Nyakabale RGC | | District Wide | |
|---|---------------|--------------|---------------|-------------|
| | Number | % | Number | % |
| Child Marriage | 1 | 7.7% | 13 | 0.7% |
| Defilement | 44 | 13% | 338 | 19.5% |
| Denial of Resources, opportunities & services | 24 | 13% | 184 | 10.6% |
| Forced Marriage | 0 | 0% | 1 | 0.1% |
| Physical Assault | 151 | 18.5% | 816 | 47% |
| Psychological Abuse | 34 | 14% | 243 | 14% |
| Rape | 3 | 16.7% | 18 | 1% |
| Sexual assaults | 17 | 13.9% | 122 | 7% |
| Grand Total | 274 | 15.8% | 1,735 | 100% |

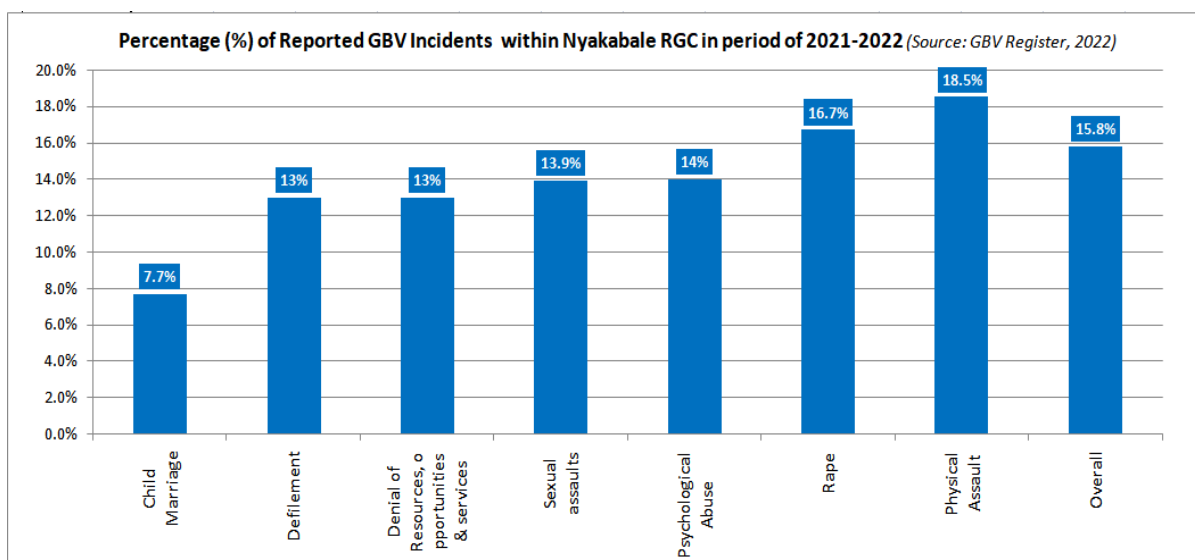


Figure 5-84: Prevalence of GBV in Nyakabale RGC

5.4.22.4.2 PERPETRATOR – VICTIM RELATIONSHIP

In terms of relationships, 42.4% (86 out of 203) of the perpetrators are not related with the victim; 36.9% (75 out of 203) are current partners; 6.4% (13 out of 203) are fathers to the victim; 6.4% (13 out of 203) are neighbours; , 3% (6 out of 203) are former partners; 1% (2 out of 203) are sons, brothers, teachers and local council members respectively as shown in **Figure 5-85**.

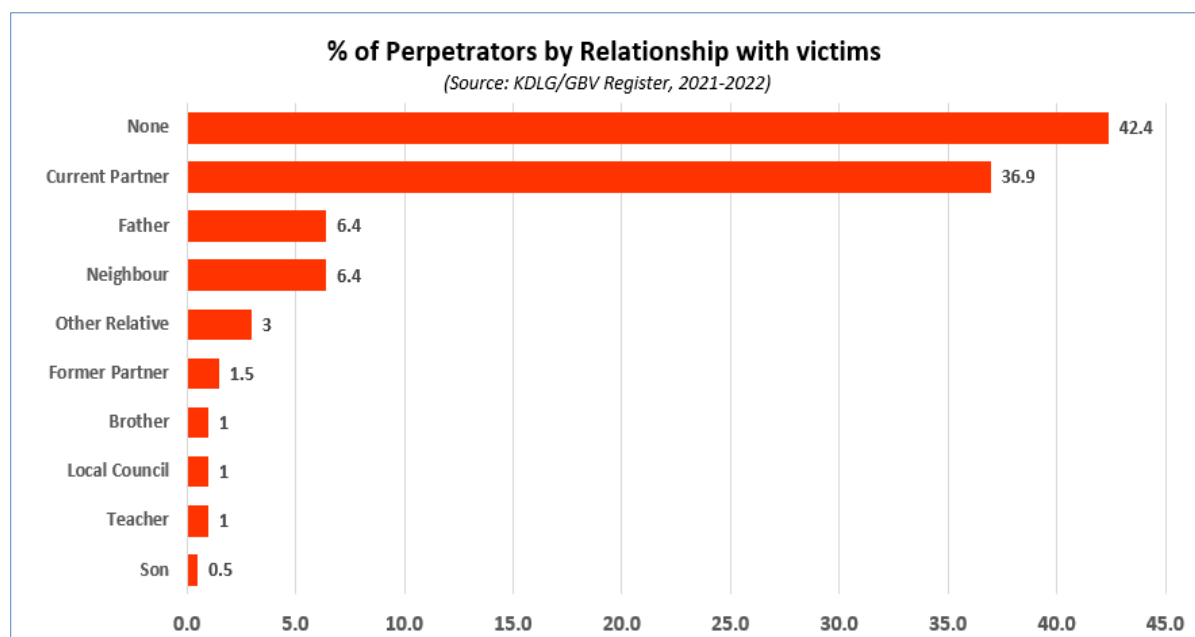


Figure 5-85: Perpetrators by Relationship with victims

5.4.22.4.3 GBV REFERRAL PATHWAYS

In terms of referral pathways, 51.2% (104 out of 203) GBV incidents were handled by police; 40.9% (83 out of 203) by health centres; 3.4% (7 out of 203) by community activist; 3% by GBV Shelters; 1.5% by District Probation office as shown in **Table 5-55** and **Figure 5-86**.

Table 5-55: GBV Incidents Handled by Referral Pathways

| Referral Pathway | Community Activist | | GBV Shelter | | Health Centre | | Police | | Probation Office | | Total | |
|---|--------------------|-------------|-------------|-----------|---------------|--------------|------------|--------------|------------------|-------------|------------|-------------|
| | N | % | N | % | N | % | N | % | N | % | N | % |
| Child Marriage | 0 | 0 | 0 | 0 | 1 | 100% | 0 | 0 | 0 | 0 | 1 | 100% |
| Defilement | 0 | 0 | 0 | 0 | 21 | 0 | 11 | 0 | 0 | 0 | 0 | 0 |
| Denial of Resources, opportunities & services | 3 | 18.8% | 0 | 0 | 0 | 0 | 11 | 68.8% | 2 | 12.5% | 16 | 100% |
| Physical Assault | 1 | 0.9% | 4 | 3.7% | 47 | 43.1% | 56 | 51.4% | 1 | 0.9% | 109 | 100% |
| Psychological Abuse | 3 | 10.3 | 0 | 0 | 2 | 6.9% | 24 | 82.8% | 0 | 0 | 29 | 100% |
| Rape | 0 | 0 | 0 | 0 | 2 | 100% | 0 | 0 | 0 | 0 | 2 | 100% |
| Sexual assaults | 0 | 0 | 2 | 14.3% | 10 | 71.4% | 2 | 14.3% | 0 | 0 | 14 | 100% |
| Overall | 7 | 3.4% | 6 | 3% | 83 | 40.9% | 104 | 51.2% | 3 | 1.5% | 203 | 100% |

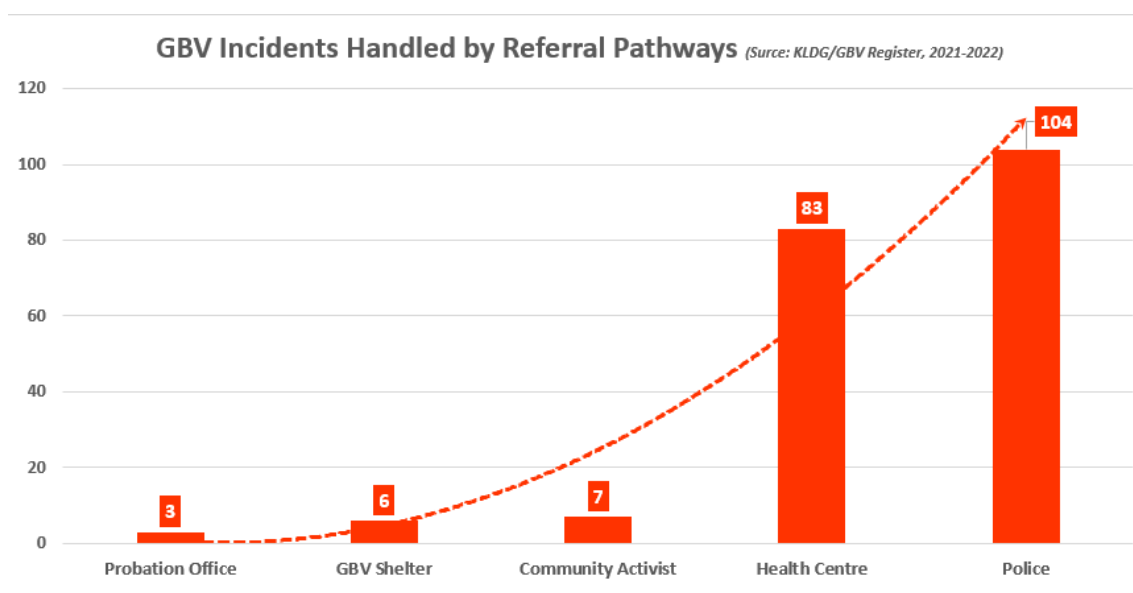


Figure 5-86: GBV Incidents Handled by Referral Pathways

5.4.22.4 VIOLENCE AGAINST WOMEN AND GIRLS (VAWG)

In terms of violence against women and girls (VAWG), there are 2.7% (4 out of 148) incidents related to Intimate partner Violence (IPV) and 94.6% (140 out of 148) were physical assaults against girls within school going age bracket (5-17 years) as shown in **Table 5-56** below.

Table 5-56: Violence against Women & Girls (VAWG)

| Violence Against Women & Girls (VAWG) | Number | Percent |
|--|--------|---------|
| Intimate Partner Violence (IPV) | 4 | 2.7% |
| <i>Against women</i> | 4 | 2.7% |
| <i>Against men</i> | 0 | 0% |
| Physical assaults on girls aged 5-17 years | 140 | 94.6% |

| | | |
|----------------|------------|-------------|
| Overall | 148 | 100% |
|----------------|------------|-------------|

5.4.22.4.5 VIOLENCE AGAINST CHILDREN (VAC)

There are reported incidents of VAC against and among children and adolescents up to the age of 18 years as shown in **Table 5-57** below

Table 5-57: VAC incidents against children below 18 years

| VAC incidents against children below 18 years | Number | Percent % |
|--|---------------|------------------|
| Child marriage | 1 | 1.7% |
| Defilement | 32 | 55.2% |
| Denial of Resources, opportunities & services | 5 | 8.6% |
| Physical Assault | 15 | 25.9% |
| Psychological Abuse | 5 | 8.6% |

5.4.22.5 CHILD LABOUR

A 2019 study conducted by Community Driven network (CODNET ⁷) Uganda revealed that that 8.6% of the children in Kiryandongo district are hired by different employees to do the tobacco related activities while 59.3% of the children work to supplement on their family income. During community meeting with local leaders, youth and women in Kikunya, Kikoba and Apodorwa villages, it was revealed that that the common child labour conditions are related to tobacco farming leading to school drop outs. The LC 3 Mboira Sub County sated clearly that ***“Previously, child labour was more prevalent in Nyakabale parish because there was no single school. Children would keep in tobacco related activities. However, a new school has been constructed there, and children are getting to school”***, said Mr Jean Mike, LC 3 Chairperson of Mboira Sub County Local Government.

5.4.22.6 SEXUAL EXPLOITATION AND ABUSE (SEA) AND SEXUAL HARASSMENT (SH)

By definition, sexual exploitation and abuse (SEA) occurs against a beneficiary or member of the community while sexual harassment (SH) occurs between personnel / staff and involves any unwelcome sexual advance or unwanted verbal or physical conduct of a sexual nature (MoGLSD, 2018). A review of GBV Register (2021-2022) revealed that there are 90.9% (10 out of 11) incidents of sexual assault and threats (SEA) as shown in **Table 5-58** below. There was no available data on sexual harassment (SH) at time of ESIA was conducted.

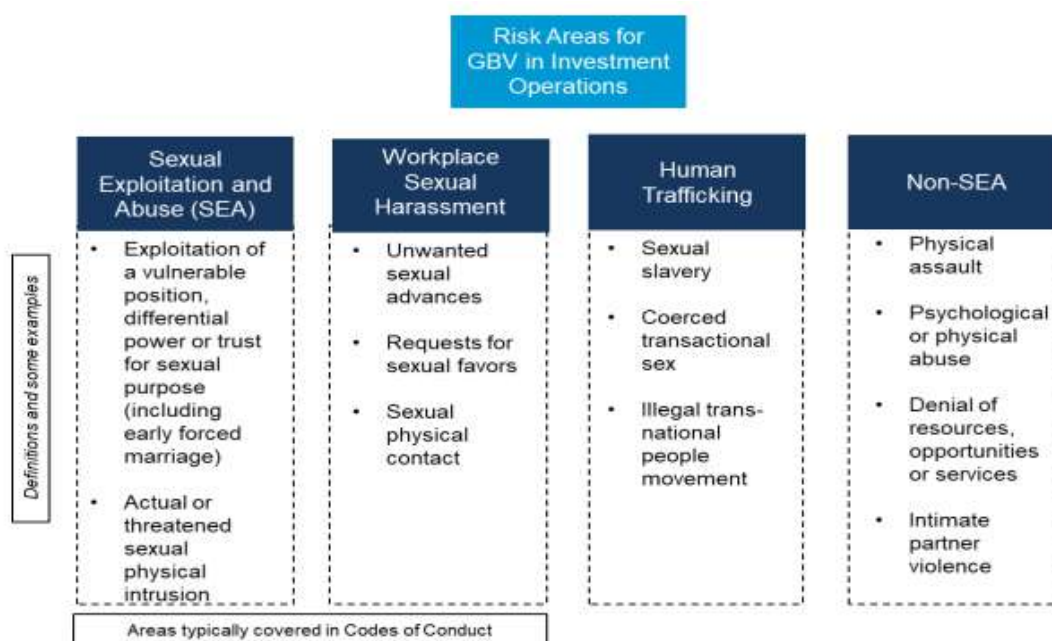
Table 5-58: Incidents of Sexual Exploitation and Abuse (SEA) in Nyakabale RGC

| SEA Incidents | Number | % |
|---------------------------|---------------|----------|
| Sexual assaults & threats | 10 | 90.9% |

⁷<https://kkcr.urdt.net/2019/12/17/masindikiryandongo-districts-grapples-with-child-labor-in-tobacco-growing-areas-report/>

| | | |
|-----------------------------|-----------|-------------|
| Early Forced Marriage | 1 | 9.1% |
| Unwanted sexual advances | No data | |
| Requests for sexual favors | No data | |
| Sexual physical contact | No data | |
| Workplace sexual harassment | No data | |
| Overall | 11 | 100% |

It should be noted that there uncounted incidents of early forced marriages which are not reported due to cultural taboos especially among the Alurs, Kebu & Lugbara in Mboira Sub county. The LC 3 Chairperson of Mboira SC emphasised that ***“The Alurs, Kebu and Lugbara are the majority ethnic group in Mboira sub county. In their culture, marrying a young girl below 17 years is regarded as a fortune. There are many cases that happen and people take it for granted”***, said Mr Jean Mike, LC 3 Chairperson of Mboira Sub County Local Government.



Implications of GBV, Child Labour, VAC, VAWG, SEA & SH

It's notable that to a large extent, the project will have positive influence on GBV, child labour, VAC, VAWG, SEA and SH. However, there is need to ensure effective environment and social safeguards against the GBV, Child Labour, VAC, VAWG, SEA & SH throughout the project phases. The appropriate mitigation measures include:

- Issuing zero tolerance on child labour policy among contractors and along supply chains such as construction materials (sand, gravel, timber, among others)
- Develop and implement comprehensive ESMP by both developer and contractors.
- Issue codes of conduct to workers
- Organise tool box meeting
- Disseminate GBV/SEA/SH Referral pathways
- Establish GRM committees

6 STAKEHOLDER CONSULTATION AND ENGAGEMENT

6.1 INTRODUCTION

This section of the report presents the objectives, process, and the outcomes of the stakeholder involvement in the process of this ESIA. Emphasis has been placed on a fully inclusive, open and transparent public participation process and the transfer of information regarding the proposed construction of Large Solar Powered Piped Water Supply Systems and Sanitation Facilities in Refugee Settlement and Host Communities of Kiryandongo District to interested and affected persons (I&APs). The provision of sufficient and useful information on an on-going basis to I&APs to allow them to participate in the project and offer comments is a cornerstone of this Environmental Assessment process.

The ESIA process started with a scoping exercise aimed identifying relevant issues to form focus of the ESIA study and refine the terms of reference provided by the project proponent. This chapter presents the results of stakeholder engagement activities undertaken during October 2021 for the scoping stage and for the final ESIA during November 2021 and January 2022.

6.2 OBJECTIVES OF CONSULTATION AND DISCLOSURE

Relevant and adequate project information were provided to stakeholders to enable them to understand project risks, impacts and opportunities. Consultation targeted relevant stakeholders, communities, government ministries, surrounding business/commercial entities and aimed at:

- 1) Generate a good understanding of the project.
- 2) Understand and characterize potential environmental, socio-economic risks/impacts of the project.
- 3) Developing effective mitigation measures and management plans.
- 4) Enhance local benefits from the proposed project.
- 5) Enable affected communities to provide views hence participating in or refining project design, where applicable.

6.3 STANDARDS FOR CONSULTATION

The public consultation was guided by Ugandan guidelines as well as World Bank policy guidelines summarized in Box below.

Although no regulations exist for public consultation, national guidelines for EIA in Uganda require that the public is given full opportunity for involvement and participation throughout the EIA process. People including individuals, or groups of local communities who may be directly affected by a proposed project should be a focus for public involvement.

Since identification of the “public” likely to be indirectly affected by the proposed activity is often more difficult, it is required to exercise care in deciding who participates to ensure that a fair and balanced representation of views is obtained, and views of minority groups are not overshadowed by more influential members of the public.

The public may appropriately be involved in the EIA process through:

- *Informing them about the proposed project.*
- *Open public meetings on the projects.*
- *Inviting written comments on proposed project.*

- *Use of community representatives.*
- *Comment and review of the Environmental Impact Statements; and,*
- *Making relevant documents available to any interested members of the public in specified places or at the cost of reproduction.*

Three stages for public involvement in the EIA process are spelt out:

a) public consultation before EIA is done

If after receiving and screening/reviewing the developer's project brief, the Authority (NEMA), in consultation with the Lead Agency, decides that it is necessary to consult and seek public comment, it shall, within four weeks from submission of the project brief and/or notice of intent to develop, publish the developer's notification and other supporting documents or their summary in a public media. It is required that objections and comments from the public and other stakeholders shall be submitted to the Authority and to the Lead Agency within 21 days from the publication of notice.

b) public consultation during the EIA

The team conducting the EIA shall consult and seek public opinion/views on social and environmental aspects of the project. Such public involvement shall be during scoping and any other appropriate stages during the conduct of the study.

c) public consultation after EIA (EIA Review)

The EIS shall be a public document and may be inspected at any reasonable time by any person. Considering the scale and level of influences likely to result from the operation of a project, the Authority, in consultation with the Lead agency, shall decide regions where it is necessary to display the EIA report to the public.

World Bank Safeguard Policy: Stakeholder Engagement and Information Disclosure

The Policy recognizes the importance of open and transparent engagement with project stakeholders. Success of any project is hinged on level and quality of stakeholder engagement which is an inclusive process expected to occur throughout the project life cycle., consultations should be done in a manner (culturally appropriate) that gives affected communities, opportunities to express their views on project risks and impacts and their mitigation measures.

In applying Policy, the following scope is envisaged:

- ❖ **Stakeholder identification and analysis:** The Policy requires the identification of key project affected parties and those with interests in the project. At this level emphasis will be on vulnerable people or groups of people whose situation are likely to be accelerated by project implementation. Identification should be able to bring out different sets of affected people and their interests.
- ❖ **Information Disclosure:** The borrower is obliged to undertake timely and effective disclosure of information regarding the project including its purpose, nature, scale, potential risks and impacts on the local communities and further present possible mitigation measures.
- ❖ **Meaningful:** Consultation is meaningful if a dialogue exists, communities and individuals should be given an opportunity to interact with respect and dignity. Interactions should be based on prior disclosure of project relevant information to all parties.

6.4 PROCEEDINGS OF STAKEHOLDER CONSULTATIONS

The emerging issues that were recorded through consultations have been detailed in the following subsections.

6.4.1 CONSULTATIONS WITH KIRYANDONGO DISTRICT LOCAL GOVERNMENT TECHNICAL TEAM (ACAO, DWO, DEO)


| | | |
|--|---|--|
| Date | 21st October 2021 | |
| Means of Engagement | Meeting at DLG Headquarters | |
| Contacts | Attendance List attached in Annex4 | |
| QUESTION | Key Issues and Concerns Raised | RESPONSE |
| <p><i>What is the current situation on water, sanitation and hygiene among community? What are existing gaps in accessing piped water supply? Who is most affected? Who benefits from current situation? How will project benefit water vendors?</i></p> | <p>The water coverage in district is at 70%, which is fairly good. However, in Kiryandongo refugee settlement, water coverage stands at 52%; 65% in Bweyale Town Council.</p> <p>There is some conflict over water sources in some parts especially between cattle keepers and land owners.</p> <p>The most affected area is Mutunda Sub County</p> <p>There are some water vendors especially in trading center but the number is no known.</p> <p>There is noticeable open defecation</p> <p>There is only 1 public toilet at Aduku open market in Mutunda SC</p> | <p>The project will support refugees</p> <p>Conflict resolution is very key in this project.</p> |
| <p><i>What are the existing piped water supply projects? Where are pipes located? How can we obtain the GPS Coordinates / Shape files on water systems in this area to enable proper</i></p> | <p>There are few piped water systems, namely – NWSC in Kigumba TC Bweyale TC, Kiryandongo Refugee Settlement, Kitwara mini-solar piped system</p> <p>The GPS coordinates for piped system can be obtained from NWSC, though they don't share any planning documents with DLG.</p> <p>WSDF asked for application but few were taken.</p> | Noted |

| | | |
|--|--|---|
| <i>laying and trenching?</i> | | |
| <i>How can the project contribute to inclusive economic growth and reduction of vulnerabilities among community?</i> | <p>The project is very welcome. However, the culture of paying water bills is not yet favorable.</p> <p>There is need for sensitization about proper user behaviors</p> <p>All the multiethnic communities will benefit both directly and indirectly</p> <p>It will reduce gender-based vulnerabilities especially child pregnancies among girls.</p> | <p>Noted</p> <p>The ESIA will assess further</p> |
| <i>What are the Environmental and Social Risks and Impacts of the project? How can they be enhanced and/or mitigated? What role can different stakeholders play?</i> | <p>Climate change is a big threat to the project</p> <p>There are many land conflicts, and hopefully the project should not trigger any land conflict. There is need to ensure proper compensation.</p> <p>There is misinformation as regards compensation</p> <p>The information disclosure is totally inadequate because even us the DLG are not fully aware on how the project will operate, when it will start.</p> <p>The involvement of DWO is so limited, and as a matter of fact, you the ESIA team are the first to come here for a detailed discussion. No one has ever done that.</p> <p>There is need for an inception workshop</p> <p>There is low funding for NRM, environment and climate change adaptation and mitigation actions</p> <p>OPM (DRDIP, NUSAF3) have helped in promoting environmental protection. However, there is still a big gap.</p> | <p>Noted</p> <p>Noted. The RAP team will advise on that</p> |

6.4.2 CONSULTATIONS WITH LOCAL LEADERS AND TECHNICAL OFFICERS OF KIGUMBA / MBOIRA SUB COUNTY LOCAL GOVERNMENT

| | | |
|---|--|--|
| Date | 18 th November 2021 | |
| Means of Engagement | Meeting & Brainstorming | |
| Contacts | Attendance list attached in annex4 | |
| QUESTION | Key Issues and Concerns Raised | RESPONSE |
| What is the current situation on water, sanitation and hygiene within Kigumba / Mboira sub counties? | <p>There are several safe water and unsafe water sources such as protected boreholes, protected shallow wells and protected springs. The unsafe water sources include unprotected wells and ponds. There are several swamps in the Sub-county. There is River Tiiti and a valley tank in Kigya Parish.</p> <p>The entire sub county relies on boreholes, shallow wells and protected wells while residents neighbouring the Victoria Nile,</p> | <p>Noted</p> <p>Noted. The new water system will</p> |

| | | |
|---|---|--|
| | <p>uses it as source of domestic water for household consumption.</p> <p>However, there is inadequate safe water. The most hit are parishes which are not blessed with potential sites for shallow wells in the entire sub county. As a result of increased population especially displaced persons, low household incomes, lack of environmental awareness and poor farming practices. There is an increase of charcoal burning and bush and over exploitation of wetlands.</p> <p>There is inadequate safe drinking water. Women and children of the sub county walk between 1-3km looking for water.</p> <p>There are weak and unskilled water user committees.</p> <p>There is lack of funds to maintain the water sources especially those which need major repairs.</p> <p>There is poor financial support for water boards and committees</p> <p>Poor soils limiting the construction of latrine.</p> <p>We have Insufficient for health assistants and CDO limiting the number of field visits.</p> <p>There is poor community response of water user co-funding.</p> | <p>not cover entire area, but some selected villages</p> <p>Charcoal burning affects water aquifers, but the SPP will be developed and implementation done jointly</p> |
| <p><i>What are other socio-economic development challenges facing the communities?</i></p> | <p>Poor access roads which are worse during rainy season. Some pregnant mothers end up delivering from the way to the health centres.</p> <p>The Sub- County has got many internally displaced people (IDPs) especially from the North. This has made the population of the Sub- County go high leading to competition for social services and hence deteriorated service delivery.</p> <p>The health services of the sub county are in adequate due to the increasing population being served by the only four health centres. Pregnant mothers walk long distances of 6 - 12km to access medical facilities. Inadequate staffing and drugs is yet a serious issue under the sector.</p> | <p>Noted</p> <p>The project is aimed to serve refugee hosting areas of which the sub county is part.</p> |
| <p><i>What are the environment and social risks that can arise?</i></p> | <p>There is high demand for firewood and charcoal</p> <p>The Environment of Kigumba is faced with threat of Environmental Degradation since a big section of the population is engaged in charcoal burning. This has left most of the sub county without trees as the charcoal burners have even resorted to cutting down even the young trees for them to earn a living.</p> <p>The community in Kigumba does not have access to electricity as yet therefore paraffin, firewood and charcoal is the principal source of power.</p> <p>Energy saving cooking stove is used by some few individuals however, most households use traditional three stone stoves.</p> | <p>Noted</p> <p>We request for the District Environment Report and also the Sub County Development Plan</p> |

| | | |
|--|---|---|
| | <p>Environmental degradation is increasing in due to demand for land for cultivation, forcing people to go to wetlands and forests.</p> <p>The major source of income of the people is smallholder farming both food and cash crops, Market vending, Local beer brewing, Charcoal burning, Small scale shop keeping and Food vending and eating houses</p> <p>There is low uptake of climate smart farming practices.</p> <p>Poor farming methods hence inadequate food security and low household incomes which impacts most on women and children.</p> <p>The majority of the populations rely on firewood.</p> | |
| <p>What can be done to mitigate the environmental threats?</p> | <p>There is need for environmental protection, restoration and conservations in some parts of that are covered with tall grasses and shrubs. It has got some hilly and sloping areas. It has got Kaduku hills in Kiigya Parish. There is Murchison Conservation area in Mboira and Kigumba I Parishes with green vegetation coverage.</p> <p>There is an initiative called Green Charcoal Project which plans of distributing trees seedlings to farmers.</p> | <p>We shall refer to the District Development plan to understand the projected budget estimate on environment</p> |
|  <p style="text-align: center;">GISO Kigumba Sub County</p> | | |



LC 3 Chairperson of Mboira Sub County



LC 1 Chairperson – Mboira village



Visit at proposed site for public toilet

6.4.3 CONSULTATION WITH LCI CHAIRPERSONS AND COUNCILORS IN MBOIRA SUBCOUNTY

| | |
|---|--|
| Date | 12 th November 2021 |
| Means of Engagement | Meeting |
| Contacts | Attendance list attached in annex4 |
| Key Issues and Concerns Raised | Response |
| Endeavor to use durable solar panels as the systems in Apodorwa are not functioning to full capacity due to deterioration of the solar panels | Quality assurance for the project will be ensure by the appointed supervising engineer. |
| The system in Apodorwa has faced challenges with the land owner who at times shuts it off until the water user committee makes payment to him. Will the project buy the land where the sources are going to be located? | A RAP is being undertaken in which land to be purchased in line with project implementation will be established, surveyed and compensation procedures put forward. |
| Will the project include planting of trees to protect the environment? | Yes, as part of the restoration activities after construction as well as part of the source protection plan |
| Could a waterborne toilet be considered for the public and institutional facilities since the water will be available? | The public sanitation facilities are waterborne while the institutional facilities are line VIPs. However, future availability of water will be put into consideration when conducting a sanitation needs assessment by the district officials |
| Who will be responsible for the operation and maintenance of the water supply project? | Currently the NUWS is the envisaged operator for the water supply project. |

| | |
|---|---|
| The project should ensure that the cost of water is affordable for the population since the majority are low-income earners. | Affordability will be put into consideration when coming up with the cost of water. |
| Karukove LCI in Apodorwa Parish should also be considered in the water supply project as water scarcity is dominant in the area | Well noted. |



6.4.4 CONSULTATIONS WITH EMERGENCY SERVICES

| | | |
|----------------------------|---|---|
| Date | 11 th November 2021 | |
| Means of Engagement | Key informant interview | |
| Stakeholder | Questions Asked | RESPONSE |
| Kiryandongo CPS | <ol style="list-style-type: none"> 1. Do you do community policing? 2. Do you have a fire station? 3. Do you have enough staff? 4. Do you have enough resources to provide security during project execution? | <ol style="list-style-type: none"> 1. Perform community policing to persuade community members not to purchase items stolen from contractor 2. No fire station and depend on Kinyara Sugar Works fire station 3. Have only one patrol pick-up 4. Government gives fuel but it is not enough to finish the months. |
| Kiryandongo Hospital | <ol style="list-style-type: none"> 1. Do you have an emergency unit? 2. Do you have a functioning ambulance? 3. Do you have functioning equipment? 4. Hours of operation 5. Theatre | <ol style="list-style-type: none"> 1. Have an emergency unit 2. Have one ambulance 3. Have enough equipment though some need replacement 4. Operates 24 hours a day 5. Have a theatre |

| | | |
|---------------------------|---|---|
| Apodorwa Police outpost | <ol style="list-style-type: none"> 1. Do you have enough staff? 2. How do you respond to fire? 3. Do you have enough resources? | <ol style="list-style-type: none"> 1. No firefighting equipment 2. No accommodation 3. No patrol pickup truck 4. No enough staff |
| Apodorwa Health Centre II | <ol style="list-style-type: none"> 1. Services provided 2. Do you have a functioning ambulance? 3. Hours of operation 4. Theatre 5. Number of staffs | <ol style="list-style-type: none"> 1. Antenatal, VCT, Laboratory tests, treatment of sicknesses like malaria, etc. 2. No ambulances 3. First Aid services 4. No theatre 5. No emergency unit 6. No enough supplies like iodine, gloves, painkillers or emergency kits |

6.4.5 CONSULTATIONS WITH WOMEN LEADERS AND WOMEN GROUPS

| | | |
|--|---|---|
| Date | 19 th November 2021 | |
| Means of Engagement | Meeting | |
| Contacts | Attendance list attached in annex4 | |
| QUESTION | Key Issues and Concerns Raised | RESPONSE |
| <i>What are the major concerns of women in this area regarding water, sanitation and hygiene?</i> | <p>There is high demand for accessible clean safe and plenty water required for mainly domestic use, and or commercial purposes.</p> <p>There is increasing congestion at the existing boreholes.</p> <p>Violence against women and children due lack of water in homes.</p> <p>It was revealed that the community have developed negative bias towards underground piped water.</p> <p>There are no water vendors</p> <p>Women and children spend a lot of time whole collecting safe drinking water.</p> <p>Men spend most of their in-leisure activities such as drinking, watching football and video. This prompts them to spend a lot money on the unproductive ventures.</p> | <p>The project is intended to benefit women, children and all categories of people. However, if water is near to homes, the burden to collect water reduces mainly among women and men.</p> |
| <i>Are there other concerns of women and children?</i> | <p>Women do donkey work at their homes but are denied control of family resource. This has led to family disunity and conflict in some families.</p> <p>Some people's savings per year is too small.</p> <p>Some school going children have failed to attain good education.</p> <p>Poor diets and nutrition</p> | <p>The project may offer direct and indirect jobs for women and youth.</p> <p>Some schools may access piped water at fee.</p> |

| | | |
|--|---|-------|
| | <p>Some people especially girls get married while they are below 18 years of age. Covid19 lockdown has caused more harm especially underage child pregnancies, early marriages, etc. The results for these marriages are bearing so many children, polygamy, separation, child neglect, high mortality rates among others.</p> <p>Low access and control of family resource of family resource by women and youth</p> <p>Inadequate staffing at sub county yet dominated by men</p> <p>Heavy workload of the women hindering their participation in development activities and programmes.</p> <p>Women have inadequate access and control of family and community resources in the sub county.</p> <p>The majority of women in the sub county move to buy and sell produce and food in different markets. The poor access road affects them badly.</p> <p>Women in the sub county are more engaged in the following socio-economic activities of petty trading, micro finance fund borrowing, and agriculture while men are engaged in brick making, farming, trading, bodaboda, charcoal production and selling. Household items of less value are owned by women while men own the most valuable items.</p> <p>Few women attend meetings due to the community culture and tradition. Youths in the sub county are mainly involved in unproductive ventures like watching videos, playing cards, mweso however few are providing transportation services, farming and brick making.</p> | Noted |
| <i>What ca be done to mitigate the above?</i> | <p>Training of LECs shall provide skills and knowledge for sustainable environment / natural resource management and utilization to both men and women in the LEC.</p> <p>Setting demonstration will help save firewood thus reduce effects of tree destruction for firewood.</p> <p>Provide PSP in many villages</p> | Noted |



6.4.6 CONSULTATIONS AMONG YOUTH IN KIZIBU TRADING CENTER & KIKOBA VILLAGE

| | | |
|---|--|-----------------|
| Date | 18 th November 2021 | |
| Means of Engagement | Meeting | |
| Contacts | Attendance list attached in annex4 | |
| QUESTION | Key Issues and Concerns Raised | RESPONSE |
| <i>What is the current situation on water, sanitation and</i> | There is a remarkable increasing population growth in the area unemployment is high | Noted |


| | | |
|---|---|---|
| <p><i>hygiene among community?</i></p> | <p>Water scarcity is high, with limited water sources Violence against women and children due lack of water in homes. There are few water vendors latrine coverage is very low</p> | <p>The project will create direct and indirect jobs. The ESIA team wishes to meet some water vendors if they are available.</p> |
| <p><i>What are the existing piped water supply projects? Where are pipes located?</i></p> | <p>There is no existing water system</p> | <p>Noted</p> |
| <p><i>What other major problems are existing among community? What conflicts have been caused by water demands?</i></p> | <p>There is high demand for wood fuel coupled with limited coverage in ownership / access / utilization of energy saving stoves, and other technologies such as briquettes. There are some water related conflicts. There is some fighting that takes place at boreholes, especially due to congestion at peak hours The long lines causes disorder, disagreement on who to collect first, hence fighting</p> | <p>Noted There is need to use energy saving stoves for firewood (rocket Lorena type)</p> |
| <p><i>How is solid waste managed in the host and refugee settlement?</i></p> | <p>The common method used is open dumping and burning. There is some open defecation especially by children</p> | <p>Noted</p> |
| <p><i>What are the anticipated benefits of the new water project? Who will benefit more?</i></p> | <p>The project will reduce water scarcity; Promote micro irrigation Youth will get jobs especially casual labor Good access to safe and clean water. However, we are told that our Kizibu area is not covered by distribution pipes? Why? This should be rectified because the water source lies within our area.</p> | <p>There is no objection to someone who wishes to use piped water for irrigation. The only limitation will be the cost of tariff YES, Kizibu is not mapped as beneficiary area according to the preliminary design. However, the ESIA report will advise on the alternative to provide water connection to the area.</p> |
| <p><i>What are the Environmental and</i></p> | <p>The communities have cut down trees The water level may reduce</p> | <p>Noted</p> |

| | | |
|---|---|---|
| <i>Social Risks and Impacts of the project?</i> | The trenching may affect our business especially the dust in dry season, or even mud in rainy season Roads may be affected yet not repaired Employment opportunities | |
| <i>How can the project enhance employment creation and income generation?</i> | There will be casual labour for trenching There will be indirect employment opportunities such as accommodation, restaurants / eating points, selling of refreshments (e.g. sodas, water), alcohol selling, cigarettes, groceries, among others. Micro irrigation may arise | Jobs will be offered by contractors |
| <i>How can construction of water distribution networks affect Community Health and Safety of community? How can it be mitigated? Who can be involved?</i> | The major risk are road accidents since many cars pass along this road | Noted Contractor will be guided on how to manage |
| <i>What categories of stakeholders can be useful in construction of water distribution system?</i> | From the inception of this particular project, community participation should be highly encouraged by involving local council leaders, youth, bodaboda riders, representatives of PWDs, women representative, youth councilors, religious leaders, leaders of cultural sites, children and women leaders; land owners | All relevant stakeholders have to be consulted |
| <i>In your opinion, what is the main source of energy at your home / place of work (used for cooking and lighting)?</i> | Kalwala residents mainly use firewood in non-improved energy stoves. Solar power is the dominant source lighting energy, followed by the use re-chargeable lamps with very few using candles and kerosene. | Noted |





6.4.7 CONSULTATIONS WITH LAND OWNERS IN KIKUNYA & KIKOBA VILLAGES

| | | |
|--|--|---|
| Date | 20 th November 2021 | |
| Means of Engagement | Meeting & Brainstorming | |
| Contacts | Attendance list attached in annex4 | |
| Question | Key Issues and Concerns Raised | RESPONSE |
| <p><i>Question 2</i></p> <p><i>What are your major concerns regarding the piped water project?</i></p> | <p>We are aware of the piped water project that will pick water from Kikunya village (land owner – Byansi Godfrey), and Kikoba village (land owner – Okuta Charles Wilfred)</p> <p>We prefer good compensation in cash, that is transparent and meaningful</p> <p>In case of any relocation of property, we shall be able to do so if compensated.</p> <p>The pipe network that may affect the graveyard at Kikoba water source can be diverted to pass 10 meters above the graveyard. The land owner suggested like that.</p> | <p>YES, the second source is located at Kikunya</p> <p>Just want to confirm the site location, assess it's characteristics and offer advise on how to proceed.</p> <p>Also want to seek an opinion from you the land owner.</p> <p>The RAP team will handle related matters on valuation and compensation</p> |
|  | | |



TO: THE ENG. OLWENY
LAMU,

THE MINISTRY OF WATER
AND ENVIRONMENT
P.O. BOX 20026
KAMPALA - UGANDA

PAGE NO.:
DATE: / /

LC1 CHAIRPERSON
KIKUNYA VILLAGE
KIKUNYA VILLAGE PARISH
NYAKABALE PARISH
MBOIRA SUB-COUNTY
KIRYANDONGO DISTRICT
Date: 20/11/2021

Re: Request for water Connection in Kikunya
village

We the people of Kikunya we have
learnt that the source of water is in our
village, but the distribution line is not
coming back to our village to help us
access it to our families and business

We therefore request you to change
the design of the distribution pipes so
that we can enjoy the water and
our neighbours along Kulooba valley
as we go to Kulooba trading Centre

I will be happy if my request
is considered

Yours in Service
M

MUSINGURI
Chairperson LC1 KIKUNYA

Cont: 0778705466
0701238756

LC1 CHAIRPERSON
KIKUNYA VILLAGE
NYAKABALE PARISH
MBOIRA SUB-COUNTY
KIRYANDONGO DISTRICT
Date: 20/11/2021

cc. District water officer, Kiryandongo DLG
cc. LC3 Chairperson - Mboira Sub County
cc. SAS Mboira Sub County

Figure 6-1: A Letter from Kikunya village hosting source but without domestic connections

6.4.8 CONSULTATION WITH DEPARTMENT OF REFUGEES, OFFICE OF THE PRIME MINISTER

| | |
|---|------------------------------------|
| Date | 22 nd March 2022 |
| Means of Engagement | Meeting |
| Contacts | Attendance list attached in annex4 |
| Key Issues and Concerns Raised | RESPONSE |
| The Kiryandongo refugee settlement land is government-owned. Therefore, any compensation activities may consider crops or structures encountered but not land. | Noted |
| There are no host communities found inside the designated refugee settlement. | Noted |
| Refugees should be considered for employment as laborers on the project since they hah the right to work in Uganda. | Noted |
| Ensure that no child (refugee or from host community) is employed on the project. Structures should be put in place for safeguards implementation. | Noted |
| Conflict for water in the area has mainly been recorded amongst refugees than against or within the host community. Therefore, the project should be mindful of this. | Noted |



6.4.9 CONSULTATION WITH UGANDA NATIONAL ROADS AUTHORITY

| | | |
|---|------------------------------------|-----------------|
| Date | 25 th March 2022 | |
| Means of Engagement | Meeting | |
| Contacts | Attendance list attached in annex4 | |
| Key Issues and Concerns Raised | | Response |
| Kigumba – Masindi Road is a newly constructed project, therefore consultations with UNRA by the design consultant and contractor should be undertaken before any cross points are made. | | Noted |
| MWE and NWSC need to interface with and provide the water network development master plan and envisaged requirements for the planned networks for decisions to be made collectively. | | Noted |
| The design team should submit their typical road crossings and typical valve design so that these can be synchronised with UNRA’s requirements when designing and constructing roads i.e. putting into consideration the size crossing ducts and structurally sound concrete class. | | Noted |
| UNRA’s policy for utilizing the road reserve should be followed by MWE the project developer. | | Noted |
| There should be agreements for utility owners/operators to contribute to the funds required when creating the road reserve, otherwise UNRA bears all the cost, which burden would be eased with contribution from other users of the UNRA ROW. | | Noted |
| MWE and the design consultant need to liaise with UNRA about future road construction project especially bridges in whose close proximity, water abstraction points would be vulnerable to pollution during the construction phase. | | Noted |
| Swamp crossing with anchors should ensure not to block the flow from culverts or trap moving debris which may result in flooding. | | Noted |



6.4.10 CONSULTATION WITH MINISTRY OF LABOUR GENDER AND SOCIAL DEVELOPMENT

| | | |
|---|------------------------------------|---|
| Date | 17 th May 2022 | |
| Means of Engagement | Meeting | |
| Contacts | Attendance list attached in annex4 | |
| Key Issues and Concerns Raised | | Response |
| For water supply system issues, land will have to be secured especially for the case of ground water (at abstraction and reservoir areas) and along transmission mains. Consent forms from local leaders and other concerned authorities on land ownership should be availed to address the issues of land ownership. | | Noted |
| The contractor should construct sanitation facilities to cater for labour force to be employed different from public toilets planned for the communities. | | Noted |
| Site layout plans and architectural designs for solar powered piped water system and all that is entailed therein, should be submitted to MoGLSD Geotechnical survey/ study reports on bearing ratio to hold the pipes should be submitted. | | Noted. The Consultant is going to share accordingly |
| During trenching, the sites should be hoarded off with clear signage. | | Noted |
| A traffic management plan should be in place to control the contractors fleet. Like wise, driver competency, vehicle maintenance schedules should at all times be assessed and safe operating distances from the road addressed (50m for borrow pits and 15-20m for transmission mains). Traffic control through signage / flagmen and diversions should be done with the aid of Police and other concerned stakeholders. | | Noted |
| Dust and noise pollution and emanating from the project should be addressed. | | Noted |
| All permits, licences and certification from concerned ministries and authorities such as the Directorate of water resources management, should be acquired. | | Noted |
| Hydrogeological studies should be done in relation to ground water and sanitation facilities in order to prevent contamination of the underground aquifers. | | Noted |
| The design lifespan of the sanitary facilities should be based on the target population and consequently size of the septic tank. | | Noted |
| Health and Safety during construction should be observed. Risk assessments should be carried out, mitigation measures put in place and explained for | | Noted |

| | |
|---|-------|
| <p>preparedness of the community and workers. Personal Protective equipment should be provided based on the risk assessed.</p> <p>Emergency preparedness should be in place, emergency contacts displayed to know whom to contact e.g., Red cross has Ambulances to attend to emergencies on road accidents. There should be internal preparedness in case of emergencies.</p> <p>Firefighting mechanisms especially in camps e.g., Assembly points, fire extinguishers and smoking places should be designated.</p> | |
| <p>Welfare provision based on gender ranging from accommodation and sanitation facilities should be observed.</p> | Noted |
| <p>The employment policy of the country should be followed; contracts, payment mechanisms, appointment letters should be in place. All employees should have written documentation of their contracts (explaining their salary/ wage, time-off duty etc.)</p> <p>Children should not be employed by the project.</p> <p>The contractor should be gender sensitive during the recruitment exercise to foster gender equality. And when employing, some percentage should be from the local people as part of ownership and sustainability of the project.</p> <p>The employees should have a pre-employment medical examination to determine among others their mental capabilities before engagement.</p> | Noted |
| <p>HIV/AIDs services should be extended to the employees especially during the construction phase.</p> | Noted |
| <p>The vulnerable groups should be accounted for especially in the design of sanitary facilities.</p> | Noted |
| <p>Restore the sites after construction through revegetation and tree planting.</p> | Noted |
| <p>The redress mechanism plans should be in place to address challenges among workers, workers to community. A committee should be formed therein having natives of the area especially LC chairperson to bridge the gap between workers and community.</p> | Noted |



7 ANALYSIS OF ALTERNATIVES

This section presents the analysis of alternatives done to maximize environmental and social safety. Alternatives can take on several forms including technological options, project site options, transportation options, labour sources and type and others. This ESIA considered analysis of the various feasible alternatives of the project under different scenarios to identify and describe the potential feasible alternatives that would allow the project to reach its objectives. It also presents a comparison of the potential alternatives on the basis of several factors which can influence the choice of alternatives to be considered by a Developer i.e. technical, economic, environmental and social criteria, as well as of public views and concerns. The comparison of alternative was done to evaluate and address the design alternatives that were examined and proposed during the feasibility and pre-design study of the proposed project. Therefore, according to the 2011 EIA Guidelines for water resources related projects, the following alternatives/options were considered:

- Site Location and Design Alternatives;
- Technology Selection Alternatives; and
- Project or No Project Alternative.

7.1 SITING AND DESIGN ALTERNATIVES

7.1.1 WATER SOURCE ALTERNATIVES

7.1.1.1 WATER SOURCES

Two water source options were envisaged for the Nyakabale water supply system, the surface water source (Victoria Nile) and the ground water sources (drilled boreholes).

The Victoria Nile is the most viable source in terms of volume, however, it would require an intake structure, a conventional water treatment plant and a transmission system of over 24Km (closest access point from river to Nyakabale). The development of a water source based on Victoria Nile would make economic sense if a regional water supply system say Kiryandongo water supply system was being developed for all the towns in the District. This water source option was not further assessed due to the prohibitive costs.

Therefore, the proposed water source for the Nyakabale RGC piped water supply system is boreholes. The maximum day demand (MDD) for the Nyakabale RGC piped water supply system is 588.29 m³/day in the Ultimate Year 2043. The proposed boreholes DWD 77383 and DWD 77382 yield 10.0m³/hr and 34.0m³/hr have estimated abstraction yields of the boreholes are 10.0m³/hr and 30.0m³/hr for a 16-hr pumping regime, respectively, which meets the MDD of Ultimate Year 2043.

7.1.2 WATER TRANSMISSION SYSTEM

From the 2 borehole water sources, water could also be conveyed to a storage reservoir in one pumping transmission main from a sump.

The transmission system from the boreholes to the Sump will then involve:

1. Borehole DWD 77383 will be fitted with a submersible pump with a flow of 10.0m³/hr. at 110m head with a borehole riser pipe of DN 65 Steel PN16, 100m long and transmission main of HDPE- OD 75 PN10, 360m long.
2. Borehole DWD 77382 will be fitted with a submersible pump with a flow of 30.0m³/hr. at 164m head with a borehole riser pipe of DN 100 Steel PN16, 120m long and transmission main of uPVC- OD 110 PN10, 2,560m long.

The Booster Station will be located in Kikoba village. The boreholes will deliver water to a sump (reinforced concrete collection chamber) and water will be pumped to the Storage Reservoir. The capacity of the Sump is 60m³. The Booster Station will have 2No. horizontal centrifugal pumps (1No. duty and 1No. standby) with a flow of 40.0m³/hr. at 125m; and transmission main of uPVC- OD 160 PN16, 5,093m long.

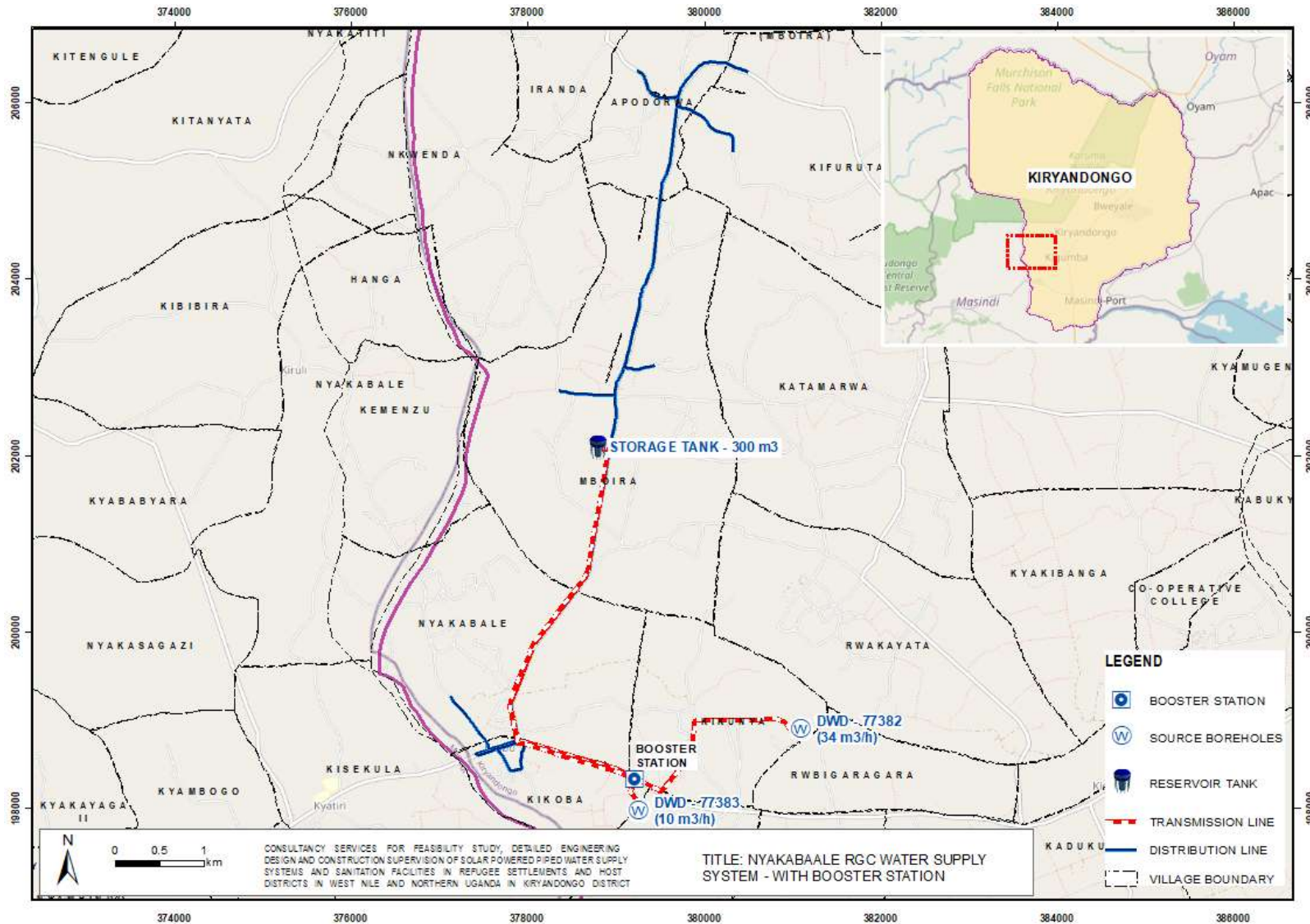


Figure 7-1: Alternative transmission system layout using a sump

The project is planned to be implemented in 2 phases, with Phase I involving the development of the borehole source DWD 73882, transmission pumping mains, storage reservoir and distribution network. Additional infrastructure will include the water office, chemical house and sanitation facilities. Phase II will involve the development of the borehole source DWD 73883 and transmission pumping mains to the reservoir. In order to meet the projected water demand in the area, the completion of Phase II is planned for the year 2033. Given the time duration between the implementation of the 2 phases, this option was not chosen.

7.2 TECHNOLOGY SELECTION ALTERNATIVES

7.2.1 WATER TREATMENT PROCESS TECHNOLOGY

The type of treatment operation performed and the treatment chemicals used depend largely on the contaminants present in the source water (EPA, 2011). An analysis of water samples collected from existing boreholes in the project area indicated satisfactory water quality for drinking for both physiochemical and bacteriological quality (**Section 5.2.8**). To ensure the adherence to Uganda Drinking Water Standards disinfection was integrated in the water supply system inform of a chlorine dosing unit at the reservoir. The following is the analysis of the key technologies that could be adopted in disinfection process.

7.2.1.1 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 7-1** 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, 1999). Thus, UV has not been analysed for the project.

According to Table 7-1, ozone, the most efficient disinfectant but not a persistent disinfectant, thus from the health aspect, unsafe water consumption can occur in case of recontamination along transmission/distribution lines and reservoirs. Environmentally, it is difficult to fulfil the legal limit for the formation of bromate during the process of ozonation, thus most water treatment processes 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. Therefore, Chlorine which is a persistent chemical (used locally) was selected as a disinfectant.

Table 7-1: Technology analysis of disinfection types

| Criteria | Disinfectant | | | |
|---------------------------------|---|---|---|---|
| | Chlorine | Chloramines | Chlorine dioxide | Ozone |
| Persistence | 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 byproducts 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 byproducts 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. |

7.2.2 ALTERNATIVE SANITATION SYSTEMS

There are many types of sanitation systems used in the country, each with numerous variations. Selection of the variant to be used is dependent on income which determines water consumption patterns. High income residents in medium or high-income group housing may be served by off-site sanitation and septic tanks but the majority rely on onsite sanitation technologies. The following section discusses the onsite options for the project.

7.2.2.1 PIT LATRINE

A pit latrine is one of the most common and simple forms of excreta disposal. Pit latrines consist of a slab over a pit which may be from 2 m to 12 m in depth depending on soil suitability and owner preference. Slabs should be firmly supported on all sides and raised above the surrounding ground to prevent surface water ingress. If the sides of the pit are liable to collapse, they can be lined – particularly if it is proposed to empty them in the future. A squat hole in the slab or (less often) a seat is provided so that the excreta fall directly into the pit. These facilities are deficient as they produce odour and attract flies and mosquitos. Additionally, there are chances of ground water contamination from pits which do not have a proper lining.

7.2.2.2 VENTILATED IMPROVED PIT LATRINE (VIP LATRINE)

Similar construction to the simple pit latrine but in order to reduce the fly and odour nuisance the pit is ventilated using a pipe extending from the pit to above the latrine roof with fly proof netting across the top. Furthermore, the inside of the superstructure should be kept dark although vents are provided to enable fresh air to flow into the latrine through the pit and out of the vent. These facilities too pose a great risk of contaminating ground water when not properly lined.

7.2.2.3 ECOLOGICAL SANITATION (ECO-SAN) TOILET

Ecological Sanitation (or “Eco-San”) is the name given to a group of latrine types the common feature of which is that human excreta is treated as a resource. Human excreta are processed on site and then, if necessary, further processed off site until they are completely free of disease organisms. The nutrients contained in the excreta are then recycled by using them in agriculture.

There are three ways to recover the resources in urine - diversion, separation and combined processing.

- Diversion is when urine is diverted away from faeces - they are never mixed with each other and the faeces are dehydrated.
- Separation is when urine and faeces are initially mixed together then separated from each other for re-use.
- Combined Processing is when urine and faeces are mixed together, processed together and their resource value is captured together.

Based on experience in other parts of the country the most common form of Eco-San is the urine diversion type.

As Eco-Sans do not require a pit they can therefore be cheaper and more suitable than pit latrines in areas of the Town where pit excavation is difficult; e.g. areas with poor soils, high groundwater or rocky ground.

The cost of an Ecosan toilet is high compare to pit latrines, its operation & maintenance requires additives while its proper use requires behavioural change to maintain sanitation of excreta.

7.2.2.4 SEPTIC TANKS

A septic tank is an underground watertight settling chamber into which raw sewage is delivered through a pipe from plumbing fixtures inside a house or other building. The sewage is partially treated in the tank by separation of solids to form sludge and scum. Effluent from the tank infiltrates into the ground through drains or a soak pit. The system works well providing:

- The soil is permeable and not liable to flooding or water-logging;
- The sludge is removed at appropriate intervals to ensure that it does not occupy too great a proportion of the tank capacity.

In Uganda, the predominant type is reported to be a two-chamber tank for water closet waste only (waste water goes to a separate pit) which is a reasonably efficient arrangement.

7.2.2.5 VAULTS AND CESSPITS

Watertight tanks called vaults are built under or close to latrines to store excreta until they are removed by hand or vacuum tanker. Similarly, household sewage may be stored in large tanks called cesspits, which are usually emptied by vacuum tankers.

Vaults or cesspits can be emptied when they are nearly full or on a regular basis. They can be cheaper than sewerage especially if waste water is disposed of separately. This form of on-site sanitation is not available in the Town.

Given the need for periodic emptying of the vaults and cesspits, this option was not chosen due to the high cost of maintenance and low potential for faecal sludge treatment in the project area as described in **Section 7.2.2.6** below.

7.2.2.6 FAECAL SLUDGE DISPOSAL

When the sanitation facilities are filled up, they have to be emptied and faecal sludge disposed of. This sludge is to be disposed somewhere and according to the Ministry of Water and Environment (National faecal sludge assessment for small towns, 2013). The Ministry proposed that faecal sludge treatment plants should be constructed in selected towns with in the country. The towns under WSDf-C that were considered were ranked and Clustered. From the National faecal sludge assessment for small towns report, 2013, Kiryandongo town was clustered under the Kigumba area. Gaspa RGC being located in Kiryandongo subcounty is also a potential source for Faecal sludge.

There is no faecal sludge treatment facility in Kiryandongo District. The nearest faecal sludge treatment facility is located in Masindi Town (86km), Gulu Town (98km) and Lira Town (101km). There is a faecal sludge treatment facility under construction in Nakasongola. It will be located approximately 162km away.

African Development Bank through the African Water Facility and Government of Uganda are funding a study for the development of the Faecal Sludge Management Facility in Kigumba with the catchment areas being Kigumba, Bweyale, Kiryandongo and Katulikire. This study is being undertaken through the Urban Water and Sewerage Services Department of the Ministry of Water and Environment.

Currently there is one privately owned cesspool emptier in Kiryandongo District. The cesspool emptier has a capacity of only 4m³. There is high demand for the services and the limiting capacity of the emptier, coupled with the haulage distances, has reportedly resulted in poor disposal of the faecal sludge in swamps.



Figure 7-2: 4m³ Cesspool Emptier in Bweyale Town

Due to the long haulage distance, the faecal sludge is sometimes disposed of at the waste stabilization ponds located in Kiryandongo Hospital in Kiryandongo Town Council. The Hospital limits the volume of faecal sludge that is disposed of at the treatment facility hence illegal dumping of waste is carried out in the maturation pond, resulting in poor treatment of waste.

Given the limited access and capacity of the faecal sludge treatment plants and the low haulage potential in the area, a lot of financial and human resources would be required to build the system to cover the RGC population efficiently. This option has a high risk of resulting in pollution of the environment and was therefore not chosen.



Figure 7-3: Waste Stabilization Ponds at Kiryandongo Hospital

A combination of lined VIP latrines for institutional sanitation facilities and septic tank systems for public sanitation facilities were chosen. The VIP latrines were chosen due to their low cost, easy to construct and maintain features. Additionally, they have odour and vector control features that would minimise the health risk from the sanitation facilities. Due to the numerous users in the institutions such as pupils/ students in schools, this option also presents one with minimal water requirements i.e. mainly for hand washing and cleaning the facilities. The septic tank system was chosen for the public sanitation facilities as the locations are along the planned water distribution lines and also due to the presence of population in growing trading centres with capacity to pay a user fee to cater for maintenance of the facilities.

7.3 THE “NO PROJECT” ALTERNATIVE PROJECT JUSTIFICATION

7.3.1 KEY BENEFITS OF THE “NO PROJECT” OPTION

- i. The water resource potential of the proposed ground water sources 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 source facilities 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; and
- v. The health risks associated with handling of harmful water treatment chemicals would be avoided.

7.3.2 KEY BENEFITS OF IMPROVED WATER SUPPLY IF PROJECT IS IMPLEMENTED

- i. Easy access to potable water within homesteads at various levels – stand posts, yard taps and house connections;
- ii. Reduction in incidences of diarrheal and other water borne diseases; this leads to reduction in mortality and morbidity, especially of children;
- iii. Improvement in hygiene and sanitation from increased use of hand washing, personal hygiene and environmental sanitation;
- iv. 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;
- v. Reduction in domestic violence and abuse of women as people in the homestead compete for the little potable water;
- vi. 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;
- vii. Possibility of improving the quality of life of refugee, IDPS and the poor neighbourhoods in the RGCs where the most vulnerable people live. The project will offer pro-poor preferential tariffs to these communities;
- viii. Cleaner and more conducive environment for activities in the RGC such as sports, markets, public places, etc.;
- ix. 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;
- x. Increased revenue to the local authority and the country in general through the collection of taxes.

7.3.3 KEY BENEFITS OF IMPROVED SANITATION FACILITIES IF PROJECT IS IMPLEMENTED

- ix. Reduced incidences of diarrheal and other water borne diseases; this leads directly to lower rates of mortality and morbidity, especially of children;
- x. 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;
- xi. Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
- xii. 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;
- xiii. Increased revenue to the local authority and the country in general through the collection of taxes.

7.3.4 CONCLUSION ON THE 'NO PROJECT' OPTION

Kiryandongo District is an ever-growing district both innately from the increasing resident population and the inflow of refugee and IDPs to the district, thus the urgent need of a sustainable water supply system and sanitation facilities. The existing 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 a major refugee and IDP hosting district in the country. 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 Kiryandongo Water Supply and Sanitation Project.

8 ENVIRONMENTAL AND SOCIAL IMPACT ANALYSIS, ENHANCEMENT AND MITIGATION MEASURES

One of the key components of an ESIA is to identify and analyse impacts (both positive and negative), for the various project phases, on physical/chemical, biological and socio-economic environments. This section presents the identified impacts and analysis for the pre-construction, construction and operation phases of the project. The project developer (MWE) will be required to develop a comprehensive decommissioning plan before the decommissioning exercise, analysing the impacts of project decommissioning, which will be submitted to NEMA for review and approval.

8.1 POSITIVE IMPACTS

8.1.1 PRE-CONSTRUCTION PHASE

8.1.1.1 SOCIAL ACCEPTABILITY, COMMUNITY INVOLVEMENT AND OWNERSHIP OF THE PROJECT

The social license is the level of acceptance or approval by local communities and stakeholders towards the project (World Bank, 2020). The SLO is a key factor in ensuring social accountability, which encompasses a broad range of actions and mechanisms that stakeholders (esp. citizens, beneficiary communities, media, CSO) can use to hold public sector actors (MWE/IWMDP) accountable. Some of the social accountability mechanisms have TO be adhered to by the project hence social license to operate (World Bank, 2014). The level of SLO within beneficiary communities was assessed by benchmarking with key indicators for social accountability. More vividly, there is increasing social inclusion and participation, trust, acceptability of planned project activities. This is a positive pre-construction impact that often enables successful project implementation. Feedback obtained during stakeholder consultations at district, sub county, parish and village levels indicated that there is significantly favourable social license to operate (SLO) by revealing that they are eagerly waiting for the piped water supply project. This is reference to minute on meeting with Mboira Sub County officials. The SLO is a positive impact classified as direct, short, medium, long- term, highly significant, permanent and continuous. The likelihood of occurrence of the is Certain (already happening). The impact magnitude has been assessed as High, because without SLO the project can be adversely affected.

Enhancement measures

- Organise public disclosure of design and other information before, during and after construction, and directly engage the Local government technical staff who are closely in line with the WASH sector namely DHO, DCDO, DLO, CDOs, SAS, Parish Chiefs,
- Ensure meaningful social accountability for such a public investment (piped water supply) by closely monitor service delivery.
- Engage citizen groups in monitoring the project.

8.1.2 CONSTRUCTION PHASE

8.1.2.1 SHORT TERM EMPLOYMENT OPPORTUNITIES FOR LOCAL COMMUNITIES

The project will create direct and indirect employment to local people. The possible direct jobs include community workers (casual labour) and semi-skilled such as trenchers, plumbers, masons, painters, carpenters, mechanics, electricians, mixer operators, steel benders, drivers, community educators, porters, cooks, security guards, etc.). These will be involved in construction works for laying pipes, water towers, sumps, pump stations, among others. There will be additional indirect employment opportunities such as supplier workers, petty business (e.g. food kiosks). This positive impact is classified as direct, short, highly significant, permanent and temporary. The income earned will enhance access to basic needs among the local communities. In order to maximize the above positive social impact, it will be necessary to consider the following enhancement measures.

Enhancement measures

- Involve LC 1 village leaders in identifying casual and semi-skilled workers (Offer Identification / registration forms). However, the contractor has jurisdictions over recruitment process and eligibility requirements.
- Prioritize giving jobs to water vendors to minimize the effect of loss of jobs after commission of this proposed water supply project.
- Where possible, the project should integrate social protection mechanisms such as offering casual jobs to vulnerable and marginalized people using a group model (labour intensive public works) especially women and youth groups, as well as refugees.
- Coordinate with Refugee Welfare Councils (RWCs) on sourcing of labour (casual & semi-skilled e.g. plumbers, masons).
- The labour management procedures will be provided to contractors with guidance from MWE and DLG (Labour Office)

8.1.3 OPERATION PHASE AND MAINTENANCE PHASE

8.1.3.1 IMPROVED / INCREASED ACCESS TO SAFE AND CLEAN WATER WITHIN COMMUNITIES

The project will significantly contribute to achieving global SDG 6 target that aims to 'Ensure access to water and sanitation for all' (UN8, 2021) as well as NDP III target on Water for All. Under increased access to safe water, the project will specifically contribute to the following:

- a) **Improved physical access to safe water points / connections:** The project will construct new portable water access points in Kigumba and Mboira sub counties. It will improve the right to water and sanitation services that are physically accessible within, or in the immediate vicinity of, their households, workplaces, educational and health facilities. It will serve hitherto under-

8 <https://www.un.org/sustainabledevelopment/water-and-sanitation/>

served areas that have been facing water stress and extreme water vulnerabilities in this rural area. The subproject will:

- b) Construct 14.1km distribution network that will improve physical access to clean and safe portable water to beneficiary villages.
- c) Install 200 start-up domestic connections including yard taps.
- d) Install 35 new public stand points (PSPs).
- e) The **walking distance to safe water source will reduce** as per the WHO standard of 100 meters to a water source. The project shall reduce critical walking distance for a hamlet to reach a PSP to less than 2,000m /2km between each PSP. Findings of the WASH survey indicate that, presently 12.3% of households access water in distance of more than 500-1,000 meters. This will be reduced.
- f) **Reduced time to collect water** – At baseline, 6.2% household spend more than 1 hour to collect water from any available source especially deep boreholes. This will be reduced.
- g) Increased reliability of water supply with a 300m³ water reservoir (Cold Pressed Steel Tank Elevated on 10m steel tower), able to supply sufficient volumes of good quality water that meet peak demand, as well as year-round service which is uninterrupted. In this case, the burden of going to water source point early in the morning will reduce, since consumers will be assured of reliable and low-cost water at a 27/7 basis.

Enhancement measures

- Conduct customer education and sensitize water users and communities about operations of new water system, especially on how to access new connections.
- Scale-up the intensification of lines, especially in areas where the trunk mains are too far away for the customers to be able to connect at reasonable cost.
- Ensure effective customer relations and customer care.

8.1.3.2 JOB CREATION FOR WATER VENDORS

Though it's anticipated that the water vendors (in Kikunya / Kizibu trading center) will lose jobs, it's also anticipated that the demand for safe and clean water in non-beneficiary areas may trigger job opportunities for water vendors to sell water to underserved and/or those unable to physically collect from PSPs and yard taps.

Enhancement measures

- Provide affordable tariff for yard taps and PSPs
- Engage water vendors

8.1.3.3 PROVISION OF SUFFICIENT QUANTITIES OF PORTABLE WATER

The project will provide **better sufficient quantities of portable water** for personal and domestic uses for present and future generations by year 2046. More specifically, the project will

- a) Meet the maximum day demand for the Nyakabale RGC piped water supply system of 642m³/day in year 2046 as per feasibility report.

- b) Provide a reservoir (water tower) with storage capacity of 300m³ able to withstand shortages and no rationing.
- c) The distribution system is assumed to operate 24 hours per day. The pumping stations and water treatment plant will however operate for a maximum of 20 hours per day.

Enhancement measures

- Sensitize communities about the benefits of piped water, in order to minimise on the possible misconception and negative attitudes.
- Sensitize communities about importance of safeguarding water infrastructure and other installations, in order to ensure physical security, avoid / minimise vandalism.
- Establish / integrate water treatment system to ensure supply of quality water with acceptable colour, odour and taste free from micro-organisms, chemical substances and radiological hazards.
- Plan for expansion of the reservoir capacity by 50%-100% in case of expanded distribution network and increased population / maximum day demand.

8.1.3.4 IMPROVED PUBLIC HEALTH CONDITIONS AND HEALTH SECURITY

The improved access to safe water will directly influence better human health conditions and health security. In this regard, the project will specifically impact as follows;

- a) Contribute to reduction in incidence and prevalence of water related diseases and illnesses (e.g. Typhoid, diarrhoea, dysentery, bilharzia, gastronomic disorders, malaria, etc) resulting from better access to safe drinking water, sanitation and hygiene. For instance, at baseline, HMIS2 data shows that incidence of water related diseases has been increasing.
- b) Improved on-site supply of water in health care facilities (WinHCF) – The project will improve / increase On-site supplies of clean water in many of health facilities (within all treatment wards and in waiting areas). Nationally, the proportion of health facilities with basic water supply stands at 33% in Uganda (WHO Global Baseline Report, 2019). The UNICEF Joint Monitoring Programme (JMP) indicators on WinHCF show that Uganda ranks highest in terms of ‘Limited’ water at HCF at 65.15% in Sub Saharan Africa. It ranked 6th in terms of having ‘Basic’ water at 30.81% and 10th rank for having ‘No Service’. Within Nyakabale RGC, there is one health facility with piped water (Apodorwa HC II). Therefore, this baseline condition will certainly improve because availability of sustainable water supply is essential to quality of care and infection prevention and control in health care facilities.
- c) Improve living conditions of medical staff at Health facilities – The improved access to on-site supply of water will contribute to better living conditions of medical staff that reside at health facilities. Baseline conditions show that majority fail to access water for their domestic use (e.g. bathing, washing) which in turn affects their work performance.
- d) Improved community sanitation and hygiene – The project will construct one water borne toilet at Nyakabale and Katamarwa trading centre.
- e) Improved menstrual health for women, adolescent girls and female youth - the public toilet will have incinerator for used sanitary pads installed in the female section of the toilet.

- f) Reduced exposure to Covid-19 infections – The improved water access will directly contribute to better responsiveness towards COVID-19 prevention, hence health security. This will be through increase in water availability for hand washing with soap.
- g) Contribute to national health security plan and targets – The piped water project will directly impact on Uganda National Action Plan for Health Security (NAPHS) 2019-2023. The aims at detecting, preventing, responding and mitigating public health hazards and emergencies (such as Cholera, Covid-19, HIV/AIDs, Ebola) that are recurrent health threats for Uganda (MoH/NAPHS⁹, 2019). In this case, Kiryandongo district is regarded as high-risk hotspot due to its high refugee population (mostly South Sudanese), as well influx of Most At Risk Populations (MARPS) that include traders, sexual workers, truck drivers, soldiers, among others. More so, the project it will contribute to NAPHS Objective 4 (Target 12 - Improve infrastructure for water systems, isolation facilities and waste management) and Objective 3: Strengthen the Healthcare-Associated Infection Prevention and Control program).

Enhancement measures

- Provide piped water connections to government health facilities (institutional connection) to all health units in Kigumba and Mboira Sub Counties as part of the intensification lines.
- Adjust eligibility criteria for water connections by including appropriate conditionalities such as having a functional pit latrine, hand washing facility, rubbish pit / gunny bags for waste collection, community sanitation conditions (zero open defecation), among other. This will enable local leaders and potential water users to mobilize and prepare themselves before connection. It should be noted in many parts of Uganda, the water utility managing units such as WSDF/Umbrellas have often verified some of the above hygiene and sanitation conditions before establishing household connections. At the same time, given the rural nature of communities, verifying WASH conditions before any connection if done will enhance public health and safety.
- Provide water tanks to health facilities to enable them store enough water.

8.1.3.5 REDUCTION IN GENDER BASED VIOLENCE (GBV, VAC & VAWG)

Baseline conditions of the project area indicate a prevalence of violence GBV, violence against children (VAC) and violence against women and girls (VAWG). Data showed that 15.8% of the total number of reported GBV incidents in whole of Kiryandongo district happened in Nyakabale RGC between years 2021-2022. There were 13% GBV incidents related to denial of resources, opportunities & services at household level, mostly perpetrated by fathers and current partners. The driving factors are partly linked to water, sanitation and hygiene aspects. Therefore, it's certainly possible that the project will contribute to reduction in GBV incidents through improved accessibility in terms of availability (reduce distance, time), reliability and sufficiency, affordability.

⁹ Uganda National Action Plan for Health Security (NAPHS) 2019-2023

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.
- Provide affordable connection fees and tariff.

8.1.3.6 IMPROVED EDUCATION OUTCOMES DUE TO ACCESS TO SAFE WATER IN SCHOOLS AND EARLY CHILDHOOD DEVELOPMENT CENTERS

The piped water project will contribute to improved education outcomes and targets due to increased access to safe water in schools and Early Childhood Development (ECD) centres within Nyakabale RGC area. The availability of safe and clean water will enhance education outcome at primary and secondary schools. The critical indicators that will be improved include: -

- Reducing the distance to water source from an average distance of between 100 - 500 meters and above, to less than 100 meters.
- Provide sufficient volumes of safe water
- Provide affordable rates for institutional connections
- Provide 2 public toilets at Nyakabale P/S and Kifuruta P/S
- Enhance water storage capacity at schools
- Improve menstrual health conditions for girls and female teachers (water for washing)

The above benefits will certainly have direct influence on education outcomes such as enrolment rate; Attendance, staff welfare, learner & teacher performance, Completion rate, Reduced Absenteeism among learners and teachers; Lower Dropout rate especially for girls, improved functionality of toilet facilities.

Enhancement measures

- Provide intensified lines / piped water connections to all Early Childhood Development centres, primary schools and secondary schools.
- Provide water tanks to enable them store enough water.
- Conduct sensitization on community led total sanitation (CLTS).

8.1.3.7 REDUCED EXTREME WATER VULNERABILITIES AMONG RURAL AND URBAN HOST AND REFUGEE COMMUNITIES

The project will reduce the vulnerability among poor host and IDP/refugee communities within Nyakabale RGC area. There are also sub groups of people who are affected by extreme water vulnerabilities such as children, women, youth, lactating mothers, health and education facilities, urban poor, rural poor, farmers. For instance, 27% of children in Uganda are experiencing high /

extremely high-water vulnerability (UNICEF¹⁰, 2021). The project will contribute to reduction of the extreme water vulnerability as follows:

1. Reduced water scarcity – the average annual water supply availability will be at least above 500 cubic metres per person (WHO Standard).
2. Reduced water stress based on temporal and spatial (geographical determinations) of water sources and users.
3. Improved water security whereby communities will safeguard water access points and water catchments.
4. Improve food security - water access/availability will have dynamic interplay on food security. The project will provide at-least 15 litres/ppp/day which is regarded as “generally food secure / usually adequate” for any household as per Global Integrated Food Security Phase Classification (IPC) classification. It should be noted that water access is a Key Reference Outcomes on human welfare and livelihoods (IPC¹¹, 2008).
5. Reduced exposure to SGBV resulting from inability to afford water; poor personal hygiene; poor household sanitation; sexual violence (e.g. rape & defilement).
6. Reduced exposure to human-livestock-wildlife conflicts caused by accessing open sources such as rivers, lake, streams, ponds.
7. Reduced poverty conditions especially reduction in household expenditure on water among all categories including those below poverty line (less than \$2 a day).
8. Improved climate resilience and adaptive pathways in case of hazards and risks (such as drought, dry spell, pests and diseases, floods) due to availability of piped water among individuals, households, communities and institutions.

Enhancement measures

- Integrate gender mainstreaming in water operations.
- Promote climate resilience and other feasible adaptive pathways among host, IDP/refugee communities such as water storage.
- Ensure continuous stakeholder consultations, information exchange and disclosure

8.1.3.8 RURAL TRANSFORMATION THROUGH IMPROVED LIVING CONDITIONS (RELIABLE AND AFFORDABLE PIPED WATER SUPPLY)

The project will contribute to Improved Quality of Life in line with the national targets stated under the 3rd National Development Plan (NDPIII). More specifically, the Nyakabale RGC piped water system will contribute to the following:

- a. Enhance the social well-being of the population within the RGC in terms of community health (reduced incidence and prevalence of waterborne diseases and conditions

¹⁰ UNICEF Report on Water Security For All 2021

¹¹ Integrated Food Security Phase Classification (IPC) Technical Manual 2008

(meaning adverse effects) on human health, such as death, disability, illness or disorders caused by pathogenic micro-organisms that are transmitted in water.

- b. Transform urban agglomerations from villages, trading centres / hamlets and into suburbs and towns (as categorised under urban sociology). These include Kikoba, Nyakabale, Mboira and Apodorwa.
- c. Strengthen social service infrastructures (health, educational and local administration facilities).
- d. Appreciated value of property.
- e. Boost local trade, leisure and hospitality sub sector.

Enhancement measures

- There is need to improve physical planning of Nyakabale trading centre and other mushrooming ones such as Mboira trading centre.
- Secure funding for sewage systems to handle expected demand for faecal sludge management facility.

8.1.3.9 IMPROVED LOCAL GOVERNANCE AND SOCIAL ACCOUNTABILITY

There will be improved local governance and social accountability between the leaders and communities. The political leaders have been actively involved in lobbying for better water supply systems in Kiryandongo. The new water system will be a tangible deliverable, and will enhance the social accountability between government and the population. At baseline, water is a critical social need that often fronted as political demand.

Enhancement measures

- The operations and maintenance of new water system should be safeguarded from political undertones arising from the discrepancies between those who are connected in phase 1 and ‘those not yet connected’ in phase 2.

8.1.4 PHASE CROSSCUTTING POSITIVE IMPACTS

8.1.4.1 BENEFITS TO THE ECONOMY

The GoU will invest heavily in the construction phase of the proposed project which would involve use of locally available materials. The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water. Furthermore, 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 Kiryandongo District residents.

Enhancement measures

- During the construction phase, conditions should be put in place to ensure contractors prioritise use locally produced materials.

- The water distribution network connections should target SMEs.
- 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 project developer should ensure that engineering designs, architectural drawings and site layout plans for the various project facilities be submitted to the Physical Planning Committee of Kiryandongo District Local Government for review and approval. NUWS, the foreseen operator of key project facilities, should obtain operational licenses from Kiryandongo 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.

8.1.4.2 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. It is anticipated that construction works will be contracted to a reputable Ugandan firm which will employ and train local labour. This will avail an opportunity for skills and knowledge transfer into Kiryandongo community. The operational phase will equally offer skills build-up, particularly for students from institute such as Kiryandongo Technical Institute, Kigumba Business and Vocational Institute and Kigumba Petroleum Institute through internships, with respect to the operation, management and maintenance of the various water supply and sanitation facilities.

Enhancement measures

- The terms of agreement as per the contracts given to the construction works contractor and NUWS for the project's O&M phase should emphasize knowledge transfer and the project developer (MWE) should monitor and ensure that the objectives are met.

8.2 NEGATIVE IMPACTS AND RISKS

8.2.1 CONSTRUCTION PHASE

8.2.1.1 IMPACTS ON LAND USE/COVER

The project mostly traverses farmland under cultivation along with settled and built-up areas. The project developer, MWE, intends to mostly use road reserves of the existing public roads for the transmission and distribution lines which are mainly covered by bushes. However, the water source site, access roads and storage reservoir sites shall be located on private land mainly covered by crop gardens.

Given the current land use/cover of the key project sites as described in **Section 5**, this will be converted as construction of project facilities occurs on the respective sites. The clearing of corridor, movement of equipment and contractor staff and laying of pipes may lead to spot destruction of crops. Excavation works may result into temporary blocking of accesses to social facilities, homes and private properties through cutting, filling, dumping of gravel, heaping of spoil, barricades etc. The practise results into considerable disruption of economic and social activities in the project area and may cause stress and resentment of project activities.

The sensitivity of the receptor will be low considering that the environment is already modified. Since the scale of the activities is short term and limited in extent, the intensity of impact is considered to be 'low'. The overall impact significance is assessed as minor.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- The water transmission line routes should be as much as possible restricted within the road reserves.
- Where land take is envisaged, compensation should be adequate and timely done. All land acquired for establishment of the water sources, reservoir tanks and any other activity either by the developer or contractor shall be compensated for in accordance with land Act and World Bank Environmental and Social Safeguard Policies.
- Sensitize the community early enough about the project so that, those affected by the project will have time to relocate their businesses to secure settings. Prior to the construction phase,

farmers shall be sensitised on the pending project at least 6 months in advance such that cultivation within the project sites/ components' footprint is stopped or reduced.

- As part of the RAP, a comprehensive impact survey is being conducted by experienced valuers in association with the district land board and local leaders. The results of the RAP will indicate all affected crops within the water transmission corridor/way leave, the respective owners and the replacement costs.
- PAPs should be given financial literacy on how to use their compensation packages.
- LGs should be involved in mobilisation and sensitizing PAPs.
- Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads. This will avoid unintended damages to vegetation and crops.
- Upon completion of construction activities, disturbed areas should be restored to as close to pre-project conditions as possible, using native vegetation.
- Put in place a community complaint reporting / GRM as a mechanism for managing feedback, appeal, response and resolution

8.2.1.2 DETERIORATION OF LANDSCAPE AND VISUAL QUALITY

During construction of the Kiryandongo water supply and sanitation project, excavation will be undertaken at the sanitation facility sites, water office and during the levelling of the reservoir site. Further to this, sourcing earth materials which are used for construction works such as murrum and gravel can pose considerable visual and socio-environmental impact if quarry pits are not properly managed or restored. Water impounded in derelict borrow pits forms a breeding ground for mosquitoes or other disease vectors, posing health risks to local communities which is a negative but reversible impact. Furthermore, Excavations and heaping of spoil soil or storage of the construction materials may be un-aesthetic to some people. Because of this, the project may attract resistance and complaints from a section of the affected people which may slow down the project implementation pace.

The potential impact receptors are assigned a low sensitivity, given that projects with similar requirements for earth materials such as road construction and maintenance go on in the area. Since the scale of the activities is short term and limited in extent, the intensity of impact is considered to be 'low'. The overall impact significance is assessed as low.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation Measures

- Murrum and subsoil will be obtained preferentially from a licensed source and in accordance with any terms of the license. “Licensed” means approved by NEMA or the respective Project District Local Governments. The contractor will provide a copy of the license to MWE before the beginning of works at the murrum/subsoil extraction location.
- Surface water run-off will be controlled during earthworks. Surface water features down-slope of the earthworks will be identified, and the necessary berms and drainage channels will be installed to ensure that run-off does not collect or pond in excavated areas or quarries.
- The contractor should utilise the existing approved material extraction sites and where need for new sites arises, the necessary approvals should be acquired from the pertinent Authority such as NEMA and the DLG before commencement of material extraction activities. Further to this, conditions of approval should be adhered to including the decommissioning and restoration conditions.
- Restoration of borrow pits to as close to pre-project conditions as possible will be done immediately after use in cases where they are specifically opened up for this project. Native vegetation must be used for re-seeding the excavated site.
- Excavated soil at the sanitation facility sites and reservoir site shall be heaped, secured with band and covers to control soil erosion and re-used for backfilling. In case the soil is not required for backfilling, it shall be ferried to designated waste disposal sites in Kiryandongo District.
- While laying the pipeline along the road reserve, excavation works should be implemented in a sectioned manner and the contractor should ensure that the trenches are restored before moving to the next section especially in busy centres.
- There will be close monitoring of impact on natural resources with enforcement of contract or legislative options.

8.2.1.3 SUSCEPTIBILITY TO SOIL EROSION

The site earthworks during construction of water sources, water transmission and distribution network, water storage reservoir, sanitation facilities and water office will reduce soil stability and hence make the soils aggregated and more susceptible to erosion especially during the rainy season. 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.

The potential impact receptors are assigned a low sensitivity, given that the soils in the project area consist of mainly sandy loam soils on gentle slopes and when eroded would affect the immediate environment. For the case of the water sources, water transmission and distribution network, water storage reservoir and sanitation facilities, the surroundings are primarily covered by vegetation with potential to trap the eroded soil. Since the scale of the construction activities is short term and limited in extent, the intensity of impact is considered to be ‘low’. The overall impact significance is assessed as minor.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Vegetation clearance should be limited to localities required for development.
- Construction sites should be hoarded off before excavations and soil barriers put in place to intercept any eroded material and any soil material will remain within the site until it is taken away for proper disposal or used for backfilling to avoid loose soil being washed away by storm water.
- Topsoil should be removed prior to carrying out excavations and kept separately so that it is used last in backfilling of the excavated areas. This is to ensure that the living soil (top soil) is available for plant growth in disturbed areas.
- The Project Contractor should backfill all trenches immediately after laying the pipes and compact such areas as to near level prior to excavation.
- Excess excavated soil material which will not be used for construction works shall be removed from the site in a timely manner and deposited at an approved site
- Areas adjacent to the construction site should not be disturbed and care taken to minimize the area of impairment caused by on-site storage of construction materials and equipment.
- MWE will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion. Native vegetation must be used for re-vegetation of excavated sites.

8.2.1.4 LOSS OF VEGETATION COVER

Vegetation clearance and removal will take place at the water source sites, transmission mains and reservoir sites. There is no envisaged removal of trees during project implementation. The reservoir sites and pipeline routes are mainly covered by short grass that will rejuvenate on completion of construction works. Fourteen invasive plant species were registered in the project area and if not appropriately handled could be spread further by construction activities.

The Impact intensity is considered medium since the transmission and distribution pipeline will mainly be laid in the road reserve. The trees are located away from the envisaged project components' footprint. Moreover, where natural vegetation exists along the proposed pipeline route, it exists in a post cultivated state. The sensitivity of the receptor is rated medium given that most of the areas traversed by the project were already disturbed with human activities and of the 157 flora species encountered in the project area, none of the species is listed on the IUCN

Red list of Uganda of 2016 (therefore of least concern). This gives rise to an overall moderate impact significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Vegetation clearance should be limited to only localities required for development.
- Avoid and minimise cutting of trees at all project sites.
- The contractor should restore sites where activities will be carried out at all the project sites. This site restoration and revegetation should be carried with local plant species as the preferred biodiversity upon completion of construction works.
- The topsoil that will have been removed before pitting the trenches for the pipeline should be put back to cover the trenches so that the crops can regrow in a natural environment. Excess soil, stones and boulders should be dumped in an area that has been approved by the District Environment Officer.
- Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads. This will avoid unintended damages to vegetation.
- When invasive species are encountered, they will be removed and destroyed, for example, by burning. The equipment and cars shall be inspected and cleaned to ensure that the construction activities do not contribute to the spread of the invasive species.

8.2.1.5 LOSS OF HABITAT FOR FAUNA

A number of research has been done on fauna and have established that disturbance on the environment by human affects the fauna's use of their habitat. Khan (1990) established that disturbance and modification of the environment by Humans affect amphibian fauna adversely by destroying their natural habitat and favourably by creating new habitat types. Davenport, T. and Howard, P. 1996 in their publication noted that birds also occur across a broad geographical range and in a large number of habitat types; and some species specialize within narrow habitat bands and are thus sensitive to habitat change. Mammals have also been observed to be affected by habitat modification and destruction. When vegetation on which butterflies depend for nutrition is cleared butterflies are affected indirectly. Likewise, dragonflies are indirectly affected when vegetation on which they patch is cleared.

When project implementation begins, there will be vegetation clearance, landscaping and excavations. These three activities will result into habitat modification, which will bring about loss of hiding, feeding, roosting and breeding grounds for fauna. The Impact intensity of the effects of the activities is low since the project alignment follows the road reserve where natural vegetation that provide habitat to fauna exist in a post cultivated form except at some swamps. The trees are located away from the road reserve. The sensitivity of the receptor is rated low given that most of the areas traversed by the project were already disturbed with human activities resulting in a minor impact significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Clearance of fauna habitat (vegetation and soils) should be limited only to localities required for development.
- Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads. This will avoid unintended damages to fauna.
- The contractor should restore sites where activities will be carried out at all the project sites. The topsoil that will have been removed before pitting the trenches for the pipeline should be put back to cover the trenches so that the mobile fauna is not affected.
- All project workers should be sensitized to minimize damage to vegetation and fauna.
- If wild animals are encountered, the Contractor shall notify UWA so that it is picked and taken to a secure place.
- Trenching, pipework laying as well as well as backfilling will be done concurrently. For any pits dug during construction, the contractor shall ensure that every evening, the pits are covered with timber while being secured with a warning tape.
- Wetlands along the project alignment should be given due attention during the construction phase to avoid negative impacts by:
 - Avoiding intentional spilling of petroleum products.
 - Implementation of the water act and wetlands policy, specifically articles that prohibits pollution and dumping of waste.
 - Scare the fauna before undertaking the activities to minimize injury and burying the hiding fauna

- Relocate those fauna species that cannot move on their own and this should be done by a trained person.

8.2.1.6 DISTURBANCE AND DEGRADATION OF WETLAND ECOSYSTEMS

The project transmission and distribution lines will traverse Nyama Swamp at E-378406, N-200275 by approximately 140m and 280m² when considering a 2m easement. The main activities that will be undertaken in the wetlands are installation of pillars for anchoring the transmission and distribution pipelines. Anchoring and installing the water transmission system within these wetlands can increase total suspended solids. However, the impact on these wetlands is likely to be minor since no clearing of wetland vegetation will be necessary for construction. The water pipes will be suspended on top of the wetlands using concrete or metallic stands, thus, no significant biological effects including on fish and other micro-organisms are expected. Further, no Critical Habitat species was found along the proposed project route and hence no impact on critical habitat is expected to be caused by the project. There will also not be likely implications on the human activities of subsistence farming.

Impact intensity is considered low since the transmission and distribution pipeline will be installed on top of pillars which will ensure minimal disturbance to the wetland system as they require minimal vegetation clearance. The sensitivity of the receptor is rated medium given that most of the wetland areas traversed by the project are close to the already existing road reserve resulting in an overall moderate impact significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Construction works across wetlands will use existing road corridors for operational access wherever possible.
- Where the route requires the suspension points for the water pipes to be located in the swamp and in areas which cannot easily be accessed from existing roads or causeways, temporary access ways built from Terramats or similar structures will be used and removed after.
- Obtain wetland user permits from NEMA before constructing across or along wetlands and follow all guidelines given.
- All project workers should be sensitized to minimize damage to flora and fauna.

- Close monitoring and supervision of the construction operations to ensure compliance to the NEMA permit conditions and avoid causing further damage to undesignated project areas.

8.2.1.7 GENERATION OF SOLID WASTE

The proposed project will generate waste of various types at the construction phase including food remains, polythene bags, plastic bottles, plastic offcuts from the HDPE and uPVC pipes 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. Such waste needs to be handled reasonably and must not remain in the road reserves or along the water trenches. Inappropriate disposal of waste or spoil could have medium or long-term environmental and public health impact. Improper managing of these wastes could result in contamination of soil, air, surface water and thereby posing public health risks.

The sensitivity of receptors is assessed as 'high' given that the water transmission line traverses a number of swamps. The impact intensity is assigned 'low' rating resulting in a moderate impact significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- The Contractor shall develop and implement a Waste Management Plan that will ensure that:
 - The wastes are properly segregated and separated to encourage recycling of some useful waste materials, that is, some excavated material can be used as backfills.
 - Solid waste storage bins and/or skips are provided at contractor's sites and at the construction sites and ensure they are collected or emptied in time. Depending on the rate of accumulation, waste collection is made at least once in 24 hours and done in such a way to minimize nuisance of smell and dust during collection.
 - Hazardous wastes such as paints, cement, adhesives are managed through a third-party contractor certified by NEMA. The wastes shall be transported in a NEMA approved box body trucks to the NEMA approved waste disposal facility in Nakasongola.
- All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and delivered to recycling facilities. Other forms of waste which are inert must be collected

by NEMA gazetted waste handlers and taken to a NEMA gazetted waste disposal facilities for disposal.

- All organic waste generated at eating places during construction such as food stuffs shall be collected and transported by the contractor to designated district landfills for disposal.
- All plastic waste generated during construction, such as mineral water bottles, polyethene bags, jerricans and cups shall be collected and taken for recycling in plastic collectors in Kiryandongo for onward transmission to plastic recyclers.
- Human excreta shall be managed using a mobile toilet and then disposed at the waste stabilisation ponds at Kiryandongo Hospital.
- The contractor will work with Kiryandongo district Local government to facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records maintained at all times.

8.2.1.8 RISK OF CONTAMINATION DUE TO FLOODING OF WATER SOURCE

The Source DWD 77383 is located in a flood prone lowland where infiltration of surface run-off may occur during heavy rains thus contaminating the water source. Given that the area is primarily covered by gardens the potential contaminants include nutrients and pesticides from the agricultural fields along with organisms such as microbes carried by runoff,

The sensitivity of the receptors is considered to be ‘high’ while the impact intensity is considered to be low given that the project design will put into consideration construction techniques for water source protection to ensure minimal risk of contamination and there are no major activities in the neighbourhood likely to contaminate the water table. The overall impact significance is moderate.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- The production well should be constructed with a water tight casing above the water table.
- The design and construction of the pump house at source DWD 77383 should incorporate a raised apron slab above the ground by the required height for the predicted flood depth of the area.
- Aprons should be constructed with deep foundation edges to avoid erosion.

- Routine water quality tests should be carried out at the source and after events with potential to cause contamination, upon which appropriate water treatment should be carried out to remove the detected contaminants before its distributed to the users.
- A water source protection plan has been developed to ensure sustained water quality and quantity for the project.

8.2.1.9 NOISE AND VIBRATIONS

Noise and vibrations will occur both on and off site. This will emanate from movement of trucks, excavation works, usage of equipment (compactors, generators, etc.), etc. Noise levels at some of the sensitive receptors in the project area such as Nyakabale P/S and Kifuruta P/S were observed to be above the maximum permissible noise limits and this was mainly attributed to the vibrant human activity in the area. Exposure of communities and workers to high noise and vibration levels can be a health concern and needs to be mitigated in line with the National Environment (Noise) Control Regulations, 2003.

The receptor sensitivity is considered low given that most of the proposed project area is located in relatively noisy areas as indicated in the baseline, while the intensity of the impact is rated low ultimately resulting in a minor impact significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. (National Environment (Noise) Standards and Regulations). Workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs.
- Workers should be provided with the necessary personal protective equipment (PPE) such as ear muffs.
- Periodic medical hearing checks should be performed on workers exposed to high noise levels.
- Sites must be hoarded to curb noise impacts to neighbouring communities.
- Works should be undertaken during day time i.e. from 8am to 6pm.
- Works near schools or health centres should be done in periods like weekends in order for noise and vibrations not to interfere with learning environment.
- Weekly monitoring of noise levels at active sites should be carried out by the contractor.

8.2.1.10 AIR POLLUTION

The most significant issues that could potentially impact on air quality and climate during construction are combustion gas emissions and nuisance dust. During the construction phase there will be an increase in road traffic associated with material and equipment haulage. Furthermore, exhaust emissions from vehicles and machinery (e.g. generators) consisting mainly of poorly burnt fuels and oils, including nitrogen oxides, carbon oxides, hydrocarbons, particulate matter, etc are expected to occur. The potential impacts are nuisance to people in the area, coverage of crops (possibly leading to reduced yields) and deposition on natural vegetation and fauna who feed on the vegetation. Due to the temporary nature of construction, dust emissions are not anticipated to have a long-term impact on local air quality. Dust nuisance will decline as stripped areas of land re-vegetate. Ambient air quality measurements indicate that the environment around the project area is currently devoid of sources of high air pollution.

The manageability of the impact is high since typical impacts are well understood in conventional infrastructure construction industry and the ability to adapt to the impact is high because construction activities have been on going in the project area especially for access roads. Due to the intermittent and short-term nature of the activities, the intensity of impact is assessed as low and sensitivity of the receptors as low. The impact significance is therefore minor.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Travel speeds of construction vehicles along the road especially at trading/ business centres will be controlled and should not exceed 50 km/h on the highway and 40 km/h off the highway.
- Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas.
- Workers will be provided with PPE and the use of PPE shall be enforced.
- All surfaced roads shall be subject to road cleaning and un-surfaced roads to dust suppression, the methodology and frequency of which shall be included in the Contractor's Traffic Management Plan.
- Stockpiles of friable material will be grassed in order to prevent wind erosion.
- A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO₂ and NO₂ are minimised.

8.2.1.11 INCREASED RISK OF ROAD ACCIDENTS

The proposed project will cut across several roads within the project area. Construction activities will involve trenching mainly in the road reserve, however, with concern about the points where the trenches cross major roads and trading centres as will be the case at Nyakabale trading centre along Kigumba – Masindi road. At these points the risk of road accidents is increased and it is therefore necessary that key precautions be undertaken at such road crossing to avoid accidents and impairing traffic activities. The movement of project vehicles while dropping workers and delivering materials may also compromise the safety of the road. Furthermore, the use of project vehicles and equipment on community access roads will expose road users to more traffic accidents.

The receptor sensitivity is considered medium given that while most of the project is being implemented in remote areas where traffic volumes are very low, and the main mode of transport is by bicycles and motorcycles, some section will be implemented along the Kigumba – Masindi road which is a busy highway. The intensity of the impact is rated medium ultimately resulting in a moderate impact significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- The Contractor shall develop and implement a traffic management plan
- Disruptions to public access shall be identified in the Contractor's Traffic Management Plan, under which suitable notice of intending delays and closures are given to all concerned parties and approved prior to commencing work. All road closures shall be separately notified and agreed with the subcounty administration.
- Where access to or from an individual property is closed for a period of 2 hours or more, the owner shall be informed at least 7 days in advance.
- Vehicular access to and from hospitals, police stations, and other public institutions shall be maintained through the use of steel road plates over open trenches. Pedestrian access to schools, health facilities, and other premises frequently accessed by the public will be maintained with the use of walking boards.
- To minimize interference with traffic, half of the road shall be closed to enable vehicles use one half as the other half is being excavated and installed with pipe work. The excavated soil

shall be temporarily consolidated on the sides of the road and re-used for backfilling immediately the laying of pipework is completed.

- The Design Team will continue to discuss with UNRA and DLG engineering departments to assess the designs and any other feasible options (tunnelling Vs trenching across the tarmac road) and to secure the pertinent permission for road crossings.
- All roads that are trenched during the process should be rehabilitated after laying of pipework is completed as advised by UNRA and DLG engineering teams.
- Road safety and site safety training should be done involving construction workers, police and local community.
- Conspicuous signage shall be well placed on roads and the Contractor’s Traffic guides on ground shall direct traffic in case of diversions or open trenches.
- All company vehicles used in the transportation of construction workers, material and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form before usage.
- All drivers to be employed by the Developer or Contractor shall be qualified, skilled with valid driving permits.
- The vehicle speed shall be limited to a maximum of 30km/hr areas near sensitive facilities.
- Works near sensitive facilities like schools and health centres shall only be limited to day time (7am to 6pm).

8.2.1.12 IMPACTS ON VIOLENCE AGAINST CHILDREN (VAC)

Its anticipated that violence against children cases like labour, child sexual abuse and exploitation practices may occur under the following circumstances; a) contracted workers engaged by third parties if any) and b) primary supply workers engaged by suppliers in providing goods and services (e.g. stone quarries, sand mining, transporters, etc); c) supply chains that engage children in extraction, processing, distribution, storage of goods and services before being delivered to contractors, or even at construction sites without contractors notice (e.g. Children vending food stuffs, drinks at / near construction sites).

However, the above-mentioned exposure factors to VAC MUST be prohibited and compliance of contractors closely monitored. If well done, the contribution of the project in reducing child labour will be HIGH.

This impact is short term and direct impact but Reversible. The receptor Sensitivity is accessed to be low because the contractor and Local governments are greatly aware of the side effects. The impact Intensity is medium especially in short run but can be handled immediately. The ultimate impact significance is moderate.

| | | Sensitivity | | | |
|---------------|---------------|-----------------|------------|-------------|------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Inten sity | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |

| | | Sensitivity | | | |
|--|-------------|---------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- 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.
- All third parties and suppliers should be made to comply to No-Child Labour policy.
- The contractor should put up notices on work sites (NO CHILD LABOUR) in order to silence agitations
- Document all workers and issue work contracts with codes of conduct against VAC
- The Developer should engage District Education Officer, District Community Development Office (DCDO), Gender Officers, Parish Chiefs among others in monitoring school attendance in the project's area of implementation.
- Sensitization on VAC should be carried out in schools and in communities.
- Reporting mechanisms should be put in place such as a whistleblowing system. Annex 11 provides the referral pathways and reporting mechanisms for VAC, GBV and other Sexual related incidents/ allegations.
- The contractor, where a case arises, will cooperate with law enforcement agencies in investigating complaints of VAC.

8.2.1.13 IMPACT ON SEXUAL AND GENDER BASED VIOLENCE (SGBV)

Baseline conditions of the project area indicate a prevalence of violence GBV (violence against children (VAC), Violence Against Women and Girls (VAWG) and Intimate Partner Violence (IPV). The baseline data showed that Nyakabale RGC contributed 15.8% (274 out of 1,735) of the GBV incidents in the entire district in two years 2021-2022. By category, 55% (151 out of 274) were Physical Assault; 16.7% rape; 14% Psychological Abuse; 13.9% sexual assaults; 13% Defilement; 13% Denial of Resources, opportunities & services; 7.7% child marriage. These were mostly perpetrated by fathers, as well as Intimate partners (IPV). Given that all users of the proposed piped water supply will be required to pay, there are possibilities of denial of resources (money to pay for water) among households who have less ability to afford, and this may in turn affect women and children who carry the burden of collecting water for domestic use. In addition, the benefits of cash compensation to PAPs will mostly be to the male household heads and this could stimulate exposure risks to GBV cases. Therefore, it's certainly possible that the project's

influence on increasing exposure to GBV. The intensity of the impact is HIGH given that the inability to afford water bills may be continuously fluctuating (either high / low) depending on seasonality. Sensitivity of the receptor is rated HIGH because children and women are often the victims and males are mainly perpetrators. Therefore, significance of the impact is Major.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Contractors to develop and implement GBV codes of conduct for workers, visitors, sub-contractors and service providers
- Promote GBV/SEA/SH awareness before and during project implementation
- Strengthen GBV Referral pathways within the community (core and influence zone of project area). The referral pathways and reporting of GBV is provided under annex 11.
- There is need to engage into community policing with emphasising on prevention of GBV. This can be done by the local area police department of Family Protection Unit (FPU).
- The local government (CDO) should strengthen awareness and sensitisation against GBV.
- MWE should consider having a dedicated service provider for GBV, VAC, HIV/AIDS to provide overall mitigation implementation and management during civil works.
- The contractor, where a case arises, will cooperate with law enforcement agencies in investigating complaints of SGBV.

8.2.1.14 RISK OF SEXUAL EXPLOITATION AND ABUSE (SEA) AND SEXUAL HARASSMENT (SH)

The Baseline conditions indicate that 90.9% of SEA incidents are related to sexual abuse (physical intrusion of a sexual nature, whether by force or under unequal or coercive conditions; unwelcome sexual advance, request for sexual favor, verbal, or physical conduct or gesture of a sexual nature, expected or be perceived to cause offense or humiliation), and 9.1% are early Forced Marriage. In comparison, 81.8% (9 out of 11) most perpetrators of SEA incidents have no relationship with the victims (can call them strangers). Basing on the above, it's certain that the labour influx will have an influence on the social interactions (voluntary and/or involuntary relationship within and/or between groups) and in turn this may impact on human sexual behaviors whether legal and./or illegal with varying patterns of practice intensity, implications, inducements (e.g. use of money, gifts, favors), whatsoever. The impact of project on attracting

influx of workers will be HIGH, short term and Reversible. In case it negatively influences SEA & SH, the impact will be Long Term and Irreversible.

The intensity of the impact is medium given the size of the workforce. Sensitivity of the receptor is rated high regardless the nature of violence some of which may not be bodily harm but may leave the affected person psychologically tortured. Therefore, significance of the impact is major.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigations measures

- The Contractor should have a sexual harassment policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges.
- The contractor will conduct mandatory and repeated training and awareness raising for the workforce about refraining from unacceptable conduct toward local community members, specifically women.
- MWE should ensure that social safeguards personnel are recruited as part of the project implementation personnel to supervise contractors and to continuously engage communities.
- GBV reporting mechanisms should be put in place by the project developer.
- Worker Code of Conduct will be part of the employment contract, and including sanctions for noncompliance (for example warning, termination, initiation of criminal proceedings).
- The contractor, where a case arises, will cooperate with law enforcement agencies in investigating complaints about gender-based violence.

8.2.1.15 RISK OF CONTRACTING AND SPREADING COVID-19

Construction sites are places where people from different places can meet and interact while executing various construction activities including meetings and trainings such as daily assembles and toolbox meetings. Such interactions pose the risk to spread COVID-19 and other similar respiratory such as pandemic influenza. COVID-19 is a new virus that had not been previously identified in humans and therefore no population-level immunity exists. While most people with COVID-19 develop mild or uncomplicated illness, approximately 14% develop severe disease

requiring hospitalization and oxygen support and 5% require admission to an intensive care unit¹². Uganda is currently experiencing an outbreak of COVID19. The statistics as of 11th January 2022 were 150,301 confirmed cases (only Ugandans) and 98,601 cumulative Ugandan recoveries (Source: <https://www.health.go.ug/covid/>).

The duration of the impact will be short-term and the extent of the impact will be local or regional depending on origin of construction workers. The likelihood of the impact occurring is medium if the contractor adequately sensitises workers about responsible and safe behaviour. The intensity of the impact is high given that a Covid 19 outbreak would require shutdown of works, possible a local/ regional lockdown with some patients requiring hospitalisation. The sensitivity of the receptor is rated medium given that Covid 19, if contracted, is has short to mid-term effects. Therefore, significance of the impact is major.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Sensitize all project employees about the signs and symptoms of COVID-19 as well as the ways to control its spread.
- Screen local employees/contractors for COVID-19 during recruitment.
- Screen all visitors to construction sites using a temperature gun and enforce washing of hands before entry and wearing of approved masks.
- Management of potential COVID-19 cases – in case, any workers develop the above symptoms, isolate them and immediately contact the respective District Health Officers (DHOs) to pick and transport the patients for treatment.
- Reduce site traffic – prohibit entry for any non-essential visitors. In addition, utilize staggered start and finish times for workers to limit site congestion and physical contact. Further, restrict the number of people in attendance at any site inductions, and consider holding them outdoors whenever feasible.

¹² Ministry of Health-National Guidelines for Management of COVID-19, 2020

- Practice social distancing – Consistently monitor points of worker interactions such as dining areas to ensure social distancing guidelines (2-4 meters apart) are being met.
- Prioritize sanitation – Enforce workers to wash their hands with soap and water for at least 20 seconds or to use sanitizers before entering and after leaving the worksite, as well as before and after handling all goods, materials and equipment. Routinely clean any common contact surfaces on-site (e.g. scanners, turnstiles, screens, telephones and desks). Lastly, be sure to temporarily remove or disable any site entry systems that require skin contact (e.g. fingerprint scanners).
- Limit physical contact – Make sure that the contractor stagger break times to reduce congestion and physical contact in eating areas. Require workers to keep at least 2-3 metres of distance between one another while eating.
- Enhance whole-of-society coordination mechanisms to support preparedness and response, including the health, transport, travel, trade, finance, security and other sectors. Involve public health Emergency Operations Centres and other emergency response systems early.
- Continuously sensitize the workers and pass on any new guidelines by Government and the WHO.

8.2.1.16 DESTRUCTION OF PHYSICAL CULTURAL RESOURCES

There are currently no known archaeological sites within the immediate vicinity of the proposed project area. However, the proposed transmission line from Kikoba village (Borehole DWD 77383) is in close proximity to a graveyard. PCR like graveyards and older-trees may be damaged during site clearance, laying of the transmission mains. Given the excavation works involved in the laying of the transmission and distribution system, the possibility that some cultural features being encountered along the alignment cannot be ruled out.

Owing to the importance of and sentiments attached to burial sites, the sensitivity of the receptors is considered to be 'high'. The impact intensity is considered to be low given that the grave yard at the proposed reservoir site is most likely not to be affected since it is located outside the project foot print. The overall impact significance is moderate.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- At the local level, additional consultations will be carried out prior to commencement of works by the contractor at the project sites.
- A ‘chance find’ procedure (**Section 9.3.13**) will guide actions to be taken in the event that suspected archaeological artefacts or paleontological items are encountered and they should be handed over to Ministry of trade and industry- Department of Museums and Monuments.
- Construction workers and managers should be trained in basic skills of how to identify and handle archaeological materials/artifacts before commencement of work. Such training should be administered in liaison with the Department of Museums and Monuments (DMM)
- Construction works will be designed to ensure no damage to any cultural sites or medicinal plants that may be encountered including older-trees that are culturally significant. Where such sites cannot be avoided, culturally appropriate measures will be agreed and implemented prior to the construction activities.
- Compensation of the affected sites will be undertaken before construction activities commence in accordance with World Bank requirements.
- The proposed transmission line alignment from production well DWD 77383 should be adjusted by 10 meters relative to point (379214E, 198114N) to avoid relocation of graveyard along the section, as described in baseline conditions8

8.2.1.17 LOSS OF LAND AND DISPLACEMENT OF ECONOMIC ACTIVITIES

During project construction, the project developer, MWE, intends to mostly use road reserves of the existing public roads which are government land for the transmission and distribution lines. However, the water source site, access roads and storage reservoir sites shall be located on private land as indicated in Error! Reference source not found., whose owners will be engaged MWE in the process of land acquisition in accordance with the land act and World Bank Environmental and Social safeguard policies as well as relevant national laws. According to the RAP (2022), the project will require a permanent land take of 1.195 ac and an easement corridor of 10.910 ac (**Table 8-1**) and a total of 260 PAPs.

Table 8-1: Project Land Takes

| Impact | Land Affected in Acres |
|--|------------------------|
| Permanent Land Affected (Water Source Sites, Reservoir Sites, Access Roads, And Sanitation Facility Sites) | 1.1950 |
| Permanent Land Restriction (Easement for Transmission and Distribution Pipes) | 10.9100 |
| Total Land Affected | 12.1050 |

In general, the loss of land will be direct, permanent and irreversible but non-cumulative. This will be limited to proposed sites and a long-term impact. The intensity will be low since the project foot print requires small pieces of land per component, per locality and the water pipelines will mainly lie in the road reserve except the areas where access to the source and reservoir sites is

required. The sensitivity has been assessed as medium because there is no physical displacement of human settlement, physical cultural resources and/or significant economic displacement. Therefore, the overall impact significance is moderate.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

8.2.2 OPERATION AND MAINTENANCE PHASE

8.2.2.1 DEPLETION OF GROUNDWATER RESOURCES

The motorized abstraction of groundwater has the potential to deplete the groundwater resources if the abstraction rate exceeds the aquifer recharge rates. To alleviate this, test pumping was conducted to estimate the safe yields of the borehole. The recharge of the aquifer which depend on the rainfall regime of the area among others things and the infiltration of part of the same can be affected by human activities¹³ that impact the amount of rainfall received in the area and the amount of infiltration.

The sensitivity of the receptors is considered to be medium while the impact intensity is considered to be high. The overall impact significance is major.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

¹³ Such activities include land use changes like deforestation, wetland drainage for agriculture

Mitigation measures

- To ensure that the ground water resources are not depleted, the abstraction rate should not exceed the rates determined during the test pumping exercise.
- The water levels should continuously be monitored to ascertain any impact on the water level.
- Water levels should be accompanied by monitoring of the water quality to ascertain any trend in water quality change with continued abstraction.
- The developer should apply /acquire the abstraction permits which will facilitate adherence to agreed rates of abstraction on one side and also guide the DWRM while issuing abstraction permits in the vicinity, to other competing users.
- MWE, the developer has undertaken a catchment management plan for the Victoria Nile in which the project lies and a source protection plan specific to the project water sources.

8.2.2.2 SOLID WASTE GENERATION

During the operation of the project, solid waste will be generated from the activities of the water office as well as activities of maintaining the water transmission and distribution lines. The wastes that will be generated include food remains, polythene bags, plastic bottles, papers, containers for treatment chemicals such as chlorine, wrappings for spare parts, etc. Wrappings/cylinders for treatment chemicals can be hazardous to humans and the environment if not safely disposed.

The sensitivity of receptors is assessed as 'low' given that the solid waste will be generated at already established sites with waste disposal facilities from the construction phase while the impact intensity is assigned low since there will be minimal activities generating waste during the operation phase and the impact of solid wastes are localized, temporary and largely reversible. This ultimately results in a minor impact significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- A Waste management plan for the operation phase of the project will be developed and implemented.
- Waste collection bins will be provided at strategic positions at the water offices, water source sites and reservoirs sites for temporary waste storage. The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes.

- The water supply system operator will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA.

8.2.2.3 RISK OF POLLUTION FROM MISMANAGEMENT OF SANITATION FACILITIES

The project will support construction of 2 VIP Latrines at institutions and 2 waterborne public toilets to serve the residents in trading centres. The area has no sewerage system and therefore the waterborne public toilets will have septic tank systems. The septic tanks shall be emptied and treated at a site (waste treatment plant) gazetted by NEMA such as the waste stabilization ponds at Kiryandongo Hospital. Therefore, the collection, transportation and disposal of sewage must be done correctly to minimise or avoid health risks to communities. Any mismanagement of sanitary waste generated during the operation may lead to pollution of the area which may end up polluting the water sources. This may cause risk to public health.

The sensitivity of the receptors is considered to be 'high' while the impact intensity is considered to be low given that the project will use septic tank technology for handling of sanitary wastes along with proper planning for emptying and disposal. The overall impact significance is moderate.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- A Periodic maintenance regime including emptying and desludging will be put in place and implemented to prevent sewage over flows.
- Use of manifest system to ensure that the wastes are disposed off at a site (waste treatment plant) gazetted by NEMA.
- A robust management system for the sanitation facilities involving the communities, their leaders and the health workers should be put in place to monitor, detect and alert the responsible authorities to call for emptying of any septic tank that poses a danger to the community.

8.2.2.4 LOSS OF JOBS FOR WATER VENDORS

In Kiryandongo District and particularly in the proposed project area, due to the great distance to traditional water source waters, fetching water is done by water vendors. They often carry 20-litre jerry cans on motorcycles, bicycles, wheel barrows, any other bulk carriers. They sell jerry

cans of 20 litre capacity and sell each between UGX 500 and 5,000 depending on prevailing circumstances (low in the rainy season and high in the dry season). The vendors are likely to have their livelihoods undermined following project implementation. By introduction of piped potable water supply, water vendors will lose their source of income within the project area as water will be accessible at homesteads and at nearby public posts.

The sensitivity of the receptors is considered to be medium since the vendors can put their effort and investments into other sources of income, while the impact intensity is considered to be low given that the water vendors can extend their services to areas not covered by the project. The overall impact significance is moderate.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- MWE should sensitise existing water vendors in the area about adapting to the new developments in the area. This would eliminate their negative attitude towards the proposed project and result in total project support.
- The community Development officer (CDO) should mobilise the local people (including water vendors) and sensitise them about the opportunities that the proposed project would bring in the area and how they can take advantage of piped water in the area to create jobs (such as washing bays) and spur development in the area.
- Vendors would be encouraged to become scheme or kiosk operators; vendors would be encouraged to tender for public water points.
- Vendors should be encouraged to be involved in casual work in the course of the construction works.

8.2.2.5 INCREASED COST PER UNIT / REDUCED AFFORDABILITY

The cost per unit is likely to be higher than the prevailing level of water affordability. Currently, majority of the households pay about UGX 3000 or less per month as borehole fees. The new piped water system will likely charge on a per jerrycan/ per unit basis. This will hinder affordability and utilization, hence increased substitutability.

The sensitivity of the receptors is considered to be low since household can access alternative sources (deep boreholes, no matter the distance), while the impact intensity is considered to be low given that the project developer put into consideration the economic situation of the project

area when developing the project and ultimately when setting water prices for the project beneficiaries. The overall impact significance is minor.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- Alternative water sources such as the boreholes should continue to be maintained by the local government and water user committees.
- MWE should support the district local government to continue funding construction / rehabilitation of alternative water sources such as shallow wells, boreholes, etc.
- UNHCR can provide subsidies for IDP / Refugee communities.
- NUWS under the guidance of MWE should put into consideration the project area’s economic profile and vulnerability when setting affordable water prices.

8.2.3 PHASE CROSSCUTTING NEGATIVE IMPACTS

8.2.3.1 OCCUPATIONAL HEALTH AND SAFETY RISKS

Construction employees meet many occupational hazards at the workplace such as construction traffic, excavation machinery, working in water and trenches may pose accident risk to workers either when equipment is operated by inexperienced workers or when in a poor mechanical condition or falls into the trenches/ deep waters. OHS risks could also result from insufficient medical capability at the construction site; or neglect of safety equipment, precautions and procedures.

During operation and maintenance of the water treatment and supply facilities, occupational health and safety problems will arise. Workers at the facilities might experience negative health impacts, particularly during poor operation of the chemical equipment like chlorine gas or calcium hypochlorite powder. Fatal falls, suffocation and injury while working in confined places. Other causes of OHS problem include but not limited to:

- ✓ Lifting of heavy and sharp objects;
- ✓ Poor transportation of materials for maintenance;
- ✓ Improper storage as well as handling and use of dangerous substances/ chemicals;
- ✓ Inadequate lighting and ventilation in workplaces;

- ✓ Lack of adequate training (or neglect of safety precautions/ guidelines) in use of equipment and tools;
- ✓ Misuse of equipment and materials for functions they are not designed;
- ✓ Lack of safety signage in specific areas;
- ✓ Electrical hazard;
- ✓ Eye hazards such as splashes;
- ✓ Lack of adequate PPE; and
- ✓ Biological hazards (vermin, mosquitos, pathogens, etc.).

Accidents could cause considerable ecological damage, financial loss and harm to human life. While largely reversible, some impacts such as loss of human life and body injury are irreversible. The receptor sensitivity is considered medium given that although such impacts may be irreversible once they occur; the workers have done similar work and have knowledge on how to avoid such incidences. The impact intensity is considered to be high even if MWE procures a qualified contractor who is aware of OHS measures but workers do not follow OHS requirements and NUWS will be in charge of operating the facilities for which it has vast experience. Nevertheless, this gives rise to an impact of major significance.

| | | Sensitivity | | | |
|---------------------|---------------|-----------------|---------------|---------------|---------------|
| | | 1 Very low | 2 Low | 3 Medium | 4 High |
| Intensity of Impact | 1 Very low | 1 Negligible | 2 Minor | 3 Minor | 4 Minor |
| | 2 Low | 2 Minor | 4 Minor | 6 Moderate | 8 Moderate |
| | 3 Medium | 3 Minor | 6 Moderate | 9 Moderate | 12 Major |
| | 4 High | 4 Minor | 8 Moderate | 12 Major | 16 Major |

Mitigation measures

- The Contractor shall prepare and implement an occupational safety and health plan for all sites, approved by the developer.
- The Contractor shall provide safety guidelines to all operations prior to start of work.
- Strict adherence to safety measures and procedures are required to minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site. To ensure occupational health and safety on construction sites, the Contractor shall be obliged to comply with all applicable Ugandan construction Health and Safety Standards as required by the Occupational Safety and Health Act of 2006. These include provisions of the Factories Act, Labour Unions Act and Workman's Compensation Act.
- Training will be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape,

conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency.

- Regular drills will be constantly followed on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in case of incidences.
- Personnel on duty shall at all times wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff.
- The Contractor shall establish emergency entrances, exits and amenities.
- The Contractor shall ensure access to first aid kits.
- The Contractor shall 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.
- The Contractor shall secure site boundaries with fences or hoardings as appropriate.
- The Contractor shall 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 Construction Supervisor will continually monitor Contractors’ compliance with Health and Safety measures.
- An Accident Log will be maintained onsite to register all injuries and to investigate their causes during both the construction and operation phases of the project.
- The manufacturer's instructions and Material Safety Data Sheets (MSDS) shall be followed for the storage of all chemicals used in water treatment. Storage must conform to compatibility restrictions.
- Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor.

8.3 CUMULATIVE IMPACTS

1.1.1 VALUED ENVIRONMENT AND SOCIAL COMPONENTS

Multiple projects currently under implementation and those planned within the spatial and temporal framework impact a set of environment resources and social systems. Although the scope of this report only covers the proposed development of the solar powered piped WSSS in Nyakabale RGC, there are other projects in the project area. The identified VECs may include;

- Material Source Areas

Projects implementing infrastructure development especially water pumping station, water reservoirs, booster stations, water office blocks and sanitation facilities shall require gravel, murrum, sand, rocks and among other products hence impacting on source areas.

- Shared Land Corridors

Linear projects like roads, power lines and telecom cables normally share corridors. Relocation of such services is an impact and acquisition and compensation of such corridors may raise social and economic concerns.

- Water Resources

Project implementation in Nyakabale may impact water sources especially during the dry season. The proposed Nyakabale borehole (Source 2 in Kikoba) is nearby an existing borehole. Therefore, the groundwater and surface water interactions may occur leading to reduced future yields of the existing and, or proposed borehole and contamination of the water sources.

- Land and Wetlands

The project area has a number of mushrooming trading centres e.g. Nyakabale, Apondorwa, Mboira, among others, which continue to expand due to the population growth as a result of refugee influx in Kiryandongo hence putting pressure on land and wetlands (cultivation, settlements and sanitation facilities). Nyakabale borehole is near Nyama wetland (which is being degraded with rice and vegetable cultivation). Also, being in a lowland renders it prone to floods during the rainy seasons from increased surface runoff due to continuous and uncontrolled landuse activities e.g. clearing landcover and wetland degradation.

- Social Services

The most critical service affected by multiple construction projects is health infrastructure. Increased inflow of workers may place a burden on health units. Security services may experience increased demand due to the inflow of workers.

- Gender and Sexual Harassment

Increased inflow of migrant labour working on different projects may increase the anonymity of workers and possible offenders. Because there are many contract workers it becomes difficult to isolate those engaged in illicit sexual behaviours and further individual involved to harassment of women. There are several on-going projects and activities by Government of Uganda, NGOs and other development actors to support refugees. Possible concurrent implementation of all these

projects and interventions within the same project area or in proximity of the RGC project has the potential to generate cumulative impacts.

1.1.2 IDENTIFIED CUMULATIVE IMPACTS

The key cumulative impacts and risks associated with the project are summarized below:

- The ease of water fetching as a result of the project is expected to translate into an increase in the enrolment ratio, especially for girls, and in the female literacy rate and contribute to the reduction in social conflicts related to water use such as those associated with the congestions at the existing boreholes. This impact will be enhanced through ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
- However, as noted under negative impacts, the project will supply water to more than 3 small and unplanned towns in Nyakabale RGC e.g. Nyakabale, Apondorwa, Mboira. Improved water supply comes with an increase in the amount of wastewater generated by households and industrial or commercial facilities. Poor disposal or management of the wastewater generated will lead to land and/ or water pollution, formation of foul wastewater channels and ponds in small towns, which will become eye sores and breeding grounds for water related illnesses, lead to contamination of soil and/or groundwater and other related sanitation problems if proper treatment systems such as septic tanks are not utilized. There is therefore need to improve physical planning and conduct behaviour change campaigns to maximise benefits from the projects and deter cumulative negative impacts of the same.
- The hydrological connection between surface water (River Nyama wetland) and groundwater (proposed borehole) may be altered. The impact of surface water on groundwater table will depend on the soil permeability (due to the proximity of about 140m) as well as the agricultural practices and climate practiced in Nyakabale catchment. The infiltration of surface water into the borehole may lead to groundwater contamination which may deteriorate the water quality. Also, being in a lowland renders it prone to floods during the rainy seasons from increased surface runoff due to continuous and uncontrolled land use activities e.g. clearing landcover and wetland degradation hence triggering the treatment costs.

8.3.1 OVER ABSTRACTION OF WATER

The existence of the proposed water supply project may induce the establishment of other projects that will draw large amounts water from the ground water sources. These may include food processing plants, steel rolling mills, etc.

Duration of the impact will generally be long-term and the extent of the impact will be regional. The intensity of the impact is low given that the regulation of DWRM and Kiryandongo DLG will always apply to regulate abstraction. Sensitivity of the receptor is rated low. Therefore, significance of the impact is minor.

9 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

The Environment and Social Management and Monitoring plan (ESMMP) proposed here specifies mitigation measures and monitoring actions with time frames, specific responsibilities assigned, and follow-up actions defined in order to check progress and the resulting effects on the environment during construction and operation phases of the project. Monitoring will begin immediately and will continue through both the construction and operation phases. One important aspect of monitoring will be to assess the effectiveness of the mitigation measures suggested, where they are found lacking, appropriate new actions to mitigate any adverse effects will be undertaken.

9.1 PHASES OF IMPLEMENTATION

Implementations of these measures will be carried out at different stages of the construction and operation phases. During the design stage, the feasibility and design consultant will incorporate proposed mitigation measures in the design and tender documents. The contractual agreement will also include clauses to enforce the management of environmental and social aspects. Construction stage activities are mainly the responsibility of the contractor and that of the construction supervision consultant. The actual physical implementation works are carried out mostly at this stage. The execution of the civil works will also include the implementation of the relevant environmental and social mitigation measures.

9.2 INTEGRATION OF SAFEGUARDS INTO CONTRACTS

The key aspects to be included in the contracts for civil works are highlighted below.

9.2.1 BILL OF QUANTITIES

The BoQs must capture all relevant safeguards aspects. The indicative costs of implementing safeguards extracted from the ESMP budget should be clearly provided as provisional sums or billable items in the Bills of Quantities. These should include safeguards staffing, documentation (CESMP, etc.), waste management, HIV/AIDS, Stakeholder engagement strategies grievance redress, gender awareness, site clean-up and landscaping, monthly ESMP reporting among others. Laxity in the provision and use of personal protective equipment is a risk to the safety of workers as well as poor working conditions and pay. The BoQs should provide a sum for PPE and supervision be done to ensure that all workers undertake works while in full PPE.

9.2.2 PROCUREMENT OF THE CONTRACTOR

Implementation of mitigation measures during construction is key to managing short- and long-term impacts and risks. As a best practice, the contracts for the civil works should include clauses on management of environment and social aspects. Sometimes, the clauses are weak and cannot be used to hold the contractors accountable. There is need to strengthen the clauses and to tailor them to the specific project safeguards aspects and management needs. The contractual agreement will also include clauses to enforce the implementation of the relevant mitigations. The clauses should be included in technical specifications in all contract documents related to the civil works. Safeguards clauses should be prescriptive and specify: what needs to be done, where

it needs to be done, when and how the actions will take place, who is responsible, the monitoring and reporting requirements, and what sanctions or legal recourse are available for work that does not meet the required specifications.

9.2.3 STAFFING

It is common for contractors to recruit unqualified safeguards staff or to assign safeguards duties to site foremen or clerks with no prior safeguards experience. Staffing requirements should be spelt out in the contracts. In addition, it may be useful to include the minimum requirements in the contracts for the civil works. Therefore, MWE through the supervising consultants must approve the contractor's Environment Officer, Health and Safety Officer and the Sociologist.

9.2.4 ESMP MONITORING AND REPORTING

Laxity in implementation and reporting on safeguards issues is common amongst contractors largely because they do not take safeguards issues seriously. This can be addressed by requiring contractors to prepare monthly environment and social monitoring reports. These should either be pay items and clearly included in the BoQs or a condition for certification and payment approvals. Contractor safeguards reports are usually characterized by failure to include useful monitoring indicators such as safety statistics (fatalities, minor injuries, near misses, etc.), number of trees cut, and number replanted amongst others. The contractors will require training on safeguards monitoring and reporting. The contractors need to undertake proper recordkeeping of all safeguards activities. The contractors should liaise with District technical offices such as the DEO, DCDO and Physical Planner to ensure proper monitoring and timely implementation of project activities.

9.2.5 DECOMMISSIONING AND RESTORATION OF DISTURBED AREAS

At the end of the construction period, the Contractor must ensure restoration of all disturbed areas including materials sites through proper landscaping, backfilling and restoring topsoil, (re-) introduction of genetic species (e.g. natural re-grassing) similar to those destroyed in order to re-establish the natural local ecology. The final payment must be tagged to successful restoration activities.

9.3 CONTRACTOR MANAGEMENT PLANS

The Contractor will be required to prepare some standalone safeguards management plans in addition to the Contractor's Environment and Social Management Plan. Reference should always be made to the Contractor's Environmental and Social Management Plan as the overarching document that contains general Control Statements for various impacts such as air quality, solid waste, and hazardous materials, water quality and ecosystem, noise and vibration control, erosion control, waste handling and disposal and safety and occupational health. In addition to the Management Plans, the Contractor should prepare Method Statements for specific activities such as excavation works and submit for the Supervision Engineer's review and comments before commencement of works. If the Engineer notifies the Contractor that a specific method statement has failed to provide adequate mitigations, such a statement should be revised and resubmitted until when approved.

9.3.1 LABOUR FORCE MANAGEMENT PLAN

The Contractor is expected to have a clear plan for recruitment of workers to promote project ownership by the communities. The Contractor should give preference to local people by recruitment of unskilled and semi-skilled labour from project villages and this should be done through local areas councils from where those seeking employment should get letters of recommendations.

9.3.2 QUALITY MANAGEMENT PLAN

A quality management plan defines the quality policies and procedures relevant to the project for both project deliverables and project processes and who is charged with what responsibility to ensure compliance to set standards. Given the nature of this project, the contractor should have a quality management plan to guide the quality control and assurance processes to achieve the intended outcomes in terms of social, design, structural and investment outcomes in line with environmental and social safeguards policies.

9.3.3 EROSION AND POLLUTION CONTROL PLAN

Soil erosion is a very important aspect given the location of the construction site for the water sources and reservoir. In addition, the transmission and distribution lines will go through some wetlands. Erosion risks are expected to be mainly associated with vegetation clearance, construction of access roads and storage of excavated materials. In some cases, the project area may receive high amounts of rainfall that will be associated with several soil erosion and drainage impacts, such as, siltation and water stagnation that could be experienced in the direct project area. There is need to lay special strategies for managing the soil erosion.

An erosion control plan should be overlaid on the project grading plan(s) or site plan if there is not a grading plan. The erosion control plan needs to show what Best Management Practices (BMPs) will be used and where, as well as the total disturbance area. The plan must include measures to prevent erosion, contain sediment and control drainage. The erosion control plan must also include installation details of the BMPs as well as notes. Construction sites often have areas where soil disturbing activities such as clearing, grading, or cut/fill work has stopped for a period of time. Bare areas that are not actively under construction need some type of temporary cover to prevent or minimize erosion in the event of rainfall. Applicable areas include topsoil stockpiles, rough graded areas, sediment basin dikes, ditches, temporary earthen structures, and graded areas undergoing settlement. The following controls should be considered:

- Stabilization which includes a wide range of erosion prevention practices that cover exposed soil such as the use of straw, mulch, erosion control blankets, plastic sheeting or tarpaulins.
- Temporary seeding which is a soil stabilization practice involving the establishment of temporary vegetative cover to reduce erosion on construction sites that have disturbed areas that are temporarily idle.

Erosion prevention practices like stabilization are generally less costly and more effective than sediment control measures, which involve settling or filtering mobilized soil particles before they are transported by runoff to surface waters. Various practices can be used for sediment removal

from dewatering discharge. Sedimentation is primarily effective at removing larger sized particles, while filtration and chemical treatment can also remove the fine particles. These approaches are less effective for dissolved nutrients and metals that are non-adsorbed. Effectiveness of chemical treatment depends greatly on the pH and temperature of the water being treated. The Contractor should ideally include a comprehensive Erosion, Sedimentation and Pollution Control Plan Checklist.

9.3.4 WASTE MANAGEMENT PLAN

The Waste Management Plan (WMP) shall be prepared to address waste management aspects associated with the construction of the markets in line with legal and regulatory requirements. The Contractor, all subcontractors, and vendors involved in the project shall have to adhere to this Plan. The Contractor is responsible for ensuring that waste is managed in accordance with this Plan by providing the necessary resources and by issuing instructions and guidance during project execution. The Contractor will implement waste management measures and practices throughout the construction period to mitigate the associated risks. The WMP will contain the following information:

- Relevant legislation and guidelines for waste management of the Project;
- The procedures and initiatives proposed to address the management of waste materials;
- Safeguards, mitigation measures and monitoring to manage waste impacts during construction;
- Roles and responsibilities of those involved in the implementation of waste management controls;
- An effective monitoring, auditing and reporting framework to assess the effectiveness of the controls implemented
- Checklists and forms for day-to-day waste management activities.

9.3.5 OCCUPATIONAL HEALTH AND SAFETY PLAN

The Contractor will have to prepare a document that presents the framework for occupational health and safety management and monitoring measures that he will undertake. The OHS plan should typically cover safety programs that will be applied for promoting health and safety, preventing harm, fatality and hazards to the employees, sub-contractors, properties and the general public.

9.3.6 HANDLING OF CHEMICALS AND OTHER POTENTIALLY HARMFUL MATERIALS

Chlorine, a harmful and toxic chemical, will be employed at the storage reservoirs during project operation. Thus, it must be safely handled to prevent any accidents, including health and safety issues. This section analyses the handling aspects of this chemical.

9.3.6.1 DESIGN AND MANAGEMENT OF CHLORINATION STORAGE AND DOSING AREAS

The following special storage and handling features should be utilized and maintained during the water supply project operation.

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

For systems that use gas chlorination:

1. Install alarm and safety systems, including automatic shutoff valves, that are automatically activated when a chlorine release is detected;
2. Install containment and scrubber systems to capture and neutralize chlorine should a leak occur;
3. 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;
4. Store chlorine away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures.

9.3.6.2 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:

- a. Prepare and approve standard operating procedures for its storage and handling;
- b. Never store chlorine gas and ammonia in the same building or area;
- c. Keep chlorine isolated and in different rooms from the chemicals that it reacts with;
- d. 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;
- e. 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;
- f. Containers should be stored and used above ground level and always in a vertical position;
- g. Chlorine gas containers should be stored in marked areas shielded from external heat sources;
- h. 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;

- i. Empty cylinders should be clearly marked and segregated from unused cylinders.

9.3.7 EMERGENCY RESPONSE PLAN

The main purpose of an Emergency Response Plan (ERP) is to provide a systematic approach to the protection of employees, assets and the environment from impact of serious incidents. The plan encompasses organizing, coordinating and implementing a range of procedures to prevent, mitigate, respond to and recover from the consequences of an emergency event. The ERP covers the required actions for all situations that could generate emergency situations during the project's construction phase. It will be developed to establish general guidelines and response procedures for the management of emergency events on the Project. It will also establish an emergency management command structure and mechanisms for review, oversight and accountability. The contractor shall establish procedures to ensure that all personnel have the skills to report environment incidents. The contractor shall keep records of all incidents, investigation, and analysis and counter measures taken.

The ERP will also set out the means by which these measures will be communicated to affected communities in a culturally appropriate manner. The ERP 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. earthquake, lightning, collapse of excavation walls
- Large-scale hazardous material spill
- Mass casualties
- Health epidemics
- Rapture or leak of equipment
- Flooding

9.3.8 SECURITY MANAGEMENT PLAN

The purpose of the Security Management Plan is to assure a safe and secure project environment for staff, visitors and its service providers alike and to mitigate any risk of loss/damage to project property, equipment or its infrastructure. It identifies potential security risks present in the construction phase, methods and policies to mitigate these risks, and the requirements to ensure

the highest levels of safety and security in the implementation of the Project. It will therefore, set out commitment of the Project to security. The Plan will specifically deal with:

1. Security issues in the project i.e. being safe from attacks from thugs and ill motivated persons;
2. Being prepared for insecurity incidents; and
3. Decisively responding to and managing the insecurity circumstances and incidents.

9.3.9 COMMUNITY HEALTH AND SAFETY PLAN

The Plan applies to Project construction activities and the associated risks and potential impacts that these activities may have on community health and safety. The risks and potential project impacts to community health and safety can emerge from both within and outside the so-called project area of influence. Therefore, the scope of this plan focuses on the management of aspects associated with the interaction of construction activities, the workforce, and the community as well as mitigation of contagious diseases (e.g. COVID-19; Ebola etc). The Plan should include control measures designed to avoid, minimize or mitigate the adverse effects of project activities on the health and safety of the community, while at the same time, enhancing the beneficial effects and capitalize on opportunities that may contribute to improving overall community well-being.

9.3.10 STAKEHOLDER COMMUNICATIONS AND ENGAGEMENT PLAN (SEP)

In pursuit of timely, meaningful and appropriate stakeholder engagement, the contractor is expected to have a clear strategy for stakeholder engagement to assist in managing and facilitating future engagement through the various stages of the Project's life cycle from mobilization up to handover. This stakeholder engagement plan shall detail the key stakeholders to be engaged and the schedule of engagements throughout the various stages of construction, decommissioning and the defects liability period.

9.3.11 HIV/AIDS AND GENDER MANAGEMENT PLAN

The Contractor in pursuit of his commitment to health and safety will organize trainings, conduct awareness and education on the use of infection control measure in the workplace. The Contractor is expected to provide appropriate PPE to protect workers from the risk of exposure to HIV/AIDS and incorporate HIV/AIDS information in occupational health and safety inductions, provide guideline in preventing the spread of HIV/AIDS and other sexually transmitted infections (STIs), publicize knowledge related to HIV/AIDS and STIs to the work crews and the surrounding communities, provide information on good HIV prevention interventions, including promotion of the correct use of condoms and ensure sufficient resources are available for HIV programs.

9.3.12 CHILD PROTECTION AND MANAGEMENT PLAN

Contractors should be cognizant of the importance of child protection issues and their responsibility to uphold the rights of children at all times. A child protection plan should spell out measures to prevent any form of abuse of children such sexual violence, exploitative labour and sexual exploitation which include children. Additionally, the plan should have stringent punitive measures properly defined for potential perpetrators of child related abuse. This should also be signed by contractor workers as part of their contractual obligations to guard against child abuse.

The Child protection Plan shall include the following:

1. Brief Overview of Child Concerns
2. Policy, Legal and Regulatory framework governing child protection issues
3. Child Protection Risks at each site
4. Contractor's Policy on Children and Codes of Conduct
5. Child Protection Services by contractor (Prevention & Mitigation)
6. Arrangements for Referral & Linkage to Other Child protection services in area
7. Support Offered to Children to access justice
8. Mentorship & Training
9. Monitoring & Reporting
10. Schedule of Engagements such as Community Meetings and Joint Stakeholder Meetings.

9.3.13 CHANCE FINDS PROCEDURE

During excavations, chance finds may be encountered. Therefore, the contractor should have a chance finds management plan that defines the measures necessary for the overall management of any cultural heritage encountered during construction.

In order to avoid potential damage to cultural property discovered during construction, the following will apply:

- Workers must be vigilant to any relics found during excavation;
- In case of a discovery during the excavation, workers must immediately report the findings to the Foreman;
- The Foreman must stop the work immediately and communicate the findings to the Supervisor;
- The Supervisor then communicates the findings to the Contractor Manager;
- The Contractor Manager then notifies MWE Safeguards Team;
- The Department of Museums and Monument of Uganda will then be notified either via communicating with the MWE Safeguards Team via telephone or email or based on a site visit within 14 days from the time of discovery;
- Any further excavations or continuation of the infrastructure development at the Site of the discovered heritage will be undertaken only with the approval of the Department of Museums and Monuments;
- Should the Conservator of Antiquities from the Department of Museums and Monuments confirm that the discovered resource falls within the heritage resource description, he/she will report the resource to the Minister of Tourism, Heritage and Antiquities for preservation and protection;
- Rescue excavation or *in-situ* conservation will be proposed based on the disturbance likely to be caused by the project or in relation to cost vis-à-vis value of the heritage resource;
- MWE will then apply for either an excavation or preservation in-situ license of the discovered resource. The feasible proposal will then be executed. In case of in-situ conservation, the site will be managed and open to the communities and tourists that access the project area; and
- All chance finds will be recorded in the chance find form.

The project activities will then continue after the following have taken place:

1. In the case of archaeological artefacts discovery, MWE will inform the Uganda Museum and grant a period where specialists from the Department of Museums and Monuments excavate and curate the artefacts professionally;
2. In the case of discovered human remains the police will have to be notified and either the remains are taken for forensic investigation or the LC1 authorities sanction the reburial of the remains at another location. The Contractor then meets the relocation and reburial expenses which shall be claimed from MWE; and
3. In the case of an encounter with an unknown sacred site, relocation ceremonies will be undertaken by the custodians of the site and the contractor then meets the relocation expenses which shall be claimed from MWE.

Overall, the following precautions ought to be undertaken:

- A. **Site avoidance:** If the boundaries of the site have been delineated, attempt must be made to redesign the proposed development to avoid the site;
- B. **Mitigation:** If it is not feasible to avoid the site through re-design, it will be necessary to sample it using data collection program prior to its loss. This could include surface collection and/or excavation; and
- C. **Site Protection:** It may be possible to protect the site through the installation of barriers during the time of the development and/or possibly for a longer term. This could include erection of high visibility fencing around the site or covering the site area with a geotextile and then capping it with fill. The exact prescription would be site- specific.

During the implementation of the project and in the event that, a PCR is encountered, the following can be contacted:

| | |
|--|--|
| Ministry of Tourism, Wildlife and Antiquities Rwenzori Towers 2 nd Floor, Plot 6 Nakasero Road. KAMPALA, UGANDA. P. O. Box 4241 Kampala Phone: +256 414 561 700 Email: info@tourism.go.ug | The Uganda Museum Plot 5-7 Kira Road, P. O Box 365, KAMPALA-UGANDA (+256) 414 232707. www.ugandamuseums.or.ug |
|--|--|

9.3.14 DECOMMISSIONING/ SITE RESTORATION PLAN

At the end of construction activities, the Contractor shall ensure restoration of the disturbed natural sites through environmental rehabilitation, backfilling and restoring topsoils, (re-) introduction of genetic species (e.g. natural re-grassing) similar to those destroyed in order to re-establish the natural local ecology.

The decommissioning phase will focus on any of the following as applicable:

- a. Workers' camp
- b. The parking yards
- c. Material stockpile areas

- d. Makeshift roads within the site premises
- e. Immediate surroundings of the access roads whose vegetation will be cleared during construction

Specifically, the process of rehabilitating and restoring the site shall follow the following sequential approach:

1. All facility structures shall be demolished; the rubble/debris shall be used for fill purposes or taken to an approved disposal site;
2. All obsolete equipment, vehicles, trucks and machinery shall be removed from sites;
3. Makeshift access roads shall be closed, scarified and revegetated;
4. Backfilling all openings with soil and leftover overburden;
5. Planting fast-growing trees and grasses to stabilize excavated areas with native species; and
6. Fencing off the re-vegetated areas should be provided until the reinstated vegetation has reached maturity.

Joint site inspections will be conducted to ensure site restoration before handover of the project in order to assess the progress of restoration activities. They will constitute the Contractor, the Client (MWE), Supervising Engineer and the District Environment Officer.

9.3.15 GRIEVANCE REDRESS MECHANISM

Effective grievance redress mechanism gives an opportunity to the organization to implement a set of specific measures to ensure good governance accountability and transparency in managing and mitigation of environmental and social issue of a particular project. The community grievance redress shall consist of grievance committees and shall be formed at the community level, construction site, Sub County/town council, District and MWE. A separate GRM for workers shall also be formed at the Construction site. The flow of grievance management is provided under Annex 10.

COMMUNITY GRIEVANCE MANAGEMENT COMMITTEE STRUCTURES

Considering the nature and extent of works, the following community grievances may arise during the construction phase of the project:

- Grievances related to Land acquisition
- Restrictions on land due to civil works, workers camps, material storage areas, material sources, etc.
- Clearance of right of way which may affect crops and trees
- Temporary displacement of road side activities in urban centers, including vendors
- Complaints related to noise, dust, and traffic incidents
- Complaints on workers behavior or conduct specially towards women, girl and boy children
- Illicit behaviors like alcoholism, smoking, drug abuse etc. of the contractor's workers
- Disruption of social set up and security
- Disputes on compensation values
- Increased pressure on social services and infrastructure, including water supply

- Contractor failure to pay workers and suppliers
- Accidents arising out of contractor's negligence to provide necessary information, protective gears and supervision

Membership and Composition of Grievance Management Committees

- GMCs at Village or Parish Levels
- Village and Parish GRM committees will be established as voluntary committees for each infrastructure to be constructed at village or parish levels depending on the community dynamics, area covered and nature of works. Community GRM Committees will have 10 members including
 - Chairperson,
 - Vice Chairperson,
 - Secretary,
 - Other Members (7) including a youth, Elderly Person, PWD and at least 3 members should be female. Quorum sitting shall be of at least five (5 members).

The LC I Chairpersons and Vice Chairpersons will be ex-officials to these committees.

NB: The committee shall be formed either at village or parish level given that linear projects traverse several communities. It is important that committees are accessible to communities at village or parish level.

GMCs at Construction Sites

Each construction site shall have a Site GMC responsible for handling all community grievances related to construction including those grievances referred by the village/ Parish GMC. The Site GMC shall comprise of the following;

- The Resident Engineer/ Supervising Consultant (Chairperson)
- The Contractor's Contract Manager
- Sociologist for the Consultant
- Sociologist for Contractor (Secretary)
- Environmentalist for the Consultant
- Environmentalist for the Contractor
- Health and Safety Officer for the Contractor
- 2 Community Representatives (1 Female and 1 Male)

This committee shall consolidate and address all grievances from the community at the site and escalate any matters appropriately to the respective Local Government and MWE.

GMC at Sub County/Town council Level

The committee will be formed at the sub-county level and its membership shall consist of;

- Local Council III (chairperson);
- The Sub County Chief,
- Community Development Officer (Secretary)

- d) Environment focal person
- e) Representatives of PAPs
- f) Parish Chief of the respective area where the complaint originated from.

GMC at District Level

At the District Level, the Grievances Management Committee shall consist of;

- a) LC V Chairperson (Chairman)
- b) Chief Administrative Officer or a his/ her Representative
- c) District Community Development Officer (Secretary)
- d) Head of Natural Resources
- e) District Water Officer
- f) Representative from the PAPs
- g) District Lands officer

Note: Due to complex nature of grievances, the committees can be extended to include any other relevant officers suitable for addressing the prevailing grievances.

WORKERS GRIEVANCE COMMITTEE STRUCTURES

The common anticipated Grievances for Employee may include; Unsafe physical working conditions, Failure to issue formal contracts to workers, Illegal termination of contracts, Changes without prior notice, Poor employee relations, Poor/ failure/ delayed remuneration, Violation of workers' rights, Inadequate safety, health, and welfare amenities, Labor-management hostility, Incidences of workplace favouritism and nepotism, among others.

The grievance redress system for workers shall have three major committees set up and supported. These include the Workers' Council, Site Disciplinary Committee and overall Grievance Committee.

Workers' Council

The workers' council shall be constituted on the basis of directly elected representatives on the basis of different work sections. It will have representative workers including operators, drivers, mechanics, office/administration, technicians/lab, masons, flag ladies, foremen, clinic, casual laborers, surveyors etc. The different workers' categories shall mobilize and elect a representative to form a council of 5 members.

The 5 members shall select a Chairperson, Vice Chairperson, Secretary and members.

The council shall sit on a regular basis or monthly to discuss all complaints, welfare, working conditions among others. The Supervising Consultant's Sociologist shall be the patron of the

Worker's Council and shall ensure that the members are provided with the support and protection to freely discuss and voice workers' issues.

Any issue that has not been addressed by the Workers' Council shall be escalated or referred to either disciplinary or Site Grievance Committee. The issues that disciplinary in nature shall be referred to the Disciplinary Committee while other issues that are not disciplinary shall be referred to the Grievance Committee.

Site Disciplinary Committee

During the construction phase, a number of disciplinary related cases might emerge. Hence, each Site shall have to set up site disciplinary committee to ensure self- enforcement mechanism of discipline among workers.

The committee shall comprise of;

- a) Consultant's Sociologist (Chairperson)
- b) Contractor's Human Resource Officer (Secretary)
- c) Workers' representatives (a Female and a Male).

The site disciplinary committee shall receive all disciplinary related complaints referred from the Workers' Council or from the Contractor's Management.

Overall Site Grievance Management Committee (GMC)

Each construction site shall have a Site Grievance Management Committee comprising of the following;

- a) The Resident Engineer/ Supervising Consultant (Chairperson)
- b) The Contractor's Contract Manager
- c) Sociologist for the Consultant
- d) Sociologist for Contractor (Secretary)
- e) Environmentalist for the Consultant
- f) Environmentalist for the Contractor
- g) Health and Safety Officer for the Contractor

9.3.16 STAKEHOLDER ENGAGEMENT PLAN AND MATRIX

9.3.16.1 STAKEHOLDER ENGAGEMENT PLAN

The Stakeholder Engagement Plan (SEP) is an instrument for mapping and prioritizing stakeholders across levels and regions; and for guiding planned consultations and disclosure of relevant project information to/with identified stakeholders.

- a. **Stakeholder categorization:** Three (3) categories of stakeholder to be mapped out (across three levels at the national, regional and community) as follows.
- b. **Primary level stakeholders** considered to have high influence and power in respect to the project, project area and potential impacts and project implementation. These require

regular engagements and consultations throughout the project life. These include the beneficiary communities Mboira and Kigumba SCLG, Kiryandongo DLG, OPM/UNHCR Kiryandongo Refugee Settlement

- c. **Secondary level stakeholder** considered to have either high influence but low power or high power but low influence. These will require to be initially consulted and regularly kept informed. These will require to be initially consulted and regularly kept informed. These include political leaders in area
- d. **Tertiary stakeholders** considered to have low power and low influence. These include neighbouring sub counties and town councils.

Information needs: The following information should be made available to all stakeholders, who are likely to be affected by positive and adverse environmental or social impacts from the project:

- a. Purpose, nature, objectives and scale of the project.
- b. Schedule and duration of proposed project activities.
- c. Potential project risks and impacts extracted from the ESIA.
- d. Proposed mitigation plans.
- e. Available grievance mechanisms.
- f. Envisaged consultation process, if any, and opportunities and ways in which the public can participate (via the SEP) and
- g. Time and venue of any planned public meetings.
- h. Benefits of project
- i. Possible risks and their consequences (non-technical) for public interest e.g. threats to water catchments production wells, contamination; threats to water infrastructural e.g. vandalism.

Disclosure mechanisms: A number of strategies can be used to enhance public information disclosure and stakeholder consultations including:

- i. Scheduled public hearings at community level (village and parish) for initial disclosure, disclosure of draft reports and final reports including their implementation
- ii. Dedicated and select meetings with institutional stakeholders at the central regional, district and sub-county levels at different project phases
- iii. Dedicated meetings with select social groups like livelihoods groupings and vulnerable social groups including women, youth, PWDs and local leaders.
- iv. Project Background Information Document (PBID) summaries will be prepared, translated and shared alongside other strategies described herein
- v. Non-Technical Summaries (NTS) of the ESIA will also be developed for public disclosure through print media and info-shops for the regulators, funder and project proponent.

9.3.16.2 STAKEHOLDER MAPPING (INTEREST & INFLUENCE GRID)

The ESIA mapped categories of stakeholders that influence, and/or exert an influence on the water supply and sanitation project in terms of its success and/or failure. Their roles and interests were mapped. A stakeholder matrix was used to assess the stakeholder interests and ranked them using Influence and Power grid (High / Low; +ve / -ve), as well as showing relationship (linkages &

synergies) with the planned project as shown in **Error! Reference source not found.** The purpose of the stakeholder mapping was to identify and assess entry points.

Table 9-1: Stakeholder mapping (Interest, Power & Influence Grid)

| Category of Stakeholders | Level of Interest, Influence & Power | Main Interests, Concerns & Contribution to Kiryandongo Water Distribution Phase 3) |
|---|--------------------------------------|---|
| Primary (high influence & power) | | |
| GoU/Executive – Presidency | High +ve | Fulfilling government / presidential priorities. Has ability to influence scale of project in case of any advocacy from local leaders & outcry from community |
| GoU/ Parliament (Area MPs) | High +ve / High -ve | Some incumbent MPs played key role in lobbying for piped water project, and are eager to see water flowing in their constituencies. If not, they have expressed concern, others have threatened to sabotage the project. Have strong support from communities and can lobby GoU/ Executive / Presidency over the project |
| GoU/ OPM | High +ve | Control all operations in IDP/ refugee communities of ranch 18; own land / sites for water facilities e.g. reservoir site |
| MWE (incl. WSDF-W/ North Umbrella) | High +ve / High -ve | Oversee and manage existing piped water system managers (WSDF-W/North Umbrella; IRWMD; MWE) |
| MWE | High +ve | Owns the project, control and manage the operation plan for the same |
| UNHCR | High +ve | Oversees and directs operations of water supply services; appoint managers of water systems within Kiryandongo refugee settlement |
| World Bank | High +ve | Funding Kiryandongo piped water supply and sanitation / IWMDP |
| Beneficiaries (Host, IDPs/Refugees community) | High +ve / High -ve | They are the reason why Kiryandongo water supply and sanitation project is to be implemented, and government is accountable to them. They can support and/or downplay the project to make it a “White Elephant”. There is also a great section that don’t know / not aware about Kiryandongo water supply and sanitation project |
| Beneficiaries (Refugees) | High +ve / High -ve | They are additional reason why project is to be implemented. Through international conventions on refugees, government is mandated to take care of them. They can welcome the project. To a small extent, they can abandon water supply services in case it’s not user friendly and resort to cheap/ free alternatives. In end OPM/ UNHCR targets are not fully accomplished. There is also a great section that don’t know / not aware about Kiryandongo water supply and sanitation project |
| Water vendors | High +ve / High -ve | They are major players in current water supply value chains across the district especially in rural growth centres. Their major concern is about negative impact of project on their potential to continue selling water to communities. |
| Kiryandongo Higher DLGs | High +ve / High -ve | The technical managers, staff and local leaders are key influencers. A same time, they feel side-lined / not fully engaged in planning and implementing the project. They also have limited information. |
| Kigumba SC Lower LGs | High +ve / High -ve | They are near to the beneficiary communities, and have direct influence and power to enforce ordinances and bylaws that enhance project implementation esp. in ensuring environment and social safeguards. |

| Secondary stakeholders (high influence but low power or high power but low influence) | | |
|---|-------------------|---|
| GoU/ Parliament | High +ve | They allocate |
| GoU/ Other MDAs | High +ve | These implement several infrastructure and livelihood related projects e.g. OPM/DRDIP, NUSAF3 Protection of water catchments and natural resources where hosts and refugees use as open water source |
| MWE | Low +ve | They are the Implementing partners (IP) for Water supply in Kiryandongo refugee settlement and nearby Bweyale and Kigumba Town Councils |
| Other CSOs & Humanitarian Agencies | Low +ve | They are civil society organizations (CSOs); humanitarian, emergency and relief agencies. Their services supplement government role. Their work enhances the integrity of water utilization and management in areas not yet covered, WASH infrastructure at household and communities e.g. hand washing kits, pit latrine construction, water tank construction, etc. There is also a great section that don't know / not aware about Kiryandongo water supply and sanitation project |
| Property & Land Owners | Low +ve / Low -ve | They own the land where water facilities will be constructed. If they decline to offer the land, it can negatively affect the project. However, in case it happens alternative sites can be identified. |
| Local media (Radio, TV, Print) VCC Radio (FM 103.6) KIBANDA FM (FM 89.3) K FM (FM 103.2) | Low +ve / Low -ve | They influence public opinion about the project. However, they have limited information, which in end causes misinformation and public anxiety. There is also a great section that don't know / not aware about Kiryandongo water supply and sanitation project |
| Tertiary Stakeholders (low power and low influence) | | |
| Corporate Clubs (Rotary Clubs, Lions Clubs, etc.) | Low +ve | They mobilise voluntary support for communities in need especially water, sanitation and hygiene. |
| Religious Institutions | Low +ve | They have direct and speedy mobilization of greater section of communities, and can be influential in shaping community roles towards the project, where need be. |

9.3.16.3 STAKEHOLDER ENGAGEMENT PLAN (SEP) MATRIX

In relation to the above, a Stakeholder Engagement Plan (SEP) matrix has been prepared to guide on how specific stakeholder engagements could be undertaken by the contractor, MWE as well as other Government-Ministries, Departments and Agencies (MDAs) in future (construction, Operation phases).

| Project phase & Activity | Objectives | Level and type of stakeholders | Methods | Materials |
|---------------------------------------|--|--|---|---|
| Pre- Construction phase | | | | |
| Organize Stakeholder Awareness events | To mobilize community /public consciousness and preparedness in relation to required roles they are supposed to play | All stakeholders esp. beneficiary community; Kiryandongo DLG (Higher & Lower); Refugees; Institutions | District level meeting of Technical Managers | Workshop / Seminars; Site Visits IEC materials e.g. Leaflets, brochures, T-shirts |
| | | | District Level meeting of Local Leaders | Radio Talk Shows (monthly / quarterly) |
| | | | Use national & Local media | Newspaper Supplement / Pull out |
| Construction phase | | | | |
| Organise Kick-off meetings | To disseminate information about design and how local areas will be affected, how to benefit and play a role | Beneficiary communities at Sub County, Town Council & Refugee Settlements (RWC 1, 2, 3) | Meeting of Sub County Technical Officers & Local Leaders Meeting Site Specific Communities (along distribution lines e.g. trading centres) | Community meetings IEC materials (in English, French / translated into 3 major local language and dialects – Runyakitara, Luganda, Lugisu, Alur, Sudanese Arabic, Swahili) Public display of design |
| Organise periodic meetings | To provide updates about the progress of the construction works, mitigate challenges and options. | Technical managers, staff & Local Leaders District (higher & Lower LGs) Beneficiary communities | Quarterly meetings Site Visits Radio programme | Radio talk shows; DJ Mentions; Radio Magazines / Features TV talk show / TV Feature / site visits |
| Provide jobs to water vendors | To mitigate the impact of project on job loss among water vendors | Water vendors | Shortlisting vendors through their representatives (also use contacts provided in ESIA report) Organize meeting | Community meetings Registration forms |

| | | | | |
|--|--|---|---|---|
| Project closure events | To sensitize about start of operations | All stakeholders | All media channels Official launch / commissioning | IECs on operations – radio, TV, print, community meetings |
| Operation & Maintenance (O&M) | | | | |
| Customer friendly service provision to end users | To mobilise water users to pay / connect to water services | Beneficiaries (water users – new & old) | All media channels | IECs on operations – radio, TV, print, community meetings |

9.3.17 Environmental and Social Mitigation Plan

Table 9-2: Environmental and Social Mitigation Plan

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|---|---|----------------|--|
| POSITIVE IMPACTS – CONSTRUCTION PHASE | | | |
| Provision of direct jobs (casual workers) for locals - youth, women and men | • Recruit locals for construction jobs according to their skills. | • Contractor | Embedded in contractor's fees |
| | • Promote labour-intensive construction methods to create more jobs. | • Contractor | |
| | • Adhere to the local labour laws of 30% women in employment and remuneration of workers above the minimum wage. | • Contractor | |
| | • Ringfence some jobs such as cleaning and cooking specifically for local women. | • Contractor | |
| | • Encourage qualified females to apply for jobs. | • Contractor | |
| | • Gender sensitive facilities such as bathrooms, toilets and breastfeeding spaces to be provided to create a conducive working environment. | • Contractor | 5,000,000 |
| NEGATIVE IMPACTS – CONSTRUCTION PHASE | | | |
| Land use/cover change | • Restrict water transmission and distribution lines to road reserves. | • Contractor | - |
| | • Compensate for land as per Ugandan laws on Land Acquisition and in line with World Bank's OP 4.12. | • MWE | 304,952,275 as determined in the RAP Valuation Report. |
| | • Movement of vehicles and equipment must follow designated pathways or agreed upon access roads. | • Contractor | - |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|---|--|--|--|
| Land acquisition and resettlement | <ul style="list-style-type: none"> Implement the RAP in line with Ugandan laws and the World Bank's ESS5 | <ul style="list-style-type: none"> | 221,960,000 Estimate from RAP for all 3RGCs in Kiryandongo |
| | <ul style="list-style-type: none"> Engage local communities to provide land voluntarily especially for the distribution lines | <ul style="list-style-type: none"> MWE | Covered in RAP implementation budget |
| | <ul style="list-style-type: none"> Select land requiring minimal or no relocation at all | <ul style="list-style-type: none"> MWE | |
| | <ul style="list-style-type: none"> Use road reserves for pipe works | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Provide a fair and prompt compensation to the affected people | <ul style="list-style-type: none"> MWE | 304,952,275 as determined in the RAP Valuation Report. |
| | <ul style="list-style-type: none"> Determine the extent of property lost or destroyed and provide fair and prompt compensation to the effected people. | <ul style="list-style-type: none"> MWE | Covered in RAP implementation budget |
| Deterioration of landscape and visual quality | <ul style="list-style-type: none"> Obtain murrum and subsoil from a NEMA/ DLG licensed source. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> Install berms and drainage channels to control surface water run-off during earthworks. | <ul style="list-style-type: none"> Contractor | |
| | <ul style="list-style-type: none"> Restore of borrow pits and revegetate with native species. | <ul style="list-style-type: none"> Contractor | |
| | <ul style="list-style-type: none"> Close monitoring of impact on natural resources with enforcement of contract or legislative options. | <ul style="list-style-type: none"> DLG/ MWE | 10,000,000 |
| Soil Erosion | <ul style="list-style-type: none"> Limit vegetation clearance to localities required for development. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Hoard off construction sites and instate soil barriers before excavations to intercept any eroded material and any soil material. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> Remove topsoil prior to carrying out excavations and stockpile separately so that it is used last in backfilling of the excavated areas. | <ul style="list-style-type: none"> Contractor | |
| | <ul style="list-style-type: none"> Backfill all trenches immediately after laying the pipes and compact such areas as to near level prior to excavation. | <ul style="list-style-type: none"> Contractor | |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|---|---|--|--------------------------------|
| | <ul style="list-style-type: none"> Remove excess excavated soil material which will not be used for construction works in a timely manner and deposit at an approved site | <ul style="list-style-type: none"> Contractor | |
| Loss of Vegetation and degradation of Habitat | <ul style="list-style-type: none"> Ensure proper landscaping and vegetation restoration is carried out using native species to further reduce the possibility of soil erosion. | <ul style="list-style-type: none"> Contractor | |
| | <ul style="list-style-type: none"> Limit vegetation clearance to localities required for development. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Avoid and minimise cutting of trees at all project sites. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Movement of vehicles and equipment must follow designated pathways or agreed upon access roads. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Remove and destroy any encountered invasive species | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Sensitise all project workers to minimise damage to vegetation and fauna. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> If wild animals are encountered, the Contractor shall notify UWA so that it is picked and taken to a secure place. | <ul style="list-style-type: none"> Contractor | - |
| Disturbance and degradation of wetland ecosystems | <ul style="list-style-type: none"> Use existing road corridors for construction and operational access wherever possible. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Where the alignment requires the suspension points for the water pipes to be located in the swamp and in areas which cannot be easily accessed, build temporary access to wetland areas not easily accessible from existing roads or causeways, that will be removed after. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> Obtain wetland user permits from NEMA before constructing across or along wetlands and follow all guidelines given. | <ul style="list-style-type: none"> MWE | 150,000 |
| | <ul style="list-style-type: none"> All project workers should be sensitized to minimize damage to flora and fauna. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> Close monitoring and supervision of the construction operations to ensure compliance to the NEMA permit conditions and avoid causing further damage to undesignated project areas. | <ul style="list-style-type: none"> MWE | - |
| Generation of waste | <ul style="list-style-type: none"> The Contractor shall develop and implement a Waste Management Plan | <ul style="list-style-type: none"> Contractor | 15,000,000 |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|---|--|--|---|
| | <ul style="list-style-type: none"> All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and delivered to recycling facilities. Other forms of waste which are inert must be collected by NEMA gazetted waste handlers and taken to a NEMA gazetted waste disposal facilities for disposal. | <ul style="list-style-type: none"> Contractor | 10,000,000 |
| | <ul style="list-style-type: none"> All organic waste generated at eating places during construction such as food stuffs shall be collected and transported by the contractor to designated district landfills for disposal. | <ul style="list-style-type: none"> Contractor | |
| | <ul style="list-style-type: none"> All plastic waste generated during construction, such as mineral water bottles, polyethene bags, jerricans and cups shall be collected and taken for recycling in plastic collectors in Kiryandongo for onward transmission to plastic recyclers. | <ul style="list-style-type: none"> Contractor | |
| | <ul style="list-style-type: none"> Human excreta shall be managed using a mobile toilet and then disposed at the waste stabilisation ponds at Kiryandongo Hospital. | <ul style="list-style-type: none"> Contractor | 10,000,000 |
| | <ul style="list-style-type: none"> The contractor will work with Kiryandongo district Local government to facilitate sound waste handling and disposal. All wastes must be taken to the approved waste disposal facilities. Proof of delivery and safe disposal of waste will be provided and records maintained at all times. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| Risk of contamination due to flooding of borehole DWD 77383 | <ul style="list-style-type: none"> The production well should be constructed with a water tight casing above the water table | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> The design and construction of the pump house at source DWD 77383 should incorporate a raised apron slab above the ground by the required height for the predicted flood depth of the area. | <ul style="list-style-type: none"> MWE | Part of the Design Consultant's work |
| | <ul style="list-style-type: none"> Aprons should be constructed with deep foundation edges to avoid erosion | <ul style="list-style-type: none"> MWE | |
| | <ul style="list-style-type: none"> A water source protection plan has been developed to ensure sustained water quality and quantity for the project. | <ul style="list-style-type: none"> MWE | Part of ESIA, RAP & SPP Consultant's work |
| Noise and Vibrations | <ul style="list-style-type: none"> Workers should be provided with the necessary personal protective equipment (PPE) such as ear muffs. | <ul style="list-style-type: none"> Contractor | |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|------------------------|---|------------------------------------|--------------------------------|
| | <ul style="list-style-type: none"> Periodic medical hearing checks should be performed on workers exposed to high noise levels. | • Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> Sites must be hoarded to curb noise impacts to neighbouring communities. | • Contractor | |
| | <ul style="list-style-type: none"> Works should be undertaken during day time i.e. from 8am to 6pm. | • Contractor | - |
| | <ul style="list-style-type: none"> Works near schools or health centres should be done in periods like weekends in order for noise and vibrations not to interfere with learning environment. | • Contractor | - |
| | <ul style="list-style-type: none"> Weekly monitoring of noise levels at active sites should be carried out by the contractor. | • Contractor | Within contractor's bid budget |
| Air Pollution | <ul style="list-style-type: none"> Travel speeds of construction vehicles along the road especially at trading/business centres will be controlled and should not exceed 50 km/h on the highway and 40 km/h off the highway. | • Contractor | - |
| | <ul style="list-style-type: none"> Trucks will be covered during haulage of construction materials to reduce on spillage of materials and wherever dust suppression is necessary, water will be sprayed over dusty areas. | • Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> Workers will be provided with PPE and the use of PPE shall be enforced. | • Contractor | |
| | <ul style="list-style-type: none"> All surfaced roads shall be subject to road cleaning and un-surfaced roads to dust suppression, the methodology and frequency of which shall be included in the Contractor's Traffic Management Plan. | • Contractor | |
| | <ul style="list-style-type: none"> Stockpiles of friable material will be grassed in order to prevent wind erosion. | • Contractor | - |
| | <ul style="list-style-type: none"> A maintenance programme for equipment and vehicles will be implemented, to ensure air emissions like particulates, SO2 and NO2 are minimised. | • Contractor | Within contractor's bid budget |
| Reduced Traffic Safety | <ul style="list-style-type: none"> The Contractor shall develop and implement a traffic management plan to be approved by the supervision engineer | • Contractor | 11,000,000 |
| | <ul style="list-style-type: none"> All road closures shall be separately notified and agreed with the subcounty administration. | • Contractor/ Subcounty Council | - |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|--------------------------------|--|--|--------------------------------|
| | <ul style="list-style-type: none"> • Vehicular access to and from hospitals, police stations, and other public institutions shall be maintained through the use of steel road plates over open trenches. Pedestrian access to schools, health facilities, and other premises frequently accessed by the public will be maintained with the use of walking boards. | <ul style="list-style-type: none"> • Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> • To minimize interference with traffic, half of the road shall be closed to enable vehicles use one half as the other half is being excavated and installed with pipe work. | <ul style="list-style-type: none"> • Contractor | - |
| | <ul style="list-style-type: none"> • Road safety and site safety training should be done involving construction workers, police and local community. | <ul style="list-style-type: none"> • Contractor/ Police/ LC | - |
| | <ul style="list-style-type: none"> • Conspicuous signage shall be well placed on roads and the Contractor's Traffic guides on ground shall direct traffic in case of diversions or open trenches. | <ul style="list-style-type: none"> • Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> • All company vehicles used in the transportation of construction workers, material and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form before usage. | <ul style="list-style-type: none"> • Contractor | - |
| | <ul style="list-style-type: none"> • All drivers to be employed by the Contractor shall be qualified, skilled with valid driving permits. | <ul style="list-style-type: none"> • Contractor | - |
| | <ul style="list-style-type: none"> • The vehicle speed shall be limited to a maximum of 30km/hr areas near sensitive facilities. | <ul style="list-style-type: none"> • Contractor | - |
| | <ul style="list-style-type: none"> • Works near sensitive facilities like schools and health centres shall only be limited to day time (7am to 6pm). | <ul style="list-style-type: none"> • Contractor | - |
| Risk of | <ul style="list-style-type: none"> • Prepare a comprehensive Stakeholder Engagement Plan (SEP); | <ul style="list-style-type: none"> • Contractor | 5,000,000 |
| misinformation due to | <ul style="list-style-type: none"> • Community liaison activities; | <ul style="list-style-type: none"> • MWE | 20,000,000 |
| failure to engage stakeholders | <ul style="list-style-type: none"> • Undertake radio talk shows to communicate progress of the project to local stakeholders. | <ul style="list-style-type: none"> • MWE | 3,000,000 |
| | <ul style="list-style-type: none"> • The contractor will be required to develop a Labour Influx Management Plan and/or a Workers' Camp Management Plan. | <ul style="list-style-type: none"> • Contractor | 7,000,000 |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|--|---|---|--------------------------------|
| Conflicts due to influx of immigrant labour | <ul style="list-style-type: none"> contractors shall be required to have an HIV/AIDS policy and a framework (responsible staff, action plan, etc.) to implement during project execution. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> Create awareness local communities prior to start of construction works. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Efforts to be geared toward instilling attitudes of tolerance, support and understanding of labour immigrants by the local communities | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Sensitize workers on proper social behaviour and conduct with regard to community systems and the acceptable societal norms; | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Put in place a grievance redress committee or a Public Complaints Desk to receive any complaints about the construction activities; | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Implement a strict employment code of conduct. | <ul style="list-style-type: none"> Contractor | - |
| Risk of violence against children (VAC) | <ul style="list-style-type: none"> Develop a strict employment code of conduct to protect the girl child. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Sensitize employees on dangers of molestation of children, especially the girl child. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Sensitize the Contractor against child labour and implement the child labour act; | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Demand birth certificate or any identify that clearly shows the age of a job applicant; | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Issue each worker with an applicant letter with well spelt out terms of engagement. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Monitoring school attendance | <ul style="list-style-type: none"> Contractor/ DLG | - |
| | <ul style="list-style-type: none"> Sensitization in schools | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Reporting mechanisms in place such as a whistleblowing system. | <ul style="list-style-type: none"> Contractor | - |
| Risk of Sexual and Gender Based Violence (SGBV) - e.g. physical assault, | <ul style="list-style-type: none"> The Contractor should have a sexual harassment policy and mainstream it to ensure strict adherence to established mechanisms to avoid the emergence of these challenges; | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> MWE should ensure that social safeguards personnel are recruited as part of the project implementation personnel to supervise contractors and to continuously engage communities; | <ul style="list-style-type: none"> MWE | - |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|--|--|---|--------------------------------|
| Sexual abuse, and sexual harassment | <ul style="list-style-type: none"> Put SGBV reporting mechanisms in place; | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Community sensitization among men and women. | <ul style="list-style-type: none"> Contractor | - |
| HIV/AIDS risks | <ul style="list-style-type: none"> Sensitize workers on proper social behaviour and conduct with regard to community norms, HIV/AIDS and other sexually transmitted diseases. HIV/AIDS policies should be developed at the workplace. Free HIV/AIDS testing, counselling and condom distribution be encouraged for both workers, sex workers and local community. The pathways for transmission of HIV/AIDS and STIs are well known, foreseeable and can be mitigated. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> 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 powerful relationships, which lead to exploitation of mostly women and children, while encouraging relationships that may lead to permanent situations. | <ul style="list-style-type: none"> Contractor/ DLG | - |
| Risk of Contracting and Spreading COVID-19 | <ul style="list-style-type: none"> Sensitize all project employees about the signs and symptoms of COVID-19 as well as the ways to control its spread. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Screen local employees/contractors for COVID-19 during recruitment. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Screen all visitors to construction sites using a temperature gun and enforce washing of hands before entry and wearing of approved masks. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Management of potential COVID-19 cases – in case, any workers develop the above symptoms, isolate them and immediately contact the respective District Health Officers (DHOs) to pick and transport the patients for treatment. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Reduce site traffic – prohibit entry for any non-essential visitors. In addition, utilize staggered start and finish times for workers to limit site congestion and physical contact. Further, restrict the number of people in attendance at any site inductions, and consider holding them outdoors whenever feasible. | <ul style="list-style-type: none"> Contractor | - |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|---|--|----------------|--------------------------------|
| | <ul style="list-style-type: none"> Practice social distancing – Consistently monitor points of worker interactions such as dining areas to ensure social distancing guidelines (2-4 meters apart) are being met. | • Contractor | - |
| | <ul style="list-style-type: none"> Prioritize sanitation – Enforce workers to wash their hands with soap and water for at least 20 seconds or to use sanitizers before entering and after leaving the worksite, as well as before and after handling all goods, materials and equipment. Routinely clean any common contact surfaces on-site (e.g. scanners, turnstiles, screens, telephones and desks). Lastly, be sure to temporarily remove or disable any site entry systems that require skin contact (e.g. fingerprint scanners). | • Contractor | - |
| | <ul style="list-style-type: none"> Limit physical contact – Make sure that the contractor stagger break times to reduce congestion and physical contact in eating areas. Require workers to keep at least 2-3 metres of distance between one another while eating. | • Contractor | - |
| | <ul style="list-style-type: none"> Enhance whole-of-society coordination mechanisms to support preparedness and response, including the health, transport, travel, trade, finance, security and other sectors. Involve public health Emergency Operations Centres and other emergency response systems early. | • Contractor | - |
| | <ul style="list-style-type: none"> Continuously sensitize the workers and pass on any new guidelines by Government and the WHO. | • Contractor | - |
| Risk of not engaging stakeholders in project monitoring | <ul style="list-style-type: none"> Bring onboard the relevant stakeholders including Kiryandongo DLG to participate in routine project monitoring. | • MWE | - |
| Decommissioning of auxiliary facilities | <ul style="list-style-type: none"> Demolish all auxiliary facilities | • Contractor | - |
| | <ul style="list-style-type: none"> Remove all obsolete equipment, vehicles, trucks and machinery shall be removed from sites | • Contractor | - |
| | <ul style="list-style-type: none"> Backfilling all openings with overburden soil | • Contractor | - |
| | <ul style="list-style-type: none"> Planting fast-growing trees and grasses to stabilize the excavated areas | • Contractor | - |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|---|--|----------------|--------------------------------|
| | <ul style="list-style-type: none"> Fencing off the re-vegetated areas is recommended until the reinstated vegetation has reached maturity | • Contractor | - |
| | <ul style="list-style-type: none"> Clean-up of the site and safe disposal of any construction waste. | • Contractor | - |
| NEGATIVE IMPACTS AND RISKS – OPERATION PHASE | | | |
| Depletion of Groundwater Resources | <ul style="list-style-type: none"> The water levels should continuously be monitored to ascertain any impact on the water level. | • NUWS | - |
| | <ul style="list-style-type: none"> Water levels should be accompanied by monitoring of the water quality to ascertain any trend in water quality change with continued abstraction. | • NUWS | Per NUWS' operation budget |
| | <ul style="list-style-type: none"> The developer should apply /acquire the abstraction permits which will facilitate adherence to agreed rates of abstraction on one side and also guide the DWRM while issuing abstraction permits in the vicinity, to other competing users | • MWE | 450,000 |
| Solid Waste Generation | <ul style="list-style-type: none"> A Waste management plan for the operation phase of the project will be developed and implemented. | • NUWS | - |
| | <ul style="list-style-type: none"> Waste collection bins will be provided at strategic positions at the water | • NUWS | Per NUWS' operation budget |
| | <ul style="list-style-type: none"> offices, water source sites and reservoirs sites for temporary waste storage. The waste collection bins should be provided with covers to avoid spillage by scavengers and clearly coded for sorting purposes | • NUWS | Per NUWS' operation budget |
| | <ul style="list-style-type: none"> The water supply system operator will hire a certified waste collection company to transport the waste for final disposal to designated waste dumping sites by NEMA | • NUWS | Per NUWS' operation budget |
| Risk of Pollution from mismanagement of sanitation facilities | <ul style="list-style-type: none"> A Periodic maintenance regime including emptying and desludging will be put in place and implemented to prevent sewage over flows | • NUWS | Per NUWS' operation budget |
| | <ul style="list-style-type: none"> Use of manifest system to ensure that the wastes are disposed off at a site (waste treatment plant) gazetted by NEMA | • NUWS | - |
| | <ul style="list-style-type: none"> A robust management system for the sanitation facilities involving the communities, their leaders and the health workers should be put in place to | • NUWS | - |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|--|--|--|--------------------------------|
| | monitor, detect and alert the responsible authorities to call for emptying of any septic tank that causes a danger to the community | | |
| Loss of livelihood for water vendors | <ul style="list-style-type: none"> Provide paid employment to water vendors who will lose their livelihood | <ul style="list-style-type: none"> NUWS | Per NUWS' operation budget |
| NEGATIVE IMPACTS AND RISKS – PHASE CROSSCUTTING | | | |
| Occupational Health and Safety Risks | <ul style="list-style-type: none"> The Contractor shall prepare and implement an occupational safety and health plan for all sites, approved by the developer. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> The Contractor shall provide safety guidelines to all operations prior to start of work. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Strict adherence to safety measures and procedures are required to minimise (or eliminate) risks of accidents or hazardous developments occurring and ensure healthy and safe conditions for all persons working on the site. To ensure occupational health and safety on construction sites, the Contractor shall be obliged to comply with all applicable Ugandan construction Health and Safety Standards as required by the Occupational Safety and Health Act of 2006. These include provisions of the Factories Act, Labour Unions Act and Workman's Compensation Act. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Training will be conducted on how to prevent and manage incidences. This should involve proper handling of electricity, water etc. and sensitization on various modes of escape, conduct and responsibility during such incidences. All must fully be aware and mentally prepared for potential emergency. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Regular drills will be constantly followed on various possible incidences. This will test the response of the involved stakeholders. Such drills will keep them alert and they will become more responsive in case of incidences. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Personnel on duty shall at all times wear appropriate PPE, such as safety glasses with side shields, face shields, hard hats/helmets, and safety boots be required for all site staff. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> The Contractor shall establish emergency entrances, exits and amenities. | <ul style="list-style-type: none"> Contractor | - |

| Impact/Risk | Mitigation /Enhancement commitments | Responsibility | Estimated Cost (UGX) & Remarks |
|-------------|---|--|--|
| | <ul style="list-style-type: none"> The Contractor shall ensure access to first aid kits. | <ul style="list-style-type: none"> Contractor | 3,000,000 |
| | <ul style="list-style-type: none"> The Contractor shall 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. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> The Contractor shall secure site boundaries with fences or hoardings as appropriate. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> The Contractor shall 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. | <ul style="list-style-type: none"> Contractor | Within contractor's bid budget |
| | <ul style="list-style-type: none"> The Developer through the Construction Supervisor will continually monitor Contractors' compliance with Health and Safety measures. | <ul style="list-style-type: none"> MWE | Within supervision consultant's bid budget |
| | <ul style="list-style-type: none"> An Accident Log will be maintained onsite to register all injuries and to investigate their causes during both the construction and operation phases of the project. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> The manufacturer's instructions and Material Safety Data Sheets (MSDS) shall be followed for the storage of all chemicals used in water treatment. Storage must conform to compatibility restrictions. | <ul style="list-style-type: none"> Contractor | - |
| | <ul style="list-style-type: none"> Work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor. | <ul style="list-style-type: none"> Contractor | - |

9.4 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

9.4.1 PURPOSE OF MONITORING

A monitoring program aims to ensure that proposed mitigation and enhancement measures are implemented to generate intended results, otherwise the measures need to be modified, ceased or replaced when inappropriate. Moreover, monitoring allows assessing compliance with national standards as well as with the World Bank policies and guidelines. The Ministry has established a monitoring mechanism for supervision, monitoring and enforcement of E&S requirements. The mechanism includes the MWE teams (including the PST), the supervising consultants and contractors. Furthermore, the Ministry will procure a dedicated consultant for undertaking stakeholder engagement activities and formation, training and tooling of GRMs as well as other E&S Risk management activities and the ministry has allocated separate budget for this consultancy.

9.4.2 SCOPE OF ENVIRONMENTAL AND SOCIAL MONITORING

Environmental monitoring will be undertaken at different levels as described below

- **Surveillance:** Undertaken by the Supervision Engineer on behalf of MWE.
- **Quarterly Monitoring:** Joint by all relevant stakeholders at various levels.
- **Audit activities:** To be done by a NEMA registered Environmental Auditor.
- **Spot checks:** By Supervising Engineer, MWE, Contractor, District Leadership, NEMA.

9.4.3 MONITORING ACTIVITIES AND PROCESSES

9.4.3.1 WEATHER FORECASTS

Weather monitoring and forecast is important to ensure that the Contractor plans for activities and provides mitigation where weather especially rainfall may pose challenges. This will be critical during excavation works.

9.4.3.2 SITE INSPECTION

Routine inspections will be carried out to cover all aspects of environmental and social management on the site. Daily inspection aims to identify any environmental issues and rectify them without delay whereas weekly, monthly and quarterly inspections will verify that the daily inspections are identifying any maintenance requirements and that these requirements are being completed in an appropriate time frame. Site inspections will be carried out by the Contractor with instructions from the Supervision Consultant.

9.4.3.3 MEETINGS

Monthly site meetings are to be held to discuss project progress and, in such meetings, safeguards issues shall be sufficiently discussed and minuted. That shall include a review of the effectiveness of the mitigation measures, successes, and non-compliances. This will be a platform for the Engineer, the client (MWE) and World Bank to raise any environmental issues arising from the joint inspection and as a reaction to the contractor's presentation.

9.4.3.4 RECORDKEEPING

MWE shall ensure that all relevant monitoring and compliance records are readily available. Section 122 (6) of NEA (2019) states, “A developer shall maintain proper records of the monitoring undertaken under subsection (2), which shall be made available to the Authority or lead agency upon request” while subsection (7) states, “A lead agency or the Authority may require the developer to submit monitoring reports in a prescribed form”.

9.4.3.5 MONTHLY AND QUATERLY ENVIRONMENTAL AND SOCIAL REPORT

Either a standalone Monthly Environment and Social Report shall be prepared, or safeguards shall be sufficiently covered in the Contractor’s Monthly Progress Report in fulfilment of the Contractor’s contractual reporting obligations. The report will highlight different activities undertaken to manage environmental and social aspects of the project in line with contract specifications, laws, standards, policies, and plans of Uganda and World Bank Safeguard policies. This report will also have to be verified and approved by the supervising consultant. Planning for management of environmental aspects is typically done on a continuous basis. In that regard, every monthly progress report should include a schedule for environmental and social activities for the next month.

This Contractor’s Monthly Report is expected to summarize the following:

- a) Progress in implementing the CESMP and the standalone management plans;
- b) Status of key approvals and documentation for the project;
- c) Compliance with legal obligations and specifications;
- d) Compliance to the commitment to child protection and GBV (SEA & SH) prevention and management
- e) Findings of the monitoring programmes, with emphasis on any breaches of the control standards, action levels or standards of general site management;
- f) Summary of any complaints by the community and actions taken/to be taken; and
- g) Key environmental activities for the next month.

On a quarterly basis, the supervising consultant will prepare an Environment and Social Report covering similar thematic areas as listed above (for the quarter) that will be submitted to the developer (MWE). This report will inform the MWE quarterly report that will be shared with the World Bank and other stakeholders.

MWE should stipulate reporting requirements in the bidding documents for sourcing the project contractor and supervising consultant, and binding clauses should also be included in the subsequent contracts to ensure compliance.

9.4.3.5.1 ACCIDENT AND INCIDENT REPORTING

The supervising consultant and contractor shall ensure reporting of any serious and severe incidents to MWE within 24 hours of their occurrence while MWE will ensure similar reporting to the World Bank within 48 hours of their occurrence.

9.4.3.5.2 REPORTING CHANNELS ON SGBV/SEA-SH ON SEVERE INCIDENTS & BREACHES DURING IMPLEMENTATION

During implementation, the contractor shall follow guidelines on where and how to report SGVB/SEA-SH incidents and breaches. The ESS team will track, record, report and manage all GBV/SEA related incidents (breaches). All reports on GBV/SEA-SH shall indicate BY WHO, TO WHOM, WHAT, WHEN and TARGET / ACHIEVEMENTS. It is essential that the confidentiality and safety of victims and/or survivors will (must) be protected.

| FORMANT / ISSUES TO REPORT | BY WHO | TO WHOM | WHEN |
|---|---|--|---|
| <p>The project will track and report severe GBV/SEA-SH incidents, breaches and allegations, by clearly establishing the following:</p> <ul style="list-style-type: none"> • Keep record of all incidents (GBV/SEA-SH Register) • Nature of the case; • Location; age, sex of victims and/or survivors; • Perpetrators sex, relationship to victim / survivor; origin • Project-related (Yes / No) • Whether the victims and/or survivor were referred to services. • Any other resolution of matter done | <p>Social Safeguards officer / GRM</p> | <p>MWE (who can then report to bank)</p> | <p>As soon as becomes known (Tracking is done continuously / daily)</p> |
| <p>The GBV Service Provider (contracted to project) shall ensure continuous monthly reporting is done on following:</p> <ul style="list-style-type: none"> • Total number of GBV/SEA-SH cases received / referred, disaggregated by age and by sex; location, date of occurrence, referral status • The number of cases open, closed cases, and average time they have been open / closed • Summary data on perpetrators (location, relation to victims and/or survivors), date of occurrences | <p>GBV Service provider (e.g. CBO, NGO)</p> | <p>Contractor & MWE</p> | <p>Monthly</p> |
| <p>The contractor (through a designated officer e.g. Supervising Engineer) shall prepare a Status Report on GBV/SEA-SH. Specifically, the report shall highlight the following issues:</p> <ul style="list-style-type: none"> • Progress on Key Indicators on GBV/SEA-SH showing Planned and Achieved Target) • GBV /SEA-SH Incident Register (Excel file) • Training done (total number of participants – workers, local leaders, community actors) | <p>Contractor</p> | <p>MWE</p> | <p>Monthly / Quarterly</p> |

| | | | |
|---|-----|------------|---------------------|
| <ul style="list-style-type: none"> • Community awareness meetings done on GBV/SEA-SH prevention and response / reporting and community feedback (minutes of the community meetings can also be shared) • Performance of GRM- how correctly for receiving and resolving complaints; GRM indicators • Status on appropriate mechanism to resolve GBV/SEA-SH complaints | | | |
| The MWE as an implementing Agency (IA) shall prepare status reports on GBV/SEA-SH and report to World Bank. | MWE | World Bank | Monthly / Quarterly |

If the aggrieved party is satisfied, the matter shall be closed and signed off with them in the complaints log book (Annex 10). The grievances on GBV, VAC, sexual harassment, among others that result into body injuries, shall be referred to nearby health centre facilities. However, in case of criminal cases, grievances on GBV, VAC, sexual harassment, among others, shall be immediately referred to Police (in respective cells) for statutory investigations and management in accordance with Uganda’s legal system.

Therefore, in a formal reporting, the following procedure will be undertaken using the report form;

- Getting the details of the Victim of GBV by GBV focal person
- Documenting the details of the Case
- Preparing witnesses to engage other Legal Actors like the Police
- Establishing the appropriate procedure including the need to for medical examination of the victim and the perpetrator
- Producing a comprehensive report to enable duty bearers assess and take appropriate actions
- Submitting the report to Duty Bearers like Uganda Police, State Attorneys and Courts
- Follow up of GBV Cases and victims to ensure appropriate services are accessed by the Victim

9.4.4 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN REVIEWS

The ESMP is a living/dynamic document subject to similar influences and changes from variations to the provisions of the project specifications. It will be reviewed at an interval of 6 months in order to identify any required amendments.

9.4.5 ENVIRONMENTAL COMPLIANCE AUDIT

MWE will take the responsibility to fulfil the requirements for an environmental and social audit, not less than 12 nor more than 36 months after project completion or commencement of operations respectively in line with the National Environment Act 2019 and the Audit Regulations of 2020.

9.4.6 APPROVAL OF THE ESMP ACTIVITIES

Implementation of ESMP activities will be approved by MWE and safeguards compliance will be one of the bases for payment. Final payment for the contractor shall be tagged to successful restoration of all disturbed areas and clean-up of all construction sites.

9.4.7 ENFORCEMENT OF COMPLIANCE

The supervising engineer must strictly supervise implementation of the ESMP and where there are breaches, the supervising engineer should issue written instructions, cautions and warnings as applicable. Where the contractor fails to comply, contractual clauses should be invoked, and penalties or fines effected. If necessary, the civil works can be suspended if the contractor repeatedly fails to adhere to instructions. MWE should penalize the supervising consultant if he fails to supervise and enforce ESMP implementation by the contractor.

9.4.8 OPERATION PHASE MONITORING

9.4.8.1 WATER SUPPLY PLAN

MWE should develop, implement, and maintain a water safety plan taking into consideration the potential risks to the safety of the water from the supply catchment area to the consumer. A water safety plan should consist of three key components:

- a) System assessment to determine whether the drinking-water supply chain (up to the point of consumption) as a whole can deliver water of a quality that meets health-based targets;
- b) Identifying control measures in a drinking water system that will collectively control identified risks and ensure that the health-based targets are met; and
- c) Management plans describing actions to be taken during normal operation or incident conditions and documenting the system assessment (including upgrade and improvement), monitoring and communication plans and supporting programmes.

A water safety plan should include:

- a) Measures to protect the source of drinking water from risks of pollution;
- b) Measures to ensure all installations intended for the production of drinking water exclude any possibility of contamination. For this purpose and in particular:
 - The installation for collection, the pipes and the reservoirs should be made from materials suited to the water and in such a way as to prevent the introduction of foreign substances in water;
 - the equipment and its use for production should meet hygienic requirements;
- c) Measures to ensure an appropriate treatment such as pre-treatment processes, coagulation, flocculation, sedimentation, filtration and disinfection are undertaken to assure the safety of water for the consumers;

- d) Appropriate operational monitoring system including monitoring parameters that can be measured and for which limits have been set to define the operational effectiveness of the activity; frequency of monitoring and procedures for corrective action that can be implemented in response to deviation from limits. If, during production it is found that the water is polluted, the producer shall stop all operations until the cause of pollution is eliminated; and
- e) A verification plan to ensure that individual components of a drinking-water system, and system as a whole is operating safely.

Public health surveillance (that is, surveillance of health status and trends) contributes to verifying drinking-water safety. Adequate infrastructure, proper monitoring and effective planning and management; and a system of independent surveillance are basic and essential requirements to ensure the safety of drinking-water. Surveillance should cover the total supply network from the source of untreated water to the consumer delivery points.

9.4.8.2 WATER QUALITY MONITORING PLAN

MWE will undertake water quality tests before use of the water by the communities to determine if water is safe to drink and to establish a baseline so that any future degradation can be detected. The Uganda Drinking Water Standards (**Table 9-3**) are as follows:

Table 9-3: Uganda Drinking Water Quality Standards and WHO Drinking Water Standards

| Characteristic | Unit | US-201: 2008 Requirement | WHO 2011 Requirement |
|--|----------------------------|---|----------------------|
| Physical Requirements | | | |
| Colour | Hazen units, max. Pt scale | 15 | No Guideline |
| Odour | | Acceptable to consumers and no abnormal changes | No Guideline |
| Taste | | Acceptable to consumers and no abnormal changes | No Guideline |
| Turbidity | NTU | 5 | 1 |
| Dissolved Solids | mg/l | 700 | No Guideline |
| Suspended Solids | mg/l | 0 | No Guideline |
| Electrical Conductivity (EC) | µS/cm | 1500 | 250 |
| Chemical Requirements | | | |
| pH | | 6.5 – 8.5 | 6.5 – 8.5 |
| Total Hardness (as CaCO ₃) | mg/l | 500 | No Guideline |
| Calcium (as Ca) | mg/l | 75 | No Guideline |
| Sodium (as Na) | mg/l | 200 | 200 |
| Magnesium | mg/l | 50 | No Guideline |
| Arsenic (as As) | mg/l | 0.05 | 0.01 |

| Characteristic | Unit | US-201: 2008 Requirement | WHO 2011 Requirement |
|--|------|--------------------------|----------------------|
| Copper (as Cu) | mg/l | 1.0 | 2.0 |
| Chloride (as Cl) | mg/l | 250 | 250 |
| Chromium (as Cr 6+) | mg/l | 0.05 | 0.05 |
| Fluoride (as Fl) | mg/l | 1.0 | 1.5 |
| Iron (as Fe) | mg/l | <0.30 | No Guideline |
| Manganese (as Mn) | mg/l | 0.1 | 0.1 |
| Nitrates (as NO ₃) | mg/l | 5 | 50 (Total Nitrogen) |
| Barium | mg/l | 1.0 | 0.7 |
| Aluminium (as Al) | mg/l | 0.1 | 0.2 |
| Sulphates | mg/l | 200 | 250 |
| Zinc (as Zn) | mg/l | 5.0 | 3.0 |
| Lead (as Pb) | mg/l | 0.05 | 0.01 |
| Selenium (as Se) | mg/l | 0.01 | 0.01 |
| Cadmium (as Cd) | mg/l | 0.01 | 0.003 |
| Phenolic substances (C ₆ H ₅ OH) | mg/l | 0.001 | No Guideline |
| Mercury (as Hg) | mg/l | 0.001 | 0.001 |
| Cyanide | mg/l | 0.01 | 0.07 |
| Poly nuclear aromatic substances | mg/l | nil | No Guideline |
| Residual free chlorine | mg/l | 0.2 | 0.2 |
| Mineral oil | mg/l | 0.01 | No Guideline |
| Anionic detergents | mg/l | 0.2 | No Guideline |
| Pesticides | | Trace | Trace |
| Carbon chloroform extracts (CCE, organic pollutants) | mg/l | 0.2 | No Guideline |

Source: Uganda Bureau of Standards, WHO Guidelines, 2011

The minimum parameters to be tested are as detailed below:

Physicochemical:

- Conductivity, or dissolved solids
- Colour
- Turbidity
- Taste
- Odour

Microbiological:

- Faecal coliform bacteria or E. coli;

- Shigella spp
- Salmonella spp

Chemical:

- Fluoride as F-
- Nitrate
- Nitrite
- pH value
- Aluminium
- Iron(total)
- Ammonia
- Residual chlorine

The frequency of sampling and surveillance will be as detailed in **Table 9-4** below:

Table 9-4: Minimum frequency of sampling of water for surveillance

| Population served (P) | Frequency (minimum) of sampling |
|-----------------------|---|
| P > 100,000 | 10 samples every month per 100,000 of population served |
| 25,001 – 100,000 | 10 samples every month |
| 10,001 – 25,000 | 3 samples every month |
| 2500 – 10,000 | 2 samples every month |
| P < 2500 | 1 sample every month |

A sampling programme that takes into consideration appropriate international recommendations should be established and implemented. The sampling should be regular, and its frequency should mainly depend on the following factors:

- a) Quality of water harnessed including effects on the water from climatic, human and industrial activities;
- b) Type of treatment for drinking worthiness;
- c) Volume of water processed;
- d) Risks of contamination;
- e) Background of public water supply network;
- f) Population served; and
- g) Capabilities of the analytical facility (both in terms of capacity and in terms of analytical performance).

9.4.8.3 OPERATION PHASE ANNUAL COMPLIANCE AUDIT

During the operation period, MWE will take the responsibility to fulfil the requirements for an environmental and social audit in line with the National Environment Act 2019 and the Audit Regulations of 2020. MWE shall submit the environmental compliance audit report to NEMA and undertake mitigation measures to address and rectify any non-compliance detected.

9.4.9 ENVIRONMENTAL AND SOCIAL MONITORING PLAN

Table 9-5: Environmental and Social Monitoring Plan

| Environmental and Social Aspect | Indicators | Monitoring frequency | Sampling Area | Measurement Units | Method | Target level/ Standard | Responsibility | Annual costs estimate (UGX) |
|--|--|--------------------------|-----------------------|--|---|--|-----------------------------|-----------------------------|
| Positive Impacts – Construction Phase | | | | | | | | |
| Employment opportunity | Percentage of local construction labourers | Quarterly | Project site | Percentage of local people employed in the project | Employment Records, inquiries and observation | 50% of local construction labourers (men) 30% Women | MWE, LC-1 Contractor | Proj. Sup. Contract |
| Negative Impacts - Pre-construction Phase | | | | | | | | |
| Air Quality | Dust (PM ₁₀) | Once before commencement | Project site | ppm | <i>Micro-dust Pro</i> | National Stds | MWE/ ESIA Consultant | ESIA Contract |
| Noise Baseline | Noise level | Once before commencement | Project site | dBA | <i>Noise Level Meter</i> | National Stds | MWE/ ESIA Consultant | ESIA Contract |
| Water Quality | Turbidity, TSS, Oil, PH | Once before commencement | Project site/ wetland | ppm | <i>Mobile Lab</i> | National Stds | MWE/ ESIA Consultant | ESIA Contract |

| Environmental and Social Aspect | Indicators | Monitoring frequency | Sampling Area | Measurement Units | Method | Target level/ Standard | Responsibility | Annual costs estimate (UGX) |
|--|-------------------------------|--|---------------------|---|---|---------------------------------------|-----------------------|------------------------------|
| Land acquisition/ displacement of land uses | PAPs | Before commencement & continuous throughout implementation | BH areas & along TL | No. of PAPs Compensated Land consent agreements | <i>RAP Implementation Report/ Grievance Log</i> | 100% compensation | MWE/ RAP Consultant | Proj. Sup. RAP Budget |
| Negative Impacts - Construction Phase | | | | | | | | |
| Land acquisition/ displacement of land uses | PAPs | Before commencement & continuous throughout implementation | BH areas & along TL | No. of PAPs Compensated Land consent agreements | <i>RAP Implementation Report/ Grievance Log</i> | 100% compensation | MWE/ RAP Consultant | Proj. Sup. RAP Budget |
| Land use/ cover change | Area cleared; Species type | Monthly | Along the TL and DL | Ha No. species | <i>Progress Reports</i> | Restricted to TL & DL Restored | MWE Contractor | 12,000,000 Contract |

| Environmental and Social Aspect | Indicators | Monitoring frequency | Sampling Area | Measurement Units | Method | Target level/ Standard | Responsibility | Annual costs estimate (UGX) |
|---------------------------------|---------------------------------|---|---------------|---|-------------------------------|--------------------------|---|---|
| Wetland Pollution | Siltation Turbidity | Once per month (daily inspection to be made to detect and remedy soil deposition during works in wetland area). | Wetland | TSS | <i>Sample & lab test</i> | Ntl Stds Baseline | MWE Consultant Contractor | 12,000,000 Contract Contract |
| Waste Management | Amount of Solid waste generated | Once a week | Project site | Kg for Solid waste, Litres for Liquid waste | Observations and Measurements | 0 Legal disposal | MWE DLG Contractor | 4,000,000 MWE Budget Contract |
| Water Quality | All | Monthly | BHs, Wetland | All | Lab. Analysis | Ntl Stds | MWE Contractor | 40,000,000 Contract |

| Environmental and Social Aspect | Indicators | Monitoring frequency | Sampling Area | Measurement Units | Method | Target level/ Standard | Responsibility | Annual costs estimate (UGX) |
|---------------------------------|--|---|---------------|------------------------------------|---|------------------------|---|--|
| Air Quality | Dust (PM ₁₀) | Once per months (daily inspection to be made to detect and remedy excessive dust generation). | Project site | ppm | <i>Micro-dust Pro</i> | Ntl Stds | Contractor MWE / Sup. Consultant | Contract 8,000,000 |
| Noise pollution | Noise level | Once a week | Project site | dba | <i>Noise Level Meter</i> | Ntl Stds | | 8,000,000 |
| Safety and health risks | Health and sanitation facilities in site. Documentation of instructions Record of PPE provided and staff; use of PPE on site | Daily by contractor, weekly by Consultant and Quarterly by MWE. | Project site | Number of safety measures provided | Site inspection Check for documentation Site inspection Check procedures and interview | 0 | MWE Consultant Contractor | 12,000,000 Contract Contract |

| Environmental and Social Aspect | Indicators | Monitoring frequency | Sampling Area | Measurement Units | Method | Target level/ Standard | Responsibility | Annual costs estimate (UGX) |
|---|--|---|---------------|--------------------|--|------------------------|---|--|
| | Supervision record Presence of signage Records of workers' orientation | | | | workers whether they are aware about the procedures Review of records of training | | | |
| GBV Cases | Nature of GBV Case | Daily by contractor, weekly by Consultant and Quarterly by MWE. | Project site | No. Reported Cases | Grievance Log Police Case Files | 0 | MWE Consultant Contractor | 36,000,000 Contract Contract |
| Negative Impacts - Operation stage | | | | | | | | |

| Environmental and Social Aspect | Indicators | Monitoring frequency | Sampling Area | Measurement Units | Method | Target level/ Standard | Responsibility | Annual costs estimate (UGX) |
|---------------------------------|-----------------------|---|---------------|---|---|------------------------|----------------|---|
| Water Quality & Quantity | All | Monthly At least once in 3 years | BHs | All | Lab. Analysis Hydrogeological analysis | Ntl Stds | MWE | 40,000,000 |
| Waste Management | Amount of Solid waste | Once a week | Project site | Kg for Solid waste, Litres for Liquid waste | Observations and Measurements | 0 Legal disposal | MWE DLG | 6,000,000 MWE Budget |
| Total monitoring costs | | | | | | | | 178,000,000 (Equivalent to 48,108 USD) |

9.4.10 ROLES AND RESPONSIBILITIES IN THE ESMP IMPLEMENTATION

Ministry of Water and Environment will coordinate with NEMA on ensuring that environmental and social issues are addressed effectively throughout the lifecycle of the Project. Implementation of the different environmental issues is done through the relevant government institutions (Lead Agencies) within whose mandate the respective issues lie. Implementation of the ESMP will involve multiple institutions at all levels as detailed out below in **Table 9-6**.

Table 9-6: Institutions involved in safeguards management of the project

| Institution | Mandate/ Responsibilities |
|--|---|
| Ministry of Water and Environment (MWE) | MWE will be responsible for the implementation of the Project through contractors Supervising Engineers, and consultants for Stakeholders Engagement, Environment and social risk managements. MWE will be responsible for contract management and will ensure that the contactors adhere to their contractual obligations and that they are compliant with the environmental and social standards as spelt out in their contracts. However, to augment the capacity of the Project Coordination Team, it is proposed some short-term technical assistance to back this capacity be provided for in the project. |
| National Environment Management Authority (NEMA) | NEMA will review and if acceptable approve this environment and social impact assessment as well as undertake compliance monitoring as per the National Environment Act 2019 Section 9 and to approve external environmental compliance audits as per the Environmental Audit Regulations (2020) section 19. |
| The World Bank | The World Bank will be financing the project and is therefore expected to offer implementation support supervision to the project’s environmental and social performance through missions. The World Bank will designate a safeguards team that can participate in safeguards missions. |
| Department of Museums and Monuments, Ministry of Tourism, Wildlife and Antiquities | This will provide support in preserving the physical cultural resources within the project area and managing any chance finds encountered. |
| OSH Department, Ministry of Gender, Labour and Social Development | The OHS Department will undertake registration of the construction site as well as participate in periodic supervision visits to assess and monitor management of occupational health and safety issues. The Department will also undertake checks on all equipment used by the contractor. |
| Kiryandongo District Local Government | Kiryandongo district environment and natural resource committee will be involved in periodic monitoring of the project both during construction and operational phases. Kiryandongo District Local Government including Mboira and Kigumba sub counties will be vital in implementation of the project in terms of mobilizing political goodwill and sensitizing communities about the project as well as the District Environment Officer (DEO) and District Community Development Officer (DCDO) who will participate the review of environmental and social impact assessment reports, environmental audit reports and other reports to be submitted to NEMA on a regular basis as provided for under Section 30 of the National Environment Act 2019. The DEO and DCDO will monitor environmental and social aspects of the project at district level to ensure mitigation measures are adequately implemented. It is highly recommended that the DEO and DCDO attend the monthly site meetings for the project and be able to point out issues of concerns. Other duties will include: |

| | |
|---|---|
| | <ul style="list-style-type: none"> • Support project as necessary as possible including community mobilisation and sensitization • Advise on compliance to law, policy & strategies (e.g. labour, women & child rights, environment, etc) • Participate in grievance redress • Prioritize and allocate funds to supplement source protection • Participate in demarcations of buffer zone • Seek support for preservation of cultural sites for tourism (Council Resolution) • Address political issues e.g. interferences (esp. District Council, RDC, Police, etc) |
| <p>The Local Council Leaders</p> | <p>The local council leaders in the project area will have a role on matters of helping the contractors settle in the project area and to support identification of raw materials sources. They will be key in aspects of labour identification and endorsements as well as safeguarding the cultural sites. The local leaders will support law enforcement agencies in curbing crime during project implementation.</p> |

The goal of the IWMDP is to the maximum extent possible utilize existing institutional structures and capacity within the MWE and the local government to implement the Project. In order to successfully implement the ESMP, it is important to ensure that target groups and stakeholders who play a role in implementing it are provided with the appropriate and continuous Environmental and Social Safeguards capacity development.

The key institutions/group of people whose capacity needs to be enhanced to effectively implement and monitor the ESMP of this project are:

- a. Beneficiary Communities: There is a need to carry our training and awareness trainings for the key community members on the safeguard’s aspects of the project. Further, they need to be facilitated to enable them effectively monitor the ESMP implementation process.
- b. Staff of the respective District Local Governments: The staff at the district level needs to be trained on key aspects of the project. They also need to be facilitated to enable them effectively monitor the ESMP implementation process.

There is a need for the project to foster inter institutional monitoring of the implementation of the project’s ESMP. An interinstitutional monitoring committee should be formed, trained and their activities facilitated. A capacity building plan should be developed after instituting an inter institutional monitoring committee.

9.4.10.1 ROLES OF CONTRACTOR DURING PROJECT IMPLEMENTATION

During the construction phase and operation and maintenance phase, MWE will engage contractors to undertake the civil works and O&M tasks for the project respectively. Contractors will be responsible for complying with all relevant legislation and adhere to all mitigation measures specified in the ESMMP including the NEMA conditions of approval. MWE will therefore have to ensure enforcement of mitigation measures which will be enshrined under contractual obligations. The contractors will be obliged to commit resources to ensure implementation of obligations in the contract through hiring qualified Safeguards Officers to operationalize the

environmental and social requirements in the ESMP and supporting documentation. The construction contractor has not yet been procured, while the NUWS has been identified as the most suitable O&M phase contractor in the project feasibility study. However, based on experience for similar projects, the following safeguards team is recommended:

- a) Health & Safety Officer
- b) Environmentalist
- c) Sociologist
- d) Site Nurse
- e) Community Liaison Officer/Grievance Officer

MWE through the supervising consultant must approve the contractors' safeguards team. It may be useful to include the minimum requirements in the contracts for the civil works/ O&M phase. The Contractors are encouraged to sign MoUs with different service providers for safeguards related matters (waste management, HIV/AIDS, etc).

9.4.10.2 ROLE OF SUPERVISING CONSULTANT

The Supervising Consultant should have in their teams at least an Environment Specialist and a Social Specialist who will have overall responsibility of issuing guidance and instructions to the contractor including review and approval of the contractor's management plans. The Environmental Specialist and Social Safeguards Specialist will work closely with MWE Safeguards Team in supervising the contractor. In addition, the Supervising Consultant will conduct scheduled site supervisions to monitor state of safeguards compliance as documented or executed by the Contractors. The Supervising Consultant will have obligation to also oversee compliance and observation of environment, safety, health and social requirements alongside other cross-cutting issues in the project.

9.4.10.3 STAFFING REQUIREMENTS

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

Table 9-7: Personnel required to implement and monitor the ESMP

| Stakeholder | Personnel required |
|---|--|
| Ministry of Water and Environment (Project Coordination Unit) | Project Support Team (PST) Specialists Water Engineer Sociologist Environmental Health Officer Health and Safety Officer |
| Construction Contractor | Site Engineer Site Supervisor Site Foreman Environmental Officer Sociologist Health & Safety Officer Site Nurse |

| | |
|---------------------------------------|---|
| O&M Contractor | Environmental Officer Sociologist Grievance Management Officer |
| Kiryandongo District Local Government | District Environmental Officer District Water Officer District Engineer District Community Development Officer |
| Mboira and Kigumba Subcounty | Community Development Officer Councilors Secretary for Health |
| NEMA | Monitoring Officer |
| OSH Department | Health and Safety Inspector supported by District Labour Officer |
| NGO/ CBO | Representative with skills in environmental management and conflict resolution |
| Department of Museums and Monuments | Archaeologist |

The ESMP is based on a collaborative approach where the responsibility for the implementation and monitoring of the environmental and social management measures is shared among relevant stakeholders, to varying degrees. Successful ESMP implementation and more particularly its institutional arrangements and its environmental and social monitoring programs, will be based on a program of institutional support and capacity-building. Contractors must also be aware of the need to integrate best practices in their work.

It is the onus of each ESMP implementing stakeholder to ensure that all its personnel required in implementation of this ESMP are adequately qualified and were appointed based on their qualification and suitability for their respective roles. The ESIA Consultant recommends a training program (safeguards clinic) be implemented through the ESMP to enhance the environmental and social awareness of the project's key personnel. Monitoring may require the services of environmental specialists or a company with laboratory and analytical facilities (for complex environmental problems) or inspection by the local government environmental officers.

10 CONCLUSIONS AND KEY RECOMMENDATIONS

This Environmental and Social Impact Assessment evaluated the environmental and social impacts associated with the proposed water supply system and sanitation facilities in Nyakabale RGC, Kiryandongo District. The proposed project will improve the capacity to deliver effective Water, Sanitation and Hygiene services to the communities of Kigumba and Mboira sub counties. The no project scenario would see continuation of the hardships faced by residents of Nyakabale RGC who are in severe need of clean and safe water, and existing sources are not enough to serve the increasing population and, in some cases, not protected. The benefits to the local economy will be in addition to reduced morbidity, increased enrolment of children in educational institutions, increased productivity of households and reduced incidences of domestic violence. The positive outcomes of implementing the project will infer positive change to the climate change, gender, health and educational vulnerabilities associated to water supply in the area.

The key negative impacts that will arise during the construction phase include influx of immigrants, labour land acquisition that will trigger displacement of livelihood activities and road crossings. Compensation and community health and safety are the key fears raised by the communities. Land acquisition and resettlement impacts and risks are expected to be managed through preparation and implementation of a Resettlement Action Plan. The transmission and distribution lines are expected to mainly utilize the road reserves which will significantly minimize resettlement risks. Road crossings of the transmission line especially within Nyakabale trading centre along the Kigumba-Masindi Road are expected to pose traffic safety risks but implementation of a robust Traffic Management Plan will address such impacts. The ESMP emphasizes the need to immediately restore excavated/ disturbed areas as soon as the pipes have been laid. In general, all potential major impacts can be effectively mitigated.

The project is an intervention of the Central government (MWE) with support from the World Bank that will require collective action from stakeholders such as the Local government and regional actors in the WASH sector for its effective implementation. The critical aspect is meaningful stakeholder mobilization and engagement as well as recruitment of an experienced team to manage the safeguards risks. MWE will spear head the supervision of the construction contractor and the operator to ensure negative impacts from the project are minimised. This should entail among others, undertaking of annual audits following provisions of the ESMP to ensure continuous improvement of the project's processes and products. MWE should use its vast experience in implementing similar water supply projects to effectively manage these potential risks.

Key Recommendations from this assessment for enhancement of the project include:

- The routing of transmission line for borehole DWD 77383 should be moved by 10 meters along with the planned access road to avoid the identified grave yard along the proposed alignment;
- The distribution line should be extended to provide water supply to the areas hosting the water sources. This is aimed at promoting social equity and sustainability of the project;
- The Contractor should develop and implement a Contractor ESMP for the project's construction phase, encompassing the auxiliary footprint;

- Further assessment needs to be carried out for the current water supply system in Apodorwa and possible synergies that can be achieved to enhance the water supply in the area;
- Construction material for the project should be sourced from legally authorised sites;
- Extension of the hydroelectric power lines at the water source sites should strictly follow the access route alignment to ensure that the set-out land requirements suffice; and
- During the operation phase, the recommended number of pumping hours and abstraction rates should be maintained in order not to compromise the existing ground water sources.

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ANNEX 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

17th January, 2022

The Permanent Secretary,
Ministry of Water and Environment,
P.O Box 20026,
KAMPALA

RE: REVIEW OF TERMS OF REFERENCE AND SCOPING REPORT FOR UNDERTAKING AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR THE PROPOSED LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITIES IN KIRYANDONGO DISTRICT - EIATOR 8140

This is in reference to the Terms of Reference (TORs) for the above-mentioned project which was submitted to this Authority for review and consideration for approval. The review has been finalized and formal **APPROVAL** granted to undertake the Environmental and Social Impact Assessment (ESIA).

Please note that the **approval of the TORs does not constitute permission to start implementing any of the proposed project activities** as this is not a certificate of approval.


- (i) The project involves three solar powered systems in Nyakabaale, Gaspa and Mutunda Rural Growth Centers. The ESIA should therefore detail each system and its components including the GPS coordinates for the infrastructure under each system clearly indicating the boundary and delineation of the different components, the coverage (spatial and administrative boundaries), and the layout of key infrastructure. The capacity of the reservoir and booster tanks should be included, and for linear components, the length should be clearly indicated.
- (ii) The water sources should be clearly detailed in terms of location, GPS coordinates and comprehensive hydrological studies and baseline analyses of water quality undertaken of the water sources and the catchment, to determine potential impacts of the project on the area hydrology and other baseline characteristics.

Assess cumulative impacts from the three systems on the area hydrology and incorporate key findings from such studies in the report.

- (iii) Develop a comprehensive water source protection plan that shall be implemented to ensure that the water sources are protected during both construction and operation of the project. Append the plan to the ESIA report.
- (iv) Taking into account the Standard Operating Procedures (SOPs) in respect of the COVID-19 pandemic, undertake comprehensive consultations with all relevant stakeholders, especially the local communities (both host and refugee communities in the rural growth centres of Nyakabaale, Gaspa, Mutunda, and the Kiryandongo District Local Government Authorities, Ministry of Gender Labour and Social Development, including persons potentially affected by the project in the respective rural growth centres. The views/concerns of stakeholders consulted should be well documented and appended in the ESIA report.
- (v) Append clear and legible, **authentic copies of land acquisition and ownership** documents.
- (vi) Indicate the actual project (investment) cost including **cost of works, machinery/equipment and land where applicable and a certificate of valuation issued by a qualified and certified valuer in accordance with schedule 5(3f)** of the National Environment (Environmental and Social Assessment) regulations, S.I 143/ 2020, all attached to the ESIA report.
- (vii) In accordance to regulation 49 (2) of the National Environment (Environmental and Social Assessment) regulations, S.I 43/ 2020 you will be required to pay a non-refundable administration fee of thirty percent (30%) of the total fees payable on submission of the Environmental and Social Impact Statement to the Authority.

This is therefore, to recommend that you proceed with carrying out the ESIA for the proposed Large Solar Powered Piped Water Supply Systems and Sanitation Facilities in Kiryandongo District.

Looking forward to your cooperation and the receipt of a comprehensive ESIA report, for further action and consideration.

 17/1/2022
Patience Nsereko
FOR: EXECUTIVE DIRECTOR

ANNEX 2: WATER SUPPLY DESIGN PARAMETERS

Borehole Pumping Mains

| Borehole Number | Nyakabale WSS | |
|--|------------------------------|-------------------------------|
| | DWD 77383 | DWD 77382 |
| Borehole Yield (m³/hr) | 10.0 | 34.0 |
| Abstracted Yield (m³/hr) | 10.0 | 30.0 |
| Hours of Pumping (hr) | 16 | 16 |
| Total Daily Delivery (m ³ /day) | 160 | 480 |
| Pumping Main Section No. 01 (From Pump Installation Point to Ground Level at Borehole) | | |
| Ground Level at Borehole (m AMSL) | 1075.023 | 1071.029 |
| Pump Installation Depth in Borehole (m BGL) | 100.000 | 120.000 |
| Static Lift (m) | 100.000 | 120.000 |
| Cwh | 120 | 120 |
| Pipe Details | DN 65 Steel Pipe PN16 | DN 100 Steel Pipe PN16 |
| Pipe Diameter ND (mm) | 65.00 | 100.00 |
| Pipe Diameter ND (m) | 0.065 | 0.100 |
| Flow in Pipe (m ³ /hr) | 10.000 | 30.000 |
| Flow in Pipe (m ³ /s) | 0.003 | 0.008 |
| Velocity (m/s) | 0.84 | 1.06 |
| Length of Pipe Section No. 01 (m) | 100.00 | 120.00 |
| Friction Loss (m) | 1.68 | 1.89 |
| Fittings losses - 10% (m) | 0.17 | 0.19 |
| Total Head in Section 01 (m) | 102 | 122 |
| Pumping Main Section No. 02 (From Ground Level at Borehole to Inlet level of Reservoir) | | |
| Reservoir Tank inlet level (m AMSL) | 1177.056 | 1177.056 |
| Ground Level at Borehole (m AMSL) | 1075.023 | 1071.029 |
| Static Lift (m) | 102.033 | 106.027 |
| Cwh | 140 | 140 |
| Pipe Details | HDPE OD 90 PN16 | uPVC OD 160 PN16 |
| Pipe Diameter ND (mm) | 73.60 | 136.20 |
| Pipe Diameter ND (m) | 0.074 | 0.136 |
| Flow through pipe section 02 (m ³ /day) | 10.000 | 30.000 |
| Flow through pipe section 02 (m ³ /s) | 0.003 | 0.008 |
| Velocity (m/s) | 0.65 | 0.57 |
| Chainage at Borehole | 0+000 | 0+000 |
| Chainage at Reservoir | 5+449 | 7+643 |
| Length of Pipe Section No. 02 (m) | 5,449.00 | 7,643.00 |
| Friction Loss (m) | 37.60 | 20.13 |
| Fittings losses - 10% (m) | 3.76 | 2.01 |
| Total Head in Section 02 (m) | 143 | 128 |

Distribution Network Pipes

| Distribution Network Pipe Details | | | | | | | |
|-----------------------------------|-----------------|----------|--------|------------------|----------|-----------|-----------------------|
| Pipe Number | Start Node | End Node | Length | Pipe Details | Diameter | Roughness | Velocity at Peak Flow |
| Pipe 1 | Nyakabaale_Rsvr | N01 | 100 | OD 160 uPVC PN10 | 144.6 | 140 | 0.83 |
| Pipe 2 | N01 | N02 | 1,780 | OD 110 uPVC PN10 | 99.4 | 140 | 0.78 |
| Pipe 3 | N02 | N03 | 1,797 | OD 110 uPVC PN10 | 99.4 | 140 | 0.63 |
| Pipe 4 | N03 | N04 | 33 | OD 110 uPVC PN10 | 99.4 | 140 | 0.63 |
| Pipe 5 | N04 | N05 | 303 | OD 63 HDPE PN10 | 55.4 | 140 | 0.63 |
| Pipe 6 | N05 | EP1 | 171 | OD 50 HDPE PN10 | 44 | 140 | 0.5 |
| Pipe 7 | N05 | EP2 | 759 | OD 50 HDPE PN10 | 44 | 140 | 0.5 |
| Pipe 8 | N04 | N06 | 22 | OD 90 HDPE PN10 | 79.2 | 140 | 0.69 |
| Pipe 9 | N06 | N07 | 247 | OD 63 HDPE PN10 | 55.4 | 140 | 0.39 |
| Pipe 10 | N07 | EP3 | 236 | OD 50 HDPE PN10 | 44 | 140 | 0.5 |
| Pipe 11 | N10 | N08 | 280 | OD 50 HDPE PN10 | 44 | 140 | 0.2 |
| Pipe 12 | N08 | N09 | 160 | OD 50 HDPE PN10 | 44 | 140 | 0.04 |
| Pipe 13 | N09 | N07 | 273 | OD 50 HDPE PN10 | 44 | 140 | 0.12 |
| Pipe 14 | N06 | N10 | 69 | OD 75 HDPE PN10 | 66 | 140 | 0.72 |
| Pipe 15 | N10 | EP5 | 245 | OD 75 HDPE PN10 | 66 | 140 | 0.63 |
| Pipe 16 | N01 | N11 | 642 | OD 160 uPVC PN10 | 144.6 | 140 | 0.46 |
| Pipe 17 | N11 | N12 | 338 | OD 110 uPVC PN10 | 99.4 | 140 | 0.73 |
| Pipe 18 | N12 | N13 | 1,820 | OD 110 uPVC PN10 | 99.4 | 140 | 0.64 |
| Pipe 19 | N13 | N14 | 1,224 | OD 90 HDPE PN10 | 79.2 | 140 | 0.87 |
| Pipe 20 | N14 | N15 | 103 | OD 75 HDPE PN10 | 66 | 140 | 0.81 |
| Pipe 21 | N15 | EP6 | 951 | OD 50 HDPE PN10 | 44 | 140 | 1 |
| Pipe 22 | N15 | EP7 | 638 | OD 50 HDPE PN10 | 44 | 140 | 0.82 |
| Pipe 23 | N14 | EP8 | 921 | OD 50 HDPE PN10 | 44 | 140 | 1 |
| Pipe 24 | N12 | EP9 | 365 | OD 50 HDPE PN10 | 44 | 140 | 0.45 |
| Pipe 25 | N11 | EP10 | 633 | OD 63 HDPE PN10 | 55.4 | 140 | 0.8 |

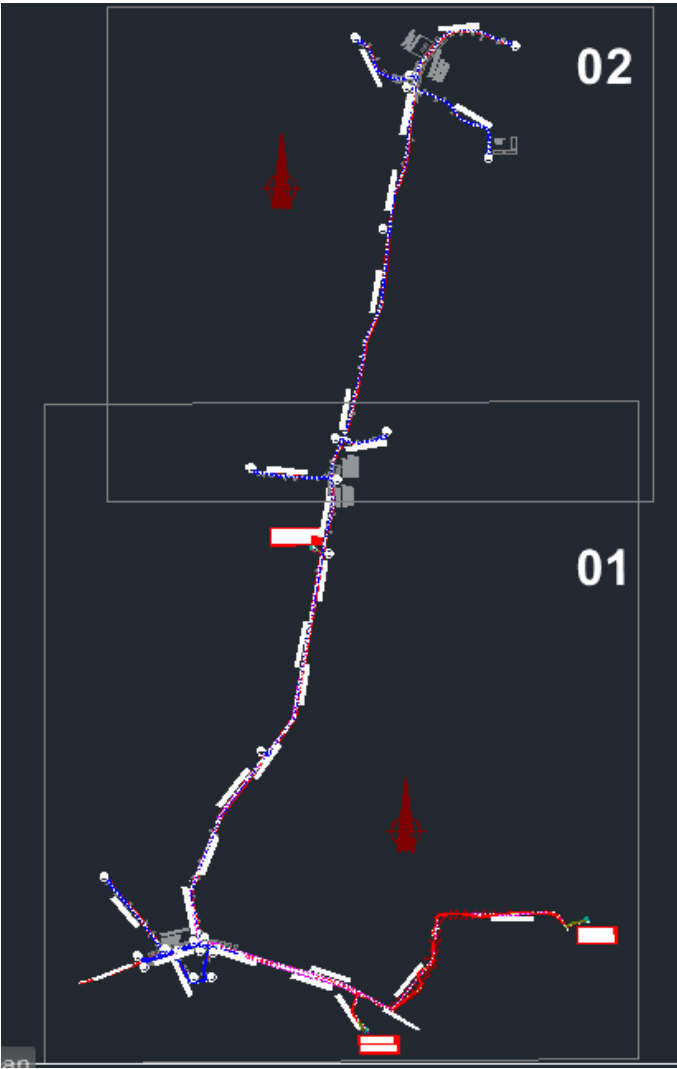
Source: Project Estimates

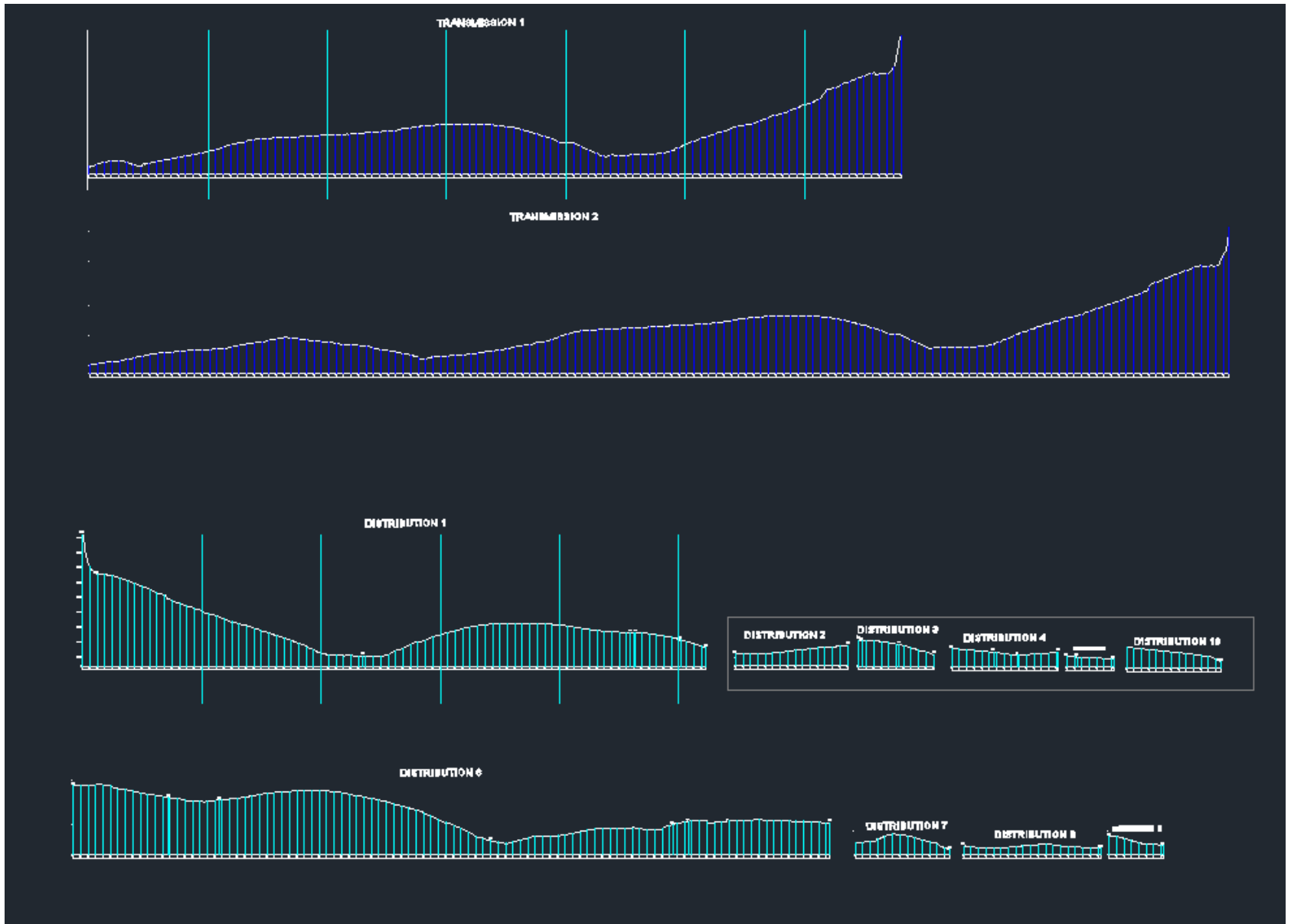
Distribution Network Nodes

| Node ID | Elevation (m.a.s.l) | Base Demand (lps) | Off Peak Flows (Peak Factor=0.5) | | | Normal Peak Flows (Peak Factor=1.0) | | | Peak Flows (Peak Factor=2.0) | | |
|-----------------------|------------------------|-------------------------|----------------------------------|------------------------------------|-----------------------------|-------------------------------------|------------------------------------|-----------------------------|------------------------------|------------------------------------|-----------------------------|
| | | | Demand (lps) | Hydraulic Gradient (m.a.s.l) | Residual Pressure (m) | Demand (lps) | Hydraulic Gradient (m.a.s.l) | Residual Pressure (m) | Demand (lps) | Hydraulic Gradient (m.a.s.l) | Residual Pressure (m) |
| Junc N01 | 1136.657 | 0 | 0 | 1173.36 | 36.7 | 0 | 1173.26 | 36.6 | 0 | 1172.91 | 36.25 |
| Junc N02 | 1081.883 | 0.56 | 0.28 | 1172.44 | 90.56 | 0.56 | 1169.95 | 88.06 | 1.12 | 1160.94 | 79.06 |
| Junc N03 | 1097.467 | 0 | 0 | 1171.81 | 74.34 | 0 | 1167.66 | 70.19 | 0 | 1152.68 | 55.21 |
| Junc N04 | 1097.38 | 0 | 0 | 1171.79 | 74.41 | 0 | 1167.61 | 70.23 | 0 | 1152.53 | 55.15 |
| Junc N05 | 1092.572 | 0 | 0 | 1171.59 | 79.01 | 0 | 1166.86 | 74.29 | 0 | 1149.8 | 57.22 |
| Junc N06 | 1096.926 | 0 | 0 | 1171.78 | 74.86 | 0 | 1167.57 | 70.65 | 0 | 1152.37 | 55.45 |
| Junc N07 | 1094.494 | 0 | 0 | 1171.71 | 77.22 | 0 | 1167.32 | 72.83 | 0 | 1151.46 | 56.97 |
| Junc N08 | 1094.5 | 0.12 | 0.06 | 1171.7 | 77.2 | 0.12 | 1167.29 | 72.79 | 0.24 | 1151.34 | 56.84 |
| Junc N09 | 1092.444 | 0.12 | 0.06 | 1171.7 | 79.26 | 0.12 | 1167.28 | 74.84 | 0.24 | 1151.32 | 58.88 |
| Junc N10 | 1096.619 | 0 | 0 | 1171.73 | 75.11 | 0 | 1167.39 | 70.77 | 0 | 1151.73 | 55.11 |
| Junc N11 | 1128.619 | 0 | 0 | 1173.28 | 44.66 | 0 | 1172.97 | 44.35 | 0 | 1171.85 | 43.23 |
| Junc N12 | 1127.019 | 0 | 0 | 1173.12 | 46.1 | 0 | 1172.41 | 45.39 | 0 | 1169.84 | 42.83 |
| Junc N13 | 1099.728 | 0.34 | 0.17 | 1172.47 | 72.74 | 0.34 | 1170.06 | 70.33 | 0.68 | 1161.35 | 61.62 |
| Junc N14 | 1110.477 | 0 | 0 | 1171.46 | 60.99 | 0 | 1166.42 | 55.94 | 0 | 1148.21 | 37.73 |
| Junc N15 | 1112.39 | 0 | 0 | 1171.37 | 58.98 | 0 | 1166.09 | 53.7 | 0 | 1147.01 | 34.62 |
| Junc EP1 | 1087.732 | 0.38 | 0.19 | 1171.48 | 83.75 | 0.38 | 1166.5 | 78.76 | 0.76 | 1148.49 | 60.75 |
| Junc EP2 | 1098.565 | 0.38 | 0.19 | 1171.14 | 72.57 | 0.38 | 1165.25 | 66.68 | 0.76 | 1143.98 | 45.41 |
| Junc EP3 | 1087.806 | 0.38 | 0.19 | 1171.57 | 83.77 | 0.38 | 1166.82 | 79.01 | 0.76 | 1149.66 | 61.85 |
| Junc EP5 | 1095.367 | 1.08 | 0.54 | 1171.59 | 76.23 | 1.08 | 1166.89 | 71.53 | 2.16 | 1149.92 | 54.55 |
| Junc EP6 | 1111.693 | 0.76 | 0.38 | 1169.35 | 57.66 | 0.76 | 1158.8 | 47.11 | 1.52 | 1120.71 | 9.01 |
| Junc EP7 | 1108.083 | 0.62 | 0.31 | 1170.44 | 62.36 | 0.62 | 1162.73 | 54.65 | 1.24 | 1134.9 | 26.82 |
| Junc EP8 | 1109.375 | 0.76 | 0.38 | 1169.51 | 60.13 | 0.76 | 1159.36 | 49.98 | 1.52 | 1122.71 | 13.34 |
| Junc EP9 | 1120.928 | 0.34 | 0.17 | 1172.95 | 52.02 | 0.34 | 1171.78 | 50.85 | 0.68 | 1167.57 | 46.64 |
| Junc EP10 | 1119.007 | 0.97 | 0.49 | 1172.59 | 53.58 | 0.97 | 1170.49 | 51.48 | 1.94 | 1162.89 | 43.88 |
| Resvr Nyakabaale_Rsvr | 1173.396 | #N/A | -3.41 | 1173.4 | 0 | -6.81 | 1173.4 | 0 | -13.62 | 1173.4 | 0 |

Source: Project Estimates

ANNEX 3: PROJECT LAYOUT DRAWINGS





ANNEX 4: STAKEHOLDER ENGAGEMENT RECORD

ANNEX 4A: Institutions



IWMDF ATTENDANCE LIST

Project Name: Kiryandongo WSDs ESIA, RAP and SAP

Location: Kiryandongo District HQ Date: 21/10/21

| No | Name | Gender M/F | Designation | Contact | Email | Signature |
|-----|---------------------|------------|--------------------------|------------|---------------------------|--------------------|
| 1. | Odoch Thomas | M | SCDO | 0784819809 | thomas.odoch@jbn.co.ug | <i>[Signature]</i> |
| 2. | MUKUMUZA SAMUEL | M | DUTO | 0772845618 | samuel.mukumaza@yohoo.com | <i>[Signature]</i> |
| 3. | CHRISTINE MBABAZI | F | SS MWE | 0972606951 | tina.mabazi@yohoo.com | <i>[Signature]</i> |
| 4. | Jule Nkanyo Kizimbe | M | Socialist/Social Science | 0751393897 | | <i>[Signature]</i> |
| 5. | ASIMUNE KOLUS WIS | M | Valuation Surveyor | 070186854 | asimune@yohoo.com | <i>[Signature]</i> |
| 6. | Andrew Mlowesiims | M | GIS Expert | 0787600671 | andrew@yohoo.com | <i>[Signature]</i> |
| 7. | Bryan WAKANI MATONI | M | RAP Specialist | 070108762 | bryan@yohoo.com | <i>[Signature]</i> |
| 8. | Dr. Martin Kabenge | M | Environmental Engineer | 0775 97199 | martin.kabenge@yohoo.com | <i>[Signature]</i> |
| 9. | ARONYA MASEN | M | SETO | 0782762949 | aronya@yohoo.com | <i>[Signature]</i> |
| 10. | Dacan Denis | M | PACAO | 0182339114 | dacan@yohoo.com | <i>[Signature]</i> |
| 11. | | | | | | |



Plot 48, Mbogo Road 1, Najjera
Kira Municipality, Wakiso
P.O. Box 101649, Kampala, Uganda
+256200901224 / +256772458903
info@jbn.co.ug | www.jbn.co.ug

ATTENDANCE LIST

Project Name: Kiryandongo IWMDF ESIA RAP SAP

Location: KIRYANDONGO POLICE STATION & HOSPITAL Date: 11/11/2021

Apostrophe Kiryandongo Hospital

| No | Name | F/M | Designation | Contact/ Email | Signature |
|----|--------------------|-----|-----------------------------|----------------|--------------------|
| | SP. Ondoga Tenney | M | DPC - | 0773126608 | <i>[Signature]</i> |
| | APR WAZIYORA MORRE | M | C-2 O- | 0779471304 | <i>[Signature]</i> |
| | D/CPM OKURUT PAUL | M | CID ^{DANYA} PIPOST | 0772361779 | <i>[Signature]</i> |
| | D/C AIGILO SAMUEL | M | C.I | 0773749990 | <i>[Signature]</i> |
| | Prileba Semmy | M | Nursing officer | 0784046802 | <i>[Signature]</i> |
| | Ayigi Josephine | F | DND | 07880324 | <i>[Signature]</i> |
| | JOYCE APOLO | M | DPC | 0782889093 | <i>[Signature]</i> |
| | MUBERWA CHARLES | M | PC | 0777294269 | <i>[Signature]</i> |
| | OP W Godfrey | M | ELN | 0773468869 | <i>[Signature]</i> |
| | | | | | |

ATTENDANCE LIST

Project Name: KIRITANSONGO I/WMAP ESIA RAP SPP

Location: NYAKABALE PRIMARY SCHOOL, HANGA/KI Date: 10-11-2021








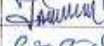


| No | Name | F/M | Designation | Contact/ Email | Signature |
|----|------------------------|-----|--------------|----------------|---|
| 1. | SUNDAI KAFUSIIME ANNET | F | D/HR | 0777702055 |  |
| 2. | OKUMIZI SAM | M | SM of Person | 0779021681 |  |
| 3. | | | | | |
| 4. | | | | | |

ATTENDANCE LIST

Project Name: KIRITANSONGO I/WMAP ESIA RAP SPP

Location: MBARA S/COUNTY COUNSELLORS

Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|-------------------------|------------|-----------------------------------|------------|---|
| 1. | Kumakech Fred | M | Sec Production and Environment | 075590505 |  |
| 2. | Ngonzebusi Nwach | F | Elder Councilor | 075437643 |  |
| 3. | Epaobi Jessa | F | male councillor | 0792516667 |  |
| 4. | KAINZA ROSEMARY | F | COUNCILOR KIFURUA | 0710638645 |  |
| 5. | MURUGURORA JOY | F | Councillor Mbasa | 0774999009 |  |
| 6. | MUKUNIMUNYA GEORGE | M | councillor - Kiwira | 0791012212 |  |
| 7. | OPIO ROBECH | M | Sec PANALCO | 0770587341 |  |
| 8. | JAKUMA J. ABDULLAH | M | MARK-COUNCILOR | 0784979736 |  |
| 9. | HON WAFUMBE JEAN MICHEL | M | LCII CIP MBARASKI | 0775001822 |  |
| 10. | HON. OKELLO GILBERT | M | S/C SPEAKER | 0774533971 |  |

ATTENDANCE LIST

Project Name: KIRITANSONGO I/WMAP ESIA RAP SPP

Location: KIFURUA PRIMARY SCHOOL, KIFURUA I VILLAGE, MBARA Date: 12-11-2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|--------------------|------------|----------------------|------------|---|
| 01. | CHANDIBALE GABRIEL | M | D/HR. | 0779023807 |  |
| 02. | DABANJA STEPHEN | M | TEACHER | 0784787853 |  |
| 03. | KUMAKECH JANE | F | SENIOR WOMAN TEACHER | 0777202270 |  |

ATTENDANCE LIST

Project Name: KIRYANDONGO NUMBP ESIA RAP ESP

Location:

Date: 22/03/22

| No. | Name | Gender M/F | Designation | Contact | Email | Signature |
|-----|-----------------|------------|--------------------------|------------|--------------------------|----------------|
| 1. | Barfaki Chole | M | PSO | 0772361418 | | <i>Barfaki</i> |
| 2. | Abduls Gardar | M | Valuer | 0701478636 | | <i>Abduls</i> |
| 3. | Segawa Samuel | M | Sociologist | 0704257850 | | <i>Segawa</i> |
| 4. | Pamela Tashobya | F | Sociologist | 0701500974 | pkolekua3@gmail.com | <i>Pamela</i> |
| 5. | Mr. MOSES OKEWI | M | OST Specialist | | | <i>Moses</i> |
| 6. | PASCAL BITUM | M | Environmental Consultant | 0779163079 | Pascalgoodwill@gmail.com | <i>Pascal</i> |
| 7. | | | | | | |

Meeting at Office of the Prime Minister



ATTENDANCE LIST

Project Name: 3 large solar powered piped water supply systems in Kiryandongo

Location: UMPA Head office

Date: 25/03/2022


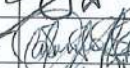

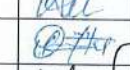

| No | Name | F/M | Designation | Contact/ Email | Signature |
|----|-------------------------|-----|---------------------|---|-----------------------|
| 1. | Eng. Patrick Mulema | M | Lead Design | 0772621123 patrick.mulema@umpu.go.ug | <i>Patrick Mulema</i> |
| 2. | Eng. DR. KENNETH MUNIWA | M | Hydrology | 0771418441 keneth.muniwa@umpu.go.ug | <i>Keneth Muniwa</i> |
| 3. | Sarah J. Kasande | F | Consultant JBN | Sarah.kasande@jbn.com 0777165859 | <i>Sarah Kasande</i> |
| 4. | Pamela Tashobya | F | Sociologist | pkolekua3@gmail.com | <i>Pamela</i> |
| 5. | PASCAL BITUM | M | Env. Consultant | pascalgoodwill@gmail.com | <i>Pascal</i> |
| 6. | Dr. Martin Kabenge | M | Project manager JBN | 0775971979 | <i>Dr. Martin</i> |
| 7. | | | | | |

ATTENDANCE LIST

Project Name: SOLAR POWERED PIPED WATER SUPPLY AND SANITATION FACILITIES IN KIRYANDONGO RGCS

Location: MoGLSD

Date: 17th/05/2022

| No | Name | F/M | Designation | Contact/ Email | Signature |
|----|-------------------|-----|---------------------|----------------|---|
| 1. | Oswal Aley | M | PGM/ESIA FP | 0772676408 |  |
| 2. | Bizman Deric | M | OSA | 0704421429 |  |
| 3. | Martin Kabenge | M | Project manager JBN | 0775 971 979 |  |
| 4. | PASCAL BITUM | M | Consultant. | 0779163 077 |  |
| 5. | Andrew Nwagisiima | M | JBN/ESIA | 0787600681 |  |
| 6. | | | | | |

ANNEX 4B: Community



ATTENDANCE LIST

Project Name: Kiryandongo WMDP ESIA RAP SPP

Location: Apodora LCI, Apodorwa LCI, Mboira S/C

Date: 22/10/2021

| Sl no | Name | F/M | Designation | Contact | Signature |
|-------|-------------------------|-----|-------------------------|-----------------------------|-----------|
| 1. | JAKUMA ABDULLAH JALARAC | M | COUNCILOR Apodorwa-F | 0784979736 | Jakuma |
| 2. | MIRACHIZO DOR OZHY | F | Oku APIDORWA | -0786-54629 -0782-688466 | Mirachizo |
| 3. | OLYCHA ABALO | M | Apodorwa | 076254593 | Olycha |
| 4. | OBUTOI ISAAE | M | Apodorwa | 0780771201 | Obutoi |
| 5. | | | | | |

ATTENDANCE LIST

Project Name: Kiryandongo WMDP ESIA RAP SPP

Location: Kiryanya LCI, Nyamahole Parish, Mboira S/C

Date: 10/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|----------------------|---------------|----------------------|------------|-----------|
| | Alinga Godfrey | M | Resident near source | 0777109899 | Alinga |
| | Atim Gerald Innocent | M | Resident near source | 0771232325 | Atim |
| | Akot RABECCA GITYI | F | Resident near source | 0782059034 | Akot |
| | NOOL Gillian | F | Resident near source | | Nool |
| | Maka Mary | F | Women's G/P in LCI | 0788918319 | Maka |
| | WABYSN FRED | M | SEC. REFERENCE | 0778932988 | Wabysn |
| | ZAKIYA MESSIA | F | TREASURER | 0776978495 | Zakiya |
| | ATHEERWA ROSCO FRANK | M | SEC. G/RECORDS | 0786860622 | Atheerwa |

ATTENDANCE LIST

Project Name: Kiryandongo IWMOP ESIA RAP SPP

Location: Nyakabale, ⁴⁴Atao, Nboira SIC

Date: 10/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|-------------------|------------|---------------|------------|-----------|
| 01 | Obomba Cornelien | M | CHAIRPERSON | 0773974550 | |
| 02 | ESAGA Benjamin | M | Gen Secretary | 0776773220 | |
| 03 | Ayemango Etaline | F | W.C PERSON | 0788950932 | |
| 04 | MATSWAMI KEVIN | F | TREASURER | 0781007801 | |
| 05 | BINEGA SILBERT | M | D.F | 0785392312 | |
| 06 | THEENDU REMEMEI | F | member | 0778705425 | |
| 07 | ONEGWA THOMAS | M | member | 0785374851 | |
| 08 | Byamhanga Francis | M | Elder | 0772317322 | |

ATTENDANCE LIST

Project Name: KIRYANDONGO IWMOP ESIA RAP SPP

Location: MASHAGWA / S.R.B.A

Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|------------------|------------|-------------|------------|-----------|
| 1 | WAMUKOTA MICHAEL | M | VICE YOUTH | 0779674340 | |
| 2 | AKACHA WILSON | M | Elder | 0772529612 | |
| 3 | MULEYI DAVID | M | Vice Elder | 0782907072 | |
| 4 | AINEA LENARD | M | VHT | 0799975098 | |
| 5 | | | | | |

ATTENDANCE LIST

Project Name: KIRYANDONGO IWMOP ESIA RAP SPP

Location: LAYOR-SINGOR VILLAGE

Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|-------------------|------------|------------------|------------|-----------|
| 01 | ONEGWA GINARO | MALE | CHAIR PERSON | 0782162475 | |
| | OJET DOSU RICHARD | MALE | VICE CHAIRPERSON | 0782880509 | |
| | | | | | |

ATTENDANCE LIST

Project Name: KIRIANDONGO IWMAP, ESIA, RAP, SPP
 Location: NIAKATI II VILLAGE, APODORWA PARISH, MBOIRA SUB-COUNTY Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|---------------------------|------------|-------------|------------|-----------|
| | OHINJURU VICENT: L.C.I | | L.C.I | 0778300651 | |

ATTENDANCE LIST

Project Name: KIRIANDONGO IWMAP, ESIA, RAP, SPP
 Location: APDORWA VILLAGE, APDORWA P., MBOIRA S/C Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|---------------------|------------|-------------|------------|-----------|
| | DI ORYEMBA GEOFFREY | M. | C/P L.C.I | 0781015258 | |

ATTENDANCE LIST

Project Name: KIRIANDONGO IWMAP, ESIA, RAP, SPP
 Location: KIKURITA III Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|----------------|------------|----------------------|------------|-----------|
| 1 | OCHUKI MICHAEL | M | C/P L.C.I | 0779048557 | |
| 2 | EPDOLAI JESCA | F | L.C.I W.P | 0772596667 | |

ATTENDANCE LIST

Project Name: KIRIANDONGO IWMAP, ESIA, RAP, SPP
 Location: KIRIANDONGO VILLAGE I Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|--------------|------------|-------------|------------|-----------|
| 1 | OHUMU MURIEL | M | C/W L.C.I | 0782493346 | |

ATTENDANCE LIST

Project Name: KIRYANDONGO IWMDP ESIA, RAP SPP

Location: KIFURUTA I VILLAGE APOBORWA PARISH MBOIRA S/C

Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|-----------------|------------|----------------|------------|--------------------|
| 1- | KINITHO JOSEPH | M | KIFURUTA I C/P | 0782486631 | <i>[Signature]</i> |
| 2- | OKETHWENGY ALEX | M | GEN SECRETARY | 0788009114 | <i>[Signature]</i> |
| 3- | KETHA GILBERT | M | VICE C/P | 0775490500 | <i>[Signature]</i> |

ATTENDANCE LIST

Project Name: KIRYANDONGO IWMDP ESIA, RAP SPP

Location: KIFURUTA II VILLAGE KIFURUTA PARISH MBOIRA S/C

Date: 12/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|-----------------|------------|---------------|------------|--------------------|
| 1- | THIWE ALEX | M | VICE CHAIRMAN | 0788694991 | <i>[Signature]</i> |
| 2- | REGINAL OCHOWIN | M | CHAIRMAN | 0759144915 | <i>[Signature]</i> |

ATTENDANCE LIST

Project Name: KIRYANDONGO IWMDP ESIA, RAP SPP

Location: KARIXONE VILLAGE APOBORWA PARISH MBOIRA SUB COUNTY

Date: 12th 11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|----------------|------------|--------------|------------|--------------------|
| 01. | NYITHO GILBERT | M | C/P RESOLVER | 0779210040 | <i>[Signature]</i> |

ATTENDANCE LIST

Project Name: Kiryandongo IWMDP ESIA RAP SPP

Location: Kikoba 2, Tulikimu Saving group Water user committee

Date: 10/11/2021

| No. | Name | Gender M/F | Designation | Contact | Signature |
|-----|----------------|------------|--|---------|--------------------|
| 01 | EBIMA EMMANUEL | M | Resident near house 2 | | <i>[Signature]</i> |
| 02 | TINO JESCA | F | Treasurer water user committee Blit 18/2 | | <i>[Signature]</i> |

ANNEX 5: WATER QUALITY TEST CERTIFICATES



MINISTRY OF WATER AND ENVIRONMENT NATIONAL WATER QUALITY REFERENCE LABORATORY - ENTEBBE

Certificate of Analysis

Client Name : JBN Consults and Planners Ltd
 Client Address : Plot 48 Mbago Road, Najjera 1
 Sample Location : Kiryandongo District
 Date Sampled : 15th November 2021
 Date received : 2nd December 2021
 Analysis Completion data : 11th December 2021

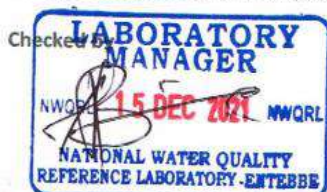
TEST RESULTS

| Source Name | NSW1 NEAL SOURCE 2 | NSW2 SOURCE 1 KIKOBA | NGW1 KIKUYA VILLAGE | NGW2 - KIKOBA SOURCE 1 | Drinking water standards (DEAS12:2018 Maximum permissible for Natural potable Water) |
|-------------------------------------|-------------------------|-------------------------|------------------------|------------------------|--|
| Sample Location and Source | Nyakabale Surface water | Nyakabale Surface water | Nyakabale Ground Water | Nyakabale Ground Water | |
| Sub County | Nyakabale | Nyakabale | Nyakabale | Nyakabale | |
| Lab Identifier code | E50106 | E50113 | E50110 | E50114 | |
| Turbidity (NTU) | 0.2 | 17.3 | 4.7 | 0.1 | 25 |
| pH | 7.34 | 7.12 | 8.07 | 6.92 | 5.5-9.5 |
| Electrical Conductivity | 265 | 459 | 339 | 430 | 2500 |
| Total dissolved solids | 169 | 294 | 217 | 275 | 1500 |
| Total Hardness as CaCO ₃ | 98 | 165 | 130 | 145 | 600 |
| Fluoride | 0.211 | 0.23 | 0.17 | 0.26 | 1.5 |
| Sulphates | 4.9 | 8.7 | 6.8 | 7.9 | 400 |
| Chlorides | 23 | 33 | 28 | 31 | 250 |
| Nitrates as N | 0.16 | 0.21 | 0.12 | 0.24 | 10 |
| Nitrites as N | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 |
| Manganese | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Total Iron | 0.28 | 0.82 | 0.19 | 0.34 | <0.5 |
| E.Coli | 10 | 4 | <1 | <1 | <1 |

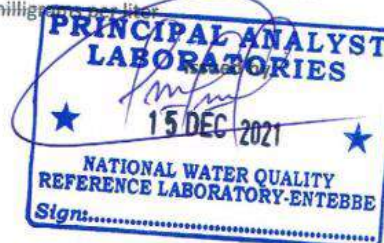
Notes;

Samples are analyzed on as received basis.

The client does bear sampling responsibility as to the representative characters of the sample delivered. Results are therefore based on the sample delivered and analyzed. mg/l-stands for milligrams per liter.



Water Quality Management Department
 Directorate of Water Resources Management
Waterquality.laboratory@mwe.go.ug
 P.O Box 19, Entebbe
 Tel: 041-321342





**NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY-BUGOLOBI.**

P.O. Box 7053, Kampala.
Tel: 041257548/341144 Fax: 041 255441
E-mail: waterquality@nWSC.co.ug

CERTIFICATE OF ANALYSIS

Client: Sumadhura Technologies
Address :Kampala

Serial No:ES/ RF/2021/1650

Sampled by: Client's Staff

Sample received: 6- 8-2021
Table of analytical results

Date of Report:9-8-2021

| Parameters | Units | V- Kikooba P- Buwomosi S/C- Kigumba C- Kibanda South D- Kiryandongo DWD:773833 | National Standards for Natural portable water |
|---|-------|---|--|
| <i>Sample Number</i> | - | <i>K905/2021/C</i> | |
| Alkalinity: Total | mg/l | 52 | 500 |
| Bicarbonate | Mg/l | 106 | 500 |
| Calcium ;Ca ²⁺ | mg/l | 12.40 | 150 |
| Chlorides-Cl ⁻ | mg/l | 5 | 250 |
| Colour | Ptco | 18 | 50 |
| Conductivity | μs/cm | 287 | 2500 |
| Fluoride :F ⁻ | Mg/l | 0.3 | 1.5 |
| Hardness: total as CaCO ₃) | mg/ | 64 | 600 |
| Iron:total | mg/l | 0.062 | 0.3 |
| Magnesium : Mg ²⁺ | mg/l | 5.20 | 100 |
| Manganese | Mg/l | 0.0 | 0.1 |
| Nitrate-N | mg/l | 0 | 45 |
| Ph(Physical-Chemical) | - | 6.63 | 5.5– 9.5 |
| Sulphates:SO ₄ ²⁻ | mg/l | 0 | 400 |
| Total dissolved solids(TDS) | mg/l | 238 | 1500 |
| Total suspended solids(TSS) | mg/l | 0 | 0.0 |
| Turbidity | NTU | 2.20 | 25 |

Remarks;

The water sample showed complying physiochemical characteristics compared to the National Standards for natural potable water.

AUTHORISED BY: Manager , Central Laboratory Services..... *LM*

APPROVED BY: Senior Manager, Water Quality Management Department..... *dy*

The NWSC certificate of analysis by no means constitutes a permit to any person or undertaking to conduct business. This report reflects results of the sample as received at the laboratory premises





**NATIONAL WATER AND SEWERAGE CORPORATION
CENTRAL LABORATORY-BUGOLOBI.**

P.O. Box 7053, Kampala.
Tel. 041257548/341144 Fax: 041 255441
E-mail: waterquality@nWSC.co.ug

CERTIFICATE OF ANALYSIS

Client: Sumadhura Technologies
Address :Kampala

Serial No:ES/ RF/2021/1651

Sampled by: Client's Staff

Sample received: 6- 8-2021

Date of Report:9-8-2021

Table of analytical results

| Parameters | Units | V- Kikunya P- Nyakabale S/C- Mboira C- Kibanda South D- Kiryandongo DWD:77382 | National Standards for Natural portable water |
|---|-------|--|--|
| <i>Sample Number</i> | - | <i>K906/2021/C</i> | |
| Alkalinity: Total | mg/l | 58 | 500 |
| Bicarbonate | Mg/l | 102 | 500 |
| Calcium ;Ca ²⁺ | mg/l | 14.20 | 150 |
| Chlorides-Cl ⁻ | mg/l | 3 | 250 |
| Colour | Ptco | 21 | 50 |
| Conductivity | µs/cm | 263 | 2500 |
| Fluoride :F ⁻ | Mg/l | 0.5 | 1.5 |
| Hardness: total as CaCO ₃) | mg/ | 68 | 600 |
| Iron:total | mg/l | 0.094 | 0.3 |
| Magnesium : Mg ²⁺ | mg/l | 5.40 | 100 |
| Manganese | Mg/l | 0.0 | 0.1 |
| Nitrate-N | mg/l | 0 | 45 |
| Ph(Physical-Chemical) | - | 6.69 | 5.5- 9.5 |
| Sulphates:SO ₄ ²⁻ | mg/l | 0 | 400 |
| Total dissolved solids(TDS) | mg/l | 234 | 1500 |
| Total suspended solids(TSS) | mg/l | 0 | 0.0 |
| Turbidity | NTU | 2.30 | 25 |

Remarks;

The water sample showed complying physiochemical characteristics compared to the National Standards for natural potable water .

AUTHORISED BY: Manager , Central Laboratory Services.....*M*

APPROVED BY: Senior Manager, Water Quality Management Department.....*aw*

The NWSC certificate of analysis by-no means constitutes a permit to any person or undertaking to conduct business

This report reflects results of the sample as received at the laboratory premises



ANNEX 6: FLORA SPECIES ECOUNTERED IN THE ASSESSMENT

| Sort | Family | Species | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|---------------|---------------------------------|---------------------------------|--------------------|----------------|----------------|----------|----------|
| 1 | Acanthaceae | <i>Acanthus pubescens</i> | 0 | 1 | 0 | 0 | Herb | LC |
| 2 | | <i>Asystasia gangetica</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 3 | | <i>Dyschoriste radicans</i> | 1 | 1 | 0 | 1 | Herb | LC |
| 4 | | <i>Justicia schimperiana</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 5 | | <i>Thunbergia mildbraediana</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 6 | Amaranthaceae | <i>Amaranthus hybridus</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 7 | Anacardiaceae | <i>Lannea barteri</i> | 0 | 1 | 0 | 1 | Tree | LC |
| 8 | | <i>Mangifera indica</i> | 1 | 0 | 1 | 0 | Tree | LC |
| 9 | | <i>Rhus vulgaris</i> | 0 | 1 | 0 | 1 | Shrub | LC |
| 10 | Annonaceae | <i>Annona senegalensis</i> | 2 | 0 | 0 | 0 | Shrub | LC |
| 11 | Araliaceae | <i>Cussonia holstii</i> | 0 | 1 | 0 | 1 | Tree | LC |
| 12 | Asteraceae | <i>Acanthospermum hispidum</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 13 | | <i>Ageratum conyzoides</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 14 | | <i>Aspilia africana</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 15 | | <i>Bidens pilosa</i> | 3 | 0 | 0 | 0 | Herb | Invasive |
| 16 | | <i>Chromolaena odorata</i> | 0 | 1 | 0 | 0 | Herb | Invasive |
| 17 | | <i>Conyza sumatrensis</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 18 | | <i>Echinops amplexicaulis</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 19 | | <i>Emilia coccinea</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 20 | | <i>Guizotia scabra</i> | 4 | 1 | 1 | 1 | Herb | LC |
| 21 | | <i>Lactuca schweinfurthii</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 22 | | <i>Siegesbeckia orientalis</i> | 1 | 0 | 0 | 0 | Herb | LC |

| Sort | Family | Species | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|----------------|---------------------------------|------------------------------------|-----------------------|-------------------|-------------------|----------|----------|
| 23 | | <i>Synedrella nodiflora</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 24 | | <i>Tagetes minuta</i> | 1 | 0 | 0 | 0 | Herb | Invasive |
| 25 | | <i>Tithonia diversifolia</i> | 0 | 1 | 0 | 0 | Herb | Invasive |
| 26 | | <i>Tridax procumbens</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 27 | | <i>Vernonia amygdalina</i> | 2 | 0 | 0 | 0 | Shrub | LC |
| 28 | | <i>Vernonia grantii</i> | 0 | 1 | 0 | 1 | Shrub | LC |
| 29 | Bignoniaceae | <i>Markhamia lutea</i> | 1 | 1 | 1 | 0 | Tree | LC |
| 30 | | <i>Stereospermum kunthianum</i> | 2 | 0 | 0 | 0 | Tree | LC |
| 31 | Boraginaceae | <i>Cynoglossum lanceolatum</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 32 | Celastraceae | <i>Maytenus senegalensis</i> | 0 | 1 | 0 | 1 | Shrub | LC |
| 33 | Colchicaceae | <i>Gloriosa superba</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 34 | Combretaceae | <i>Combretum collinum</i> | 0 | 1 | 0 | 1 | Tree | LC |
| 35 | | <i>Combretum molle</i> | 0 | 1 | 0 | 1 | Tree | LC |
| 36 | Commelinaceae | <i>Commelina africana</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 37 | | <i>Commelina bengalensis</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 38 | Convolvulaceae | <i>Dichondra micrantha</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 39 | | <i>Hewittia scandens</i> | 1 | 0 | 1 | 0 | Herb | LC |
| 40 | Cucurbitaceae | <i>Diplocyclos palmatus</i> | 1 | 0 | 0 | 0 | Liana | LC |
| 41 | | <i>Momordica foetida</i> | 1 | 0 | 0 | 0 | Liana | LC |
| 42 | Cyperaceae | <i>Cyperus dives</i> | 0 | 1 | 0 | 0 | Herb | LC |
| 43 | | <i>Cyperus foliaceus</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 44 | Dioscoreaceae | <i>Dioscorea bulbofera</i> | 1 | 0 | 0 | 0 | Liana | LC |
| 45 | Euphorbiaceae | <i>Acalypha bipartita</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 46 | | <i>Acalypha ciliata</i> | 1 | 1 | 0 | 1 | Herb | LC |
| 47 | | <i>Bridelia scleroneura</i> | 1 | 1 | 0 | 1 | Herb | LC |

| Sort | Family | Species | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|----------|--------------------------------|------------------------------------|-----------------------|-------------------|-------------------|----------|----------|
| 48 | | <i>Manhot esculanta</i> | 2 | 0 | 1 | 0 | Shrub | LC |
| 49 | | <i>Euphorbia hetrophylla</i> | 2 | 0 | 1 | 0 | Herb | LC |
| 50 | | <i>Euphorbia tirucalli</i> | 0 | 1 | 0 | 0 | Shrub | Invasive |
| 51 | | <i>Flueggea virosa</i> | 2 | 1 | 0 | 1 | Shrub | LC |
| 52 | | <i>Jatropha curcas</i> | 1 | 0 | 0 | 0 | Shrub | LC |
| 53 | | <i>Margaritaria discoidea</i> | 1 | 0 | 0 | 0 | Tree | LC |
| 54 | | <i>Ricinus communis</i> | 0 | 1 | 0 | 0 | Shrub | Invasive |
| 55 | Fabaceae | <i>Acacia abyssinica</i> | 0 | 1 | 0 | 1 | Tree | LC |
| 56 | | <i>Acacia hockii</i> | 1 | 1 | 0 | 1 | Tree | Invasive |
| 57 | | <i>Acacia polyacantha</i> | 3 | 2 | 0 | 1 | Tree | LC |
| 58 | | <i>Albizia coriaria</i> | 2 | 0 | 0 | 0 | Tree | LC |
| 59 | | <i>Albizia zygia</i> | 1 | 0 | 0 | 0 | Tree | LC |
| 60 | | <i>Aeschynomene abyssinica</i> | 0 | 0 | 1 | 0 | Herb | LC |
| 61 | | <i>Cajanus cajana</i> | 0 | 0 | 1 | 0 | Shrub | LC |
| 62 | | <i>Cassia hirsuta</i> | 0 | 0 | 1 | 0 | Herb | LC |
| 63 | | <i>Cassia obtusifolia</i> | 0 | 2 | 0 | 1 | Herb | LC |
| 64 | | <i>Crotalaria spinosa</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 65 | | <i>Delonix regia</i> | 0 | 1 | 0 | 0 | Tree | LC |
| 66 | | <i>Desmodium gangeticum</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 67 | | <i>Desmodium tortuosum</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 68 | | <i>Desmodium velutina</i> | 1 | 1 | 0 | 1 | Herb | LC |
| 69 | | <i>Entada abyssinica</i> | 0 | 1 | 0 | 1 | Tree | LC |
| 70 | | <i>Eriosema psoraleoides</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 71 | | <i>Erythrina abyssinica</i> | 0 | 1 | 0 | 0 | Tree | LC |
| 72 | | <i>Glycine wightii</i> | 2 | 1 | 0 | 1 | Liana | LC |

| Sort | Family | Species | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|------------------|--------------------------------|------------------------------------|-----------------------|-------------------|-------------------|----------|----------|
| 73 | | <i>Indigofera emarginella</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 74 | | <i>Indigofera spicata</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 75 | | <i>Indigofera trita</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 76 | | <i>Lonchocarpus laxiflorus</i> | 2 | 0 | 0 | 0 | Liana | LC |
| 77 | | <i>Mimosa pigra</i> | 0 | 1 | 0 | 0 | Liana | Invasive |
| 78 | | <i>Piliostigma thonningii</i> | 2 | 2 | 0 | 1 | Tree | LC |
| 79 | | <i>Pseudarthria hookeri</i> | 1 | 1 | 0 | 1 | Herb | LC |
| 80 | | <i>Rhynchosia densiflora</i> | 0 | 1 | 0 | 1 | Liana | LC |
| 81 | | <i>Senna spectabilis</i> | 1 | 1 | 0 | 1 | Tree | Invasive |
| 82 | | <i>Tamarindus indica</i> | 3 | 0 | 0 | 0 | Tree | LC |
| 83 | | <i>Terminalia glaucescens</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 84 | | <i>Tylosema fassoglensis</i> | 0 | 1 | 0 | 0 | Liana | LC |
| 85 | Hymenocardiaceae | <i>Hymenocardia acida</i> | 0 | 1 | 0 | 1 | Tree | LC |
| 86 | Hypericaceae | <i>Psorospermum febrifugum</i> | 0 | 1 | 0 | 1 | Shrub | LC |
| 87 | Lamiaceae | <i>Leonotis nepetifolia</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 88 | | <i>Leucas deflexa</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 89 | | <i>Tinnea aethiopica</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 90 | Malvaceae | <i>Corchorus tridens</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 91 | | <i>Grewia mollis</i> | 1 | 1 | 0 | 1 | Shrub | LC |
| 92 | | <i>Grewia similis</i> | 1 | 0 | 0 | 0 | Shrub | LC |
| 93 | | <i>Hibiscus sp</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 94 | | <i>Sida acuta</i> | 3 | 3 | 1 | 1 | Herb | Invasive |
| 95 | | <i>Sida alba</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 96 | | <i>Sida cordifolia</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 97 | | <i>Sida rhomboidea</i> | 1 | 0 | 0 | 0 | Herb | LC |



| Sort | Family | Species | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|----------------|--------------------------------|------------------------------------|-----------------------|-------------------|-------------------|----------|----------|
| 98 | | <i>Triumfetta rhombidea</i> | 2 | 1 | 0 | 1 | Herb | LC |
| 99 | | <i>Triumfetta tomentosa</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 100 | | <i>Urena lobata</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 101 | | <i>Waltheria indica</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 102 | Meliaceae | <i>Melia ssp</i> | 1 | 0 | 0 | 0 | Tree | LC |
| 103 | Moraceae | <i>Artocarpus heterophylla</i> | 1 | 0 | 1 | 0 | Tree | LC |
| 104 | | <i>Ficus ovata</i> | 1 | 0 | 0 | 0 | Tree | LC |
| 105 | Myrtaceae | <i>Eucalyptus grandis</i> | 0 | 1 | 0 | 0 | Tree | LC |
| 106 | | <i>Psidium guajava</i> | 1 | 0 | 0 | 0 | Tree | Invasive |
| 107 | Onagraceae | <i>Ludwigia abyssinica</i> | 0 | 1 | 0 | 0 | Herb | LC |
| 108 | Passifloraceae | <i>Passiflora edulis</i> | 1 | 0 | 0 | 0 | Liana | LC |
| 109 | Phytolaccaceae | <i>Phytolacca dodecandra</i> | 1 | 0 | 0 | 0 | Liana | LC |
| 110 | Pinaceae | <i>Pinus patula</i> | 0 | 3 | 0 | 0 | Tree | LC |
| 111 | Poaceae | <i>Brachiaria comata</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 112 | | <i>Brachiaria decumbens</i> | 2 | 1 | 0 | 0 | Herb | LC |
| 113 | | <i>Cynodon dactylon</i> | 4 | 5 | 0 | 1 | Herb | LC |
| 114 | | <i>Digitaria abyssinica</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 115 | | <i>Digitaria ternata</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 116 | | <i>Digitaria velutina</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 117 | | <i>Echinochloa pyramidalis</i> | 0 | 1 | 0 | 0 | Herb | LC |
| 118 | | <i>Eragrostis aspera</i> | 0 | 0 | 1 | 0 | Herb | LC |
| 119 | | <i>Eragrostis tenuifolia</i> | 2 | 0 | 0 | 0 | Herb | LC |
| 120 | | <i>Hyparrhenia collina</i> | 0 | 1 | 0 | 0 | Herb | LC |
| 121 | | <i>Hyparrhenia cymbaria</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 122 | | <i>Hyparrhenia filipendula</i> | 0 | 1 | 0 | 1 | Herb | LC |



| Sort | Family | Species | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|---------------|------------------------------------|------------------------------------|-----------------------|-------------------|-------------------|----------|----------|
| 123 | | <i>Imperata cylindrica</i> | 0 | 2 | 1 | 1 | Herb | Invasive |
| 124 | | <i>Leersia hexandra</i> | 0 | 1 | 0 | 0 | Herb | LC |
| 125 | | <i>Melinis repens</i> | 0 | 0 | 1 | 0 | Herb | LC |
| 126 | | <i>Panicum maximum</i> | 6 | 5 | 1 | 0 | Herb | LC |
| 127 | | <i>Paspalum scrobiculatum</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 128 | | <i>Pennisetum polystachion</i> | 1 | 1 | 1 | 0 | Herb | LC |
| 129 | | <i>Pennisetum purpureum</i> | 0 | 1 | 0 | 0 | Herb | LC |
| 130 | | <i>Pennisetum unisetum</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 131 | | <i>Rottboellia cochinchinensis</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 132 | | <i>Setaria incrassata</i> | 1 | 1 | 0 | 0 | Herb | LC |
| 133 | | <i>Setaria sphacelata</i> | 0 | 2 | 0 | 1 | Herb | LC |
| 134 | | <i>Sorghum arundinaceum</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 135 | | <i>Sorghum bicolor</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 136 | | <i>Sporobolus pyramidalis</i> | 1 | 1 | 0 | 1 | Herb | LC |
| 137 | | <i>Zea mays</i> | 3 | 3 | 3 | 0 | Herb | LC |
| 138 | Proteaceae | <i>Gravillea robusta</i> | 0 | 1 | 0 | 0 | Tree | LC |
| 139 | Ranunculaceae | <i>Clematis hirsuta</i> | 1 | 1 | 0 | 1 | Liana | LC |
| 140 | Rhamnaceae | <i>Maesopsis eminii</i> | 1 | 1 | 1 | 0 | Tree | LC |
| 141 | | <i>Ziziphus mucronata</i> | 1 | 0 | 0 | 0 | Tree | LC |
| 142 | Rubiaceae | <i>Coffea canephora</i> | 0 | 0 | 1 | 0 | Shrub | LC |
| 143 | | <i>Mitrocarpus virosa</i> | 3 | 0 | 0 | 0 | Herb | LC |
| 144 | Rutaceae | <i>Clausena anisata</i> | 0 | 1 | 0 | 1 | Shrub | LC |
| 145 | Solanaceae | <i>Capsicum frutescens</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 146 | | <i>Physalis angulata</i> | 1 | 0 | 0 | 0 | Herb | LC |
| 147 | | <i>Solanum incanum</i> | 3 | 3 | 0 | 1 | Herb | LC |

| Sort | Family | Species | Bore hole 1 & 2 and Access Road | Mboira T & D lines | Nyakabale Rope | Reservoir site | Lifeform | Status |
|------|---------------|---------------------------------|------------------------------------|-----------------------|-------------------|-------------------|----------|----------|
| 148 | Verbenaceae | <i>Clerodendrum myricoides</i> | 0 | 1 | 0 | 1 | Shrub | LC |
| 149 | | <i>Clerodendrum umbellatum</i> | 3 | 0 | 1 | 0 | Herb | LC |
| 150 | | <i>Gmelia sp</i> | 0 | 0 | 1 | 0 | Tree | LC |
| 151 | | <i>Lantana camara</i> | 1 | 2 | 0 | 1 | Shrub | Invasive |
| 152 | | <i>Lantana trifolia</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 153 | | <i>Lippia javanica</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 154 | | <i>Stachytarpheta indica</i> | 1 | 1 | 0 | 1 | Herb | Invasive |
| 155 | Vitaceae | <i>Cyphostemma adenocaulis</i> | 2 | 0 | 0 | 0 | Liana | LC |
| 156 | Zingiberaceae | <i>Aframomum albobviolaceum</i> | 0 | 1 | 0 | 1 | Herb | LC |
| 157 | | <i>Aframomum verrucosum</i> | 0 | 1 | 0 | 1 | Herb | LC |

LC = Least Concern

ANNEX 7: SELECTED SENSITIVE RECEPTORS FOR AIR QUALITY AND NOISE MEASUREMENTS

| Location details | Land use/cover | Photo |
|--|---|--|
| <p>Nyakabale Trading Centre</p> | <p>Located along Kiryandongo-Masindi Road. Built up area with several commercial and residential buildings on either side of the road. Main economic activities are retail businesses dealing in basic merchandise, bars and restaurants.</p> |  |
| <p>Nyakabale Primary School</p> | <p>Located in rural agricultural setting with a few scattered homesteads in the surrounding environs. School compound has a large number of mature trees including Albizia spp, Eucalyptus, Pine.</p> |  |

| | | |
|---|---|---|
| <p>Apodorwa Health Center II</p> | <p>Located a few metres from Apodorwa Trading Centre in a mixed land use area. The health centre compound is composed of OPD building, laboratory, treatment building and staff quarters. Site also has several mature trees and surface covered by pasparum grass.</p> |  |
| <p>Kifuruta Primary School</p> | <p>School located about 2km from Apodorwa TC, in a rural agricultural and residential area. The school neighbourhood is composed of staff quarters in the east, 2 homesteads in the west, Catholic church and community access road in the south and a eucalyptus woodlot in the north.</p> |  |

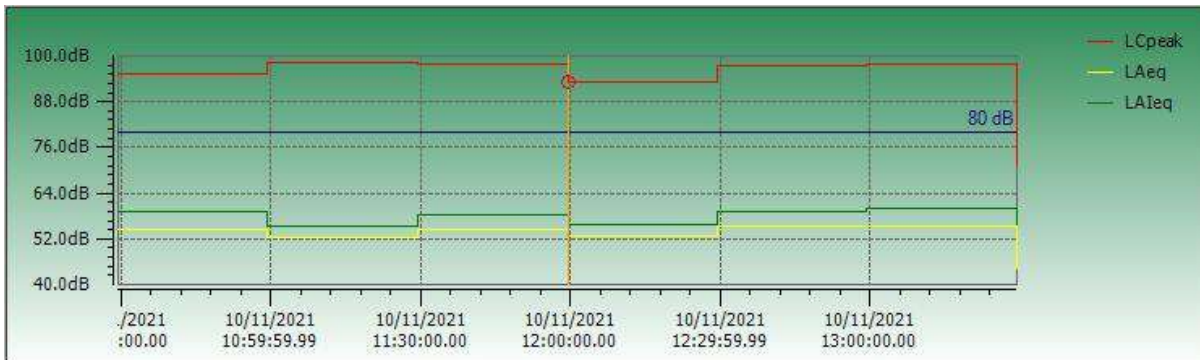
ANNEX 8: BASELINE SPL MEASUREMENTS AT SELECTED SITES

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) FOR LARGE SOLAR POWERED PIPED WATER SUPPLY SYSTEMS AND SANITATION FACILITIES IN REFUGEE SETTLEMENT AND HOST COMMUNITIES OF KIRYANDONGO DISTRICT



Nyakabale Trading Centre

| | | | |
|-------------------------|----------------------------------|---------------------------|------------------------|
| Instrument Model | CEL-633B | | |
| LAFmin | 36.2 dB | LAlmax | 83.3 dB |
| LAFmin with Time | 36.2 dB (11/10/2021 12:42:24 PM) | LCpeak | 98.2 dB |
| LCpeak with Time | 98.2 dB (11/10/2021 11:16:39 AM) | LAF 10% | 56.5 dB |
| Run Number | 22 | LAF 50% | 49 dB |
| LAFmax with Time | 82.1 dB (11/10/2021 12:46:19 PM) | LAF 90% | 44.5 dB |
| Start Date & Time | 11/10/2021 10:29:27 AM | LAF 95% | 43 dB |
| Duration | 03:00:07 HH:MM:SS | End Date & Time | 11/10/2021 1:29:34 PM |
| LCeq | 68.7 dB | Calibration (Before) Date | 11/10/2021 10:28:29 AM |
| LAeq | 54.3 dB | Calibration (Before) SPL | 114 dB |
| LAFmax | 82.1 dB | Calibration (After) Date | 11/10/2021 1:31:02 PM |
| Serial Number | 2670936 | Calibration Drift | 0.1 dB |

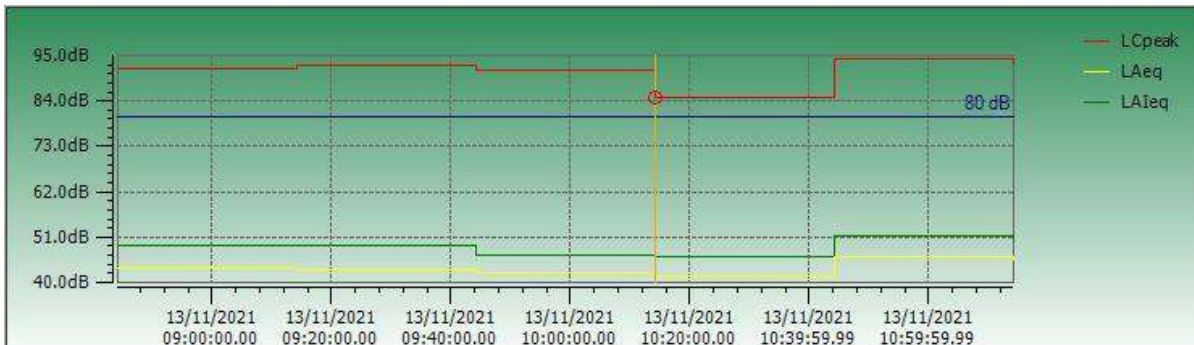


**ENVIRONMENT AND SOCIAL IMPACT
ASSESSMENT (ESIA) FOR LARGE SOLAR
POWERED PIPED WATER SUPPLY SYSTEMS
AND SANITATION FACILITIES IN REFUGEE
SETTLEMENT AND HOST COMMUNITIES OF
KIRYANDONGO DISTRICT**



Apodorwa Health Centre II

| | | | |
|-------------------------|----------------------------------|---------------------------|------------------------|
| Instrument Model | CEL-633B | | |
| LAFmin | 31.6 dB | LAlmax | 74.2 dB |
| LAFmin with Time | 31.6 dB (11/13/2021 10:42:47 AM) | LCpeak | 94.3 dB |
| LCpeak with Time | 94.3 dB (11/13/2021 11:06:27 AM) | LAF 10% | 46.5 dB |
| Run Number | 35 | LAF 50% | 41.5 dB |
| LAFmax with Time | 71.6 dB (11/13/2021 11:07:50 AM) | LAF 90% | 37.5 dB |
| Start Date & Time | 11/13/2021 8:44:11 AM | LAF 95% | 36.5 dB |
| Duration | 02:31:00 HH:MM: SS | End Date & Time | 11/13/2021 11:15:11 AM |
| LCeq | 65.5 dB | Calibration (Before) Date | 11/13/2021 8:42:40 AM |
| LAeq | 43.7 dB | Calibration (Before) SPL | 114 dB |
| LAFmax | 71.6 dB | Calibration (After) Date | 11/13/2021 11:48:14 AM |
| Serial Number | 2670936 | Calibration Drift | 0.0 dB |



Report generated by Insight CEL-63x - Casella CEL Ltd - on 11/24/2021 at 11:35:34 AM

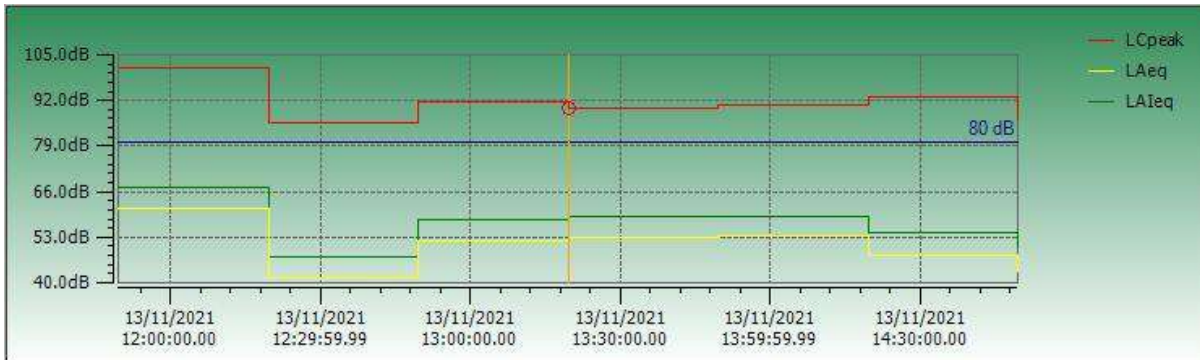
ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT
(ESIA) FOR LARGE SOLAR POWERED PIPED WATER



Kifuruta Primary School

Instrument Model CEL-633B

| | | | |
|------------------------------|-----------------------------------|---------------------------|------------------------|
| LAFmin | 28.8 dB | LAI _{max} | 94 dB |
| LAFmin with Time | 28.8 dB (11/13/2021 2:46:08 PM) | LC _{peak} | 101.3 dB |
| LC _{peak} with Time | 101.3 dB (11/13/2021 11:55:17 AM) | LAF 10% | 54.5 dB |
| Run Number | 37 | LAF 50% | 44.5 dB |
| LAF _{max} with Time | 92.8 dB (11/13/2021 11:55:17 AM) | LAF 90% | 35 dB |
| Start Date & Time | 11/13/2021 11:49:33 AM | LAF 95% | 33.5 dB |
| Duration | 03:05:00 HH:MM:SS | End Date & Time | 11/13/2021 2:54:33 PM |
| LC _{eq} | 59.2 dB | Calibration (Before) Date | 11/13/2021 11:48:14 AM |
| L_{Aeq} | 55.1 dB | Calibration (Before) SPL | 114 dB |
| LAF_{max} | 92.8 dB | Calibration (After) Date | |
| Serial Number | 2670936 | Calibration Drift | -0.9 dB |



Report generated by Insight CEL-63x - Casella CEL Ltd - on 11/24/2021 at 11:36:46 AM

ANNEX 9: SOCIOECONOMIC SURVEY RESULTS

Area population per parish (Core Beneficiary and Immediate Influence zone, Non-Beneficiary Areas)

| CORE BENEFICIARY AREA (7 villages) | | | | | | | |
|--|------------|----------------------|----------------------|--------------|--------------|---------------|--------------|
| SUB COUNTY | PARISH | VILLAGE | HHs | FEMALE | MALE | TOTAL | |
| Mboira SC | Apodorwa | Apodorwa | 51 | 267 | 201 | 468 | |
| | | Kifuruta II | 81 | 214 | 159 | 373 | |
| | Nyakabale | Nyakabale | 202 | 584 | 350 | 934 | |
| | | Kikunya | 97 | 303 | 277 | 580 | |
| | Mboira | Mboira I | 64 | 204 | 349 | 553 | |
| | | Mboira II | 97 | 179 | 166 | 345 | |
| | | Sub Total | 592 | 1,751 | 1,502 | 3,253 | |
| Kigumba SC | | Kikooba | 284 | 534 | 498 | 1,032 | |
| | | Sub Total | 284 | 534 | 498 | 1,032 | |
| | | OVERALL TOTAL | 876 | 2,285 | 2,000 | 4,285 | |
| INFLUENCE ZONE | | | | | | | |
| | PARISH | VILLAGE | HHs | FEMALE | MALE | TOTAL | |
| MBOIRA SC | APODORWA | Karacove | 26 | 231 | 174 | 405 | |
| | | Abiira | 21 | 221 | 166 | 387 | |
| | | Nyakatiti I | 66 | 292 | 245 | 537 | |
| | | Nyakatiti II | 48 | 211 | 179 | 390 | |
| | | Iranda | 26 | 108 | 150 | 258 | |
| | | Sub Total | 186 | 1,063 | 914 | 1,977 | |
| | KIFURUTA | Cana | 69 | 197 | 126 | 323 | |
| | | Alengo | 61 | 171 | 114 | 285 | |
| | | Kifuruta III | 59 | 194 | 209 | 403 | |
| | | Kyakakunguru | 86 | 389 | 241 | 630 | |
| | | Uyaa | 62 | 281 | 174 | 455 | |
| | | Lavorongor East | 61 | 91 | 94 | 185 | |
| | | Lavorongor West | 49 | 82 | 85 | 167 | |
| | | Sub Total | 448 | 1,405 | 1,043 | 2,448 | |
| | MBOIRA | Nyakafunjo | 57 | 178 | 314 | 492 | |
| | | Nkwenda I | 97 | 395 | 123 | 518 | |
| | | Nkwenda II | 52 | 215 | 197 | 412 | |
| | | Hanga | 65 | 161 | 129 | 290 | |
| | | Sub Total | 271 | 949 | 763 | 1,712 | |
| | KIGUMBA SC | KIGUMBA | RWABIGARAGARA | 165 | 326 | 269 | 595 |
| | | | RWAKAYATA | 121 | 235 | 201 | 436 |
| | | | Sub Total | 286 | 561 | 470 | 1,031 |
| | | | OVERALL TOTAL | 1,191 | 3,978 | 3,191 | 7,169 |
| GRAND TOTAL (BENEFICIARY 7 NON BENEFICIARY) | | | 2,066 | 6,263 | 5,191 | 11,454 | |

Main Sources of Drinking Water

| Main sources of drinking water | | | |
|--------------------------------|----------|----------------|-------------|
| Parishes | Borehole | PSP / yard tap | Grand Total |
| | | | |

| | Freq | % | Freq | % | Freq | % |
|--------------------|------------|-------------|----------|------------|------------|------------|
| Apodorwa | 6 | 40 | 9 | 60 | 15 | 100 |
| Kiigya | 94 | 100 | 0 | 0 | 94 | 100 |
| Mboira | 92 | 100 | 0 | 0 | 92 | 100 |
| Nyakabale | 26 | 100 | 0 | 0 | 26 | 100 |
| Grand Total | 218 | 96.0 | 9 | 4.0 | 227 | 100 |

Methods of Treating Drinking Waters

| Boiling Drinking Water | | | | | | | | |
|------------------------|----------|------------|-------------|-------------|-----------|-------------|-------------|------------|
| Parishes | Daily | | Do not boil | | Weekly | | Grand Total | |
| | Freq | % | Freq | % | Freq | % | Freq | % |
| Apodorwa | 0 | 0 | 15 | 100 | 0 | 0 | 15 | 100 |
| Kiigya | 0 | 0 | 66 | 70.2 | 28 | 29.8 | 94 | 100 |
| Mboira | 6 | 6.5 | 68 | 73.9 | 18 | 19.6 | 92 | 100 |
| Nyakabale | 3 | 11.5 | 20 | 76.9 | 3 | 11.5 | 26 | 100 |
| Grand Total | 9 | 4.0 | 169 | 74.4 | 49 | 21.6 | 227 | 100 |

Energy used to boil drinking water

| Energy used to boil drinking water | | | | | | | |
|------------------------------------|---------------------|-------------|---------------------|-------------|-------------|------------|--|
| Parishes | Boil using charcoal | | Boil using firewood | | Grand Total | | |
| | Freq | % | Freq | % | Freq | % | |
| Apodorwa | 0 | 0 | 0 | 0 | 0 | 0 | |
| Kiigya | 15 | 53.6 | 13 | 46.4 | 28 | 100 | |
| Mboira | 17 | 70.8 | 7 | 29.2 | 24 | 100 | |
| Nyakabale | 3 | 50 | 3 | 50 | 6 | 100 | |
| Grand Total | 35 | 60.3 | 23 | 39.7 | 58 | 100 | |

Storage of drinking water

| Storage of drinking water | | | | | | | | | | |
|---------------------------|-----------|------------|-----------|------------|-----------|------------|-----------|------------|-------------|------------|
| Parishes | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Grand Total | |
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Bucket | 0 | 0 | 4 | 4.3 | 3 | 3.3 | 8 | 30.8 | 15 | 6.6 |
| Fridge | 2 | 13.3 | 0 | 0 | 3 | 3.3 | 1 | 3.8 | 6 | 2.6 |
| Jerry can | 13 | 86.7 | 44 | 46.8 | 71 | 77.2 | 11 | 42.3 | 139 | 61.2 |
| Jug / flask | 0 | 0 | 0 | 0 | 12 | 13.0 | 1 | 3.8 | 13 | 5.7 |
| Pot | 0 | 0 | 46 | 48.9 | 3 | 3.3 | 5 | 19.2 | 54 | 23.8 |
| Grand Total | 15 | 100 | 94 | 100 | 92 | 100 | 26 | 100 | 227 | 100 |

Meals per day

| Meals per day | | | | | | | | | |
|---------------|--------|------|---------|------|---------|------|-------------|------|--|
| Parishes | 1 meal | | 2 meals | | 3 meals | | Grand Total | | |
| | Freq | % | Freq | % | Freq | % | Freq | % | |
| Apodorwa | 6 | 40 | 7 | 46.7 | 2 | 13.3 | 15 | 6.6 | |
| Kiigya | 20 | 21.3 | 38 | 40.4 | 36 | 38.3 | 94 | 41.4 | |

| | | | | | | | | |
|-------------|----|------|----|------|----|------|-----|------|
| Mboira | 17 | 18.5 | 38 | 41.3 | 37 | 40.2 | 92 | 40.5 |
| Nyakabale | 6 | 23.1 | 11 | 42.3 | 9 | 34.6 | 26 | 11.5 |
| Grand Total | 49 | 21.6 | 94 | 41.4 | 84 | 37.0 | 227 | 100 |

Common Waste Management practices (solid waste)

| Common Waste Management practices (solid waste) | | | | | | |
|---|--------------|------|---------|------|---------|------|
| Parishes | Open Dumping | | Burning | | Burying | |
| | Freq | % | Freq | % | Freq | % |
| Apodorwa | 15 | 6.6 | 15 | 6.6 | 6 | 2.6 |
| Kiigya | 94 | 41.4 | 94 | 41.4 | 67 | 29.5 |
| Mboira | 92 | 40.5 | 92 | 40.5 | 27 | 11.9 |
| Nyakabale | 26 | 11.5 | 26 | 11.5 | 18 | 7.9 |
| Grand Total | 227 | 100 | 227 | 100 | 118 | 52.0 |

Aware of any bye-laws on WASH

| Aware of any bye-laws on WASH | | | | | | |
|-------------------------------|------|------|------|------|-------------|-----|
| Parishes | Yes | | No | | Grand Total | |
| | Freq | % | Freq | % | Freq | % |
| Apodorwa | 6 | 40 | 9 | 60 | 15 | 100 |
| Kiigya | 81 | 86.2 | 13 | 13.8 | 94 | 100 |
| Mboira | 39 | 42.4 | 53 | 57.6 | 92 | 100 |
| Nyakabale | 7 | 26.9 | 19 | 73.1 | 26 | 100 |
| Grand Total | 133 | 58.6 | 94 | 41.4 | 227 | 100 |

Do you prefer to have a new bylaw / modify the current one?

| Do you prefer to have a new bylaw / modify the current one? | | | | | | |
|---|------|------|------|------|-------------|-------------|
| Parishes | Yes | | No | | Grand Total | |
| | Freq | % | Freq | % | Freq | |
| Apodorwa | 6 | 40 | 9 | 60 | 15 | Apodorwa |
| Kiigya | 81 | 86.2 | 13 | 13.8 | 94 | Kiigya |
| Mboira | 30 | 32.6 | 62 | 67.4 | 92 | Mboira |
| Nyakabale | 3 | 11.5 | 23 | 88.5 | 26 | Nyakabale |
| Grand Total | 120 | 52.9 | 107 | 47.1 | 227 | Grand Total |

Common diseases that affect Households

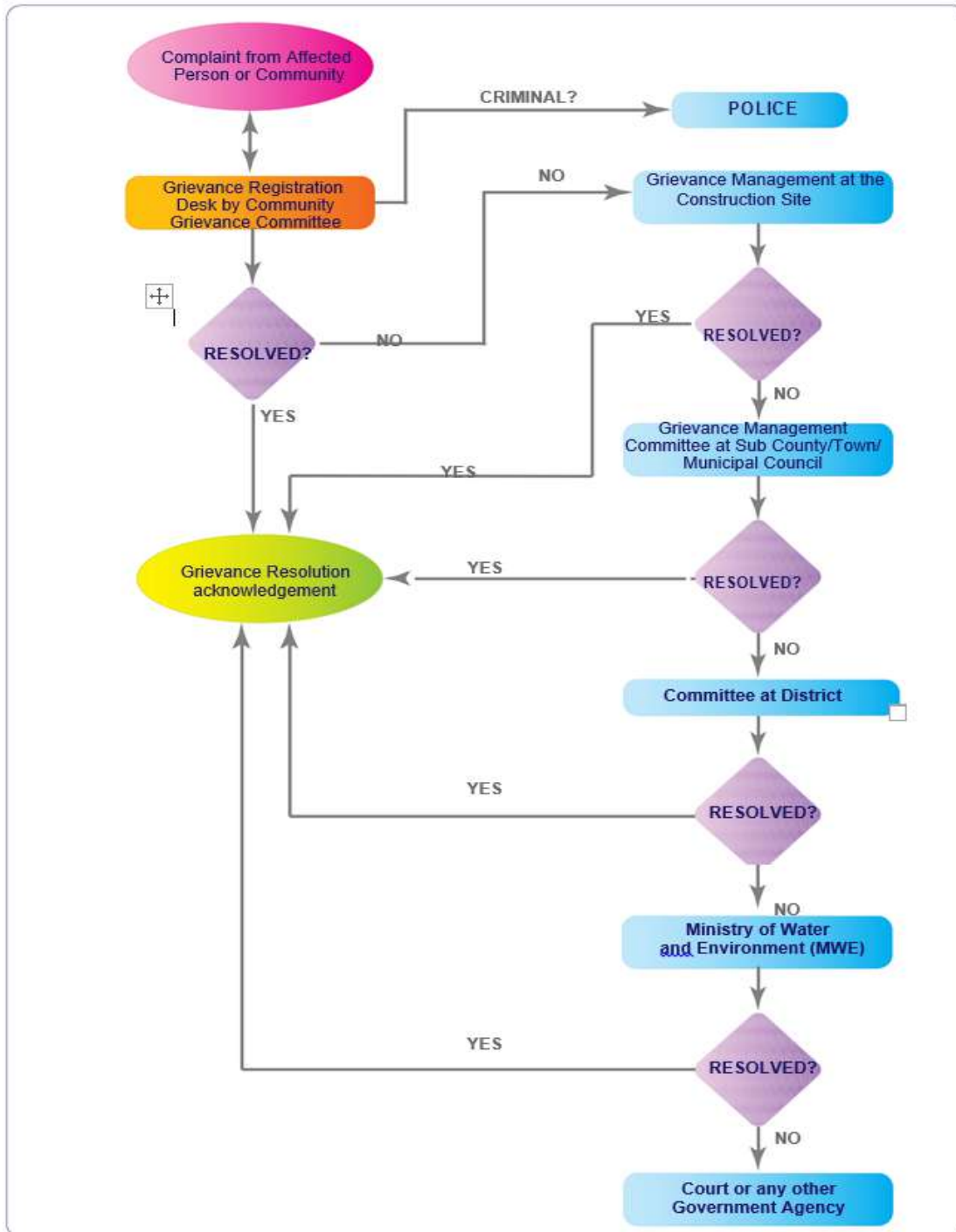
| Common diseases that affect HHs | Apodorwa | | Kiigya | | Mboira | | Nyakabale | | Total | |
|---------------------------------|----------|------|--------|------|--------|------|-----------|------|-------|------|
| | Freq | % | Freq | % | Freq | % | Freq | % | Freq | % |
| Malaria | 15 | 100 | 91 | 96.8 | 82 | 89.1 | 15 | 57.7 | 203 | 89.4 |
| Cough | 9 | 60 | 75 | 79.8 | 76 | 82.6 | 14 | 53.8 | 174 | 76.7 |
| Typhoid | 6 | 40 | 87 | 92.6 | 49 | 53.3 | 7 | 26.9 | 149 | 65.6 |
| Bilharzia | 4 | 26.7 | 11 | 11.7 | 9 | 9.8 | 0 | 0 | 24 | 10.6 |
| Gastronomic disorders | 0 | 0 | 0 | 0 | 2 | 2.2 | 0 | 0 | 2 | 0.9 |
| Ulcers | 0 | 0 | 6 | 6.4 | 13 | 14.1 | 0 | 0 | 19 | 8.4 |
| HIV/AIDS | 6 | 40 | 4 | 4.3 | 7 | 7.6 | 0 | 0 | 17 | 7.5 |

List of land owners per location of proposed water facilities

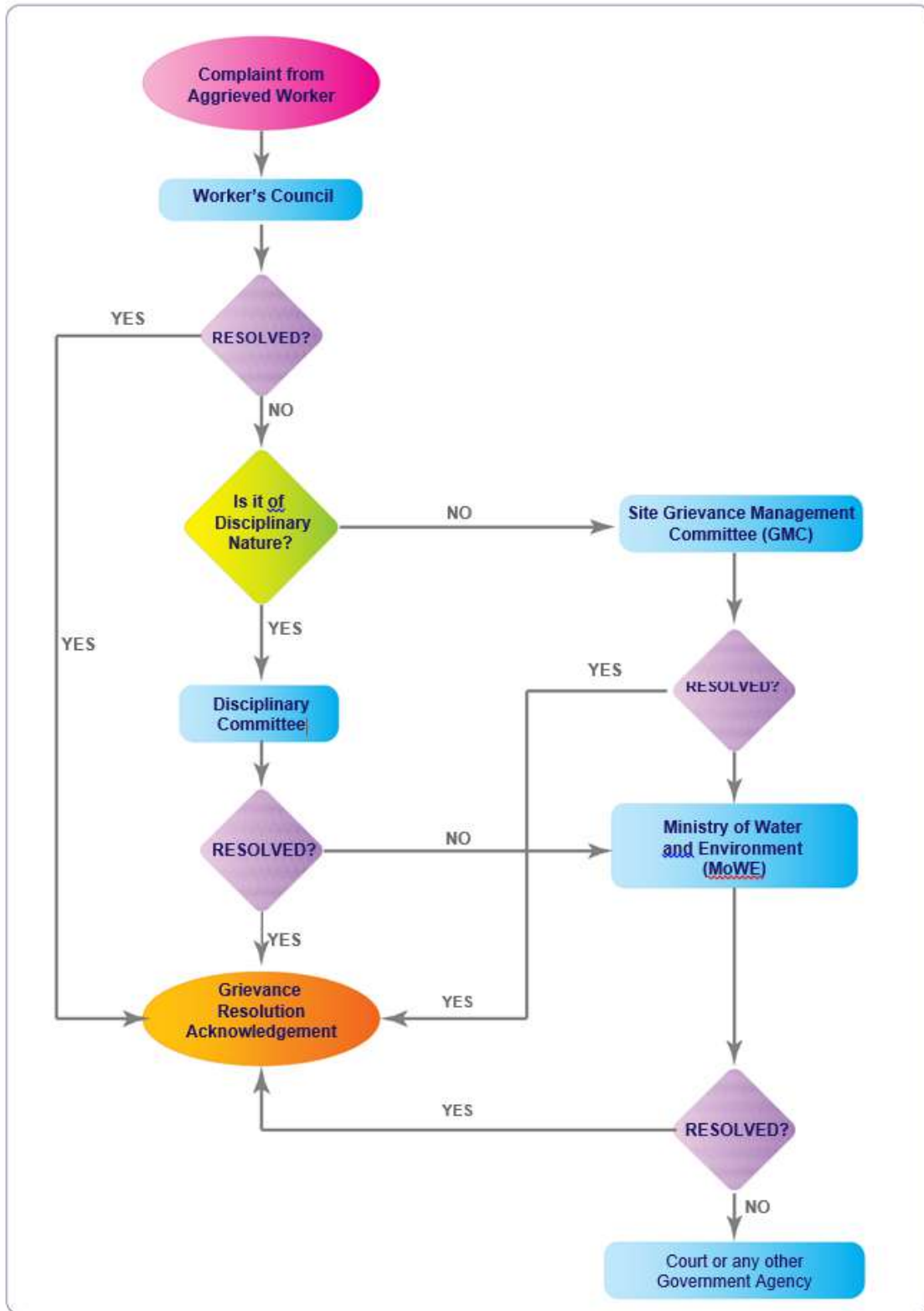
| Infrastructure | Site location by village & parish | GPS Coordinate | Land uptake, sq.mtr | Land owner |
|---------------------------------|-----------------------------------|--------------------------------|--|---|
| Borehole Pump Station DWD 77382 | Kikunya village, Mboira parish | 36N 381073 mE, 199234 mN | 900m ² (30m square) | Byansi Godfrey 0779767772 |
| Borehole DWD 77382 Access Road | Kikunya village, Mboira parish | | 4,302m ² (717m long, 6m wide) | Byansi Godfrey - 0779767772 Adam Idi – 0788822233 |
| Borehole Pump Station DWD 77383 | Kikoba village, Kiigya parish | 36N 379216 mE, 198304 mN | 900m ² (30m square) | Okuta Charles Wilfred 0772955116 |
| Borehole DWD 77383 Access Road | Kikoba village, Kiigya parish | | 60m ² (10m long, 6m wide) | Okuta Charles Wilfred 0772955116 |
| Nyakabale Reservoir Tank | Mboira village, Mboira parish | 36N 378747 mE, 202381 mN | 900m ² (30m square) | c/o Mboira SC Chairperson – Watube Mike Jean (0775001822) |
| Nyakabale Reservoir Access Road | Mboira village, Mboira parish | | 1,524m ² (254m long, 6m wide) | c/o Mboira SC Chairperson – Watube Mike Jean (0775001822) |

ANNEX 10: GRIEVANCE REDRESS MECHANISMS AND FORMS

Community Grievance Flow Chart



Workers Grievance Flow Chart



Village Level GRC Reporting Template

District.....

Sub-county.....

Village.....

Indicators

| SN | Indicator | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|----|---|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| 1. | No of grievances related to project activities logged per month | | | | | | | | | | | | |
| 2. | Number of grievances that received timely response (within 7 days) | | | | | | | | | | | | |
| 3. | Number of grievances received and addressed at village level | | | | | | | | | | | | |
| 4. | Number of recurrent complaints received (over a period of 15 days) | | | | | | | | | | | | |
| 5. | No. of meetings held | | | | | | | | | | | | |
| 6. | Number of unresolved grievances | | | | | | | | | | | | |
| 7. | Number of grievances referred from village to sub-county level for addressing | | | | | | | | | | | | |
| 8. | Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law | | | | | | | | | | | | |

Provide details on recurrent complaints raised (attach evidence where necessary)

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National Level GRC Reporting Template

Indicators

| SN | Indicator | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec |
|----|---|-----|-----|-----|-----|-----|-----|-----|-----|------|-----|-----|-----|
| 1. | No. of grievances related to project activities logged per month | | | | | | | | | | | | |
| 2. | Number of grievances that received timely response (within 14 days) | | | | | | | | | | | | |
| 3. | Number of grievances received and addressed at district level | | | | | | | | | | | | |
| 4. | Number of recurrent complaints received (over a period of 15 days) | | | | | | | | | | | | |
| 5. | No. of meetings held | | | | | | | | | | | | |
| 6. | Number of unresolved grievances | | | | | | | | | | | | |
| 7. | Number of grievances referred from the district to national level for addressing | | | | | | | | | | | | |
| 8. | Number of grievances referred to other legal institutions e.g. LCs, Police, Courts of Law | | | | | | | | | | | | |

Provide details on recurrent complaints raised (attach evidence where necessary)

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**ANNEX 11: REPORTING AND REFERRAL OF VAC, GBV AND OTHER SEXUAL RELATED
CASES ON THE PROJECT**

| Stakeholder | Action and support is to be provided | Where the case should be Referred? |
|---|---|---|
| VAC /GBV Victim | <p>Reports to immediate persons like relatives, friends, peers, and other resourceful persons such as teacher, religious leaders, CSOs, LC, Police</p> <p>Makes a statement providing details on what happened, form of violence, perpetrator, any witnesses.</p> | Immediately refer the case to LC and Police for recording and further investigation. |
| <p>Community Persons including LCs, parents, guardians, Roads Committees, Project Management Committees, contractors' management teams, Grievance committees, Contractor's worker, Faith based member like church members, CSOs</p> <p>Police</p> | <p>Reports the case and perpetrator immediately to nearby Local Council, Contractor's supervisor, Probation Officer/ CDOs and Police for further action.</p> <p>Liaises with other actors and ensures that the survivor gets support services such as medical care and check-up, counselling and other basic needs such as food.</p> <p>Follow-up the case with LCs, Police, health services and courts of law.</p> <ul style="list-style-type: none"> • Investigates the case, Signs the PF3 forms and other sources of evidence • to support court proceedings, Supports the child survivor to access required • support services and evidence such as a medical report. | <p>Refers the case to Police for further investigation.</p> <p>Refers the case to State Attorney for committing the perpetrator to courts of Law for hearing and sentencing</p> |
| Designated Medical Centre | <ul style="list-style-type: none"> • Medical Examination for bodily harm or other injuries caused, • Produces medical report for police investigations and other evidence for the courts of law, • Provides medical care for the victim survivor to ensure recovery. | Reports to the Police and to the Courts of Law as evidence against the perpetrator. |
| Probation and Social Welfare Officer/ CDO | <ul style="list-style-type: none"> • Assess the needs of the survivor/victim and refers the victim to services providers for appropriate support services, Collects data and information on the victim for processing and management | Reports to Police |

| Stakeholder | Action and support is to be provided | Where the case should be Referred? |
|--|---|---|
| <p>Courts of law</p> <p>Prison</p> | <ul style="list-style-type: none"> • Hears the case, decides on support services to the child survivor or the parents of the child victim, • Sentences the perpetrator according to the existing laws regarding the case. • Ensures that the person found guilty serves his/her sentence, • Person is rehabilitated. | <p>Commits the person found guilty to serve his/her sentence and orders for any care and support to be provided to the victims</p> <p>Freed at the end of serving the sentence.</p> |
| Contractors | <p>Ensure workers are well screened for VAC&GBV before employment with involvement of LC and Police</p> <p>Ensure workers files and background information is on file for future references</p> <p>Ensure workers are trained in company policies specifically on VAC & GBV</p> <p>VAC & GBV Tool box meetings organized</p> <p>Ensure that there is a site clinic and medical service provider for workers and other victims on referral by the site clinic</p> <p>Have MoU with Police to expedite any investigations and trainings</p> <p>Create awareness to the communities on VAC & GBV risks and referral pathways</p> <p>Cooperate with law enforcement agencies and officials in detecting, investigations and managing VAC & GBV cases</p> <p>Provide any other relevant support to victims</p> | <p>Refer all allegations of VAC & GBV to the Supervising Consultant, VAC&GBV Consultant for independent investigations and reporting to Uganda Police</p> |
| Local Government (CDOs and other relevant Officials) | <p>Monitors cases of any GBV/VAC allegations on the project</p> <p>Participate in GBV&VAC sensitizations to project workers and communities</p> | <p>Refers to Uganda Police and existing service providers to victims and survivors of VAC & GBV</p> |

| Stakeholder | Action and support is to be provided | Where the case should be Referred? |
|-------------|--|--|
| | <p>Provides technical guidance to contractors and communities on any referral pathway for a specific incident</p> <p>Maintains a directory of services providers (Government and Civil Society Organizations) for survivors and victims</p> <p>Links victim and survivors for more support to existing service providers</p> <p>Follows up on the progress of judicial processes for the suspects</p> | |
| MWE | <p>Ensure that the Civil works contracts have strong penalties for contractors and workers involvement in VAC & GBV</p> <p>Provides effective orientation of contractors and their staff on safeguards management on the project</p> <p>Deploys dedicated service provider for VAC& GBV on the project sites</p> <p>Monitors VAC & GBV cases in the community and assesses any cases involving the contractors and their workers</p> <p>Provides reports to World Bank on any incidents related to VAC & GBV within 48 hours; provides root cause analysis (RCA) and safeguards correction action plans (SCAP)</p> <p>Make follow up to ensure that all cases are judiciously managed</p> <p>Liaise with other MDAs to ensure appropriate actions to the VAC & GBV victims and offenders</p> | Ensures zero occurrence of VAC cases in relation to the Project. |

Reporting form for VAC and GBV incidents on the project.

Part I: Details of the Reporter

| | | |
|---|--|-----------------------------|
| Name of the Person reporting the case | Address: Location: | Date of reporting the case: |
| Designation and relationship with the child victim and survivor | Contact details; Tel. No (Landline): Tel. No (Mobile): Email: | Time of Reporting: |

Part II: Details of Victim/ Survivor

| S/N | Indicators | Details captured |
|-----|--|------------------|
| | Name of the victim | |
| | Sex | |
| | Date of birth and Age | |
| | Residence | |
| | Contacts- telephone | |
| | Reference number | |
| | Nature/type of the alleged act of violence: | |
| | Location: where the incident took place | |
| | Number of times the victim has encountered such a form of violence | |
| | Other associated forms of violence the victim has encountered by the alleged perpetrator | |
| | Relationship of the victim with the alleged perpetrator | |

| | | |
|--|--|----------------------------------|
| | Impact of the act of violence on the victim i.e. physical, mental, health etc | |
| | Date or time frame of the act of violence | |
| | Witnesses (if any) and their observations and their willingness to appear in case of further investigations and their telephone contacts | |
| | Status of reporting (if there are previous efforts of reporting the case and the person/officer reported to | |
| | Measures or actions taken | |
| | Outcomes of the measures if any | |
| | Recommended actions and support services for the survivor/victim | |
| | Witnesses Name: Address: Contact number: | Describe the event as witnessed: |
| | Any other information found necessary to support the case- photographic or recorded evidence | |
| | Form compiled by: Name: ----- Signature: ----- | Position----- Date----- |

Part III: Details of the alleged perpetrator

| Notes | | Attach all the necessary supporting information or documents and remember to retain a copy for follow-up |
|-------|---|--|
| S/N | Indicators | Details captured |
| 1 | Name of the alleged perpetrator (attach a photo) if available | |
| 2 | Sex | |
| 3 | Age (if known) | |

| | | |
|----|--|--|
| 4 | Residence | |
| 5 | Marital status | |
| 6 | Contacts- telephone | |
| 11 | Consent or non-consent of the perpetrator on committing the act | |
| 12 | Previous incidents of violence committed by the alleged perpetrator | |
| 13 | Measures taken by the duty bearers and other stakeholders against the perpetrator | |
| 14 | Outcomes of the measures if any | |
| 15 | Recommended actions against the perpetrator | |
| 16 | Any other information found necessary | |
| 17 | Form compiled by: Name: ----- Signature: ----- Position:----- Date:----- | Contact details: Tel:-----Email:----- -- |

ANNEX 12: PROJECT INVESTMENT COST VALUATION

OUR REF: GMT|102|MWE
YOUR REF:

03rd October, 2022

The Executive Director
National Environmental Management Authority
P. O. Box 22255, Plot 17/ 19/21 Jinja Road,
KAMPALA.

INVESTMENT APPRAISAL OF THE PROPOSED LARGE SOLAR POWER WATER SUPPLY AND SANITATION SYSTEM IN NYAKABAALÉ RGC, KIRYANDONGO DISTRICT.

1. BACKGROUND

The Government of Uganda received credit from the World Bank towards implementation of the Integrated Water Management and Development Project (IWMDP). The Project Development Objective (PDO) is to improve access to water supply and sanitation services, capacity for integrated water resources management and the operational performance of service providers in project areas. The project will also contribute to the achievement of National Development Plan III objectives, Vision 2040 and Sustainable Development Goals. Under the IWMDP, funds have been provided for Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP) and Source Protection Plans (SPP).

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Component 1.2 Support to Refugee and Host Communities, this sub component will, with financing from the IDA 18 Refugees Sub-Window, support activities designed to improve the sustainable provision of water supply and sanitation services to refugee settlements and host communities. The sub-component will target the districts of Yumbe, Arua, Moyo (including Obongi district newly created from Moyo), Adjumani in West Nile, Lamwo in Northern and Kiryandongo in Central Uganda, where about 70 percent of the refugees in Uganda are being hosted.

In order to address the water supply and sanitation gap in Kiryandongo District, 3 solar powered piped water supply systems and 10 toilets have been proposed. These water supply and sanitation infrastructure will be implemented as part of the strategy to improve access to clean water, improved sanitation and hygiene in the refugee settlements and host communities.

The main components of the Large Solar piped water systems will include; a production well as a water source, a raw water pumping main to a reservoir, an elevated storage reservoir on a steel tower, Solar Pumps, Solar Panels, chlorine dosing unit, pump motor, pump house, distribution network, and service connections.

2. TERMS OF REFERENCE

We received Instructions from M/S Ministry of Water and Environment to prepare a Valuation Brief advising on the Project Investment Estimate RAP for the proposed project in Nyakabale Rural Growth Centres (RGCs)

3. LIMITING CONDITIONS

This Valuation Brief is subject to the following limiting conditions: -

- i. It is advisable that our approval of the form and context of this Brief Report should be sought if any altered or rephrased part of it is to appear in any published documents or circulars.
- ii. Where it is stated in the report that information has been supplied by another party, this information is believed to be reliable but the we can accept no responsibility if this should prove not to be so. Where information is given without being attributed directly to another party, this information has been obtained by our own search of records and examination of documents or by enquiry from Government or other appropriate departments.
- iii. The responsibility of the firm in connection with this Valuation Brief is limited to **M/S National Environment Management Authority** to whom the Brief is addressed.
- iv. The values in this Brief are for the project described and any allocation of values between parts of the project apply only in the terms of reference and for the purpose of this Brief. The values assessed should not be used in conjunction with any other project, as they may prove incorrect if so used.
- v. This Brief is only valid if in original and without alteration and signed and sealed by us. We do not guarantee the validity or authenticity of any copies that may be presented to by any other person, organization or entity as being made from the original.
- vi. During the preparation of the Brief, we did consider the necessity of relying upon the work of a specialist, specifically an Engineer. The appropriateness and reasonableness of the assumptions and methods used by the specialist Engineer in arriving at some of the project estimates are the responsibility of the specialist. We do accept the specialist's judgment and work in this regard and believe that the specialist's assumptions or methods are unreasonable in the circumstances.

4. GENERAL DESCRIPTION

Nyakabaale RGC in Kigumba Sub County

Nyakabaale Rural Growth Center is located in Kigumba Sub County at coordinates 36N 198746 Northings and 377835 Eastings. The RGC is located approximately 15km off Kampala-Gulu highway at Kigumba Trading Center on the left. Nyakabaale RGC is shared by Mboira Parish and Kiigya Parish. The RGC has roughly 700-1000 households, one primary school with an approximate enrolment of 300 pupils. With an average household size

of 5.1, the proposed community population is between 3,570 -5,100 people. This community has 4 boreholes but only 3 are functional.

5. BASES OF VALUE & VALUATION METHODOLOGY

In arriving at the figure in this valuation brief, we have adopted the following Basis of Value and Methodology as defined by the International Valuation Standards and in accordance with the terms of reference: -

- i. Investment Value. The value of an asset to the owner or a prospective owner given individual investment or operational objectives (may also be known as worth). As a basis of Value, Investment value is an entity-specific basis of value thus reflecting the circumstances and financial objectives of the entity for which the valuation is being produced.

6. VALUATION

In accordance with our terms of engagement and having regard to the contents of this Brief, we certify that the investment cost for the Nyakabaale RGC Solar Power Water Supply and Sanitation System Project in Kiryandongo District is approximated at **UGX 4,850,000,000/- (Four Billion Eight Hundred Fifty Million Ugandan Shillings only)** as detailed in the Engineer's Estimate contained in the Bills of Quantities (BOQ) for this project.

On behalf of
GMT Partners



ALOZIUS GONZA FISURU
REGISTERED VALUER

